

EDUCATION AND ITS EFFECT ON EARNINGS IN GHANA

BY

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DECLARATION

This is to certify that this thesis is the result of research undertaken by John Okletey towards the award of the Master of Philosophy degree in Economics in the Department of Economics,
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ABSTRACT

This thesis focuses on the effect of education on an individual's earnings in Ghana. The Mincer (1974) earnings equation is used in examining the relationship between different educational levels and their effect on earnings in Ghana. The study found that there are positive returns to education in Ghana and as such the earnings of an individual rise as a result of additional years of schooling. The findings of the study was confirmed by a cited research by Palmer (2006), noting that returns to education are lowest at the primary level and that it is at the post-basic level that returns are highest. Thus, the old middle school or JSS level has only marginal impact on returns to investment in education.

Moreover, the empirical results on gender dimension show some disparity between earnings of males and females in Ghana. It was observed from the descriptive statistics that the mean monthly earnings of males are higher than that of females at the secondary and tertiary levels of education in Ghana. However, the private rate of returns obtained from the earnings equation showed a reverse situation where the private rates of return for females are higher than that of males at the primary and secondary levels of education. This was due to the fact that the supply of educated females is scarce as compared with males on the labour market. This finding was confirmed by Schultz (1996), using estimates for Ghana which shows that returns for females at the secondary level is almost as twice as high as males. Furthermore, on sectoral analysis it was observed that the marginal returns to working in the non-agricultural sector are higher than working in the agricultural sector in Ghana.

DEDICATION

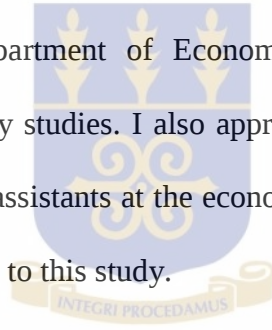
I dedicate this work first and foremost to the Almighty God and my mother Florence Docia Teye and my uncle Mr. Enoch Okletey and all my relatives who have contributed immensely to the success of my education up to this point.



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LIST OF ABBREVIATIONS AND ACRONYMS

BECE	Basic Education Certificate Examination
COTVET	Council for Technical Vocational Education and Training
CSSPS	Computerized School Selection and Placement System
EMIS	Education Management Information System
ERC	Education Review Committee
ERP	Economic Recovery Program
ESACP	Education Sector Adjustment Credit Program
ESPR	Education Sector Performance Report
DFID	Department for International Development
DHS	Demographic and Health Survey
FCUBE	Free Compulsory Universal Basic Education
GEIES	Ghana Education Impact Evaluation Survey
GER	Gross Enrolment Ratio
GES	Ghana Education Service
GETFund	Ghana Education Trust Fund
GLSS	Ghana Living Standard Survey
GoG	Government of Ghana
GIJ	Ghana Institute of Journalism
GIL	Ghana Institute of Languages
GSS	Ghana Statistical Service
ICT	Information and Communication Technology
ILO	International Labour Organization

IMF	International Monetary Fund
IPS	Institute of Professional Studies
ISODEC	Integrated Social Development Centre
JSS	Junior Secondary School
KG	Kindergarten
MDA	Millennium Development Goals
MoESS	Ministry of Education, Science and Sports
MoMYE	Ministry of Manpower, Youth and Employment
NAFTI	National Film and Television Institute
NDC	National Democratic Congress
NCTE	National Council for Tertiary Education
NLC	National Liberation Council
NPP	New Patriotic Party
OECD	Organisation for Economic Co-operation and Development
PNDC	Provisional National Defense Council
SHS	Senior High School
SSS	Senior Secondary School
SSSCE	Senior Secondary School Certificate Examination
TVET	Technical and Vocational Education and Training
UBC	Universal Basic Completion
UCEW	University College of Education Winneba
UDS	University of Development Studies
UNESCO	United Nations Education, Science and Cultural Organization

UNICEF	United Nations Children's Fund
UPC	Universal Primary Completion
URC	University Rationalization Committee
WAEC	West African Examination Council
WBI	World Bank Indicators
WDI	World Development Indicators

CHAPTER ONE

INTRODUCTION

1.0 Background

Education economists and policy makers all over the world are concerned about what determines or what creates education and what impact education has on an individual and the societies and economies in which they live. Historically at the World Bank a great deal of emphasis has been placed on determining outcomes to educational investment. The impact of education on an individual's earnings has been widely acknowledged in the literature. According to Alfred Marshall (1890), the most valuable of all capital is that invested in human beings. Since the beginning of the industrial revolution, literacy and knowledge have become increasingly valuable relative to basic manual skills. This increasing value has led to wage premiums for educated workers. The impact of education on an individual does not only affect the earnings prospects but also the individual's life, economic growth and the likelihood to participate in the labour force. It is quite obvious that a person without basic literacy and numeracy skills is in a very difficult situation to master everyday life and combat poverty as well.

Human capital accumulation is an important determinant of individuals' earning capacity and employment prospects, and therefore plays an important role in determining the level and distribution of income in society (Blondal et al, 2001). Africa experienced a massive growth of enrolment at all levels of education during the 1960s and 1970s. On average for sub-Saharan Africa, gross enrolment rates at the primary level doubled from 40% in 1960 to almost 80% in 1995. At the secondary level enrolment rates increased eightfold, from 3.4% to 27% during the same period (World Bank, 1999). However, even though enrolment has greatly increased in sub-

Saharan Africa over the last decades, the region is still struggling to catch up in terms of average years of schooling (Michaelowa, 2000). Psacharopoulos (1994), in an attempt to arrive at returns to investment in education, estimated the private rate of returns across regional blocks. The study found that the rate of return to education is remarkably higher in sub-Saharan Africa than in any other region of the world, especially for primary education. The reason for this phenomenon is that the cost of education in the developed countries is higher than that of the developing countries. These findings have been cited numerous times and have guided policy makers, most directly by the World Bank (World Bank 1995). To this day, the United Nations and the world's policymakers continue to push for increases in primary education as part of the Millennium Development Goals (MDGs) to provide universal primary education to all children of school going age by the year 2015. This policy direction is focusing on education as a long term strategy in alleviating poverty in sub-Saharan Africa.

Ghana obtained independence in 1957 having one of the best educational systems in the sub-region. However, school quality declined during the 1970s, with low enrolments and shortages of materials (GEIES, 2003). This coincided with a period of extremely poor economic performance. Since then, Ghana's economy has recovered and has grown at an average of 5% per year from 1990-2009 (WDI, 2010). This has been accompanied by a greater than proportional increase in education investment and with education reforms in 1986, 1990, and 1997 (GEIES, 2003). Gross enrolments have risen from 1971 to 2008, from 65% to 105% in primary schooling and from 40% to 55% in secondary schooling (WBI, 2010). Tertiary enrolments have also increased from less than 1% in 1975 to 6% in 2007. Analyst and commentators of Ghana's development history have often compared her with the Asian tigers (i.e. South Korea, Malaysia, Singapore, etc.) and

spoken of how these countries all started on the same economic level. However, the Asian countries have achieved faster economic growth over the last five decades whilst Ghana is still struggling to break through into a middle income status. For instance a country like Singapore which gained independence in 1965, increased from a per capita GDP of US\$400 in 1959 to US\$22,000 in 1999 (Yew, 2000), as against Ghana which had independence in 1957 with a per capita GDP of US\$180.53 in 1960 and increased to US\$411.94 in 1999 (World Bank).

1.1 Problem Statement

The low level of education in Ghana is likely to affect individual's earnings prospect in the labour market. The high number of school dropouts from the primary level up to the tertiary level has been a matter of concern to successive governments. The report of the President's Committee for Education Reforms (2002) highlighted the fact that only 40.0 percent of Junior Secondary School (JSS) graduates proceed to Senior Secondary School (SSS), with only 10.0 percent of SSS students proceeding to tertiary institutions. The gross enrolment ratio stands at 107 percent for primary education, 58 percent for secondary education and 12 percent for tertiary education in 2011 (WBI, 2011). Although enrolment at the primary level in sub-Saharan Africa has increased over the last decades, the continent has not been able to catch up in terms of average years of schooling (Psacharopoulos, 1994).

Furthermore, there is income disparity between earnings of males and females in Ghana. The low level of educational attainment by females compared with their male counterparts is among the major factors that account for women on average earning lower than men in Ghana. The 2010 population census clearly shows that females constitute 52 percent and males form 48 percent of the population (GSS). It is quite interesting to note that of the 31 percent of the adult's

population (i.e. persons aged 15 years and older) who have never been to school, females form 38 percent as against 22 percent for males (GLSS5). These results clearly show that there is high illiteracy rate for females even though they form a higher share of the population and this is likely to affect their earnings prospect on the job market. Moreover, graduate unemployment is also on the ascendency and people are beginning to question the wisdom of investing in education when the jobs are not available for graduates to benefit from their investments in education. Thus, if education is not rewarded by the current employment system, individuals may be discouraged to invest in education. The repercussion of such a phenomenon will further retard the country's growth prospect. In addition, the cost of investment in education has been a major impediment for most households with low income levels. The financial constraint has also prevented individuals from investing in education and as a result dropping out of school. It is in line with these problems that several argument was put forward as to whether education should be free from the primary level up to the secondary level in the 2012 election. In view of the above discussions, there is clear indication that high illiteracy rate, gender and financial constraints are likely to have a significant effect on an individual's earnings in Ghana.

1.2 Research Questions

This study seeks to provide answers to the following questions:

- What is the effect of education on an individual's earnings in Ghana?
- Do the individual's gender and the sector of work affect returns to education?
- To what extent do different levels of education impact on earnings?
- To what extent does the age and experience of an educated individual affect his or her earnings?

1.3 Objectives of the Study

The main objective of this study is to examine the effect of education on an individual's earnings in Ghana. The study will specifically seek to achieve the following objectives:

- Examine the extent to which different levels of education affect earnings.
- Investigate the extent to which the age of an educated individual affects his or her earnings.
- Examine the extent to which differences in gender affects returns to education.
- Find out whether the individual should bear the cost of investment in education.

1.4 Significance of the Study

The budgetary allocation to the education sector has had a significant incremental growth since Ghana obtained independence in 1957. For instance for the year 2011 an amount of GH¢1.98 billion was allocated to the ministry as compared to an amount of GH¢1.73 billion in 2010 (ISODEC-UNICEF Collaboration, 2011). However, despite these huge investments, the rate of return of these investments has been a matter of concern not only to successive governments but the general public as well. That is, in spite of all these huge investments that have gone into education, there is little evidence of growth with regards to externalities to education at the macro level (Olaniyan & Okemakinde, 2008). In the light of these problems, this study will also provide information on private rate of returns to education at the micro level which will further guide policy makers in fashioning appropriate policies for the country. Furthermore, the study will also help address the debate that came up in the 2012 election in Ghana as to whether the individual should bear part of the cost of investments from the primary level up to the secondary level or the government should be fully responsible for the entire cost of investments in

education up to the secondary level. Moreover, this study will add up to knowledge by providing information on marginal returns associated with each level of education in Ghana.

1.5 Limitations and Scope of Study

This study focuses on private returns to investment in education at the micro level, leaving the case for social rate of return at the macro level for another study. The reason for focusing only on private returns is due to the complexities associated with capturing the social returns with respect to externalities to education. Moreover, the study did not take into account the quality of education, innate ability and family background in estimating the returns associated with the various levels of education. Again, the study did not address the reversal causality between education and earnings in the literature. In terms of scope, the study confines to what prevails in Ghana and hence it employs only country specific data and in this particular case, the fifth round of the Ghana Living Standards Surveys (GLSS 5) which was conducted by the Ghana Statistical Service (GSS) in the year 2005/2006.

1.6 Organization of the Study

The study is organized into five main chapters. The first chapter is an introduction to the entire study. Following the present introductory chapter, chapter two gives an overview of Ghana's educational system. The necessary theoretical and empirical literature of the study under consideration is dealt with in chapter three. Chapter four discusses the methodology, estimation of variables and discussion of empirical results. The fifth chapter concludes the thesis and provides policy recommendations based on the findings of the study.

CHAPTER TWO

OVERVIEW OF THE EDUCATION SYSTEM IN GHANA

2.0 Introduction

This chapter presents an overview of the education system in Ghana over the last five decades. The chapter also throws more light on the various reforms the education system in Ghana has gone through since the country obtained independence in 1957. The outline of the chapter comprises of background history of education in Ghana, education reforms in Ghana and the various levels of education in Ghana.

2.1 Background history of education in Ghana

Formal education is an important part of the skill acquisition process and development of the stock of human capital. It contributes to the process of molding attitudinal and developing technical skills (Oduro, 2000). Scholars and stake holders in the educational sector have made various attempts to analyze what determines education and what impact education has on an individuals and society in general. The World Bank (2004) for the past decades have placed a great deal of emphasis on educational development and improvement in human capital by supporting policies aimed at increasing investment in education. The initial attempts to introduce formal education in Ghana were made possible by many European merchants, especially the Danes, Dutch and English with the intention of providing employment for their administrative assistance and soldiers. The Christian missionaries were also linked with the establishment of formal education in Ghana, who realized early that, in order to create an independent native church, they needed to have a staff of well educated local assistants. By 1874 when the British Government assumed colonial authority of the Gold Coast colony, significant progress had been

made in the educational sector and it was still expanding with the majority of the Basel and Wesleyan Mission schools scattered widely over the interior. There were 139 schools by 1881, of which the Basel Mission had 47 schools, the Wesleyans 84, the Bremen Mission 4 and the Roman Catholic Church had 1. However, the government observed that the system of education adopted by the various missions differed widely, and so in 1882, it drew the first plans to guide the development of education. The plan called for the establishment of a General Board of Education (GBE), and for the formation of local boards to study and report on existing conditions. In 1902 Ashanti and the Northern Territories were both annexed to the colony and the country had a favourable economic situation which helped finance the dramatic improvements in the educational sector.

In 1919, Sir Gordon Guggisberg had then assumed the position of new governor of the Gold Coast by then and he also made remarkable contribution to the educational sector in Ghana. Guggisberg set up the '1922 Committee', chaired by the Director of Education, Mr. J.D. Oman, to debate further on education in the Gold Coast. He suggested that the three separate institutions recommended by the 1920 Committee could not be afforded by the Government, and should therefore be combined into one comprehensive institution. The Committee recommended that the site chosen at Achimota, in Accra, should provide general secondary education, teacher training, and technical education for male students. The Prince of Wales College, which later became known as Achimota College, finally opened in 1927, with Rev. Alek Fraser as its first Principal and Dr. Aggrey as its Assistant Vice-Principal. Dr. Aggrey campaigned vigorously for women's education at a time when the idea was not popular, and held the belief that to educate a man was to educate an individual, while educating a woman had more far-reaching benefits to family and

community. This led to an increase in the number of places offered to girls by the College. The training of teachers was a Government priority and by 1933 there were a total of 449 teacher trainees. In 1937, the White Fathers' Mission founded a two-year teacher training college at Navrongo. Furthermore, the University College of the Gold Coast, which had its roots in Achimota College, and was established as an independent body in 1948, later moved to a separate campus in Legon and is known today as the University of Ghana. The total number of primary and secondary schools reached 3,000 in 1950 with an enrolment of 280,960 boys and girls. The number of people in school constituted 6.6% of the population of 4.2 million. The government policies and strategies for education in 1957 were aimed in achieving three objectives. First it was to be used as a tool for producing a scientifically literate population. Secondly, for tackling mainly the environmental causes of low productivity; and thirdly, for producing knowledge to harness Ghana's economic potential. Investments were then channeled into the whole system of education, from primary to tertiary education with the aim of fulfilling these aspirations and goals.

Furthermore, the government initiated the Education Act in 1961 (Act 87), aimed at achieving Free Universal Primary Education. The Act endorsed the two-tier system of education as instituted by the British in colonial times, namely primary and middle education, and secondary education. Three main issues can be highlighted from the Act;

First, the Act established Local Education Authorities within Local Authorities and entrusted them with the responsibility, among other things, to:

- Build, equip and maintain all public primary and middle schools in their areas; and

- Establish all such public primary, middle and special schools as are, in the opinion of the Minister, after consultation with the Minister responsible for Local Government.

The second important feature of the 1961 Act was the fact that it made education compulsory. For instance, Section 2(1) states that: "Every child who has attained the school-going age as determined by the Minister shall attend a course of instruction as laid down by the Minister in a school recognized for the purpose by the Minister." The third important feature of the Act emphasized for the provision of free education. Section 20(2) stipulated: "No fee, other than the payment for the provision of essential books or stationery or materials required by pupils for use in practical work, shall be charged in respect of tuition at a public primary, middle or special school." The 1961 Act resulted in policies aimed at expanding access to education at all levels (see Table 2.1), and in just a matter of a few years after independence, Ghana had an education system that could be described as one of the most respected in Africa (World Bank 2004).

Table 2.1: Rapid expansion of access to education (1951-1966)

Level	1951		1966	
	Schools	Students	Schools	Students
Primary	1083	153,360	8144	1,137,495
Middle	539	66,175	2277	267,434
Secondary	13	5033	105	42,111
Teacher Training	22	1916	83	15,144
Technical	5	622	11	4956
University	2	208	3	4291

Source: Hayford, B.K, 1988

The government was overthrown in 1966 by the National Liberation Council and this gave birth to a new set of educational reforms. The military government, appointed an Education Review Committee (ERC) to examine the problems arising out of the educational system at that time and also to make recommendation for improvement. The Review Committee's proposals covered a wide range of issues concerning education from primary to the university. The structural recommendations by the committee included the following;

- The school-going age should be six years.
- Elementary education should have a duration of ten years with a break at the end of the eighth year for selecting those suitable for secondary education.
- After this selection, the remaining middle school pupils should complete their elementary education by attending for two years pre-vocational continuation classes where these are available; otherwise the pupils should continue the study of the ordinary school subjects for the two remaining years.
- Two-year pre-vocational continuation classes patterned on the industrial and farming needs of the country should be established in two middle schools of each region to serve as a pilot scheme.
- The secondary school courses should have a duration of five years, at the end of which suitable pupils may proceed to a two year sixth form course.
- The first-degree course at the university should be of three years' duration (four years or more for specialized courses).

The Committee also proposed a long term objective where the six-year primary school course, will be followed by four years to secondary school education with two years of sixth form work leading to a three-year university degree. Embedded in the long-term plan, pupils who could not

enter secondary school after the primary school course would have to attend continuation classes for four years.

Ghana witness yet another coup d'état in 1972 and this led to the development of elaborate programme for education from kindergarten through primary and Junior Secondary School to Senior Secondary School. The new structure and content of education for Ghana were stipulated in the Dzobo Review Committee in 1974. The new reform introduced the Junior Secondary school concept to teach academic and practical skills to all pupils. In the early seventies to the mid eighties, Ghana experienced a serious national economic decline which affected all social sectors. The economic constraints that faced the country in the late 1970s, made it virtually impossible for the implementation of the new JSS system. By 1983 the education system was in such a crisis that it became necessary for a serious attempt to be made to salvage it. In the early 1980s, Ghana with the support of development partners (i.e. World Bank, IMF, DFID, etc) embarked on a number of Economic Recovery Programs (ERP), to salvage the economy decline and the educational sector.

In an attempt to put the educational sector on track, the Education Sector Adjustment Credit Program (ESACP) ensured that the review of the Dzobo Report was undertaken by the Evans Anfrom Committee in 1986. The proposal was finally implemented in 1987. The 1987 education reforms abolished the old middle schools (four years), and replaced it with three years junior secondary school, and reduced senior secondary school from seven to four years and primary and junior secondary school was combined to become basic education.

The government between 1992 and 2000 also made significant contribution to the education sector in Ghana. Subsequent to the new structure of education, the government commences an educational sector policy in 1996 known as ‘Free Compulsory Universal Basic Education (FCUBE)’. The main objective of the FCUBE policy was to ensure that all school children receive free compulsory quality primary education by 2005. Against this backdrop and other considerations the FCUBE also aimed at improving teaching processes and learning outcomes; build capacity to manage the basic education; and improve access to basic education, particularly for girls and vulnerable groups in society. Again, the government in 2007 set up a committee to review the education system in Ghana. The committee was chaired by Pro. J. Anamuah-Mensah. The committee was tasked with reviewing the entire educational system in the country with the view of making it responsive to current challenges.

In order to address concerns with Senior Secondary Schools with regards to quality and increasing the number of students who pass the SSCE a number of programs were put in place. Some of the programs put in place to improve the education system were as follows; extending the Senior Secondary School from three years to four years, the implementation of the capitation grant and the school feeding program at the basic level. In conclusion, it is quite interesting to note that over the last five decades Ghana’s education system has gone through remarkable transformation with a great deal of success. However, each reform under the various regimes also came along with new challenges as well and the way forward is to ensure that the government put in place a kind of education system to produce the kind of human resource that is required by the various industries as the country aspire to attain a full middle income status by the year 2020.

2.2 Educational reforms in Ghana

Ghana's record of educational reforms dates back several decades, to the period before the attainment of full political independence in 1957. The earliest recorded evidence on education reform was in 1908, followed by the Ten –Year Development Plan initiated by Guggisberg in 1920. Education reform is described as a formal implementation of changes in the philosophy of education and institutional techniques (Microsoft Encarta 2008). Ghana has witness several reforms under different political regimes and the next section focus much attention on these reforms.

2.2.1 Educational reforms: The period 1951-1987

Before independence, various interventions on education were implemented to reform Ghana's education system. The government in 1951 implemented an Accelerated Development Plan of Education to rapidly expand recruitment into elementary and secondary education. The Seven-years Development Plan (1963-1970) and further education reforms were proposed with the objective, among other things, of making secondary schooling free to all Ghanaians. Broadly, the Plan proposed changes that were to feature, in various forms, in subsequent education reforms by successive governments. For example, the Plan proposed that “education policy must concern itself with the teaching of skills and other attainments that are needed for the running of a modern economy.” In this regard, the “pattern of education” was also to be altered substantially to adequately address the demands of a modernizing economy. This implies that the duration of elementary school, which had been introduced in the 1952 reform to replace “upper primary school”, was to be reduced from ten to eight years. Other areas receiving attention under the plan were: Continuing education; secondary and secondary technical schools; teacher training;

technical education; clerical and commercial education; university education; adult education; and education research. The Dzobo Review Committee of 1974 introduced the concept of "comprehensive" Junior Secondary Schools to teach academic and practical skills to all pupils. Among other things, the Dzobo committee made the following observations, summarized below;

- The common entrance as a selection mechanism for secondary school, taken at an early age, discriminated against the many pupils who needed more time to find their levels in life.
- The many pupils who fail to enter secondary schools did not have the opportunity to develop their minds and were therefore disadvantaged in life.
- Undue emphasis on mental work inadvertently fostered the development of unhealthy attitudes towards manual work and occupations of non-academic kind.
- Under the existing system, it took 15-17 years to complete pre-university education, whereas in industrialized countries, such as the USA, it occupied 12-13 years.

On the basis of the Committee's report, the government in 1974 issued a white paper, which captured the title '*New Structure and Content of Education for Ghana*'. The report fixed pre-university education at 13 years, down from 17, by eliminating middle schools and introducing the junior and senior secondary school system as follows:

- 6 years primary school
- 3 years junior secondary school
- 2 years senior secondary school - lower, and
- 2 years senior secondary school – upper.

The 1974 reform was then followed by the 1987 education reform which introduced the Junior Secondary School and Senior Secondary School (JSS & SSS) concept. In summary, the 1987 reforms sought to achieve the following broad objectives:

- Reduce the number of years in pre-tertiary education from 17 to 12 years by turning the 4-year middle into a 3-year junior secondary school and collapsing the 7-year Ordinary and Advanced level secondary school into 3-year Senior Secondary Schools, all in addition to the 6 years of primary schools.
- Increase access and thus enrolment.
- Improve teaching and learning by increasing school hours – as well as the school term and replacing untrained (or “pupil” teachers) with trained ones over time.
- Increase “cost recovery” at the secondary and tertiary levels by, among other things, abolishing food subsidies at boarding schools and charging tertiary students a part of the cost of their education, including accommodation expenses.
- Make education planning and management more effective.

As a result of the reforms, the Junior Secondary School structure was put in place nationwide. This meant that the 6 years of primary school and 3 years of Junior Secondary School were consolidated into a uniform and continuous 9-year free and compulsory basic education. The reforms also brought about revisions in syllabuses and provision of educational resources ranging from infrastructure such as classroom blocks and libraries and text books and technical skills equipment were also provided. The number of Senior Secondary Schools was also increased to absorb the expected increases in enrolment. All these reforms in away strengthen

Ghana's education system not withstanding a number of challenges that came along with these reforms.

2.2.2 Educational reforms: A More social approach (1987- 2007)

The problems that the educational sector faced prior to 1987 with respect to access, quality and infrastructure, the government which had come to power through a military coup d'état turned to the World Bank for assistance to reform basic education as part of economic reforms (World Bank 2004). In 1992 the government commenced an education sector policy in 1996 known as "Free Compulsory Universal Basic Education (FCUBE). The main objective of the FCUBE Programme was to provide an opportunity for every child of school-going age in Ghana to receive good quality basic education by the year 2005 as part of fulfilling the Millennium Development Goals (MDGs).

The FCUBE was aimed at achieving the following objectives:

- Improving access and reducing the low enrolment rates at the primary and junior levels especially for girls.
- Improving teaching processes and learning outcomes.
- Strengthening management at both the Central and the District levels.
- Intensifying community involvement in education decentralization.

The scope of the strategic objectives of the FCUBE were later extended in 1997 to include the following; improving access to science and technology education, training and ensuring the relevance of education to the manpower needs of the country and improving operations of a self sustaining functional literacy programme.

2.2.3 New reforms: Education review of 2007

The government instated a 29-member Committee on 17th January, 2002 which was chaired by Prof. J. Anamuah-Mensah. The committee was tasked with the responsibility of reviewing the entire education system in the country with the view to making it more responsive to current challenges. For instance, they addressed the issue of the eventual upgrading of teacher training into the tertiary education system and the continuous reduction of trained teachers from basic schools. In addition, the reform was initiated for formation of human capital for industrial growth and for ensuring competitiveness in the global economy. The Committee recommended that there should be a change of three years Secondary School to four years Senior High School to ensure that students have sufficient time to prepare for their final exams (WASSCE) and also to address the issue of quality.

Ghana launched the new education reforms in September 2007. However, the program faced a number of problems at the implementation stage. For example, there were delays in the supply of syllabuses and textbooks for the smooth take off of the program, teachers were not adequately prepared in terms of training to implement the reforms and there were inadequate classrooms and other facilities as students proceeded to the fourth year of the Senior High School (SHS) in September 2010. Secondary and Technical & Vocational Education and Training (TVET) were both prioritized in the reform plans. There was a new determination to restructure pre-tertiary education provision so that it focused on preparing all secondary students either for entry into tertiary institution or the job market through apprenticeship training in the private sector (MOESS, 2007). The reform aimed at ensuring 100 percent access to basic education and set the target date for achieving universal basic school completion at 2015 and 2020 for all Junior

Secondary Schools students to benefit from secondary education. The basic school system will then consist of 2 years of kindergarten, 6 years of primary education and 3 years of Junior High School (JHS). In August 2009, the government revert the 4 years SHS to 3 years due to the challenges the four years system posed to the government. However, the Technical and Vocational Education and Training (TVET) which was part of the secondary cycle schools remained at 4 years.

2.3 The system of education in Ghana

The education system from the time of independence in 1957 operated under the British system. In 1987 the country embarked upon an educational reform that gradually replaced the British based O-Level and A-Level system with the Junior Secondary School and Senior Secondary school system. The structure of the education system before the reforms was such that it takes 17 years to complete pre-tertiary education. The education system was then 6-4-7, where an individual spends 6 years at primary, 4 years at middle school and 7 years of secondary education. The reforms replaced the three-track system with a one-track system and this ensured that all children of school going-age have a continuous 9 years of basic education, where a student spends 6 years at the primary level and 3 years at Junior High School (JHS). Ghana currently operates a 2-6-3-3-4 education system. The structure consist 2 years of kindergarten, 6 years of primary education, 3 years Junior High School (JHS), 3 years Senior High School (SHS) and 4 or more years of tertiary education depending on the subject of study.

2.4 Basic Education

Ghana's history of education policy reforms has given a top priority to basic education. The policy reforms have classified basic education to comprise two years of kindergarten, 6 years of primary school and 3 years of Junior High School (JHS). The introduction of the 2 years of kindergarten education is to ensure that pre-school education which plays a crucial role in the formative years of the child, progressively become part of the universal, free and compulsory basic education structure. The number of kindergarten schools has increased from 14,246 in 2006/07 to 15,449 in 2007/08 and the increase from 2004/05 to 2007/08 is 120% (MOESS, 2008)

Table 2.2: Number of primary schools (2004-2008)

Type of Education	2004/05	2005/06	2006/07	2007/08
Public	12,406	12,427	13,093	13,247
Private	3,622	2,990	3,810	4,068
Total	16,028	15,417	16,903	17,315

Source: MOESS, 2008

The reason for such a great increase over the years is primarily due to government's policy that each primary school should have a kindergarten attached to it. The government's policy which indicates that every basic school should have a KG has encouraged crèches and nurseries to be converted into kindergartens in order to partially take advantage of the capitation grant that is provided for KG students. The number of primary schools also increased from 16,903 in 2006/07 to 17,315 in 2007/08 (see Table 2.2) and the increase from 2004/05 to 2007/08 is only 8% (MOESS, 2008). Again, gross enrolment ratio also increased significantly since 2003/04, with

the biggest increase occurring between 2006/07 and 2007/08. For instance, gross enrolment ratio for primary school was 93.7% in 2006/07 and 95.2% in 2007/08 (MOESS, 2008). In addition, the number of schools at the primary level for both public and private schools increased significantly over the period under consideration (see Table 2.2).

Furthermore, the primary completion rate also appears to be increasing steadily. For instance, the completion rate was 85.4% in 2006/07 and 88% in 2007/08 respectively (MOESS, 2008). On another note, the number of Junior High Schools (JHS) also increased considerably over the years. The increase, however, is higher in the private sector than the public sector. This could be due to the increased number of private schools that are covered by the Education Management and Information System (EMIS) census. For example, between the period 2006/07 and 2007/08 the number of schools at the JHS level stands at 9,334 and 9,507 respectively. The Gross Enrolment Rate (GER) at the Junior High School also increased from 77.4 in 2006/07 to 78.8 in 2007/08 (MOESS, 2008). Moreover, the completion rate stands at 67.7% in 2007/08 which falls below a target of 100 percent set by the government for a period of four years. In order to meet the target of Universal Basic Completion (UBC) by 2015, enrolment projections made by the Ministry of Education (MOE) planning unit show that public JHS enrolment levels would have to rise from about 1,040,000 in 2005/06 to 1,951,000 in 2015/16. The demand for teachers will also rise from a projection of 34,000 to 63,000 within the same period.

2.5 Secondary Education

Secondary school education is universally considered to be an unavoidable path to providing teachers for basic schools and training the highly skilled manpower. The number of Senior High

Schools increased dramatically between 2005/06 and 2006/07. This was mainly due to increased coverage in the Education Census for 2007 and not due to the fact that a large number of schools opened. For instance, the number of Senior High Schools increased from 492 in 2005/06 to 700 in 2006/07 year (MOESS, 2008). Furthermore, enrolment in Senior High has increased overall, but inconsistently. There was a small drop between 2003/04 and 2005/06 as well as a more significant drop between 2006/07 and 2007/08. The Gross Enrolment Rate (GER) increased slightly from 26.6% in 2003/04 to 29.1% in 2005/06. However, it dropped from 35.8% in 2006/07 to 32.2% in 2007/08 year (MOESS, 2008). The percentage of trained teachers at the SSS level was 77.6 percent, somewhat higher than the 70.7 percent that existed at the JSS level, but still considerably lower than optimal. The pupil-teacher ratio was 22:1 and lower than 25:1, which is the standard. The low pupil teacher ratios reflect the low rates of enrolment as well as the sizeable number of under-enrolled schools in the system.

In terms of gender equity, the percentage of girls in secondary schools was 43.1 percent, with private schools having a much higher percentage (55.0 per cent) than the public schools which stands at 42.1 percent (Thompson & Hayford, 2008). A World Bank report in 1998 found a “high rate of return to SSS” education, compared to the “relatively low rates of return on JSS education”. Palmer (2006) cited research confirmed this view, noting that “returns to education are lowest at primary level and that it is at the post-basic level that returns are now highest, the old middle school education (or JSS) level has only a marginal impact.” Furthermore, the traditional boarding schools located mostly in the cities and towns have better infrastructural facilities than the community day secondary schools found mainly in the rural areas. Also, the traditional schools tend to attract more qualified teachers than the community schools. At the

SHS level the core subjects are follows; English language, mathematics, integrated science, social studies and ICT. In addition to the core subjects at the Senior High Schools, government has also ensured that every student is offered an opportunity that enables him or her to choose one of the course programmes either in agriculture, technical, vocational and general education. The government position on Senior High School is that the Senior High School system will be of four years' duration and will offer opportunities for students to receive further pre-tertiary education or skills training backed up by formal instruction such as in sandwich courses. The new structure and content of the Senior High School instruction should adequately prepare students to enter university or polytechnic institutions and other institutions at globally competitive standards. Generally, secondary education is faced with the challenge of providing equitable and meaningful access so that dropout rate reduces significantly and to improve learning as well. An additional challenge is the rising cost of secondary education to both government and parents and the repercussion of this situation is likely to affect the growth potential of secondary school enrolment.

2.5.1 Technical and Vocational Education

The demand for post basic education and training opportunities has pushed policy makers and politicians to respond to this demand by proposing dramatically increased support to post-basic levels education, including technical and vocational education and training (TVET). The history of education development in Ghana suggests that TVET development plans face two main challenges. First, ensuring that sustainable capital and recurrent investment is available to ensure systematic growth and secondly, monitoring the quality of implementation especially the extent to which relevant institutions and structures can be readied to assume new roles and

responsibilities. Formal TVET in Ghana, as in other developing countries, is largely orientated towards formal rather than informal employment. Pre-employment institution-based training finds it hard to connect with industry, to arrange staff and trainee industrial placements, and to get industry representation on institution boards. In total there are about 190 public training institutions training approximately 50,000 youth; and about 20,000 of these trainees are to be found in the 26 Ministry of Education Science and Sports (MOESS) Technical Training Institutes (averaging about 800 trainees per institute); the remaining approximately 164 public training institutions have an average enrolment of less than 200. The newly established Council for Technical and Vocational Education and Training (COTVET) is more promising, but still has to deal with the great challenge of harmonizing the efforts of the two main ministries delivering skills training (i.e. MOESS and the MOMYE).

The 2006/07 Education Management Information System (EMIS) data reports that there were 252 registered private institutions training about 21,000 trainees (an average of about 80 trainees per institute) which falls below the average enrolment level in public institutes. The number of TVET institutions for both private and public institution increased from 258 in 2006/07 to 273 in 2007/08 (see Table 2.3 for details).

From Table 2.3, there is clear indication that the number of private TVET institutions is slightly higher than that of public TVET institutions. Also, enrolment levels in the 26 Technical Training Institutes (TTIs) in 2006/07 were almost the same as in 2001/02, at around 18,000 trainees. Whiles there have been some fluctuations over these periods, enrolment targets were not met in 2005/06 and 2006/07 due to the lack of interest in the selection of technical vocational courses

by lower secondary (JHS) graduates and their parent/guardians. As a way of improving enrolment in Technical Institutes, the Technical and Vocational Education Division in collaboration with West African Examinations Council and Computerised School Selection and Placement System (CSSPS) have introduced a new scan-able form for Technical Institutes separate from that of Senior Secondary Schools. It is hoped this will provide better information on technical institutes, thereby increasing enrolment.

Table 2.3: Number of TVET Institutions

TYPE OF EDUCATION	NUMBER OF TVET INSTITUTIONS		
	2006/2007	2007/2008	% CHANGE
Public	129	130	0.8
Private	129	143	10.9
Total	258	273	5.8

Source: MOESS, 2008

2.6 Tertiary Education

Tertiary education in Ghana since the early nineties has had an impressive incremental growth over the last two decades. The tertiary level of education in Ghana currently comprises of the training colleges, polytechnics, universities and specialized institutes of journalism and other professional studies. In Ghana, tertiary education is provided in both public and private institutions.

Currently there are 9 universities within the public sector which comprises; University of Ghana, University of Cape-Coast , Kwame Nkrumah University of Science and Technology, University College of Education Winneba, University of Development Studies at Tamale, University of Mines and Technology at Tarkwa, University of Health & Allied Sciences in the Volta region, University of Energy and Natural Resources in Brong Ahafo region and University of Professional Studies, formally known as IPS at Legon. The two new Universities (Energy and Natural Resources & University of Health And Allied Sciences) were set up by Pro. John Evan Atta Mills on 7th February, 2012 and they are expected to start admission for the period 2012/2013 academic year.

The second public sub-sector is comprised of 10 polytechnics, one in each region and there are also other professional institutes as well. Tertiary enrolment has increased significantly since the nineties. For instance, total enrolments increased tenfold from 10,000 in 1990 and close to 100,000 in 2008. The period 1990-2004, the average annual growth rate reached 18 % for all tertiary institutions combined and 16 % for universities (MOESS, 2008). Enrolment at the polytechnics have also increased significantly, however, the increased is more towards business related programmes and not in science and technology programmes. Addae-Mensah and Asare (2005) lamented the fact that “educational institutions, including those set up to promote science and technology education, are drifting away from the national norm of 60:40 science and humanities.’ There are other public degree awarding or professional institutions at the tertiary level. Six other institutions have recently become part of the public tertiary sector: The Ghana Institute of Journalism (GIJ), The National Film and Television Institute (NAFTI), Ghana Institute of Management and Public Administration (GIMPA), Ghana Armed Forces Command

and Staff College, Institute of Local government and Kofi- Annan International Peace Keeping Training Centre (KAIPTC). The Ghana Institute of Languages (GIL) provides specialized programmes and enrolls a small number of students. The GIL provides professional training for interpreters and translators in various languages.

The Government endorsed the tertiary status for some of these institutions in the White Paper on “The Report of The Education Reform Review Committee” of 2002 (Anamuah-Mensah Committee) and some of them also got accreditation by the National Accreditation board as at December 2012. The private tertiary institutions have also contributed immensely to tertiary education in Ghana. The percentage enrolment in private universities has shot up from 4% to almost 20% from the period 2004-2008 (MOESS, 2008). This is due to the current trend in the opening of private universities in the country. It seems obvious in the Ghanaian case that the rapid increase in tertiary enrolments is more driven by a strong demand for higher education from families, than by the requirements of the labour market. Despite the rapid growth in the number of private tertiary institutions, the private sector accounts for less than 5% of total enrolment at the tertiary level.

The government in 1991 set up the University Rationalization Committee (URC) to review post-secondary education in the country. The URC Report formed the basis for the Government White Paper on the ‘Reform to the Tertiary Education System’. The 1991 White Paper on tertiary reforms had its objectives in the following areas:

- The establishment of an integrated tertiary education system comprising all post-secondary pre-service training institutions.

- Establishing a sustainable system of financing;
- Expanding access to tertiary education including improved gender balance;
- Making tertiary education more cost –effective and relevant; and
- Ensuring appropriate balance between science/technology and the social science/humanities in relation to national needs.

The University College of Education Winneba (UCEW) and the University for Development Studies (UDS) in Tamale were part of the reform of increasing access to tertiary education. The National Council for Tertiary Education (NCTE) was established in 1993 to be responsible for tertiary education. The polytechnics which were under Ghana Education Service (GES) as second cycle institutions were upgraded to tertiary status in 1992. They still however continue to provide non-tertiary programmes. In contrast with universities, which tend to be more academic in nature, polytechnics prepare students for practically oriented middle-level professions. Ghana has also managed a relatively successful diversification of funding for tertiary education.

GETFund has come to support infrastructure developments in education and a student loan scheme has been instituted. State universities are increasingly engaging in income generating activities to supplement government subvention. But even with these innovations in funding, the tertiary sector continues to consume a substantial share of education expenditure compared to other education sectors. Whilst government spending on both primary and secondary education has been falling, that of tertiary education has increased from 14 percent in 2003 to 23 percent in 2006. The unit cost of tertiary education is about three times that of the unit cost of TVET, and about 12 times the unit cost of primary education (MOESS, 2007). According to the Ministry of

Education, university enrolment rates were already 55.0 per cent higher than planned for by 2005. The Gross Enrolment Ratio (GRE) for tertiary education stands at 0.97 percent in 1991 and 12.1 percent in 2011 (WBI, 2012). This clearly shows that enrolment continues to expand at a rapidly fast pace for tertiary education in Ghana since the early nineties to the year 2011.

2.6.1 The way forward for education in Ghana

The education system in Ghana over the last five decades has chocked some remarkable achievements through several reforms. However, a lot more have to be done to ensure that Ghana take advantage of the information age to learn from the Asian tigers how they have been able to produce the kind of human resource to become a third world country today even though Ghana attained independence at similar time periods with these countries. Today, access to all levels of education has improved significantly, but there are still old and new challenges that would require different approaches to make the interaction of education and economic growth mutually beneficial for accelerated development.

The goal of universal access to primary quality education cannot be achieved through the linear expansion of existing public schools system alone. The government has to look at alternative policy options to ensure that the last 10% enroll in primary education in order to achieve the Universal Primary Completion (UPC) in 2015. For basic education, policy should be aimed at motivating and increasing the supply of teachers. Major incentives for teachers in the rural schools such as the provision of good housing with running water and electricity must be addressed to improve academic performance from both students and teachers. Unless this is done the large majority of children living in rural areas will continue to receive poor quality education.

Ghana's education system after independence in 1957, has made significant strides, but now needs investments that can improve quality; provide equitable access for the disadvantaged; especially poor households and girls; strengthen decentralization of education services; improve teachers' work and living conditions particularly in rural areas; strengthen public-private sector partnerships in education service delivery; reduce overall recurrent spending on tertiary education and increase investment in science and technology related programmes in universities, research institutions and polytechnics.

It is in line with these concerns that the government in the 2012 election promised building 200 new secondary schools and 10 new polytechnics in addressing access to education at the secondary and tertiary levels. For the first time in many years, Ghana's economy is showing signs of consistent growth under an increasingly stable macro-economic environment. This offers some real opportunities to use educational growth to accelerate economic development as happened with the East Asian economies, where secondary education development became more closely linked to economic growth and emerging labour market needs (World Bank 2007).

CHAPTER THREE

LITERATURE REVIEW

3.0 Introduction

This chapter reviews literature relevant to this study. It starts with a theoretical literature review on education and its effects on earnings. It is then followed by a review of empirical works on education and its relationship with earnings. The chapter also highlights literature pertaining to externalities and other indirect effects of education on earnings.

3.1 A Review of Relevant Theoretical Literature

3.1.1 The Human Capital Theory

The economic theories of education form an aspect of human capital investment. However, since the overall health of workers also affects productivity, investments in medical care are sometimes considered as a form of human capital investment. This thesis focuses on the relationship between educational attainment and earnings and as such its focus will be on education under the human capital theory even though health can also be considered as an aspect of human capital theory. The human capital theory and screening hypothesis are the two elementary, competitive and complementary theories in economics of education. They both try to explain the relationship between education and earnings.

The economic prosperity of a nation depends on its physical and human capital stock. Most economists assert that it is the human resources of a nation and not its physical capital nor its material resources that ultimately determine the character and pace of its economic and social development (Olaniyan, 2008). This is a typical situation that sub-Saharan African countries have

been struggling with over the last five decades since independence. In general terms, human capital represents the investment people make in themselves that enhance their economic productivity. The human capital model was propounded by Schultz (1962) and developed extensively by Becker (1964). The human capital theory posits that education directly augments individual skills and the ability to profit in the labour market (Groot & Hartog, 1981). The human capital theory holds the view that education or training raises the productivity of workers by imparting useful knowledge and skills which raises workers future income by raising their earnings (Becker, 1964). Human capital investments involve an initial cost which the individual or firm hopes to gain a return on in the future. Thus an individual will invest in human capital when the expected return from the investment is greater than the cost or the market rate of interest. The work of Schultz (1971), Sakamota & Powers (1995), and Psacharopoulos & Woodhall (1977) concluded that human capital is based on the assumption that formal education is highly instrumental and is likely to affect the production capacity of a nation. Thus an educated population is a productive population (Olaniyan & Okemakinde, 2008).

3.1.2 The Screening Model

The screening theory refers to a range of theories that challenge the human capital assumption of the productivity-augmenting role of education (Groot & Hartog, 1981). In this model, individuals make rational decisions on schooling just like the human capital theory. The screening model largely rejects the idea that education leads to higher productivity. According to this model, there are people who are productive and capable and there are those who are not. Those who are able to succeed at higher education signal the fact that they are part of the productive group, even if that education has not given them any skills particularly useful in the workforce. In this view,

education is a way of improving how good a prospect you appear to be when evaluated by a firm. In contrast to the human capital theory, the screening hypothesis assumes that the capacity for productivity is innate and that education can rarely enhance individual productivity. Instead, the economic function of education is to screen out individuals with the capacity for higher productivity so that employers and society can assign individuals to tasks and match people to work (Fengliang, Xiaohao & Morgan, 2009). One of the underlying assumptions of this model is that wages are solely determined by observable characteristics such as qualifications. The model also assumes that the more able have an absolute advantage in all jobs over the less able (Stiglitz, 1975). Stiglitz (1975) asserts that education identifies the productive traits of individuals and as such returns to schooling vary with innate capabilities.

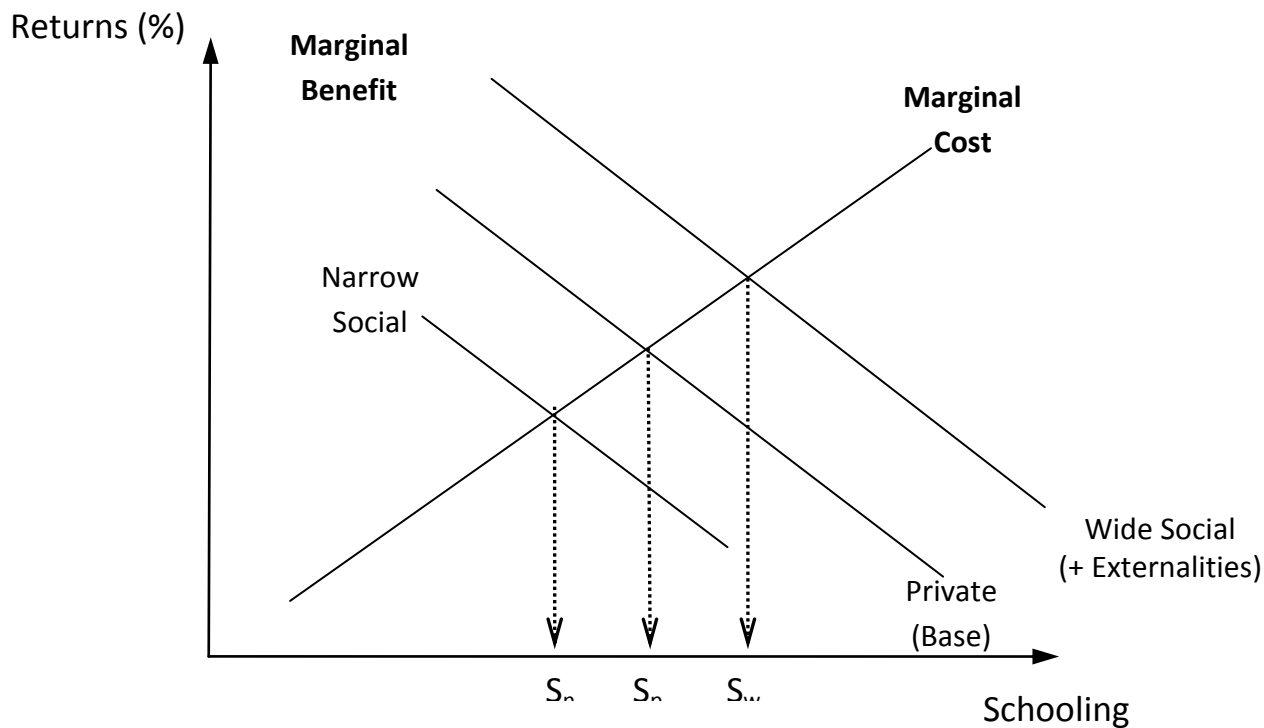
3.2 Diminishing returns on investment in education

The returns on investment in education declines over time just like physical capital and land. The individual's internal rate of return is seen to decline over successive years of formal education. This is because individuals have a fixed amount of time available to them, and the more years spent in education the less time spent in the workforce. In general, the more years invested in an individual's education, the fewer available for the realization of incremental income and consequently the lower the rate of return. The diminishing rate of return is also marginally lower due to the increased direct and indirect costs. The direct costs increase with further investment in education, as additional years of schooling typically cost more. The indirect costs on the other hand, in the form of foregone earnings, also increase with additional education. Another reason for this phenomenon is that the opportunity costs of an individual's time will also be increased by the acquisition of higher qualifications and therefore this factor also increases the cost of

undertaking further study. For instance, an individual will have to forgo higher earnings in order to pursue a doctoral degree than, they were giving up to study their initial bachelor's degree.

3.3 Returns to education

The returns to investment in education in the human capital model have been estimated since the late 1950s. The rise in earning inequality experienced during the late 1980s and 1990s in many countries led to renewed interest in estimates of returns to schooling over the years (Psacharopoulos & Patrinos, 2004). The returns to schooling can be categorized into private and social returns. The private returns deals with the monetary earnings received by the individual. The earnings of the individual who undertakes this investment doesn't capture the external benefits that accrue to society as a whole. On the other hand, the benefit to society in terms of additional education is assessed on the basis of social rates of returns. The social rates of return reflect the costs and benefits to society of investment in education. The social cost comprises the opportunity cost of people not participating in the production of output including the cost of providing the education. The social benefit comprises increased productivity enjoyed by society due to investment in education. Private rates of return are used to explain the behaviour of individuals in seeking different levels and types of education, whereas social returns are used to formulate educational policies regarding the expansion, or contraction of different levels and types of education (Psacharopoulos & Patrinos, 2004). In the literature the private returns are higher than the social returns. This is because of the public subsidization of education and the fact that the social rates of return estimates do not include social benefits due to the difficulty involved in capturing the externalities associated with education. Thus social returns are under estimated compared with the private returns.

Figure 3.1: Private and Social Optimum Levels of Schooling

Source: Psacharopoulos & Patrinos, 2004.

From Figure 3.1 above, S_p represents the private optimum number of years of schooling which shows an overinvestment in schooling according to the narrow social returns (S_n equilibrium), but an underinvestment according to the wide social returns (S_w equilibrium). The narrow social returns represent a private rate adjusted for the full cost of schooling which does not capture the benefit that accrues to society. On the other hand, the wide social returns include externalities. That is, benefits beyond those captured by the individual investor.

3.3.1 Private rate of return to education

The link between education and increased individual earnings is very well documented in the literature. The private rate of return for a bachelor's degree relative to the completion of high school is generally estimated to be somewhere between 10% and 15% in Australia (Fox et al, 2001). This suggests that higher education is a profitable investment. There is also evidence that the private rate of return was about 5 percentage points higher than the social rate of return. However this gap appears to have narrowed or even closed in recent years, given that individuals are now required to bear a greater proportion of the cost of their education. The private rate of return to higher education appears to have fallen slightly in the 1970s and 1980s. This may be because the greater accessibility of university places has meant that the supply of graduates has increased faster than the demand for graduates (Fox et al, 2001).

Psacharopoulos (1994) sampled data across different countries around the world which indicated that women's returns to schooling appear to be slightly higher than that of men. The average rate of return for men is 11.3% and that for females is about 1.3 percentage points higher. In the same direction, a study by Schultz (1996) using estimates for Ghana shows that at the secondary level females' rate of return appears to be almost twice as high as males'. On another note, the demand for educated labour obviously influences private returns to education as well. In order to obtain estimates of the supply effect, Mwabu & Schultz (2000) selected a specific situation where supply of education varies independently of demand. The scope of their study was in South Africa during the apartheid system, where the government at that time rationed the access to education for political reasons. The findings of the study clearly shows that returns to an additional year of schooling was considerably higher for blacks than for whites due to relative

scarcity of skilled black labour as compared with the relatively abundance of skilled white labour. Moreover, the observed trend in relation to supply and demand of skilled labour in many African countries suggest that in recent years, the estimates of private returns to education is lower compared with the estimates found by Psacharopoulos in earlier studies (Hussain, Moyo & Oshikoya, 2000). The reason for such a phenomenon is due to the fact that in early years after independence, there was a strong demand for skilled labour to fill the posts left by the colonial masters. The supply of labour with secondary school attainment and above was extremely limited. However, as enrolment increased the supply of labour rose considerably in the next decades while private sector demand did not rise at the same pace.

Furthermore, the quality of education also affects earnings and returns to education. In Kenya, Armitage & Sobot (1989), considered the effect of quality in terms of student-teacher ratio. They found that private returns to secondary education were remarkably higher for children who attend government secondary schools than those who attend private schools. However, this assertion may not be true for other African countries where government schools are overcrowded and student-teacher ratios are very high. Behrman et al (2002) also examined the impact of school quality on earnings. They found that a Pakistani living in the rural area tends to have higher rates of returns in investing in primary school education than investing in middle school education.

3.3.2 Externalities and other indirect effects of education

Despite the direct effect of education on earnings, it has been observed that education influences other variables which impact on private income, either for the educated person directly or for

other persons in society. There is abundant evidence on specific externalities and indirect effects of education. These indirect links are mostly documented concerning externalities within the context of the family. The link between health and education is well documented in the literature. In this context, the education of parents particularly mothers, leads to better health and nutrition which influences the children's education achievement and attainment. Studies by Cochrane et al (1980), concluded that one additional year of schooling for mothers in low-income countries is likely to be associated with a 5-10% reduction in the likelihood that their children will die before reaching the age of five. This conclusion is consistent with recent results from Demographic and Health Surveys (DHS) for sub-Saharan Africa reported by Pritchett (1997). In addition to the above, the health and nutrition of a worker will also affect productivity and income as well. This may be in the form where the healthy worker may be less absent at work thereby resulting in higher productivity and income. Straus & Thomas (1998), made an extensive analysis of the effect of health and nutrition on productivity and income. The findings of the study clearly show that the link is strongest at low levels of health and high levels of malnutrition which is mostly prevalent in low-income countries. In this same direction, the health and nutrition status may also affect a student performance at school. Michaelowa (2000) conducted a study involving five sub-Saharan African countries and concluded that children under malnutrition tend to have a negative influence on their performance at school.

Another interesting disaggregation is by sector of employment, in particular, between the agricultural and other sectors of the economy. Jamison and Lau (1982) reviewed an earlier literature and found that, holding inputs constant, farming output increases by only 2% for each additional year of schooling. More recent studies on farming in Africa equally found only very

low effects (Gurgand 1997). However, it is likely that technological progress might increase the returns to schooling in agriculture due to the complementarity of human and physical capital. This could account for the low rates of return to education for farmers in sub-Saharan Africa (Pritchett 1997).

The study of Jamison and Lau has been criticized for the fact that the estimates presented underestimate the effect of education since they correct for a change in farming inputs. Education improves the ability to make informed decisions about new inputs both in terms of machinery and fertilizers. Thus, education could lead to higher returns with respect to changes in input and this effect would bias the regression results. Furthermore, just as much as there are positive externalities of parents' schooling on their children's health, there are also positive externalities of parents' schooling on their children's education. In the literature there is few evidence for Africa and they are; Michaelowa (2000) for Burkina Faso, Cameroon, and Cote d'Ivoire, Glewwe & Jacoby (1994) for Ghana, and Tansel (1997) for Ghana and Côte d'Ivoire. Later studies in recent years indicate that, *ceteris paribus*, the test performance of fifth graders in math and french increases between 4.5% and 7.5% of average scores when both parents are literate as compared to the situation where both parents are illiterate (Michaelowa, 2000).

The parents' schooling is likely to influence the child's education as well and this in turn can increase their chances to find a relatively well paid job when they start working. Moreover, apart from externalities of education on the educated person's own children, there can also be positive externalities on other people in the neighborhood. For instance, if an educated farmer

successfully tries out higher yielding crops or new production methods, other members in the neighborhood observing this might copy the innovations and thus also earn higher income.

Again, there is a higher chance for an educated person to participate in the labour force than an individual with no education. This observed phenomenon is applicable to both developing and developed countries. The ILO (1998) and World Bank (1999) did a study for some selected African countries and found that the share of uneducated persons in the population is much higher than their share in the labour force. For instance, in Morocco out of 56.1% illiterate of the population, only 27.77 % participated in the labour force. Similarly, in Mauritius out of 17.8% illiterate of the population, only 6.06% participated in the labour force. This indirectly confirms the observation for African countries, that participation in the labour force is positively related to education.

3.3.3 Methods used in computing private returns to education

There are several analytical techniques used in computing private returns to education. Psacharopoulos (1994) identifies three such techniques. These techniques comprise the elaborate method, the shortcut method and the earnings equation method. The elaborate method, according to Psacharopoulos follows an algebraic definition of the rate of return which is the rate that equates the stream of benefits to the stream of costs at a given point in time. In this method the private rate of return is calculated with the assumption that the only cost of education is the opportunity cost of staying on in school beyond the age of 18 instead of working in the labour market (Psacharopoulos & Ng, 1994). The data requirement of this method is quite demanding and is usually not available for most developing countries.

This is computed as follows;

$$\sum_{t=s+1}^n \frac{W_u - W_x}{(1+r)^t} = \sum_{t=1}^s C_u (1+r)^t$$

In the above expression, $(W_u - W_x)$ measures the earnings differential between person u with a higher level of educational attainment and person x with a lower level of educational attainment. C_u represents the annual cost during the s years of additional schooling, including both, direct cost and foregone earnings (Michaelowa, 2000).

The shorter method to estimate private returns to education is by using tabulated earnings of workers with respect to their educational levels. Given the shape of the age-earnings profiles, one can approximate them as flat curves (Psacharopoulos & Patrinos, 2004). The estimation method is expressed as follows;

$$\text{Private } r = \frac{W_u - W_s}{S(W_u)}$$

Where $-W$ denotes the mean earnings of an individual with subscripted education level, and S represents the length of the educational cycle depending on the area of study. The weakness of this method lies in the abstraction that the age-earnings profiles are concave, and that the discounting process (in estimating the true rate of return) is very sensitive to the values of the early working ages entering the calculation.

The earnings function method involves the fitting of a function of log-wages (LnW), using years of schooling (S), years of labour market experience (EX) and its square as independent variables. Often weeks worked or hours worked are added as independent variables to this function as

compensatory factors (Psacharopoulos & Patrinos, 2000). The basic ‘Mincerian’ earnings function takes the form:

$$\ln W_i = \alpha + \beta S_i + \gamma_1 EX_i + \gamma_2 EX_i^2 + \varepsilon_i$$

In this function, i refer to the individual household member, β (the coefficient of the variable for years of schooling) can be interpreted as the marginal returns to one additional year of schooling. Since $\beta = (d \ln W / d S)$, measures the relative increase in wages following an increase in S . This method assumes that forgone earnings represent the only cost of education, and so measures only the private rate of return and assumes further that individuals have an infinite time horizon.

3.4 A Review of Empirical Literature

The early work on private rate of return to education was considered by Jacob Mincer (1974), popularly known as the Mincerian return. This assesses how much an additional year of schooling increases the income of the individual being educated. However, Mincer’s study did not consider differences in the quality of education. In recent years, there has been an increase in the number of studies that have sought to analyse private returns to investments in education. The recent studies have focused attention on areas such as, the effect of years of schooling, labour market experience, school quality, innate ability, and family background on private income. Psacharopoulos (1994) made an extensive overview of the literature in this field for over 70 countries around the world. The study shows that the private returns to education are generally higher than the associated social returns. In addition, the findings of the study indicate that returns to investment in education are positive and decrease as the level of education increases. Thus emphasis should be placed on primary education *more* than on higher levels of

education. In contrast to recent studies, Manda & Bigsten (1998) and Liu (1998) argue that returns to investment in education increases with the level of education. Moreover, the returns to investments in education in the developing countries are higher than the returns in developed countries because the supply of educated labour is relatively scarce in developing countries. However, the study of Psacharopoulos has been criticized that the data employed were out-dated cross-sectional data and it does not cover more recent studies. The study of Psacharopoulos obtained high returns to education but educational expansion over the decades since then must have decreased the returns to education.

In addition, Robert (1993) developed a human capital model and asserts that education and the creation of human capital was responsible for both differences in the labour productivity and differences in the level of technology that we observe in the world. He indicated that countries such as Singapore, Hong Kong, Korea and Taiwan have achieved unprecedented rates of economic growth due to large investments they made in education. The World Bank (1993) also found that investment in education is a very significant explanatory variable for East Asian economic growth. Again, Garba (2002) reviewed empirical tests on the human capital theory and it shows that cross-country regressions have shown positive correlation between educational attainment and economic growth. In the same direction, Odekunle (2001) affirms that investment in human capital has positive effects on the supply of entrepreneurial activity and technological innovations.

Ayeni (2003) also asserts that education as an investment has future benefits of creation of job security, status and other benefits in cash and in-kind. In contrast to the above views, Ayara

(2002) reports that education has not had the expected positive growth impact on economic growth in Nigeria. He emphasized that the reason for such a phenomenon may be due to three possibilities. Firstly, educational capital has gone into privately remunerative but socially unproductive activities. Secondly, there has been slow growth in the demand for educated labour and lastly, the education system has failed, such that schooling provides few or no skills. Furthermore, the direct testing of the strong version of the screening model has been carried out in a number of studies (Taubman & Wales 1973, Layard & Psacharopoulos, 1974, Wolpin 1977, and Cohn et al, 1987). The direct test entails whether the partial effect of education on wages decreases with years of work experience whiles controlling for other productive traits. Psacharopoulos & Layard (1979) compared earnings for different educational level for a 33 year old and a 47 year old in the United States. They found that the relative earnings differential between these two ages increases with the level of education. Similar findings were reported by Cohn et al (1987).

In addition, Taubman & Wales (1973) tested the screening hypothesis by comparing the expected and actual distribution of education over occupation. The result of the study found that the actual probability that an individual with an intermediate level of education ends up in a low paid occupation is higher than the expected probability. From this finding the study concluded that education is used as a screening device to prevent lower educated workers from entering well paid occupations. Moreover, Amin & Awung (2005) and Edokat (1998) did an economic analysis of private returns to investment in education in Cameroon. The results of the study strongly suggest that emphasis should be on all the educational levels in Cameroon due to high pressure on the government to invest heavily at the primary level rather than at the tertiary level.

The findings of the study emphasized the importance of investment in education particularly at the tertiary level. According to them, the individual must bear part of the cost of investment since more of the benefits accrue to him or her directly. However, the state or society must still bear much of the cost because of the crucial importance of higher education and the externalities that it also generates. Again, Edokat (1998) concluded just like Psacharopoulos (1994) that more emphasis should be placed at the primary level than at the tertiary level. Thus, the individual willing to pursue additional level of education beyond the primary level must be made to bear the cost of higher education. The major gap in Edokat's study was that the study was restricted to the primary level in a region of Cameroon and there was a total neglect of the social benefits of higher education.

Similarly, there have been many studies on returns to education in Kenya. Some of these studies have placed emphasis on factors that have affected private returns to education over time. In this direction, Manda & Bigsten (1998) analyzed returns to schooling in Kenya over a period. The result of the study shows that private returns to secondary and tertiary education are high, while it is close to zero for primary education. In the case of China, Liu (1998) estimated rates of returns to education for two sectors of the economy. The study found private returns to education to be between 6% and 3% for the pure public sector and the informal sector respectively. The study shows that earnings are higher in the pure public sector than the informal sector.

In the case of Ghana, Glewwe (1996) assessed the impact of innate ability on education using data on cognitive skills. He found that cognitive skill acquired rather than accumulation of schooling credentials also affects wages in the private sector in Ghana. In addition to this, the

study also analyzed the effect of school quality on education with regards to reading and mathematical skills across geographical regions in Ghana. The findings of the study show that on average, the schools in the coastal areas perform better than those in the eastern areas.

Furthermore, Teal (2000) argued that Africa has relatively low skill levels and there is evidence from Kenya that returns on skills have fallen. According to him, in Ghana, the growth of labour demand with respect to supply has been insufficient to prevent real wages from falling for unskilled labour. In addition, Teal (2001) also analyzed the returns to education in Ghana in self employment, wage employment and other major occupations in Ghana. In general, the study concluded that investment in education can be used as a tool in reducing poverty because it permits increases in income overtime due to changes in the average amount of education which is good for technical progress.

In addition, Kingdon and Soberbom (2007) suggest that education plays a critical role in occupational outcome in Ghana. They found that education raises earnings indirectly by helping individuals to gain entry into high paying occupations. On the other hand, it has a low direct effect on earnings particularly in wage employment. The study shows that education raises earnings only modestly in wage employment but it does not directly raise earnings for majority of workers in Ghana since returns to agriculture and self-employment are generally low. The study used the GLSS 4 data and found that these two occupations (i.e. agriculture and self-employment) constitute 82.50% of the employed workforce. Moreover, Twumasi (2006) estimated private returns to higher education in Ghana using the fourth round of the Ghana Living Standards Survey (GLSS 4). The findings of the study clearly indicate that polytechnic

education has the highest returns to education relative to training college and university education. The gap in Twumasi's study was that the study was restricted to higher levels of education in Ghana and less emphasis was placed on the lower levels of education.

CHAPTER FOUR

METHODOLOGY AND ANALYSIS

4.0 Introduction

This chapter is mainly organized into four main sections. The first section focuses on the theoretical model within which the study was carried out. The next section presents the model for estimation. Section three deals with the estimation procedure and section four presents the description of data and its source. This chapter also expounds the research methodology used in achieving the study's objective and ends with discussion of the findings.

4.1 Theoretical Framework

The study uses descriptive statistics and the earnings equation method which is widely used in the literature. The basic earnings equation is attributable to Mincer (1974) and involves the fitting of a semi-log ordinary least square regression using the natural logarithm of earnings as the dependent variable, and then the years of schooling, potential years of labour market experience and its square as independent variables. The coefficient of the variable for years of schooling can be interpreted as how much an additional year of education increases the earnings of the individual. The standard earnings function can be broken into components relating to schooling, post-school or labour market experience (work), and endowment before schooling.

Drawing from the above, it can be assumed that the log earnings (W_i) for individual i is related to schooling (S_i), work experience (X_i), and heritable earnings (H_i) (Amin & Awung, 2005).

From the above assumption, we have the following function:

$$W_i = aS_i + bX_i + cH_i + \varepsilon_i \quad i = 1, 2, \dots, m \quad (1)$$

Where; i refers to the individual household member, S , X , and H are as defined above; a , b , c are the respective parameters to be estimated and ε the error that is assumed uncorrelated with the determinants, S , X and H (see Schultz, 2003, p. 4).

4.2 Model for empirical estimation

The natural logarithm of earnings (w) is regressed on years of schooling (S), a proxy of labour market experience (X), and its square (X^2), and a variety of control variables (Z) (see Michaelowa, 2000, pp. 2.).

This model begins with the specification of the basic earnings function (Mincer, 1974) as follows;

$$\ln(w) = \beta_0 + \beta_1 S + \beta_2 X + \beta_3 X^2 + \beta_4 Z + \varepsilon \dots\dots\dots (2)$$

Where:

$\ln(w)$ = the natural logarithm of earnings for the individual.

β_0 = constant.

S = the level of education or individual's years of schooling.

X = work experience

Z = additional variables that may also influence earnings such as age, gender, marital status, hours worked, sector of employment and others factors.

β_0 , β_1 , β_2 , β_3 and β_4 = parameters to be estimated.

In addition, to distinguish between different levels of education, dummy variables have to be introduced into equation (2) to allow the coefficient of schooling to vary between levels. This technique is used to estimate the marginal returns to education at different levels. For the purpose of this study, the earnings at the individual level are used.

The extended earnings equation becomes;

$$\begin{aligned} \ln W = & \beta_0 + \beta_1 \text{Prim} + \beta_2 \text{Sec} + \beta_3 \text{Ter} + \beta_4 X + \beta_5 X^2 + \beta_6 A + \beta_7 A^2 + \beta_8 \text{Gen} + \beta_9 \text{Loc} + \beta_{10} \text{Emp} \\ & + \beta_{11} \text{Hrw} + \beta_{12} \text{Mar} + \beta_{13} \text{Hhs} + \varepsilon \dots\dots\dots (3) \end{aligned}$$

Where:

$\ln W$ = the natural logarithm of earnings for the individual

Prim = dummy for primary education.

Sec = dummy for secondary education

Ter = dummy for tertiary education

X = labour market experience

A = age

Gen = gender of the individual and is dummy as, male = 1 and female = 0

Loc = dummy for rural-urban locality, where LOC1 = urban and LOC2 = rural

Emp = dummy for sector of employment, where emp1 = agric and emp2 = non-agric

Hrw = the hours the individual worked

Mar = dummy for marital status, where mar1 = married and mar2 = non-married

Hhs = household size

ε = stochastic error term

$\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8, \beta_9, \beta_{10}, \beta_{11}, \beta_{12}$ and β_{13} = are parameters to be estimated.

Furthermore, in a polynomial Mincerian regression involving age and age squared (and/or experience and experience squared) the partial effect of age (or experience) on earnings is not constant. A parsimonious quadratic Mincerian formulation that ignores other determinants of earnings is expressed as follows:

$$y = \beta_0 + \beta_1 x + \beta_2 x^2 + u \dots\dots\dots (4)$$

Where y and x denote earnings and age (or experience) respectively, ($\beta_1 > 0$; $\beta_2 < 0$). The relationship between y and x is characterized by inverted U. Moreover, differentiating y with

$$\text{respect to } x \text{ in equation (4) yields } (\partial y / \partial x) = \beta_1 + 2\beta_2 x \dots\dots\dots (5)$$

Equation (5) indicates that the effect of y on x is not constant in that the effect also depends on

$$\text{the value of } x. \text{ Equating equation (5) to zero yields } x^* = -\beta_1 / 2\beta_2 > 0 \dots\dots\dots (6)$$

Thus, equation (6) indicates the threshold level of x for which y attains its maximum value provided that ($\beta_1 > 0$; $\beta_2 < 0$).

4.2.1 Description of explanatory variables

The highest educational attainment is classified into three groups (primary, secondary and tertiary education) and the reference variable is no education. Primary education is categorized into BECE/MSLC certificate. Similarly, secondary education is categorized into SSCE, GCE O/A Level and Vocational/Technical school certificate. Furthermore, tertiary education is categorized into teacher training, polytechnic, bachelors, masters, doctorate and other professional certificate. Furthermore, all levels of education coefficients ($\beta_1, \beta_2, \beta_3$) are expected to have positive signs and the coefficients must increase with the level of education, that is, ($0 < \beta_1 < \beta_2 < \beta_3$). Again, experience is measured as the number of years an individual spends on the main job. The experience variable is constructed using the GLSS5 questionnaire under section 4 part-A where the individual was asked how long he/she has been doing this work altogether. On another note, the variable experience (X) and experience squared (X^2) coefficients (β_4 and β_5) are expected to have positive and negative signs respectively (i.e., $\beta_4 > 0$ and $\beta_5 < 0$). However, β_4 and β_5 are intended to capture non-linear effects with regards to returns to labour

market experience. Furthermore, the effect of age on earnings is not constant. The coefficients for the age and age squared (β_6 and β_7) are expected to have positive and negative signs respectively (i.e., $\beta_6 > 0$ and $\beta_7 < 0$). Also, gender is categorized into male and female. The reference variable for gender in the model is male and the coefficient for gender (β_8) cannot be determined a priori. The locality of the individual is classified under rural-urban location and the reference variable use in the model is rural location (LOC2). The coefficient for locality (β_9) cannot be determined a priori.

Moreover, the sector of employment is categorized into agricultural and non-agricultural sector and the non-agricultural sector is use as the reference variable in the model. The coefficient for sector of employment (β_{10}) cannot be determined a priori. In addition, the marital status of the individual is categorized into married and non-married. The reference variable for marital status in the model is non-married and the coefficient (β_{12}) for marital status cannot be determined a priori. Lastly, the hours the individual worked and household size is use as a continuous variable in the model. The coefficient for hours worked and household size are expected to take positive signs respectively (i.e., $\beta_{11} > 0$ and $\beta_{13} > 0$). The above equation (3) can be estimated by OLS and the coefficients on years of schooling can be interpreted as the marginal returns to one additional year of schooling or the rate of return to the marginal years of schooling (Psacharopoulos & Patrinos, 2004). The earnings of the individual is measured using the questionnaire issued out in the GLSS 5 under section 4 part-A where the individual was asked what work did he/she did for the past seven days. The earnings of the individuals are generated by finding the time units (i.e. daily, weekly, monthly, etc) within which they worked. The various time units within which the individual worked are then harmonized into one single unit of measurement (i.e. monthly). The

log of monthly earnings for the individual was then regressed on the various variables in the model. The estimated private rate of return associated with an additional year of schooling is obtained by dividing the differences between the coefficients of adjacent groups by their differences in years of schooling. The private rates of return between levels of education can then be calculated from the extended earnings equation (i.e. equation 3) by the formulas,

$$R_{PRIM} = \frac{\beta_1}{S_{PRIM}} \dots\dots\dots (7)$$

$$R_{SEC} = \frac{\beta_2 - \beta_1}{S_{SEC} - S_{PRIM}} \dots\dots\dots (8)$$

$$R_{TER} = \frac{\beta_3 - \beta_2}{S_{TER} - S_{SEC}} \dots\dots\dots (9)$$

Where:

R_{PRIM} = the rate of return to primary education

R_{SEC} = the rate of return to secondary education

R_{TER} = the rate of return to tertiary education

S_{PRIM} , S_{SEC} and S_{TER} = total number of years for completing each successive level of education. In this study, the Breusch-Pagan or Cook-Weisberg test is used to test for heteroscedasticity. Also, the pairwise correlation of all the independent variables appearing in the Mincerian formulation is reported under the appendix (see Table A6, p.78).

4.3 Data Source

The study used secondary data from the fifth round of the Ghana Living Standards Survey (GLSS5) conducted in 2005/2006 by the Ghana Statistical Service (GSS) from 4th September, 2005 to 3rd September, 2006 (over a 12-months period). The Ghana Living Standards Survey

(GLSS) with its focus on the household as a key social and economic unit provides valuable insights into living conditions in Ghana. A nationally representative sample of 8,687 households in 580 enumeration areas, containing 37,128 household members was covered in GLSS 5. Detailed information was collected on demographic characteristics of respondents and all aspects of living conditions including health, education, housing, household income, consumption and expenditure, credit, assets and savings, prices and employment. This study focused on household members at the individual level and as such a sample size of 14,266 is considered in the estimation analysis for persons aged 15 years and above. Moreover, it is quite interesting to note that the educational reform in 1987 was still in operation until 1995 when the old system was abolished.

The new Senior Secondary School (SSS) system started in 1991, with the first batch passing out in 1993. However, data for GLSS 5 was collected in 2005/2006, 14 years after the abolishment of the old educational system in Ghana. This created a disparity between the years of schooling with regards to the old and new educational systems. In addressing this problem with regards to the years of schooling for these two groups, the study use the GLSS 5 data on household members who passed through the old educational system only where students spent 10 years in primary education, 5-7 years in secondary school and 3-7 years in the tertiary institution based on one's area of pursuit.

4.4 Empirical Analysis

The analysis begins with descriptive statistics, focusing on the mean monthly earnings among individuals with different educational levels across sectors. The analysis further moves on to

look at private returns associated with demographic factors (i.e. gender and age) and sectoral differences.

4.5 Descriptive Statistics

The descriptive statistics are provided to highlight the relationship between different educational levels and its impact on earnings. On gender dimensions, females accounted for 23.11% and that of males is 76.89% of the sample. Again, simple averages, standard deviations and differences in mean wages between each education group, sex, sectors, and other areas are considered. Furthermore, the descriptive statistics gives an insight into the relationship between years of schooling and earnings. The estimation technique that follows, gives an in-depth relationship between the levels of education and earnings.

4.5.1 Empirical Results

Table 4.1 shows the mean monthly earnings, number of observations and the standard deviations for individuals with different levels of education in Ghana in terms of the overall model, gender and sectoral dimensions. It can be observed from Table 4.1 that, the mean monthly earnings for an individual increases with more years of schooling for all categories of workers in the sample with the exception of workers in the agricultural sector where the mean monthly earnings for an individual with primary education is higher than that of an individual with secondary education. For instance, the mean monthly earnings for an individual with tertiary education (¢3.9292 million) is higher than that of an individual with secondary education (¢1.4392 million) and that of an individual with primary education (0.9227 million) for the overall.

Table 4.1: Mean monthly earnings by educational level

Variable		Primary	Secondary	Tertiary
Overall	Number	1623	380	429
	Mean	0.9227	1.4392	3.9292
	Std. Dev.	2.2913	3.6074	24.9
Male	Number	1310	313	373
	Mean	0.9182	1.4411	4.2685
	Std. Dev.	2.2783	3.5776	26.7
Female	Number	313	67	56
	Mean	0.9411	1.43	1.6687
	Std. Dev.	2.3489	3.7716	1.1461
Agricultural	Number	659	64	26
	Mean	0.5496	0.4644	0.827
	Std. Dev.	1.8327	0.7126	1.4189
Non-Agricultural	Number	964	316	403
	Mean	1.1777	1.6366	4.1293
	Std. Dev.	2.5274	3.9146	25.70

Source: Computed by Author from GLSS 5, 2005/2006. Note- Mean and std. dev. are in millions of cedis (old currency).

The introduction of gender into the analysis shows that the mean monthly earnings for males are higher than that of females at the secondary and tertiary level but there is a reverse situation where the mean monthly earnings of females is higher than that of males at the primary level. This finding is confirmed with empirical observation of the Ghanaian labour market where women mostly withdraw intermittently from the labour market due to child birth and marriage. Women also have lower years of experience and as such they receive lower remuneration as compared with their male counterparts who are mostly promoted on the job with higher remuneration due to more years of experience. Furthermore, the descriptive statistics on sectoral

dimension from the results in Table 4.1 show that the mean monthly earnings in the non-agricultural sector are higher than that of the agricultural sector at all levels of education in Ghana.

Table 4.2: Mean and standard deviation of key variables

Variable		Age	Experience	Earnings
Overall	Number	3536	3536	3536
	Mean	41.40	12.91	1.2562
	Std. Dev.	11.55	10.53	8.9840
Male	Number	2719	2719	2719
	Mean	41.55	13.62	1.3823
	Std. Dev.	11.66	10.63	10.20
Female	Number	817	817	817
	Mean	40.88	10.55	0.8367
	Std. Dev.	11.15	9.85	1.9897
Agricultural	Number	1327	1327	1327
	Mean	43.12	16.90	0.5318
	Std. Dev.	12.43	11.39	1.8486
Non Agricultural	Number	2209	2209	2209
	Mean	40.36	10.52	1.6913
	Std. Dev.	10.86	9.19	11.30

Source: Computed by Author from GLSS 5, 2005/2006. Note- Mean earnings are in millions of cedis (old currency).

Table 4.2 presents the mean and standard deviation of the main variables. The mean age of males is higher than that of females. The mean age irrespective of sex for the sample is 41.40. It is 41.55 for males, 40.88 for females, and for those working in the agricultural and non-agricultural sector the mean age is 43.12 and 40.36 respectively. As regards with experience, the mean for the overall sample is 12.91. It is 13.62 for males and that of females is 10.55. On sectoral dimensions, the mean experience is 16.90 for the agricultural sector and 10.52 for the non-agricultural sector. In addition, the mean monthly earnings for the overall sample is ₵1.2562 million and the mean monthly earnings for males is higher than that of females (₵1.3823 million and ₵0.8367 million respectively). Furthermore, the mean monthly earnings for the non-agricultural sector (₵1.6913 million) is higher than that of the agricultural sector (₵0.5318 million).

Table 4.3: Percentages of schooling for various levels of education

Variables	Overall (%)	Male (%)	Female (%)	Agricultural (%)	Non-Agric. (%)
SCHOOLING					
No education	31.22	26.59	46.63	43.56	23.81
Primary	45.90	48.18	38.31	49.66	43.64
Secondary	10.75	11.51	8.20	4.82	14.31
Tertiary	12.13	13.72	6.85	1.96	18.24
Number of Observ.	3536	2719	817	1327	2209

Source: Computed by Author from GLSS 5, 2005/2006.

Table 4.3 shows the percentages of schooling for various levels of education in the analysis; about 31.22 percent of the people in the sample have no education, 45.90 percent have primary education and 10.75 percent have secondary education, while 12.13 percent have tertiary education. Again, about 26.59 percent of males have no education, 48.18 percent have primary education, 11.51 percent have secondary education and 13.72 percent have tertiary education. On the other hand, about 46.63 percent of females have no education and is higher than that of males with no education (26.59 percent). Females form 23.11 percent of the whole sample while males form 76.89 percent. However, it is interesting to note that even though females form a smaller percentage of the overall sample, the number of females who have no education is higher than the number of males who have no education, indicating high illiteracy rate among females than that of males.

On the basis of sectoral dimension, 43.56 percent of workers in the agricultural sector have no education, 49.66 percent have primary education, 4.82 percent have secondary education and 1.96 percent of the people have tertiary education. In the non-agricultural sector, 23.81 percent have no education, 43.64 percent have primary education, 14.31 percent have secondary education and 18.24 percent have tertiary education. The number of individuals who have no education in the agricultural sector is almost twice the number of individuals in the non-agricultural sector who have no education. Again, in terms of educational attainment, workers in the non-agricultural sector dominate those in the agricultural sector at the secondary and tertiary levels. Also, the analysis in terms of educational attainment shows that the number of people with primary education is higher than those with secondary and tertiary education for all categories of workers in the sample.

4.5.2 Results of earnings equations

Table 4.4 and Table 4.5 show the results of the specification of earnings equation taking into consideration the various levels of education (primary, secondary and tertiary), gender as well as two sectors of the economy (agricultural and non-agricultural). The F-statistic indicates that the variables in the model are jointly significant at the 1% level of significance. Given that the data is cross sectional, the low R-square is not surprising. From Table 4.4, the marginal return for an individual with primary education is 40.9% higher than those with no education. Again, the marginal returns for an individual with secondary and tertiary education attainment raises earnings by 84.70% and 155.20% respectively higher than those with no education for the overall model. Again, the inclusion of all the variables that affects earnings in the model shows the same trend of increasing marginal returns for additional years of schooling. From Table 4.5, the contribution of primary education to earnings is 20.10% higher than those with no education. Similarly, the completion of secondary and tertiary education raises earnings by 39.90% and 95.70% higher than those with no education for the overall sample.

These results clearly indicate that the marginal returns to education increases as individual's progresses from primary education to tertiary education. This agrees with the findings of Manda & Bigsten (1998), and Amin & Awun (2005), whose results show that returns to education increase as one moves from lower levels of education to higher levels of education. However, it contradicts the finding of Psacharopoulos (1994), whose results shows that returns to education are highest at the primary level and then it decreases with higher levels of education. On another note, these results agree with the findings by Twumasi (2006), whose results shows that returns to education are positive and it increases with higher levels of education in Ghana.

Moreover, the estimation of the earnings equation on gender dimensions indicates some disparities between earnings of females and males. It can be observed from Table 4.5 that the marginal returns to education are higher for females than that of males at all levels of education. This result is consistent with empirical data on enrolment levels for females and males at the secondary and tertiary levels. For instance, data from Education Sector Performance Report (ESPR) in 2010 indicates that gross enrolment rate for males was 55.7 % and 44.3 % for females in 2008/09 and then in 2009/10 it was 55.3 % for males and 44.7 % for females at the SHS level. In addition, enrolment rates for six public universities show that enrolment rate for males was 67.5% and 32.5 % for females in 2003/04 and then in 2008/09 it was 62.6 % for males and 37.4 % for females (Education Sector Performance Report, 2010). Thus, the supply of educated females is scarce as compared to their male's counterparts and as such they will command higher returns on their investments than their male's counterparts. Furthermore, an analysis of the model on sectoral dimension shows some disparities in marginal returns to education between the agricultural sector and non-agricultural sector.

The study also shows that the sector of employment of an individual affects earnings as well. For instance, from Table 4.5 an individual working in the agricultural sector had 95.50% earnings lower than those working the non-agricultural sector. Again, a careful observation of Table 4.5 show that the coefficients on education dummies for the non-agricultural sector are higher than that of the agricultural sector for all levels of education. This implies that the returns to working in the non-agricultural sector are higher compared to working in the agricultural sector. This result tends to confirm the findings by Teal (2001) which indicates that returns increase with the level of education except with those of farmers in the agricultural sector. In addition, the

earnings of females working in the agricultural sector and non-agricultural sectors reduced by 41.10% and 21.40% respectively lower than their male's counterparts working in the same sectors from Table 4.5. Moreover, the locality in which the individual works affects earnings as well. From Table 4.5, individuals working in the urban locality had 12.70% more earnings than those working in the rural locality for the overall.

Furthermore on the gender dimension, males and females working in the urban locality had 39.70% and 30.30% respectively more earnings than their colleagues working in the rural locality. Similarly, individuals working in the agricultural and non-agricultural sectors in the urban locality had 3.40% and 16.70% more earnings respectively than their colleagues working in the rural locality in the same sectors. This clearly indicates that an individual working in the urban locality receives more earnings than those working in the rural locality for all categories of workers in the sample. Again, the coefficient for experience and experience squared from Table 4.5 indicates that earnings initially increase with experience and then at a certain experience threshold level of 60 years, experience will not have any effect on earnings for the overall model (the experience threshold level is estimated using equation 6, p.51).

Similarly, the coefficient for age and age squared indicates that earnings initially increase with age and then at some age threshold level of 46 years, earnings will begin to decrease for the overall model (the age threshold at which earnings will begin to decrease is estimated using equation 6, p.51). This is due to the fact that as the individual advances in age he/she works fewer hours and as a result the earnings falls as well. The marital status of individuals also has an effect on earnings in Ghana. It can be observed from Table 4.5 that a married individual have

12.5% higher earnings than non-married individuals. This observations holds true and is consistent across all categories of workers in the sample, be it male, female, agricultural and non-agricultural sector. In conclusion, the hours worked and household size both has a positive impact on earnings. It can be observed from Table 4.5 that each additional hour's worked increased earnings by 0.60% for the overall. This finding holds for all categories of workers in this study. Similarly, each additional rise in household size increased earnings by 2.60%. On sectoral dimension, each additional rise in household size increased earnings by 3.90% and 1.60% for the agricultural and non-agricultural sectors respectively.

Table 4.4: Earnings equation for different educational levels

Independent Variables	DEPENDENT VARIABLE (LOG OF EARNINGS)				
	Overall	Male	Female	Agricultural	Non-Agric.
Constant	12.596*** (356.21)	12.677*** (290.44)	12.444*** (207.08)	12.189*** (244.93)	13.044*** (295.75)
Primary	0.409*** (8.91)	0.352*** (6.48)	0.461*** (5.16)	0.241*** (3.53)	0.354*** (6.46)
Secondary	0.847*** (8.83)	0.759*** (9.56)	1.038*** (6.68)	0.088*** (0.56)	0.635*** (8.83)
Tertiary	1.552*** (23.22)	1.486*** (19.87)	1.612*** (9.60)	0.591*** (2.47)	1.193*** (17.81)
F-stat	194.78	142.55	41.42	5.46	113.42
Pro > F	0.0000	0.0000	0.0000	0.0000	0.0000
R ²	0.1420	0.1361	0.1326	0.0122	0.1337
Sample Size	3536	2719	817	1327	2209

* Significant at 10%, ** Significant at 5% and *** Significant at 1%. Note - Numbers in parentheses are t-statistics.

Source: Author's estimates from GLSS 5, 2005/2006

Table 4.5: Earnings equation for all variables in the model

Independent Variables	DEPENDENT VARIABLE (LOG OF EARNINGS)				
	Overall	Male	Female	Agricultural	Non-Agric.
Constant	12.034*** (0.211)	11.115*** (0.254)	11.542*** (0.456)	11.245*** (0.365)	11.835*** (0.267)
Primary	0.201*** (0.043)	0.229*** (0.054)	0.369*** (0.089)	0.187*** (0.069)	0.224*** (0.055)
Secondary	0.399*** (0.065)	0.510*** (0.079)	0.868*** (0.132)	-0.005 (0.185)	0.508*** (0.068)
Tertiary	0.957*** (0.064)	1.287*** (0.073)	1.535*** (0.126)	0.531** (0.256)	1.030*** (0.068)
Experience	0.012** (0.004)	-0.011* (0.006)	0.036*** (0.014)	0.011 (0.007)	0.016** (0.007)
Experience ²	-0.0001 (0.0001)	0.0002 (0.0001)	-0.001*** (0.0004)	-0.0001 (0.0001)	-0.0003 (0.0002)
Age	0.028*** (0.010)	0.047*** (0.013)	0.017 (0.023)	0.018 (0.017)	0.037*** (0.013)
Age ²	-0.0003*** (0.0001)	-0.0005*** (0.0001)	-0.0002 (0.0003)	-0.0002 (0.0002)	-0.0004*** (0.0002)
Female	-0.268*** (0.048)	-	-	-0.411*** (0.099)	-0.214*** (0.054)
Urban locality	0.127*** (0.038)	0.397*** (0.046)	0.303*** (0.082)	0.034 (0.076)	0.167*** (0.043)
Agricultural sector	-0.950*** (0.046)	-	-	-	-
Hours of work	0.006*** (0.0009)	0.011*** (0.001)	0.009*** (0.002)	0.007*** (0.002)	0.006*** (0.0009)
Married	0.125*** (0.041)	0.087* (0.051)	0.109 (0.090)	0.128* (0.075)	0.110** (0.048)
Household size	0.026*** (0.010)	-	-	0.039*** (0.016)	0.016* (0.012)
F-stat	115.68	74.80	26.74	7.11	40.10
Pro > F	0.0000	0.0000	0.0000	0.0000	0.0000
R ²	0.3083	0.2189	0.2180	0.0628	0.1920
Sample Size	3536	2719	817	1327	2209

* Significant at 10%, ** Significant at 5% and *** Significant at 1%. Note - Numbers in parentheses are robust standard error.

Source: Author's estimates from GLSS 5, 2005/2006.

Table 4.6: Breusch-Pagan / Cook-Weisberg test for heteroscedasticity

Null Hypothesis: Constant Variance					
FIVE DIFFERENT MODELS					
Output	Overall	Male	Female	Agricultural	Non-Agric.
Chi2 (1)	8.05	3.49	4.79	3.02	0.62
Prob > Chi2	0.0046	0.0618***	0.0286***	0.0822***	0.4296***

* Significant at 10%, ** Significant at 5% and *** Significant at 1%.

Source: Author's estimates from GLSS 5, 2005/2006.

From Table 4.6, with the exception of the overall all the models proved to be satisfied from heteroscedasticity. The p-values reported are significantly less than 1% .Hence we fail to reject the null hypothesis of homoscedasticity and conclude that these models are homoscedastic. The heteroscedasticity found in the overall model is corrected using the robust standard error.

Table 4.7: Private rates of return to an additional year of schooling (%)

Educational Level	Overall	Male	Female	Agricultural	Non-Agric.
Primary	2.01	2.29	3.69	1.87	2.24
Secondary	2.83	4.01	7.13	-2.74	4.06
Tertiary	18.60	25.90	22.23	17.87	17.40

Source: Computed from Table 4.5 using the coefficients obtained from the earnings equations and using equation 7, 8, & 9 in estimating the private returns for each level of education based on the assumption that the years of schooling for primary, secondary and tertiary education are 10, 17 & 20 years respectively.

Table 4.7 presents the private rates of return according to the various levels of education, gender and two sectors of the economy. For the whole sample, private rate of returns increase with higher levels of education. The private rate of returns to tertiary education (18.60 percent) is higher than the private rate of returns to secondary education (2.83 percent) and that of primary education (2.01 percent) for the overall. Palmer (2006), cited research confirmed this view, noting that returns to education are lowest at the primary level and that it is at the post-basic level that returns are highest, thus the old middle school or JSS level has only marginal impact. For males, the private rate of returns to tertiary education (25.90 percent) is higher than the private rate of returns to secondary education (4.01 percent) and that of primary education (2.29 percent). On the other hand, the same finding holds true for females where the private rate of returns increases at higher levels of education. Females had a higher private return on their investment at the primary and secondary levels of education than that of males. However, at the tertiary level the private returns for males are higher than that of females. This result is confirmed by Schultz (1996), using estimates for Ghana indicates that at the secondary level the rate of return for females appear to be almost twice as high as males.

The same finding is true for the non-agricultural sector where returns increase as the level of education rises. But the results for the agricultural sector tend to be slightly different, where the private rate of returns to primary education is higher than that of secondary education. Regarding the sectoral analysis, the private rate of return to education in the non-agricultural sector is higher than the private returns in the agricultural sector at the primary and secondary levels of education but at the tertiary level the private returns in the agricultural sector is higher than that of the non-agricultural sector. The overall results underscore the importance of higher education.

The results in Table 4.7 are consistent with the findings of Appleton et al (1999) and Liu (1998) which show that returns to education are positive and are high at higher levels of education and lower and close to zero at the primary level. However, the results obtained in Table 4.7 are in contrast with the findings of Psacharopoulos (1994) and Tafah-Edokat (1998) where primary education gives the highest returns followed by secondary and tertiary education. Psacharopoulos (1994) and Edokat (1998) hold the view that emphasis should be placed more on primary education than higher levels of education and that individuals willing to pursue further education should be made to bear a higher proportion of the cost of investment

4.6 Summary of Findings

The main objective of this study is to examine the effect of education on an individual's earnings in Ghana. Using the GLSS 5 data set, the findings can be summarized as follows:

- There are positive returns to education in Ghana and earnings increase as an individual acquires higher levels of education.
- The returns to education on the gender dimension show that the marginal returns for females are higher than that of males at all levels of education based on the results obtained the earnings equation. However, the results obtained from the descriptive statistics showed a reverse scenario where the mean monthly earnings for males are higher than that of females at all levels of education.
- The earnings of an individual initially increase with experience and then at a certain experience threshold level of 60 years, experience will not have any effect on earnings for the overall model.

- Similarly, the earnings of an individual initially increase with age and then at a certain age threshold level of 46 years, earnings will begin to decrease for the overall model.
- The marginal returns to working in the non-agricultural sector are higher than that of the agricultural sector at all levels of education.
- The findings of the study show that the private benefit to education comes directly to the individual; therefore, the individual must bear part of the cost of investment in education in Ghana.
- Individuals working in the urban locality receive more earnings than those working in the rural locality for all categories of workers in the study.
- The constant term in all the estimations is positive and significant as well, showing that there are unexplained variations in the dependent variable (i.e. log of earnings) which are not stated in the model.

CHAPTER FIVE

CONCLUSIONS AND POLICY RECOMMENDATIONS

5.0 Introduction

This chapter focuses on summary and conclusions of the study. It ends with appropriate policy recommendations based on the findings and conclusions.

5.1 Summary and Conclusions

The data employed from the GLSS 5 was used to estimate the rates of return to education on the three main educational levels, two main economic sectors and gender differences. The study was carried out with the use of descriptive statistics and the modified Mincerian earnings equation. The study focused on the marginal and private rates of returns associated with each educational level. It is interesting to note that, the rate of return for each educational level was different for each category in the sample. Also, there was an increase in earnings with an extra year of schooling.

Again, it was observed that, the mean monthly earnings for an individual increases with more years of schooling for all categories in the sample with the exception of workers in the agricultural and non-agricultural sectors. Moreover, analysis of the results on gender dimensions show that the marginal returns for females are higher than that of males at all levels of education based on the results obtained from the earnings equation. However, the results obtained from the descriptive statistics showed a reverse scenario where the mean monthly earnings for males are higher than that of females at secondary and tertiary levels of education. Furthermore, a major revelation emerging from the results in Table 4.5 indicates that the coefficients of the educational

dummy variables increase with higher levels of education for all categories of workers in the sample with the exception of workers in the agricultural sector. The coefficients from the earnings function, on average and across all levels are higher for females than that of males. The results from the coefficients on the educational dummy variable shows that returns to education are positive and it increases as an individual progresses from primary education to tertiary education.

Also, private rates of return, for most categories in the sample increase with higher levels of education. For instance tertiary education had the highest returns (18.60 percent), followed by secondary (2.83 percent) and that of primary education (2.01 percent) respectively for the overall sample. Females had a higher rate of return on their investment than that of males at the primary and secondary levels of education but they had a lower return than males at the tertiary level (see Table 4.7). On sectoral analysis, returns to working in the non-agricultural sector are higher than that of the agricultural sector at the primary and secondary levels of education confirming the results obtained from the earnings equation in Table 4.5. However, the rate of return to education for the agricultural sector tends to be slightly different, where the return to primary education is higher than that of secondary education (see Table 4.7).

In addition, the analysis of this study in terms of percentages for various categories in the sample indicates that about 31.22 percent of the people in the sample had no education, 45.90 percent had primary education, and 10.75 percent had secondary education, while 12.13 percent had tertiary education for the overall (see Table 4.3 for details). Also, the number of females who had no education (46.63%) is higher than the number of males with no education (26.59%), and

again females form 23.11 percent of the whole sample while males form 76.89 percent. Moreover, earnings initially increase with experience and then at a certain experience threshold level of 60 years, experience will not have any effect on earnings for the overall model. This is due to the fact that individuals retire at 60 years in Ghana and will move out of the labour force so experience will no longer have any effect on earnings by this threshold. Similarly, earnings initially increase with age and then at some age threshold level of 46 years, earnings will begin to decrease for the overall model. This is due to the fact that as the individual advances in age he/she works fewer hours and as a result the earnings falls as well. Furthermore, the study clearly indicates that an individual working in the urban locality receives more earnings than those working in the rural locality for all categories of workers in the sample. The marital status of an individual also has a positive impact on earnings.

The study revealed that a married individual impact on earnings is higher than a non-married individual. This observation holds true for all categories of workers in the study. Lastly, the hours worked and household size both exhibited positive impact on earnings in Ghana. It was observed that each additional hour's worked and rise in household size led to an increase in earnings for all categories of workers in the study.

5.2 Policy recommendations

The study found that education is a worthwhile investment for the individual because it permits increases in earnings with more years of schooling. The results from the descriptive statistics and earnings equation show that there are positive returns to education and it rises with higher levels of education. Thus, policies should be aimed at increasing access to higher education by

providing the infrastructural facilities as well as improving quality at all levels of education in Ghana. Policies of this nature will help curb poverty and bridged the gap with regards to earnings between the poor and rich in the Ghanaian society. It will also help reduce the high illiteracy rate thereby mitigating the rural-urban migration which is a major concern in Ghana.

Again, the issue that arises with education is who should bear the cost of investment? This equity issue is one of the major issues that came up during the country's 2012 presidential debate. The results obtained from the descriptive statistics and the earnings equation clearly indicates that more of the benefit seems to accrue to the individual. Thus, the individual must bear part of the cost of investment since more of the benefits come to him/her directly. However, because of the crucial importance of higher education and the externalities that it also generates to society, the state or government must still bear much of the cost of investment. The challenge that arises has to do with financing education by the individual. One way of financing education in Ghana is that the government can help to strengthen financial markets and also through public-private partnership agreements with financial institutions where individuals can borrow to support their education and then re-pay back when they start working. The World Bank initially, tended to emphasize more on primary education to almost a total neglect of tertiary education (Amin & Awung, 2005).

Recently, the importance of tertiary education has been recognized. Thus policies designed to favour primary education must also take into consideration the greater spill-over effects of the different educational levels and more so with the fact that the three educational levels form a

whole system. The lower levels are inputs into the higher levels and similarly, the outputs of the higher educational levels are valuable inputs into the lower educational levels as well.

Furthermore, government should provide the enabling environment by fashioning appropriate policies for private investors to invest in the economy. When individuals are assured of ready employment opportunities for their investment it will also boost investment in education since graduates will be assured of ready employment. In addition, the study found that the returns to education for females are higher than that of males at all levels of education. Therefore, policies that advocate for higher female participations at all educational levels should be put in place. Again, on sectoral analysis the study revealed that the returns for working in the non-agricultural sector are higher than that of the agricultural sector. Thus policies must be put in place to expand the non-agricultural sector in order to absorb the greater number of graduates coming out of the various tertiary institutions yearly. However, investment in the agricultural sector must not be neglected totally since majority of the working force finds themselves in that sector. The government should invest more in scientific research and technology in order to boost output levels of farmers which also have a potential of increasing their income levels.

Finally, government should design investment policies in line with human resource development. The Asian Tigers (i.e. Singapore, Malaysia, China, and Japan) have demonstrated that investment in education is indeed the most valuable investment of all capital. These countries have achieved remarkable growth and development due to the immense contribution of their human resource base which has impacted into their GDP growth. Ghana can take a clue from these countries and also adopt similar policies by shifting high dependency on natural resources

which have accounted for a greater share of the country's GDP growth by expanding investing on the human resource base.

5.3 Areas for further studies

The causality debate between education and earnings is one of the issues that arise in the literature. The causality debate between education and earnings has mostly been addressed in the literature by using instrumental variable techniques and family fixed effect model. Future studies can investigate and look at the reverse causality between educational attainment and earnings. Again, future studies can investigate into social rate of return to education at the macro-level and other factors which have not been considered in this study.

APPENDIX

Table A1: Estimated earnings function for all workers for the overall sample

```
reg logE education2 education3 education4 experience experience2 age agesq gender2 LOC1
```

```
emp1 s4aq7 mar1 hhsize, r
```

Linear regression

Number of obs = 3536
 F(13, 3522) = 115.68
 Prob > F = 0.0000
 R-squared = 0.3083
 Root MSE = 1.0565

logE	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
education2	.2013146	.043404	4.64	0.000	.116215	.2864141
education3	.3987892	.0653738	6.10	0.000	.2706149	.5269634
education4	.9566495	.0635352	15.06	0.000	.8320801	1.081219
experience	.0117182	.0042386	2.76	0.006	.0034078	.0200285
experience2	-.0001301	.0000931	-1.40	0.163	-.0003126	.0000525
age	.0279622	.010193	2.74	0.006	.0079774	.0479471
agesq	-.0003259	.0001114	-2.93	0.003	-.0005442	-.0001076
gender2	-.2683245	.0481597	-5.57	0.000	-.3627482	-.1739009
hhsize	.025708	.0100634	2.55	0.011	.0059773	.0454387
LOC1	.1274788	.0378186	3.37	0.001	.0533302	.2016273
s4aq7	.0060305	.0008636	6.98	0.000	.0043372	.0077238
emp1	-.949538	.0461076	-20.59	0.000	-1.039938	-.8591377
mar1	.1251619	.04129	3.03	0.002	.0442072	.2061165
_cons	12.0344	.2105089	57.17	0.000	11.62167	12.44713

Table A2: Estimated earnings function for male workers

```
reg logE education2 education3 education4 experience experience2 age agesq LOC1 mar1
```

```
s4aq7, r
```

Linear regression

Number of obs = 2719
 F(10, 2708) = 74.80
 Prob > F = 0.0000
 R-squared = 0.2189
 Root MSE = 1.1174

logE	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
education2	.2291134	.0539059	4.25	0.000	.1234125	.3348142
education3	.5102302	.0790843	6.45	0.000	.3551585	.6653019
education4	1.2867	.0727345	17.69	0.000	1.14408	1.429321
experience	-.0105894	.0055254	-1.92	0.055	-.0214238	.000245
experience2	.0001803	.0001231	1.47	0.143	-.000061	.0004217
age	.0469766	.0125449	3.74	0.000	.0223781	.071575
agesq	-.0005011	.0001354	-3.70	0.000	-.0007666	-.0002357
LOC1	.3969698	.0458948	8.65	0.000	.3069773	.4869622
s4aq7	.011328	.0011566	9.79	0.000	.00906	.0135959
mar1	.0873967	.0512421	1.71	0.088	-.013081	.1878744
_cons	11.11533	.2542559	43.72	0.000	10.61677	11.61388

Table A3: Estimated earnings function for female workers

reg logE education2 education3 education4 experience experience2 age agesq LOC1 mar1
s4aq7, r

Linear regression

Number of obs = 817
F(10, 806) = 26.74
Prob > F = 0.0000
R-squared = 0.2180
Root MSE = 1.1186

logE	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
education2	.3694121	.0885653	4.17	0.000	.1955662	.543258
education3	.868319	.132241	6.57	0.000	.6087417	1.127896
education4	1.535051	.12571	12.21	0.000	1.288293	1.781808
experience	.0360206	.0136853	2.63	0.009	.0091575	.0628838
experience2	-.0011865	.0004215	-2.81	0.005	-.0020139	-.0003591
age	.0172876	.0232256	0.74	0.457	-.0283022	.0628773
agesq	-.0002481	.0002704	-0.92	0.359	-.0007789	.0002828
LOC1	.3028566	.0820343	3.69	0.000	.1418304	.4638827
s4aq7	.0091088	.0021663	4.20	0.000	.0048565	.0133612
mar1	.109472	.0904162	1.21	0.226	-.0680069	.2869509
_cons	11.54163	.4558597	25.32	0.000	10.64682	12.43644

Table A4: Estimated earnings function for agricultural workers

reg logE education2 education3 education4 experience experience2 age agesq gender2 LOC1
s4aq7 mar1 hhsiz, r

Linear regression

Number of obs = 1327
F(12, 1314) = 7.11
Prob > F = 0.0000
R-squared = 0.0628
Root MSE = 1.1693

logE	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
education2	.1873126	.0692438	2.71	0.007	.0514722	.3231531
education3	-.004623	.1846147	-0.03	0.980	-.3667947	.3575488
education4	.5311167	.2556562	2.08	0.038	.0295777	1.032656
experience	.0108765	.0066379	1.64	0.102	-.0021455	.0238984
experience2	-.0001316	.000109	-1.21	0.228	-.0003454	.0000822
age	.0176025	.0169501	1.04	0.299	-.0156498	.0508548
agesq	-.000198	.000176	-1.13	0.261	-.0005433	.0001472
gender2	-.4110617	.0992229	-4.14	0.000	-.6057143	-.2164092
hhsiz	.0394517	.0162973	2.42	0.016	.0074801	.0714234
LOC1	.0341867	.0758311	0.45	0.652	-.1145765	.18295
s4aq7	.0074151	.0023762	3.12	0.002	.0027537	.0120766
mar1	.1282482	.0751716	1.71	0.088	-.0192212	.2757175
_cons	11.24546	.3645362	30.85	0.000	10.53032	11.9606

Table A5: Estimated earnings function for non-agricultural workers

reg logE education2 education3 education4 experience experience2 age agesq gender2 LOC1
s4aq7 mar1 hhsiz, r

Linear regression

Number of obs = 2209
F(12, 2196) = 40.10
Prob > F = 0.0000
R-squared = 0.1920
Root MSE = .97896

logE	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
education2	.2242608	.0549588	4.08	0.000	.1164841	.3320374
education3	.5081264	.0683786	7.43	0.000	.374033	.6422199
education4	1.030194	.0682759	15.09	0.000	.8963024	1.164087
experience	.016066	.0077077	2.08	0.037	.0009509	.0311812
experience2	-.0002841	.0002294	-1.24	0.216	-.0007339	.0001657
age	.0366392	.0134931	2.72	0.007	.0101787	.0630997
agesq	-.0004271	.0001544	-2.77	0.006	-.0007299	-.0001243
gender2	-.2136837	.0543202	-3.93	0.000	-.3202081	-.1071594
hhsiz	.0162931	.0124227	1.31	0.190	-.0080684	.0406547
LOC1	.1668912	.0434942	3.84	0.000	.0815972	.2521853
s4aq7	.0056928	.0009029	6.31	0.000	.0039222	.0074633
mar1	.1103402	.0481722	2.29	0.022	.0158724	.2048081
_cons	11.83539	.2670038	44.33	0.000	11.31178	12.35899

Source: Author's estimates from GLSS 5, 2005/2006.

Table A6: Pairwise Correlation Table of all independent variables appearing in the**Mincerian formulation**

pwcorr education2 education3 education4 experience experience2 emp1 age agesq gender2 mar1
 hhsize LOC1 s4aq7, sig

	educat~2	educat~3	educat~4	experie~e	experie~2	emp1	age
education2	1.0000						
education3	-0.3196 0.0000	1.0000					
education4	-0.3423 0.0000	-0.1289 0.0000	1.0000				
experience	0.0311 0.0642	-0.1240 0.0000	0.0371 0.0273	1.0000			
experience2	0.0163 0.3337	-0.1057 0.0000	0.0250 0.1378	0.9163 0.0000	1.0000		
emp1	0.0585 0.0005	-0.1482 0.0000	-0.2415 0.0000	0.2933 0.0000	0.2441 0.0000	1.0000	
age	0.0431 0.0103	-0.1107 0.0000	0.1112 0.0000	0.5666 0.0000	0.5169 0.0000	0.1156 0.0000	1.0000
agesq	0.0363 0.0307	-0.1089 0.0000	0.1024 0.0000	0.5558 0.0000	0.5279 0.0000	0.1249 0.0000	0.9863 0.0000
gender2	-0.0835 0.0000	-0.0451 0.0074	-0.0886 0.0000	-0.1231 0.0000	-0.0872 0.0000	-0.1408 0.0000	-0.0246 0.1441
mar1	0.0587 0.0005	-0.0313 0.0628	0.0997 0.0000	0.1830 0.0000	0.1254 0.0000	0.0986 0.0000	0.1893 0.0000
hhsize	-0.0190 0.2590	-0.0329 0.0502	0.0372 0.0269	0.1465 0.0000	0.1205 0.0000	0.0677 0.0001	0.1279 0.0000
LOC1	0.0015 0.9308	0.1214 0.0000	0.1292 0.0000	-0.1043 0.0000	-0.0944 0.0000	-0.4218 0.0000	0.0034 0.8408
s4aq7	0.0189 0.2615	0.0864 0.0000	-0.0057 0.7338	-0.0778 0.0000	-0.0705 0.0000	-0.3019 0.0000	-0.0681 0.0001
	agesq	gender2	mar1	hhsize	LOC1	s4aq7	
agesq	1.0000						
gender2	-0.0274 0.1033	1.0000					
mar1	0.1646 0.0000	-0.4128 0.0000	1.0000				
hhsize	0.1145 0.0000	-0.1232 0.0000	0.1444 0.0000	1.0000			
LOC1	-0.0085 0.6146	0.0445 0.0082	-0.0164 0.3282	-0.1156 0.0000	1.0000		
s4aq7	-0.0814 0.0000	-0.0495 0.0032	0.0233 0.1653	-0.0016 0.9243	0.2112 0.0000	1.0000	

Source: Author's estimates from GLSS 5, 2005/2006.

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