THE IMPACT OF SCHOOL QUALITY ON EARNINGS IN GHANA

AGNES KUTORKOR KOTEI
(10442424)

A THESIS SUBMITTED TO THE UNIVERSITY OF GHANA,
LEGON IN PARTIAL FULFILMENT OF THE REQUIREMENTS
FOR THE AWARD OF MASTER OF PHILOSOPHY
(ECONOMICS) DEGREE

JULY, 2015
DECLARATION

This is to certify that this thesis is the result of research undertaken by Agnes Kutorkor Kotei, towards the award of a Master of Philosophy (M. Phil.) degree in Economics in the Department of Economics, University of Ghana. I hereby declare that with the exception of references made to the works of others, which have been duly acknowledged, this thesis is entirely my own work under the guidance of my supervisors and neither part nor whole of it has been presented for another degree anywhere.

AGNES KUTORKOR KOTEI
(10442424)

DR. WILLIAM BAAH-BOATENG
(SUPERVISOR)

DR. PRISCILLA TWUMASI BAFFOUR
(SUPERVISOR)
ABSTRACT

This study examines the role of school quality in Ghana (measured by pupil-teacher ratios and percentage of trained teachers in basic schools), and how it affects earnings of workers in Ghana by identifying the variations in school quality across the country. The Mincer earnings equation is modified to include school quality and other variables and employed to show the relationship with earnings. The study uses secondary data from the sixth round of the Ghana Living Standard Survey and Ghana Ministry of Education.

Results from the study reveal a significant relationship between school quality variables and the earnings of workers in Ghana. There are also variations in school quality across the country. After obtaining the Ordinary Least Square estimates, school quality represented by pupil-teacher ratios (PTR) and percentage of trained teachers (PTT) suggest that individuals educated in regions with better quality schooling (i.e., higher percentage of trained teachers and lower pupil-teacher ratios) earn significantly more than those educated in regions with lower quality schooling. This is thus consistent with findings of Bedi and Edwards (2001) and Godana and Ashipala (2006). Using parents’ years of education as instruments with a sample size of 9219 workers, the Instrumental Variables estimates suggest that the impact of school quality on earnings is significant for the percentage of trained teachers measure of school quality.

Pertaining to gender, pupil-teacher ratio has a significant impact on male workers whereas percentage of trained teachers has a significant impact on female workers. This suggests that males educated in regions with lower pupil-teacher ratios earn
significantly more than males educated in regions with higher pupil-teacher ratios. Females also educated in regions with higher percentage of trained teachers earn significantly more than females educated in regions with low percentage of trained teachers.
DEDICATION

This thesis is dedicated to my family, friends, lecturers and colleagues who encouraged and supported me in diverse ways throughout my academic life.
ACKNOWLEDGEMENTS

I acknowledge and thank the Lord God Almighty for His goodness and faithfulness through the Lord Jesus Christ. Only His grace has brought me this far and I am eternally grateful to Him. Much appreciation also goes to my supervisors, Dr. William Baah-Boateng and Dr. Priscilla Twumasi Baffour for their contributions and supervision for the successful completion of this work.

Special thanks also go to my parents, Mr. Isaac Ben Kotei and Ms. Victoria Noi and my siblings Mrs. Rebecca Numelio and Ms. Naomi Kotei for every encouragement, prayer and support given me throughout my academic pursuits.

To all my friends and loved ones whose diverse support helped me complete this thesis particularly Ms. Georgina Cobla, Ms. Vera Oteng and Ms. Florence Addo, I say a big thank you. I also thank my colleagues from the Department of Economics, University of Ghana. I am grateful for the opportunity to go through this programme of study with them.
# TABLE OF CONTENTS

DECLARATION ........................................................................................................... ii  
ABSTRACT .................................................................................................................. ii  
DEDICATION ............................................................................................................. iv  
ACKNOWLEDGEMENTS .......................................................................................... v  
LIST OF FIGURES .................................................................................................... viii  
LIST OF TABLES ....................................................................................................... ix  
LIST OF ABBREVIATIONS ....................................................................................... x  
CHAPTER ONE ............................................................................................................ 1  
INTRODUCTION ......................................................................................................... 1  
  1.1 Background of Study ............................................................................................. 1  
  1.2 Problem Statement ............................................................................................... 5  
  1.3 Research questions .............................................................................................. 7  
  1.4 Objectives of the Study ....................................................................................... 7  
  1.5 Significance of the Study .................................................................................... 8  
  1.6 Organization of the Study ................................................................................... 9  
CHAPTER TWO ......................................................................................................... 11  
LITERATURE REVIEW ............................................................................................ 11  
  2.1 Introduction ......................................................................................................... 11  
  2.2 Theoretical Literature ....................................................................................... 11  
    2.2.1 The Human Capital Theory ......................................................................... 11  
    2.2.2 The Signalling/Screening Model ................................................................. 13  
    2.2.3 On-the-Job Training .................................................................................. 13  
    2.2.4 Mincer model ............................................................................................ 14  
  2.3 Empirical Literature Survey ............................................................................... 14  
  2.4 Conclusion ......................................................................................................... 27  
CHAPTER THREE ..................................................................................................... 28  
OVERVIEW OF EDUCATION IN GHANA ............................................................. 28  
  3.1 Introduction ......................................................................................................... 28  
  3.2 Evolution of education before independence ..................................................... 28  
  3.3 Educational Reforms in Ghana ........................................................................ 30  
  3.4 Structure of the Schooling system in Ghana .................................................... 34  
  3.5 Access to basic education in Ghana .................................................................. 35  
  3.6 Enrolment ........................................................................................................... 39
LIST OF FIGURES

Figure 3.1 Education System in Ghana.................................................................35

Figure 3.2 Trends in Percentage of Trained Teachers, Pupil-Teacher Ratio and Availability of Core Textbooks .................................................................42

Figure 3.3 Trends in Availability of Toilet Facilities, Drinking Water and Classrooms Needing Major Repairs ........................................................................44

Figure 3.4 Trends in Unemployment Rates in Ghana (1995-2013) ......................47

Figure 5.1 Pie Chart Showing the Level of Education of Workers ......................65

Figure 5.2 Pie Chart Showing the Proportion of Workers by Residence ..............66

Figure 5.3 Mean Monthly Earnings of Paid Workers by Regions ......................69

Figure 5.4 Mean PTT and PTR of Paid Workers by Regions. (1989-2013) ..........71

Figure 5.5 Histogram of Log of Earnings .................................................................71
LIST OF TABLES

Table 3.1 Availability of a Pre-School and Primary School by Region ..................... 38
Table 5.1 Summary Statistics for Selected Independent Variables ............................. 63
Table 5.2 Descriptive Statistics for the Independent Variables ................................. 64
Table 5.3 Mean Monthly Earnings of Paid Workers .................................................. 67
Table 5.4 OLS Estimates of Independent Variables ................................................... 73
Table 5.5 IV Estimates of Independent Variables ...................................................... 78
# LIST OF ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADP</td>
<td>Accelerated Development Plan</td>
</tr>
<tr>
<td>BECE</td>
<td>Basic Education Certificate Examination</td>
</tr>
<tr>
<td>CREATE</td>
<td>Consortium for Educational Access, Transitions and Equity</td>
</tr>
<tr>
<td>DBE</td>
<td>Diploma in Basic Education</td>
</tr>
<tr>
<td>EMIS</td>
<td>Education Management Information System</td>
</tr>
<tr>
<td>FCUBE</td>
<td>Free Compulsory Universal Basic Education</td>
</tr>
<tr>
<td>GER</td>
<td>Gross Enrolment Rates</td>
</tr>
<tr>
<td>GES</td>
<td>Ghana Education Service</td>
</tr>
<tr>
<td>GLSS</td>
<td>Ghana Living Standards Survey</td>
</tr>
<tr>
<td>GoG</td>
<td>Government of Ghana</td>
</tr>
<tr>
<td>GSS</td>
<td>Ghana Statistical Service</td>
</tr>
<tr>
<td>HND</td>
<td>Higher National Diploma</td>
</tr>
<tr>
<td>ISCO</td>
<td>International Standard Classification of Occupations</td>
</tr>
<tr>
<td>IV</td>
<td>Instrumental Variables</td>
</tr>
<tr>
<td>JHS</td>
<td>Junior High School</td>
</tr>
<tr>
<td>JSS</td>
<td>Junior Secondary School</td>
</tr>
<tr>
<td>MDG</td>
<td>Millennium Development Goal</td>
</tr>
<tr>
<td>MoE</td>
<td>Ministry of Education</td>
</tr>
<tr>
<td>MSLC</td>
<td>Middle School Leaving Certificate</td>
</tr>
<tr>
<td>NER</td>
<td>Net Enrolment Ratio</td>
</tr>
<tr>
<td>NLSY</td>
<td>National Longitudinal Survey of Youth</td>
</tr>
<tr>
<td>OLS</td>
<td>Ordinary Least Square</td>
</tr>
<tr>
<td>PBET</td>
<td>Post Basic Education and Training</td>
</tr>
<tr>
<td>PhD/Dphil</td>
<td>Doctor in Philosophy</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>PREP</td>
<td>Primary Education Project</td>
</tr>
<tr>
<td>PTR</td>
<td>Pupil-teacher Ratio</td>
</tr>
<tr>
<td>PTT</td>
<td>Percentage of Trained Teachers</td>
</tr>
<tr>
<td>SHS</td>
<td>Senior High School</td>
</tr>
<tr>
<td>SSS</td>
<td>Senior Secondary School</td>
</tr>
<tr>
<td>TVET</td>
<td>Technical and Vocational Education and Training</td>
</tr>
<tr>
<td>UNDP</td>
<td>United Nations Development Program</td>
</tr>
<tr>
<td>UNICEF</td>
<td>United Nations Children’s Fund</td>
</tr>
<tr>
<td>UTDBE</td>
<td>Untrained Teacher’s Diploma in Basic Education</td>
</tr>
<tr>
<td>WDI</td>
<td>World Development Indicators</td>
</tr>
</tbody>
</table>
CHAPTER ONE
INTRODUCTION

1.1 Background of Study

Education is an act or process of imparting or acquiring general knowledge, developing the powers of reasoning and judgement, and in general preparing oneself or others intellectually. The most common and well-known way of acquiring education is through schooling although informally, one could also obtain education through home training and apprenticeship. Schooling, as a tool of education, produces the skills that enhance individual labour productivity thereby making the individual better off and possibly, making others better off as well. A more educated society may lead to higher rates of invention, enhance the ability of firms to introduce new and better production methods and boost rapid introduction of new technologies (Hanushek, 2005). Some of the social and non-economic benefits produced by schooling include improvement in child well-being, health status, efficiency of consumer choices, fertility and social capital (Montenegro and Patrinos, 2013).

Education is critical for economic growth and since economic growth determines the overall standard of living of society, education is critical in the improvement of the standard of living of a society. Economists have developed a variety of models and theories relating education to economic growth. One such theory is the human capital theory. Human capital can be defined as knowledge, skills, attitudes, aptitudes, and other acquired traits contributing to production (Goode, 1959). It enables one to think of not only the years of schooling, but also of a variety of other characteristics as part of human capital investments. These include school quality, training, attitudes towards work, and others.
Although a specific definition of school quality is difficult to find, it generally involves the process of having the essential and basic inputs for a smooth delivery in the educational process. This entails having trained and motivated teachers, well-managed classroom and schools, good supervision, right attitude towards learning, basic learning tools and the effective use of information and communication as instruments for learning.

In the measurement of school quality, most studies tend to use two approaches. The first involves using scores on standardised national or international tests when they are available as measures of education quality (Glewwe 1999, Hanushek 1995) and the second is to proxy school quality by the level of school resources (Card and Krueger 1996, Case and Yogo 1999). Jointly, these two approaches may be referred to as the traditional/resource based measurement of school quality. Other measures of school quality (which are however not so common) include the environment-based and match-based measurements (Owyang and Vermann, 2012).

The traditional/resource-based view proposes that school quality may be measured by tangible resources such as class size, expenditure per student, teachers’ level of education, student-teacher ratios, term lengths and teacher salaries. The environmental definition is based on the argument of Hanushek et al (2003) that a school’s environment contributes to students’ academic and economic outcomes more than its resources. That is, where students and teachers are more motivated irrespective of the resources available, they are likely to perform better because of the “achievement-oriented” environment they find themselves in. In this case, school environment forms the measure for school quality. The third measure of school quality which is the
“Match quality” is the fit between the school and the student and is a more subjective measure that takes into account how well students’ needs and learning styles fit with the culture of their schools. This definition of school quality posits that the more choices available to students and their families for a school, the better the match of the school for a particular student. Based on this theory, attending the “best” school (in regards to resources) may not necessarily result in the best outcome for a particular student.

Notwithstanding, there is a strong and positive link between years of schooling and earnings of students once they enter the labour market. This remains one of the well-established facts in labour economics. A review of research by Psacharopolous (1994) reveals that an additional year of schooling has larger effects on earnings for workers in developing countries and within these countries the returns to education decline with the level of schooling. However, recent studies in Ghana have revealed the benefits of education and how higher levels of education suggest higher returns to education (Teal, 2001; Twumasi, 2006; Nunoo, 2009; Okletey, 2013). In the light of the observed returns to an extra year of schooling, the imposition of compulsory school attendance laws in both developed and developing countries during the last centuries and the associated expenditures are widely viewed as excellent public investments.

Researchers have therefore sought to examine whether the substantial observed returns to additional years of schooling depend on the level of funding that schools receive. A clear understanding of the impact of education on individuals as well as social welfare is important to determine whether individuals and society are making
the right investment choices. Over the past decade, Ghana’s spending on education has been around 25% of its annual budget (World Bank, 2012). Prior to 1992, the consensus was that high levels of school expenditures had little impact on educational or labour market outcomes. This was based on Hanushek’s (1986) conclusion that there appeared to be no strong or systematic relationship between school expenditure and student performance when he tried to examine public school expenditure in the United States in relation to their productivity and efficiency. However, when Card and Krueger (1992a) showed that school quality as proxied by school resources was indeed positively correlated with the rate of return to schooling, a heated debate generated over the economic importance of school quality and school resources. This has since motivated a great deal of research to be done on school quality.

Discussions in developing countries concerning school quality and earnings are however impeded by the lack of empirical work devoted to the school quality–earnings link. This may be attributed to most of the limitations found in analysing school quality. Card and Krueger (1996), in their work discussed how researchers face a number of obstacles in studying the connection between school resources and economic outcomes. They asserted that one difficulty is the need to wait until students finish school and join the labour market. Consequently, researchers must have access to datasets that report both the current earnings and completed education of adults and information on the resources available in the schools they attended. They further observed that since differences in the structure of the labour market may affect the reward to skills, and thus the measured impact of school resources, evaluations of the economic returns to school resources may require certain assumptions, or complex
econometric modelling, or both. On the other hand, most individuals are also not willing to give out information and especially, accurate information on their earnings.

Despite these shortcomings, however, works have been undertaken in developed countries more especially the United States on the impact of school quality on earnings (Heckman et al, 1995; Betts, 1996a; and Hanushek, 2004), and a few in developing countries (Behrman and Birdsall, 1983; Case and Yogo, 1999; Bedi and Edwards, 2001; and Godana and Ashipala, 2006). Evidence on the impact of school quality on earnings is however mixed up. While one set of paper reports strong effects of school quality on students’ subsequent earnings, another set finds little or no effect of school quality on earnings (Ribich and Murphy, 1975; Rizutto and Wachtel, 1980; Card and Krueger, 1992a). To this day, the varied findings, their underlying reasons and the lack of school quality effects on earnings and educational attainment continue to be debated in the United States (Bedi and Edwards, 2001). Betts (2010) however, attributes this to the different measurements and methods used in analysing school quality and earnings link.

1.2 Problem Statement

According to Michaelowa (2000), education affects the life of individuals, their participation in economic activities, and overall economic development in various ways. A person without basic literacy and numeracy skills is in a difficult situation to master everyday life. The lack of basic education has always been accepted as one of the major components of any multidimensional concept of poverty.
An economy in which most individuals have a basic level of schooling may grow faster than one in which a minority of individuals have advanced education while the rest of the population have little to no education with emphasis on good quality education. This is because positive household-level externalities of education benefit a greater number of people in the former case (Dahlin, 2002).

Although primary gross and net enrolment ratios continue to increase to the point of achieving the Millennium Goal 2, quality of education in terms of school facilities and resource remains a challenge in Ghana. Data from Ministry of Education as at 2013/2014 academic year show disparities in school quality across the country. At regional levels, primary schools in some regions have a pupil-teacher ratio as high as 42 and others have percentage of trained teachers being as low as 51%. In addition, while 34% of primary schools in some regions do not have access to good drinking water, 27% of primary schools in another are in need of major repairs (MoE, EMIS).

Though the importance of quality education is recognised universally, there is only but few researches in Ghana addressing the quality of schools in the country. Glewwe and Jacoby (1994) highlight the indirect effects of improving school quality on student achievement through increased grade attainment. In employing a cost-benefit analysis, they showed that repairing classrooms (a policy option ignored in most education production function studies) is a cost-effective investment in Ghana, relative to providing more instructional materials and improving teacher quality. Although they did not extend their work to examine the effect of school quality on earnings, Glewwe (1996) in assessing the impact of education on wages found out that cognitive skills acquired rather than years of schooling or innate ability determine
wages in the private sector in Ghana. This is consistent with the findings of Boissiere et al. (1985) for East Africa and those of Alderman et al. (1996) for Pakistan. Jolliffe (1998) and Vijverberg (1999) used the same dataset as Glewwe (1996) to examine school quality on off-farm income, on-farm income, and nonfarm self-employment. Only off-farm income was significantly related to cognitive skills.

The scarcity of empirical evidence from developing countries and the inconsistency in empirical results from the developed countries where studies have been undertaken make it quite unclear whether or not school quality actually has significant impact on earnings and more so earnings in Ghana. Therefore, the problem the research intends to investigate is whether the quality of schooling as proxied by better school resources does matter in determining future earnings of Ghanaians.

1.3 Research questions

The study seeks to provide answers to the following questions:

- Does school quality vary across the country?
- Does school quality impact earnings in Ghana?

1.4 Objectives of the Study

Flowing from the research questions, the main objective of the study is to investigate the impact of school quality on earnings in Ghana. Specific answers to the above research questions will help achieve the objectives underlying this study, which are:

- To identify among others the variations in school quality across the country.
- To examine the effect of school quality on earnings in Ghana.
1.5 Significance of the Study

Aside being one of the leading countries of educational expansion in Africa after independence, Ghana has also been regarded as one of the post-structural adjustment success stories of sub-Saharan Africa in terms of economic reforms and educational provision (UNDP, 2004). Various educational reforms and programmes including Free, Compulsory and Universal Basic education (FCUBE) and recently, the MDG 2 of providing universal primary education to all children of school-going age by this year, show that the country acknowledges the importance of education as an engine of growth. All these programmes and reforms came at high cost of about 25% of annual budget.

However, education differs from other areas of public expenditure because direct measures of outcomes are available, making it is possible to consider results and by implication, to consider the efficiency of provision (Hanushek, 2002). It is not surprising therefore that several and widespread studies have been carried out on the educational system in Ghana. While some of the studies looked at the broad spectrum of education in Ghana, others focused on just a section or level of schooling. Ghana, like most developing nations, is thus working hard to enhance education so in order to eradicate poverty and improve the standards of living of individuals. An ideal measure of an individual’s education should capture several components, including the number of years spent in school, the quality of the schooling, the nature of the curriculum, and the student’s effort. Creating a measure that accurately quantifies these components is difficult. Of these components, an individual’s years of schooling is the only directly observable characteristic, although one may indirectly measure
aspects such as educational quality and individual ability and effort through standardized tests.

However, since data is not readily available for these variables as compared to years of schooling in developing countries, most studies do not incorporate the quality aspect in the estimation of returns to education and therefore do not account for differences in the quality or type of education received (Appleton, 1999). There is concern among policy makers that quality improvement has lagged behind the vast expansion in access to education. Furthermore, the United Nations Children’s Emergency Fund annual report on Ghana show that quality is not distributed evenly over all schools (UNICEF, 2013). Examining the extent to which school quality affects the earnings of individuals in Ghana therefore is necessary in order to shed more light on the quality of the educational system in country and also to permit a comparison of the returns to improving the system and not only expanding it. The findings of the study would also enlighten policy makers as to which school resources or inputs are more likely to affect the rate of returns to education and earnings and this would direct policy makers and investors to know exactly where to channel resources to enhance higher returns to education in Ghana. Furthermore, this study will also help bridge the gap in existing literature on the link between school quality and earnings in Ghana.

1.6 Organization of the Study

The study is organised into six main chapters. The first chapter is an introduction to the study. The second deals with the necessary literature review on the topic. The third chapter gives an overview of education in Ghana. Chapter four presents the
methodology comprising the model specification, estimation technique and data used in the study. The presentation and discussion of results are contained in chapter five while the sixth chapter concludes the thesis with some observations and policy implications and suggestions for future research based on the findings of the study.
CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter reviews the theoretical underpinning of the study. Literature is also reviewed on empirical work to serve as a guide to the choice of appropriate method and variables to be used. It also expounds the gaps in the existing literature on the subject and as a result clarifies the essence and contribution of this study in filling these gaps.

2.2 Theoretical Literature

Various theories exist that shed light on schooling and earnings. Some of these theories are the human capital theory, the signalling/screening model, on-the-job training and the Mincer model.

2.2.1 The Human Capital Theory

In general, human capital can be seen as investment in individuals that make them differ in skills and productivity. However, human capital could be viewed in different ways. Becker (1994) defines human capital as the activities that influence future monetary and psychic income by increasing resources in people with the main forms of influence coming from schooling and on-the-job training. He also considers human capital as directly useful in the production process. His view presents human capital in a one-dimensional way, such as the stock of knowledge or skills which directly imparts the production function.
Alternatively, a different view from Becker (1994) is that of Gardner (1983) who in contributing to the development of multiple-intelligences theory saw that a strict definition of human capital/potential would mean many geniuses or famous personalities are very “unskilled” in some other dimensions. Gardner’s view takes an objection to the one-dimensionality of human capital in the production process and argues that there are many dimensions of human capital such as mental verses physical abilities.

Schultz (1961) along with Nelson and Phelps (1966) consider human capital as the capacity to adapt to structural changes. According to their approach, human capital is especially useful in dealing with situations in which there is a changing environment and workers have to adapt to this change. From a different perspective also, Bowles and Gintis (1975) view human capital as the capacity to work in organizations, obey orders, and to adapt to life in a hierarchical or capitalist society. According to this view, the main role of schooling is to instil in individuals the correct ideology and approach towards life.

Despite their differences, the first three views confirm that human capital is valued in the labour market because it increases firms’ profits. Most applications in labour economics however, view human capital as a mixture of these three approaches. Notwithstanding, the Bowles and Gintis (1975) view have similar implications in that firms would pay higher wages to educated workers because these workers will be more useful to the firm as they will obey orders better and will be more reliable members of the firm’s hierarchy.
2.2.2 The Signalling/Screening Model

Spence’s (1974) signalling model considers the possibility that education is purely a signal of ability. His model assumes that education adds nothing to an individual’s human capital but rather serves as a filter through which the most able students pass. As a result, the possession of more education “signals” a worker’s quality in the job market. By choosing to invest in education, highly productive workers distinguish themselves from less productive workers. Potential employers may not be able to observe the ability of the workers but are aware that investing in education is cheaper for highly able workers. Therefore, education serves as a credible signal of unobserved productivity and rewarded with higher wages. In contrast to the signalling model, the screening model assumes that the uninformed party (employers) move first and offer a menu of contracts from which the informed party (employees) may choose. In the screening variant of the Spence game, the employers move first by offering wages contingent on the investment decision. Moving second, the workers then decide on their investment in education.

2.2.3 On-the-Job Training

After schooling, workers continue to invest in their human capital by acquiring some set of skills useful for a particular industry or useful with a particular set of technology. Even at this stage, just like schooling, the worker is faced with the similar decision of how much to invest since it is difficult for a worker to make training investments by himself. Firms also invest in the training of their workers so training is often a joint investment by firms and workers. The role of the firm is even greater taking into account that training has a significant matching component since it is most useful for the worker to invest in a set of specific technologies that the firm will be
using in the future. Compared to workers, firms often end up bearing a large fraction of the costs of these training investments (Barron et al., 1999).

2.2.4 Mincer model

The Mincer model is one of the prominent models that relate schooling to earnings. It examines the relationship between educational attainment and earnings by assuming that if the only costs of an additional year at school are foregone earnings and if the effected proportional income increase is constant over one’s lifetime, the logarithm of earnings is linearly dependent on the years of schooling (Mincer, 1974). The Earning Function Method as derived from Mincer (1974) involves the fitting of a function specified as:

\[ \ln w_i = \alpha + \beta_1 S_i + \beta_2 X_i + \beta_3 X_i^2 + \mu_i \]

Where \( \ln w_i \) is the natural log of earnings for the \( i_{th} \) individual; \( S_i \) is years of schooling; \( X_i \) is labour market potential experience; \( X_i^2 \) is potential experience-squared; and \( \mu_i \) is a random disturbance term reflecting unobserved abilities. \( \beta_1 \) can be viewed as the average private rate of return to years of schooling to wage employment. Work experience is included as a quadratic term in order to capture the concavity of the earnings profile. The Mincerian equation has been the basic model used in determining the rate of return to investment in schooling and is seen to be a stable measure in its regard (Montenegro and Patrinos, 2013).

2.3 Empirical Literature Survey

This section reviews studies on the economics of school quality and its impact on earnings. It includes an analysis of the main trends and findings in the research that has been conducted over the last several years within and outside Ghana. A key
feature of this review is the variety of measures of school resources that researchers have used. Some have used spending per pupil, pupil-teacher/teacher-pupil ratios, test scores/cognitive ability whiles others have used teacher education, books per student, teacher experience and length of the school year as measures of school quality. These measurements are often taken at the district or state level and only a few at individual school levels.

In determining the possibility of variations in school quality, researchers examine whether test scores or earnings of individuals differ systematically across the schools that they attended. Based on a number of papers, there is evidence that students attending different public schools in the United States have systematic variations in their earnings, after controlling for personal traits of the students (Betts 1995; Grogger 1996a). Using test-scores also provide similar signs that schools vary in quality. Hanushek et al. (1998) based on test scores of individual students in Texas show that schools vary significantly in how quickly their students learn. They also show that within schools, much of the variation in rates of learning between one grade and the next appeared to depend on variations in teacher quality. Similarly, Murnane (1975) shows equal results in his work.

Hanushek (1995) reviews research on the impact of school spending and resources in developing countries. The school resources he reviewed were teacher-pupil ratio, teacher salaries, teachers’ education and school facilities. Based on 96 studies in developing countries, he reports little evidence that teacher-pupil ratio or teacher salaries are positively and significantly related to student performance which he measured through test scores. However, 35 of 63 studies found a positive significant
effect of teachers’ education, and 22 out of 34 studies reported a positive and significant link between school facilities and student performance. The overall pattern suggests that school spending might matter more in a developing country context than in countries such as the United States. We can therefore infer that there exist substantial variations in school quality in developing countries than in developed countries and this may account for the higher impact of school spending in developing countries.

However, although test scores do confirm variations in school quality, a shortcoming of using this measure is that test scores only provide a feeble link to educational outcomes such as employment and earnings. Test scores in themselves explain only a small part of the overall variation in outcomes of earnings or the years of education students obtain (Mason and Griliches 1972). Another reason why economists tend to focus on earnings of workers rather than test scores is that earnings serve as a proxy for the underlying productivity of the individual, and so provide clues as to the long-term productivity consequences of the types of schooling that workers obtained when they were young. A general conclusion that can be thrown from this is that among other labour market outcomes earnings unlike test scores provide a good measure of a person’s overall economic welfare and are a more meaningful indicator of adult success. This confirms the reason why social scientists have attempted to estimate a link between school resources and earnings of students once they leave school and enter the labour market.
Berhman and Birdsall (1983) observe that in estimating the impact of schooling on productivity and earnings, schooling is mostly represented by years or grades of schooling (Psacharopoulos, 1994). They argue that since there are considerable variations in the quality of schooling, as it seemed in many countries, failure to control for the quality of schooling in earnings function estimates may cause biases in the estimated returns to schooling. They therefore incorporated school quality formally into the standard Mincerian (1974) framework for analysing the returns to school investments. This they considered would enable public investment decisions on school quality to be explored. This observation remains a significant point since if school quality has an impact on earnings then estimates on the returns to schooling which may omit school quality variables could be biased.

In order to demonstrate how exclusion of quality in the standard procedure may cause biases in the estimated returns to years of schooling, their work captured young Brazilian males from a random subsample of 6,171 ages 15-35 from the 1% of households in the Public Use sample of the 1970 Brazilian census. They limited their sample to males in order to avoid selectivity problems associated with female labour-force participation. Their choice of 15-35 years age range was also to lessen measurement error in their school quality variable, which they choose as the average schooling of teachers in the area in which an individual obtained his schooling. Their work was based on three assumptions. The first was that quality varied across geographical areas. If quality is uniform across regions, the effect of quality on earnings cannot be identified empirically. That is, in order to determine the effect of quality on earnings, there should exist variations in school quality. Secondly,
individuals did not move across areas in response to quality differentials (though they may migrate in post schooling years in response to geographical income differentials).

This is however more likely to be satisfied for lower levels of schooling, since the costs of sending younger children to other areas for schooling or of moving the entire household for this reason are likely to be higher. The third assumption was to view quality as determined by public resource allocation to schooling out of general overall revenues so that there was no direct relation between quality in a particular area and the tax burden of a particular household in that area. They show in their estimates that the private return to years of schooling using their preferred quality-inclusive specification is only one-half the estimate using the standard procedure, indicating substantial upward bias in the standard estimates. They also show in their work how inclusion of quality resolves or reduces the paradox of varying returns to schooling over space and among individuals.

Although Berhman and Birdsall (1983) were one of the first to incorporate the school quality variable into the Mincerian model in order to estimate the impact of school quality on earnings, their measure of school quality had some inadequacies. By averaging over the rural or over the urban parts of a state, they ignored some of the intrastate variation in school quality and this may have exposed their estimates to some biases. Nevertheless, they chose to use the state rural and urban averages for quality since they could not identify in what rural or urban part of a state most of the respondents obtained their schooling. Their measure of quality also indicated that teacher training was more uniform across locales for teachers than for the overall population, however, there were variations. Aside teacher quality, their research could
have also explored other important inputs as their index for measuring school quality such as school facilities, textbooks and more. Their work was however limited because they did not have observations on such factors and therefore could not include them.

A conceptually similar approach used by Behrman and Birdsall (1983) is the work of Card and Krueger (1992a). They use state-level data to estimate the effect of school quality on the return to education for white men in the United States of America, born in the 48 mainland states and the District of Columbia between 1920 and 1949. Their paper presents an extensive analysis of the relation between earnings and school quality for their cohorts. The sample was taken from the 1980 census to estimate rates of return to education by state of birth and cohort. They also relate rates of return to schooling to objective measures of school quality, including pupil-teacher ratios, relative wages of teachers, and the length of the school term. In using unrestricted state of birth effects, they controlled for differences that may occur in the mean earnings of men born in different states. They also controlled for systematic differences in the returns to education associated with an individual’s current region of residence. This helped them to eliminate relative supply or demand effects that raise or lower the returns to education in different parts of the country.

Their results reveal the significant variation in the rate of return to education across individuals born in different states and at different times. Much of the variation was associated with differences in the quality of schooling. They found that rates of return were higher for individuals who attended schools with lower pupil-teacher ratios and higher relative teacher salaries. Their estimates suggest that a decrease in the pupil-
teacher ratio by five students is associated with a 0.4% increase in the rate of return to schooling. Similarly, a 10% increase in teachers' pay is associated with a 0.1% increase in the rate of return to schooling. They also show that returns were linked to higher education among teachers. However, controlling for measures of school quality, they found no evidence that returns to education were related to the income or schooling levels of the parents' generation.

Betts (1995) found a contrast to the results of Card and Krueger (1992a). Using data from the National Longitudinal Survey of Youth (NLSY) of the United States of America, Betts (1995) tested for a link between the log weekly wage of white males and the quality of the actual high school attended by the individuals. The data used was from 1979-1990. The dataset followed a set of workers aged 14 to 21 in 1979 and who were 24 to 31 in 1989. The sample included observations on labour-market outcomes from 1979-1989. The paper rejected the hypothesis that workers' earnings were independent of which high school they may have attended. After determining that schools differed significantly in quality and that earnings differed among workers who attended different high schools, Betts (1995) tried to identify the characteristics of schools which influenced earnings of their former students. He found out that traditional measures of school quality such as class size, teachers' salaries and teachers' level of education failed to capture the differences.

Despite repeating the regression under many different specifications, and using various subsamples designed to eliminate potential data problems, the same conclusion held throughout: there was no significant positive relation of the three school inputs to the subsequent earnings of students. The advantage Betts (1995) had
in using actual school attended by individual was to eliminate measurement error and aggregation bias associated with the use of average school quality by school district or state. In addition, the data provided information on detailed school and individual characteristics which allowed for individual characteristics to be controlled and for school quality to enter not just as an interaction with each worker's years of education, but as a direct effect.

However, the lack of significant effect between the school quality variables and earnings of their students according to the work of Farber and Gibbons (1991) could be attributed to the fact that Betts’ (1995) analysis was based on young workers. This could be an important factor the research might have overlooked since there would be little correlation between earnings and any measurement of worker productivity for new entrants to the labour force. This might explain why the results of Card and Krueger (1992a), based on workers aged 31-60 at the time of data collection were so different from their results which were based on workers who ranged in age from 17 to 32 during the course of the survey.

Case and Yogo (1999) using a two-state estimation procedure similar to that employed by Card and Krueger (1992a), found that the quality of schools in a respondent’s magisterial district of origin had a large and significant effect on the rate of return to schooling for Black men in South Africa. Their data was based on the incomes of Black South Africans from the 1996 South African census and two national surveys of school quality. The South African data was reported at the magisterial district level. They analysed only 24 to 34 year-olds so that the 1991 school quality measures might better reflect the quality of schools attended by those
they studied. The first stage regression was to analyse the log of annual income for persons who reported working in a particular magisterial district, who had moved from a specified magisterial district and who were in a specific age cohort. Observations were included in the first stage only if individuals came from magisterial districts for which there was school quality information for the second stage. In the second stage, they took the magisterial district specific returns to education and regressed them on measures of magisterial district school quality and other characteristics of the magisterial district from which the individual migrated. All individuals were assigned the school quality measures of the district they report having migrated from, and those who have not migrated were assigned the quality measure for the district they had been currently living in.

From their estimates, Case and Yogo (1999) found that a decrease in the pupil-teacher ratio of 5 students would, on average, be associated with an increase in the return to education of roughly 1%. They also found out that school quality significantly affected educational attainment and the probability of employment. Their estimate of the effect of the pupil-teacher ratio on years of completed schooling was identical to that estimated by Card and Krueger (1992a) for cohorts of men born in the United States between 1920 and 1950. Reducing the pupil-teacher ratio by 10 students would, all things being equal, increase completed schooling by 0.6 years.

Godana and Ashipala (2006) also investigate the impact of school quality on returns to education in Namibia. Based on an extensive survey of households and a record of school resources for almost 20 years, their study matched individuals to the schools they had attended during their schooling years. The primary data was collected
through an extensive field survey carried out in all 13 regions in Namibia covering 888 households and interviewing 1168 individuals. Their questionnaire was designed to collect both qualitative and quantitative data. In addition, a cognitive test was administered using a math test developed for Ghana. The survey targeted individuals above the age of 15 years who were not schooling at the time of interview. The questionnaire covered respondent’s family background, his/her schooling, employment details as well as income of the respondent in wage and self-employment. Information on school quality was taken from the Ministry of Basic Education, Sports and Culture, Namibia.

In agreement with many other studies for different countries, school resources as measured by pupil-teacher ratio and teacher qualification were found to have very little impact on rate of returns to education. However, in contrast to the findings of Card and Krueger (1992a), the study gave strong evidence that factors like mother’s education and household assets along with attendance of pre-primary education as well as cognitive ability of the individual had strong and positive impact on earnings. Pupil-teacher ratio had a negative impact on returns to education implying that the higher the ratio, the lower the quality of schooling and ultimately affecting market returns to education negatively. Teacher qualification had however an unexpected negative sign. This may be possible because of the negative correlation between pupil teacher ratio and teacher qualification observed in the data used.

Bedi and Edwards (2001) combine household survey data with data on school quality from Honduras, to study the importance of school quality as a determinant of earnings. Their measures of school quality captured teacher training, school
infrastructure and school crowding. Their results displayed strong positive effects of school quality on earnings and on educational returns. Their data file used was created by combining information from a 1986 survey of urban Honduran households conducted by the Office of Planning, Coordination and Budget and data on primary school quality collected by the Ministry of Education for the same year.

The household survey was a random sample of 4,400 urban Honduran households. Survey information included monthly income, demographic characteristics (such as education, age and family size), characteristics about housing quality, and detailed information on population movements. Measurements for school data were municipal-level averages and the data was for Honduran males between the ages of 14 and 35, who were not full-time students and who supplied information on their labour income. Again, this sample was restricted to males in order to avoid selectivity problems associated with female labour force participation and was limited to 14–35 year age range in order to capture individuals who would have first enrolled in school between 1958 and 1979. This they did to lessen the measurement error associated with the use of current school quality measures to explain current earnings.

Like the previous works, Bedi and Edwards (2001) used different specifications by incorporating the quality variable into the Mincerian model independently, by interacting it with the years of schooling and subsequently, using the two at the same time. Overall, regardless of the specification used, there appeared to be a statistically and quantitatively significant impact of school quality on earnings. Their estimates suggest that males educated in municipalities with better school quality tend to be rewarded with higher earnings. Depending on the specification, the effect of an
increase in electricity provision by one standard deviation increased earnings by 3–5.6%. A similar increase in the student–table ratio increases earnings by 3.3–4.3%, while a decrease in the student teacher–ratio may be expected to increase earnings by around 2.7% to 4.5%. The school quality effects they obtained however appeared to be much larger as compared to those reported for the United States. This may be possible because of the considerable variations in school quality in Honduras and that of the United States.

In Ghana, Glewwe (1996) estimated rates of return to schooling based on the standard human capital model of Becker (1975) and Mincer (1974). He investigates whether failure in accounting for differences in ability and school quality lead to significant biases. He uses datasets from the second round of the Ghana Living Standards Survey (GLSS 2) which was conducted in the 1988/1989. The paper uses data on cognitive skills to estimate rates of return to three types of school quality improvements for which cost data could be obtained; namely blackboards, leaking classrooms and number of books per class. The data covered 3200 households from all regions of Ghana from October, 1988 to August, 1989.

Three tests were administered to all household members from age 9 to 55. This Glewwe (1996) used to measure their cognitive skills. The three tests covered abstract reasoning (Raven's Coloured Progressive Matrices), mathematics, and (English) reading comprehension. Using the basic Mincerian model, he estimated the private rate of return to education to be 8-9% and the experience variable also had a strong significant positive sign. The rate of 8-9% was lower than the general finding of Psacharopoulos (1994) of 13% for Africa, but not necessarily inconsistent. He
however noted that rates of return to additional years of schooling may be of little use without information on school quality. He found it vital to have estimates of rates of return to improvements in school quality, which one could not obtain from standard estimates of rates of return to additional years of schooling. The data from Ghana indicate that school quality improvements had higher rates of return than additional years of schooling at the then current level of quality. The social rates of return to government investments in school quality were estimated to be between 25-29% than investments in the quantity of schooling. However, these rates of return are not comparable because they were given in social returns whereas the others were given in private returns.

Overall, in trying to estimate the impact of school quality on earnings, as observed, most literature limited their surveys to males in order to avoid inconsistencies associated with female labour participation. However, Dearden et al. (2002) modelled outcomes for British women and found some evidence that pupil-teacher ratios are significantly negatively related to women’s earnings at age 33, but only for women of lower academic ability, as measured at age 11. Betts (2001) also provided the first study of the relation between school resources and the earnings of women in the United States and estimated that for white women there was no significant connection between school resources and wages. However, the pupil-teacher ratio and library books per student were significantly related to black women's wages, even though overall spending per pupil in the district and teachers’ salaries bore no relation to black female students’ subsequent earnings.
Although Card and Krueger (1992a) found no link between individual earnings and parental income and education, by using individual-level data, Altonji and Dunn (1996), estimated the effect of parental education and school quality on educational returns. In most of their specifications, having a more educated parent was associated with a higher return to education while school expenditures per student did not show any positive effect. The study on Namibia by Godana and Ashipala (2006) also confirmed that factors such as mother’s education and household assets had a strong and positive significant relation to earnings. Mulligan (1999) using controls for a large number of measures of school quality variables as well as cognitive skills found that an estimate of parental income was an important and statistically significant predictor of the natural logarithm of the hourly wage rate in 1990 and 1991 in the National Longitudinal Study of Youth.

2.4 Conclusion

The chapter reviewed literature on the relation between school resources and earnings. Results varied as to whether there existed a significant relationship between school resources which estimated quality, and the earnings of individuals. Subsequently, studies that focus on more recent generations and that measure school resources of the actual school attended did not find a strong effect and the studies which found an effect suggested that increasing school resources were only likely to increase wages by small amount. Given the variations in these findings, it is useful that this study be carried out in order to examine the impact of school quality on earnings in Ghana and bridge the gap in the existing literature.
CHAPTER THREE

OVERVIEW OF EDUCATION IN GHANA

3.1 Introduction

This chapter presents an overview of the education system in Ghana. It initially highlights the development of education in Ghana from the pre-independence and post-independence era, through the various reforms undertaken to the current structure of the educational system in the country. Also included is a statistical overview on basic education in Ghana with emphasis on access, enrolment and quality. Labour market outcomes in Ghana are also reviewed.

3.2 Evolution of education before independence

Before the introduction of formal education into Ghana, knowledge and skills were passed on from the elderly to the youth by word of mouth or by way of apprenticeship (Adu-Agyem and Osei-Poku, 2012). With the arrival of the European traders into Gold Coast (now Ghana) came along the introduction of western education. This was around the 16th century and the traders included the Portuguese, the Dutch, Danes, British, Normans, Spaniards and the French. Although the main aim of the Europeans was to trade with the indigenes, an added effect was the founding of schools and the spread of Christianity. Western education started in the form of castle schools with the Portuguese in 1529 in Elmina. However, at that time, only children born to the western traders by their African wives (mulattoes) and children of important chiefs and wealthy merchants were allowed to attend the schools. They taught reading, writing and arithmetic in these castle schools. The Europeans also produced educated local people to work as storekeepers and clerks in commerce, industry, and government.
After the Dutch drove out the Portuguese in 1637, they continued with the castle school system in Elmina. The Danes also followed and in 1722, they established the first Danish school at the Christiansburg castle in Accra. Like the preceding Europeans, they also sent some of the students abroad for further studies. When the British arrived in 1553, they set their headquarters in Cape Coast. Rev. Thomas Thompson was one of the early missionaries to arrive there. He was also the first man to attempt bringing schooling out of the castle and into the African community. The castle schools faced many challenges but more pressing was the issue of funds.

After a while, the missionaries began to take over the schooling system. The Wesleyan missionaries from England started schools along the coastal regions specifically in the Greater Accra region and Central region. They later advanced inland, established a Teacher Training College in Aburi in the Eastern Region, later moved it to the Ashanti region in 1924, and renamed it Wesley College. Most of their well-known schools include the Wesleyan Secondary School (now Mfantsipim School) which they established in 1876 and Wesley Girls High School (1935) all in Cape Coast.

The Basel missionaries from Germany were also involved together with the Bremen missionaries. Unlike the British, they encouraged the use of the local languages in teaching and were more into girl-child education. The Basels established a boy’s school in Aburi, a teacher training college in Akropong in 1853 all in the Eastern region. Subjects studied included English, Reading and Writing, Twi or Ga, Geometry, Natural History, Physics, Geography, History, Drawing, Bible Study, Craft Instruction and Singing Practice. The Bremen missionaries’ works were however
focused more in the Volta region among the Ewe speaking people (McWilliam & Kwamena-Poh, 1975).

Other mission supporters of education in Ghana were the French Catholic Priests, the African Methodist Episcopal Zion Mission, the Anglican Church and Islamic Religious Groups. In 1881, seven years after the British Government established colonial rule over Gold Coast, there were 139 schools established of which the Wesleyans founded 84, the Basel Mission, 47, the Bremen Mission 4 and the Roman Catholic Church, 1. Missions remained the main provider of formal education until independence in 1957.

3.3 Educational Reforms in Ghana

After independence, the various reforms which have helped improve the educational system in Ghana over the years include:

- Education Act, 1961
- New Structure and Content of Education, 1974
- Education Reform Programme, 1987
- Free Compulsory Universal Basic Education (FCUBE) Programme, 1996
- The 2007 reform

With the attainment of self-governance in 1951, the new government led by Kwame Nkrumah implemented an Accelerated Development Plan (ADP) with the intention of providing universal and free primary education for all children of school-going age whiles improving on enrolment in elementary and secondary education. A decade after, an Education Act was passed to reinforce the ADP. By 1965, Ghana’s educational system was one of the most advanced in Africa (Palmer, 2005c) and
enrolment stood as high as 75% for 6-14 years old (Ahadzie 2000). However, the rapid increase in enrolment was not accompanied by the same expansion in infrastructure and numbers of trained teachers. This marred the quality of schooling provided and quality of education begun to diminish. Later in 1972, a committee was set up in order to advice government on a new structure and content to help improve the educational system of the country. This committee was chaired by N. K Dzobo of the University of Cape Coast. Based on the committees report, proposals were accepted and recommendations were made. A way they saw to improve the educational system was by reducing the 17 years pre-tertiary schooling and also enabling students acquire more practical, technical and vocational skills. These targets were however only partially realized due to financial limitations and political instability during those times.

However, in the year 1986, the Dzobo report was reviewed and this time measures were taken in place to bring it to reality. A new educational reform was introduced in 1987 with a comprehensive Junior Secondary system which led to the reduction of pre-tertiary education from 17 years (6 years primary, 4 years middle school, 5 years secondary school and 2 years sixth-form) to 12 years (6 years primary, 3 years JSS, and 3 years SSS). The new reform had three phases with the JSS system starting from 1987-89, the SSS 1991-93 and the tertiary 1994-97. Vocational education also appeared in the JSS system and education was compulsory from 6-14 years. Teacher trainees were also require to have completed SSS before entering the training colleges. Educational infrastructures were also increased and these led to increment in enrolment.
After Ghana came under constitutional rule in 1992, the government was mandated to draw a program to improve the quality of teaching and learning of the educational system of the country. This brought about the birth of the Free Compulsory Universal Basic Education (FCUBE). The FCUBE was launched in 1996 as a ten-year action plan for the improvement of basic education, access and quality. The FCUBE was also aimed at improving teaching processes and learning outcomes, strengthening management at both the Central and the District levels and intensifying community involvement in education decentralization.

A year after coming into office in 2001, the new government appointed a 29-member Committee chaired by J. Anamuah-Mensah to review the entire education system in the country. From their review, the committee found out among others that about 60% of JSS graduates were ill equipped for either continued formal education or work. Also, the technical and vocational education were inadequately provisioned in resources and in structure. The Committee advised that in order to correct the defects observed in the educational system and to achieve the objective of producing graduates with the essential knowledge, skills and values needed to build a knowledge-based economy, there had to be a strong foundation for secondary education.

The major highlights of the reform include the following:

- The inclusion of 2 years kindergarten to the existing basic education structure.
- At the basic level, emphasis shall be on Literacy, Numeracy, Creative Arts and Problem Solving Skills.
The mainstreaming of technical, vocational and agricultural education were introduced into the usual secondary system and the introduction of the core subjects common to the traditional secondary school into existing technical, vocational and agricultural schools.

The extension of all kinds of secondary education to four years.

The creation of a new National Inspectorate Board outside the Ghana Education Service but under the Ministry of Education, Science and Sports to be responsible for periodic inspection of Basic and Secondary Schools.

Greater emphasis on Information and Communication Technology.

The strengthening of Guidance and Counselling in Schools.

The government came out with the White Paper in October, 2004 (GoG, 2004) which outlined the proposed reforms for the education and training system. Two and a half years after the release of the white paper the new education reform was finally launched on the 11th of April, 2007 to start operation in September, 2007.

However, the new reform was faced with many challenges including delays in the supply of syllabuses and textbooks for the smooth take off of the program. Teachers were also inadequately prepared in terms of training to implement the reform and classrooms and other facilities had not been adequately expanded to accommodate the extra year as students proceeded to the fourth year of the Senior High School (SHS) in September 2010. The change in the years of schooling at the Senior High level only lasted for 2 years as the new government in August 2009 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.

3.4 Structure of the Schooling system in Ghana

The schooling system in Ghana, over the past decades has undergone many systematic changes in its structure. Although its main components consist of basic education, second cycle education and tertiary education, the differences in the various educational reforms have always been on how to structure these three components in order to increase access to education and to improve upon the quality it provides as well as infrastructure. The current structure of the educational system in Ghana which was adopted in 2007 and later modified in 2009 comprises of 2 years of kindergarten or pre-school, 6 years of primary education, 3 years of Junior High School (JHS) and 3 years of Senior High School (SHS). Tertiary education involves schooling between 2-6 years depending on the degree or diploma to be obtained. A BECE certificate from successful completion of basic school allows one entry into any Senior High School or Technical and Vocational Education and Training (TVET) Institute. From there, one could enter either a university or a polytechnic to obtain a degree or Higher National Diploma (HND). The figure below gives a summary of educational attainment in Ghana.
3.5 Access to basic education in Ghana

As shown by the reforms, various measures have been undertaken to ensure accessibility of basic education to all. This is because education is very important and its effect spreads to the other sectors as well such as health, employment, and others. Having a good foundation for education can confidently be achieved through a strong basic education system which as stated by Oduro (2000) serves as the essential
building blocks to acquisition of higher levels of education. Even for those who may not continue to higher levels of education, a good foundation of basic education may provide the basis upon which work-related skills may be developed. This section reviews the first stage of the skill acquisition process in Ghana - basic education.

As defined by Ghana Education Service (GES), basic education is the minimum period of schooling needed to ensure that children acquire basic literacy, numeracy and problem solving skills as well as skills for creativity and healthy living. Basic education in Ghana lasts for a period of 11 years and the curriculum is free and compulsory from ages 4-15 years. It is divided into Kindergarten (2 years), Primary school (6 years) and Junior High School (JHS, 3 years), and ends on the Basic Education Certificate Examination (BECE).

The Consortium for Educational Access, Transitions and Equity (CREATE) considers access to basic education at the heart of development. Limiting educational access would mean limiting acquired knowledge and skill, and lack of these is an outline for poverty. A sure means of reducing inter-generational cycles of poverty, inequality, improving productivity and preventive health care as well as empowerment of women is by sustained access to meaningful learning that has essential value.

In Ghana, poverty is defined as an unacceptable physiological and social deprivation (GoG, 2003). Data from the third household living standards survey conducted in Ghana in 1991/92 shows that the incidence of poverty amongst households declines the more educated is the household head. This suggests education can be the route out of poverty (Oduro, 2000). Education provides opportunities for involvement in activities with high returns. In addition, evidence from Ghana and other developing
countries shows the children of educated mothers are more likely to have better levels of nutrition than children of uneducated mothers. Infant mortality rate amongst educated mothers is lower (Glewwe, 1999). Education therefore confers on women household heads the knowledge to manage household resources efficiently. The trend is however not different when it comes to the GLSS 6 poverty profile thus indicating the importance of education in poverty reduction.

The returns to education and training depend on the quality within the education and training systems, and the environment into which graduates enter after education and training. These benefits can be poverty reducing either by helping the poor directly or indirectly through support at the community or national levels.

Surely, education cannot achieve these gains on its own. Free Primary Education will not automatically create a series of developmental benefits, even if it responds to the rights to education of all children. However, through post basic education and training (PBET) the potential indirect educational contributions to poverty reduction can be realized. PBET can be achieved through maintenance and improvement activities by training teachers, developing new curricula, training educational managers and supervisors at all levels and ensuring that parents and children see clear evidence of improved opportunities at the post-basic level. Secondly, PBET contributions to training agricultural and health professionals, employment creation, developing a knowledge economy, stimulating economic growth and promoting innovation, inventiveness and research that catalyses education-developmental outcomes at all levels of education. For poverty reduction to occur, PBET must contribute to this
transformative context that allows knowledge and skills to translate into developmental outcomes (Palmer et al., 2007).

Table 3.1 Availability of a Pre-School and Primary School by Region

<table>
<thead>
<tr>
<th>Region</th>
<th>Pre-school</th>
<th>Primary school</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western</td>
<td>76.5</td>
<td>83.8</td>
</tr>
<tr>
<td>Central</td>
<td>78.1</td>
<td>75</td>
</tr>
<tr>
<td>Greater Accra</td>
<td>27.3</td>
<td>36.4</td>
</tr>
<tr>
<td>Volta</td>
<td>72.5</td>
<td>80</td>
</tr>
<tr>
<td>Eastern</td>
<td>61.2</td>
<td>60</td>
</tr>
<tr>
<td>Ashanti</td>
<td>82.8</td>
<td>84.5</td>
</tr>
<tr>
<td>Brong Ahafo</td>
<td>71.9</td>
<td>82.5</td>
</tr>
<tr>
<td>Northern</td>
<td>49.5</td>
<td>64.2</td>
</tr>
<tr>
<td>Upper East</td>
<td>71.3</td>
<td>73.6</td>
</tr>
<tr>
<td>Upper West</td>
<td>71.6</td>
<td>78.4</td>
</tr>
<tr>
<td>Total</td>
<td>68.7</td>
<td>74.2</td>
</tr>
</tbody>
</table>

Source: Ghana Statistical Service (GLSS 6)

Pre-schools and primary schools are the foundation to the education of the individual and as indicated in Table 3.1, more than two-thirds of rural communities (68.7%) in the country have a pre-school while about three-quarters have a primary school (74.3%). A higher proportion of communities in the Ashanti region (82.8%) have pre-schools followed by the Central (78.1%) and Western (76.5%) regions. With the exception of the Northern region (49.5%), the other two regions in the north have high proportions of communities with pre-schools (Upper East, 71.3% and Upper West, 71.6%).

With regard to primary education, the Ashanti region (84.5%) again has the highest proportion of rural communities with primary schools, with Western and Brong-Ahafo having 83.3% and 82.5% respectively. All the other regions, with the exception
of Greater Accra (36.4%) and Northern (64.2%), have more than 70% of their rural communities having a primary school.

3.6 Enrolment

Highlighted in almost all the educational reforms undertaken in Ghana is the goal to achieve universal basic education, increase enrolment and in general increase accessibility of education to children of school-going age. The most recent and expedient target facing the educational sector and the nation as a whole is the achievement of the Millennium Development Goal 2 which is targeting 100% enrolment of children into school by end of year 2015. Enrolments rates can be assessed by either looking at the Gross Enrolment Ratio (GER) or the Net Enrolment Ratio (NER).

The GER is a measure of the number of pupils or students enrolled in a given level of education, regardless of age, expressed as a percentage of the official school-age population corresponding to the same level of education. The ratio can exceed 100% due to over-aged and under-aged children who enter school late/early and/or repeat grades (MoE, 2013).

Net Enrolment Ratio (NER) on the other hand is the total number of pupils or students in the theoretical age group for a given level of education enrolled in that level, expressed as a percentage of the total population in that age group. The NER should have an upper limit of 100%.
Both graphs (see appendix A1 and A2) show improvement in GER and NER over the years. This indicates that most children of school-going age are now enrolling in school and if this persists Ghana may achieve her Development Goal 2 and increase literacy rate in the country as well.

However, during the sixth round of the Ghana Living Standards Survey (GLSS 6), some reasons were brought forward as to why some children of school-going age in the rural communities do not still attend school. Nine reasons were given as to why children were not attending school. About 37.6% of rural communities attributed the inability of parents to fund education as the main reason for the children not being in school while one-quarter attributed it to lack of parental interest in education (20.5%). The Ashanti (57.8%) and Western (54.5%) regions have more than half of the rural communities attributing the inability of parents to fund education as the reason for children not being in school.

Lack of parental interest is cited by about one-third of communities in the Brong-Ahafo and Upper West regions (32.4% and 33.3% respectively). In the Greater-Accra, 12.5% of children are not attending school because they are used for work. A slightly higher proportion of rural communities in the Upper West region (13.6%) cited the same reason. Also, in relation to the most serious schooling problems faced by rural communities, for the country as a whole, lack of school buildings was cited as the most serious problem faced by 34.1% of the communities while 14.8% of the communities indicated the lack of qualified teachers. An additional 11.7% and 12.6% of communities cited high cost of school fees and lack of accommodation for teachers respectively. The Greater Accra has 54.5% of rural communities which reported that lack of school buildings were the most serious problems, followed by Eastern region,
(51.2%) and Northern region (45.3%). For lack of qualified teachers, the Western region (31.8%) had the highest proportion of communities reporting such a problem, followed by the Northern (21.1%) and Central (4.8%) regions.

These poor indicators of school facilities and infrastructure in the rural areas may not only contribute to reasons why enrolment is low in the rural areas but also why most individuals migrate to the urban areas and the disparity in earnings of individuals in urban and rural areas.

### 3.7 School quality

In the measurement of school quality, resources and facilities available in schools that provide conducive environment and enhance teaching and learning play important roles. Some of these elements include availability of sanitary facilities, good drinking water, good learning structures, core textbooks, percentage of trained teachers and pupil-teacher ratio. These factors enhance enrolment and educational outcomes of students. Figures 3.2 and 3.3 show trends in these factors over the academic years 2001/2002 to 2013/2014.
Figure 3.2: Trends in Percentage of Trained Teachers, Pupil-Teacher Ratio and Availability of Core Textbooks

Source: Ministry of Education, EMIS

- **Percentage of trained teachers**
  
  This is the number of teachers who have a teacher training qualification required for teaching at the basic level, expressed as a percentage of the total number of teachers at the basic level.

  Percentage of trained teachers (PTT) at the national level was about 72% as at the year 2001/02. It however, continued to fall over the years to as low as 59% until 2010/11 when it shot up to 78%. Consequently, from that year, percentage of trained teachers has been maintained at an average of 83% which shows that the country is committed to improving the quality of education by having a high percentage of trained teachers. All things being equal, this should go a long way to influence positively educational outcomes of pupils.
- **Pupil-teacher ratio**

  This refers to the average number of pupils per teacher at a given level of education. This is derived by dividing the total number of pupils enrolled at the specified level of education by the number of teachers at the same level.

  Pupil-teacher ratios on the average over the years have not been above 39. In the last year, pupil-teacher fell to as low as 26 pupils per teacher. This is quite encouraging and measures to maintain low pupil-teacher ratios must be put in place to avoid overcrowding of pupils and possibly for teachers to able to address the special needs of each pupil.

- **Availability of Core textbooks**

  Core subjects in basic school include Mathematics, English and Science. The graph shows the availability of the three Core textbooks to a pupil. Its values call for major concern. Over the years, availability of Core textbooks to pupils has ranged between 10%-60% per pupil. The percentages for the last four years have been quiet low (10%-27%). It could be that although enrolment increases over the years, provision of Core textbooks are inadequate and more pupils have to share textbooks reducing their access to Core textbooks. This may have a negative effect on educational outcomes of the pupils. An analysis carried out by Joseph and Wodon (2012) using data from the EMIS show that the availability of textbooks seems to make a difference in tests scores for some subjects especially Mathematics.
Figure 3.3: Trends in Availability of Toilet Facilities, Drinking Water and Classrooms Needing Major Repairs

Source: Ministry of Education, EMIS

Figure 3.3 shows trends in the availability of toilet facilities, availability of drinking water and the percentage of classrooms that need repairs. This is reviewed for academic years 2002/03 to 2013/14.

- **Availability of toilet facilities**

  This is the number of schools with at least one toilet facility for each sex expressed as a percentage of the total number of schools.

  Over the years, toilet facilities have been available for only about half of basic schools in the country. It is important that most schools if not all have toilet facilities of at least one for each gender. Although this may not directly affect educational outcomes of the pupils, it does have a direct impact on their health. However, Joseph and Wodon (2012) show that the presence of toilets increases test scores by about 0.5%-1% points.
Availability of drinking water

Availability of drinking water is the number of schools with drinking water expressed as a percentage of the total number of schools. In the same way, availability of drinking water is important to the health of pupils. It seems to increase over the years and then drop again. Once more, Joseph and Wodons’ (2012) research show that the impact of having drinking water is at 1%-2% points increase in test scores.

Percentage of classrooms that need major repairs

The percentage of classrooms needing major repairs have ranged between 22%-37%. It has been on the low side for the past four years. However, it is of major concern since the safety of pupils and teachers are at risk. Schools with classrooms needing major repairs means that pupils may not attend school during bad weather conditions or otherwise number of pupils per class would have to increase in order to cater for the pupils left out of their classroom if the classrooms are not repaired. This means enrolment would have to fall otherwise overcrowding of pupils would have a negative effect on their educational outcomes.

From the school quality indicators by Ministry of Education in basic schools, two variables have been selected to represent school quality in this research. The variables include pupil teacher ratio and percentage of trained teachers. This is because data is available for these factors over longer years compared to the others.

Colleges of Education are the main teacher training institutions: There are 38 public and three private colleges found in the ten regions in Ghana. They offer a three-year curriculum that leads to the Diploma in Basic Education (DBE).
examinations granting the DBE are conducted by the public University of Cape Coast’s Institute of Education. Holders of DBE are allowed to teach at every level of the Basic education (Kindergarten, Primary school, Junior High School).

Apart from the Colleges of Education, two universities (Cape Coast and Winneba) train teachers. A specific four-year bachelor’s degree allows one to teach in any pre-tertiary education. A specific master’s degree is needed for teaching in College of education. Universities also offer to DBE graduates a two-curriculum granting the right to teach in secondary education. Distance education is also possible: the programme lasts four years and leads to the Untrained Teacher’s Diploma in Basic Education (UTDBE). This was introduced to increase the number of basic education teachers in rural area.

3.8 Labour market outcomes

Education plays a central role in preparing individuals to enter the labour force and in equipping them with the skills needed to engage in lifelong learning experiences. Labour markets, broadly defined as the buying and selling of labour services (Fields 2007), are distinguished by two types of employment: wage and salaried employment and self-employment. Employment is the basic labour market outcome of education for individuals.

Standard economic theory suggests that markets are often the most efficient institutions for the allocation of scarce resources, because they clear to adjust demand and supply, and hence eliminate rent opportunities. However, in reality, there are frictions, unobservable characteristics, adjustment costs, different expectations, and
probably discrimination in markets that tend to drive market equilibrium away from efficient allocation. This not different when it comes to the labour market. These markets are expected to match workers with firms and set wages to clear the labour market. However, labour markets particularly in developing countries tend to suffer from frictions and other rigidities that prevent them from achieving market equilibrium (Kingdom et al., 2005). Due to these imperfections, unemployment arises. Unemployment occurs when people who are not working but available and seeking work do not find any. Unemployment rate expresses the number of unemployed individuals as a percentage of the total labour-force. Figure 3.4 shows the trends in unemployment rates in Ghana from 1995-2013.

Figure 3.4: Trends in Unemployment Rates in Ghana (1995-2013)

![Unemployment Rates Graph](http://ugspace.ug.edu.gh)

*Source: World Bank (2013), WDI*

Trends in unemployment rates in Ghana since 1995 to 2013 have been undulating. The highest rate of unemployment given the data has been in the year 2000 at 10.4% whiles the lowest occurred five years later at 3.8%. Since the year 2005, although
unemployment rate continues to increase, it maintains on average a low rate of 4%. Compared to the world’s unemployment rates ranging from 5.5% to 6.2% from the year 2007-2013, unemployment in Ghana has been on the lower side. This is also true for sub-Saharan Africa which had unemployment rates ranging from 7.5%-7.7% over the same years (ILO, 2014).

A paper on the determinants of unemployment in Ghana by Baah-Boateng (2013) suggest that unemployment in Ghana is more likely to occur among the youth, those seeking particular kind of jobs, those seeking full-time jobs, those with reservation wages and Basic and Secondary school leavers. He further explains that since the youth lack the working experience that most employees require, they are more likely to be unemployed compared to the older ones. The attitude of seeking for a particular job or a full-time job also limits the employment opportunities of individuals. Basic and Secondary School leavers are also likely to be unemployed because they may fall short of the educational qualifications some employers require and at the same time most of them find working in the informal sector unattractive.
CHAPTER FOUR

METHODOLOGY

4.1 Introduction

Different methodologies have been used in the literature to investigate the impact of school quality on earnings. This chapter presents a discussion of the methodology and the data to be used in the study. It begins by underlining the theoretical framework from which the estimated model in this study is derived. It continues with an empirical framework and later discusses the reasons influencing the choice of variables that are used in the study. It highlights the sources of data as well.

4.2 Theoretical Framework

The Mincer (1974) earnings equation serves as the main framework for the study. It examines the relationship between an individual’s education, experience and earnings by modelling the natural log of earnings as a function of years of education and years of potential labour market experience:

\[ \ln Y = \alpha + \beta_1 S + \beta_2 X + \beta_3 X^2 + \mu \]

Where:

\[ \ln Y = \text{Natural log of earnings for the individual} \]

\[ S = \text{Years of schooling;} \]

\[ X = \text{Labour market potential experience} \]

\[ X^2 = \text{Potential experience-squared; and} \]

\[ \mu = \text{Random disturbance term} \]

\[ \beta_1 \text{ is viewed as the average private rate of return to a year of schooling.} \]

The model views education as an investment in individual human capital as individuals choose the number of years of schooling to pursue with the goal of
maximizing the present value of lifetime earnings (Dahlin, 2002). Many researchers with few modifications have investigated the effect of education on earnings and the private rate of returns to education using the above Mincer equation (Montenegro and Patrinos, 2013). However, if school quality has an impact on individual earnings, then estimates on the returns to schooling (earnings), which may omit school quality variables, could be biased.

4.3 Empirical Framework

Behrman and Birdsall (1983), along with other researchers modified the Mincer earnings equation to include school quality variables. They showed that school quality may be integrated into the traditional Mincer framework by allowing educational returns to depend on the quality of schooling. The empirical model to be used in this study is adapted from the works of Bedi and Edwards (2001). They used a similar approach to investigate the impact of school quality on rates of return and earnings as well. However, they included alternative specifications in analysing the impact of school quality.

Based on a simple earnings determination function given as:

$$Y = W_h H e^u$$  \hspace{1cm} (1)

Where, $Y$ is the labour market earnings of the individual, $W_h$ is the market rental price per unit of human capital, $H$ is the unobservable human capital possessed by an individual and $u$ is the error term representing random unobserved determinants of earnings, Bedi and Edwards (2001) relied on the log-linear human capital production function:

$$H = e^{\beta_s Q + \beta_E E + \beta_F F + \nu}$$  \hspace{1cm} (2)
Where, $Q$ represents a vector of school quality variables, $S$ gives the years of schooling, $E$ is experience, $F$ is a vector of variables that captures the quality of the individual’s home environment whereas $v$ is error term representing random influences on human capital production. $\beta_s$, $\beta_E$ and $\beta_F$ are conformable coefficient vectors to be estimate.

This is under the assumption that the human capital possessed by an individual is mainly determined by the quantity and the quality of schooling, an individual’s on-the-job training, as well as his/her family background (Heckman, 2008).

Substituting equation (2) into equation (1) and taking logs, the familiar semi-log form of the earnings equation is obtained as:

$$\ln Y = \ln W_h + \beta_s(Q)S + \beta_E E + \beta_F F + v + u \quad (3)$$

Assuming a linear approximation to the unknown function, i.e, $\beta_s(Q) = \gamma + \gamma_1 Q$, gives:

$$\ln Y = \ln W_h + \gamma S + \gamma_1 SQ + \beta_E E + \beta_F F + v + u \quad (4)$$

This specification according to Bedi and Edwards (2001) allows school quality to influence earnings through its effect on educational returns but does not allow for a direct school quality–earnings link. Indicating that should the impact of quality on educational returns be positive, the return to educational quality will be higher at higher educational levels. This approach is conceptually similar to Behrman and Birdsal (1983) and Card and Krueger (1992a).

Other studies however have examined the effect of school quality on earnings by using an alternative specification. This specification assumes the idea of "effective
schooling”, $S^*$, which depends on the quantity ($S$) and quality ($Q$) of schooling (Behrman and Birdsall, 1983). Specifically, $S$ may substitute $S^*$, leading to an alternative human capital production function:

$$H = e^{\beta S^* S(S,Q) + \beta E + \beta F + \nu_1} \tag{5}$$

Substituting equation (5) into equation (1) and taking logs gives:

$$\ln Y = \ln W_h + \beta S^* S(S,Q) + \beta E + \beta F + \nu_1 + u \tag{6}$$

Since the functional form of effective schooling is not known, a linear approximation to the unknown function, i.e., $S^*(S,Q) = \rho + \rho_S S + \rho_Q Q$ is used. Integrating the linear approximation in equation (6) and rewriting, gives rise to:

$$\ln Y = \ln W_h + \beta + \beta_S S + \beta_Q Q + \beta_E E + \beta_F F + \nu_1 + u \tag{7}$$

This specification unlike equation (4) allows school quality to exert a direct impact on the level of earnings. Therefore school quality does not influence earnings through its effect on educational returns but allows for a direct school quality–earnings link without altering the earnings and schooling relationship.

Some authors (e.g. Betts, 1995) however have estimated specifications that combine equations (4) and (7). This specification allows school quality to influence educational returns and also bring out a direct influence on earnings. Allowing for both effects leads to:

$$\ln Y = \ln W_h + \alpha + \alpha_S S + \alpha_Q Q + \alpha_{SQ} SQ + \beta E + \beta_F F + \nu_2 + u \tag{8}$$

### 4.4 Model Specification

In order to estimate the direct impact of school quality on earnings, using equation (7), the empirical model for the study is specified as:
\[
\ln Y = \beta_0 + \beta_1 Edu + \beta_2 Q + \beta_3 Exp + \beta_4 Exp^2 + \beta_5 Mar + \beta_6 Res + \beta_7 Gen \\
+ \beta_8 Occ + \mu
\]

Where;

- \(Edu\) = Years of education of the individual
- \(Exp\) = Working experience of the individual
- \(Exp^2\) = Working experience squared
- \(Mar\) = Marital status of the individual
- \(Res\) = Residence of the individual, whether rural or urban
- \(Gen\) = Gender of the individual
- \(Occ\) = Occupational skill level of the individual
- \(Q\) = School quality variables (PTT and PTR)
- \(\mu\) = Error term representing random influences on earnings.

\(\beta_0\) shows the intercept, \(\beta_1\) gives the rate of return to a year of schooling, whereas \(\beta_2\) shows the change in earnings of paid workers given a unit change in the school quality variables. \(\beta_3\) and \(\beta_4\) show the rate of return to working experience. \(\beta_5, \beta_6, \beta_7, \& \beta_8\) give the average wage differences between married and unmarried paid workers, area of residence, gender, and occupational skill levels respectively.

### 4.5 Method of estimation

The Ordinary Least Square (OLS) is used to estimate the impact of school quality on earnings in Ghana. However, researchers have argued about the endogeneity of years of schooling. If the years of schooling variable is endogenous, that is a variable chosen by the person and influenced by other factors in the regression model, then there would be a correlation between the error term and the variable. This implies the OLS estimator would be biased and inconsistent.
The Hausman Test is used to determine whether one of the explanatory variables in a regression suffers from endogeneity (omitted variable biased, measurement error, or reverse causality). The Hausman Test is therefore employed in testing for endogeneity in the regression model. If there is the presence of endogeneity, then Instrumental Variables which employs the use of an instrument (i.e., a variable that is correlated with the endogenous variable but uncorrelated with the dependent variable) would be employed for the estimation. Also, Robust standard errors are also used to control for heteroskedasticity which violates the assumption of the classical linear regression of constant conditional variance and thus produces biased standard errors.

Another source of bias commonly associated with OLS estimates of effects of education on earnings is sample selectivity bias. This relates to the concern in earnings literature that individuals self-select into employment. Consequently, observations with no earnings information are excluded, and if omission of these observations is not done randomly, then OLS estimates may be bias. A way of addressing sample selection bias is by the implementation of selection correction methods following Heckman (1979). However, studies on earnings in Ghana such as (Baffour, 2013) found insignificant effect of sample selection variable which consequently suggests that sample selection bias may not necessarily be an issue in returns in the Ghanaian labour market.

4.6 Description of Variables and Expected Signs

The dependent and independent variables in the study are chosen in accordance with the objectives of the study and the literature reviewed earlier. The a priori
expectations of the signs of the independent variables are based on existing theoretical and empirical literature and the findings from previous studies.

4.6.1 Dependent variable

- **Earnings**

The earnings of paid workers were generated by finding the time units (i.e. daily, weekly, monthly, and others) within which the individual received pay for work done. This refers to individuals who had received earnings for work done for pay, family gain, profit during the seven days prior to the interview. The various time units within which the individual received pay were then harmonized into one single unit of measurement (i.e. monthly). This amount also included some bonuses received.

4.6.2 Independent Variables

The choice of the independent variables is guided by the findings from existing literature and the purpose of the study. The explanatory variables used in the study are defined as follows;

- **Years of education/schooling**

This comes as a continuous variable. An individual’s years of education gives the total number of years the individual spent in school in order to acquire his or her current level of education or academic qualification. This variable is vital because all things being equal, higher educational levels are associated with higher productivity and hence higher earnings. The coefficient of years of education is thus expected to be positive.
**Experience and Experience squared**

Experience is noted by the number of years the individual has been employed in his/her life. Potential experience is obtained by subtracting the individual’s years of schooling and school-starting age from the individuals present age. However in this analysis, the experience of the individual was derived by subtracting the age at which the individual started working on a regular basis from his/her current age. This measure is preferred over former because it gives the actual measure of experience of the individual without making assumptions. Experience does not display a linear relationship with earnings. It has an inverted U shape which implies that earnings rises as experience increases, gets to a peak and then starts to fall. This variable is important because of the on-the-job knowledge acquired from years of working which all things being equal increases productivity. This is expected to have a positive influence on earnings. However, its square is expected to be negative implying diminishing returns.

**Marital Status**

The marital status of the individual is introduced to assess the returns to earnings of the married and the unmarried. However, its expected sign is uncertain since being unmarried may not exclude one from having responsibilities as the married. The unmarried include individuals who have never married, are widowed, divorced, separated or in consensual union.

**Gender**

This is a control variable in the study to measure the effect of gender on the earnings of individuals. All things being equal, a male and female with the same qualifications
should have same earnings. However, Barber (2008) notes that in most developing
countries, women and men have different earning opportunities and have different
degrees of access to resources. The expected sign is therefore uncertain.

- **Residence**

This variable captures the locality of the individual be it urban or rural. It is expected
that those in the urban areas are likely to earn more than those in the rural areas due to
easier access to better schools and facilities that enhance human productivity and
therefore earnings.

- **Occupation**

This is a description of the work done by the respondent. All things being equal, if
workers earn according to their skills, then different occupations would attract
different earnings. Although there are ten broad classifications according to the
International Standard Classification of Occupations (ISCO), in order to simplify the
analysis, this study would analyse the earning opportunities of the individual based on
the four skill levels of ISCO (skill level 1,2,3,4). The highest skill level is skill level 4.
Occupations classified at skill level 4 include sales and marketing managers, civil
engineers, secondary school teachers, medical practitioners, musicians, operating
theatre nurses and computer systems analysts. These involve performance of task that
require complex problem solving, decision making and creativity in a specified field.
Occupations at skill level 3 involve the performance of complex technical and
practical tasks. Occupations classified at skill level 2 typical involve performance of
task such as operating machinery and electronic equipment, driving of vehicles,
maintenance and repairs of electronic equipment and others. Occupations classified at
skill level 1 include office cleaners, garden labourers, kitchen assistants etc. These jobs typically involve the performance of simple and routine physical or manual tasks (ISCO-08). The mapping of the ten ISCO-08 major groups to their various skill levels is summarized in the appendix A3.

➢ **School quality**

School quality is proxied by the provision of teachers as measured by pupil-teacher ratio (PTR) and the quality of teachers measured by the percentage of trained teachers (PTT) in basic schools. Since actual measures were difficult to obtain, regional-level averages are used. Region of birth is used as a proxy for region where the individual had his or her basic education. Averages of percentage of trained teachers and pupil-teacher ratios were found over a number of years and used for individuals who may have completed basic education at the end of those years. These quality variables are essential in addressing the main objective of the study which is to determine the impact of school quality on earnings. The higher the pupil-teacher ratio the lower the quality of schooling and therefore its sign is expected to be negative. However, the coefficient of trained teachers is expected to have a positive sign so that the more trained teachers a school has, the higher the expected future earnings of its pupils.

➢ **Parents’ education**

This refers to years of education of the individual’s mother or father or both. Parents’ educational background forms a proxy for the family characteristics of the individual and could be used as instrumental variable if years of education is tested to be endogenous. This is because parents’ education is expected to be correlated with an individual’s years of schooling but uncorrelated with his or her earnings. Parents
provide informal education for their children and an educated parent may have more knowledge through his or her educational experience to provide better guidance for their wards right from choosing the right courses to read, helping with assignments and giving career guidance.

4.7 Data Sources

This study employs cross-sectional data from the sixth round of the Ghana Living Standards Survey (GLSS 6) and data from the Ministry of Education (MoE).

The sixth round of the Ghana Living Standards Survey (GLSS 6) is a nationwide household survey designed to generate information on living conditions in the country. Like the previous rounds, it focuses on the household as the key socio-economic unit and provides valuable information on the living conditions and well-being of households in Ghana. From 18th October 2012 to 17th October 2013, the survey covered a nationally representative sample of 18,000 households in 1,200 enumeration areas. Of the 18,000 households, 16,772 were successfully enumerated leading to a response rate of 93.2%.

Detailed information was collected on the demographic characteristics of households, education, health, employment and time use, migration and tourism, housing conditions, household agriculture, household expenditure and income and their components and access to financial services, credit and assets. The survey also collected information on households’ perception of governance, peace and security in the country. Five types of questionnaires were used to achieve this: a household questionnaire, non-farm household questionnaire, a community questionnaire,
governance, peace and security questionnaire and a questionnaire on the prices of food and non-food items.

Information used for this study is obtained from the Part A of the household questionnaire. Workers sampled for the study included those born in any region in Ghana, aged 15 years and above and who were not enrolled in school at the time of interview. This was done to lessen the measurement error which may be associated with the use of on-going school attainment measures to explain current earnings. The earnings variable used in estimating the earnings of individuals was selected from the employment and time-use section (section 4A) of the survey instrument as well as the type of occupation. The individual’s work experience was also derived from the same section. The educational levels of individuals were also obtained from the general education section (section 2A). Also, the other explanatory variables such as gender, parental education, marital status, residence and region of birth were obtained from the household roster of section 1 in the Part A of the household questionnaire. The choice of the GLSS 6 was informed by the fact that it is the most up-to-date nationwide survey Ghana has more especially on earnings and employment statuses of individuals.

Data from Ministry of Education (MoE) was used to create regional-level school quality variables that capture number and percentage of trained teachers and number of pupils per teacher (pupil-teacher ratio) in basic schools. This measure of school quality was used considering the data available. Data was obtained from the year 1988/89 to 2012/13. Averages were further found for year groups were percentage of trained teachers and pupil-teacher ratio were stable. These were then used as the
percentage of trained teachers and pupil-teacher ratio for individuals who completed basic school in those years. Other measures which could have well served as proxies for school quality such as number of textbooks per student, availability of sitting places, good drinking water and others, were only available from the years 2001/02. However, percentage of trained teachers and pupil-teacher ratio could be considered as good measures of school quality because they capture the idea that the impact a teacher is able to make on his or her pupils partly depends on the teacher’s training and the number of students assigned to him or her.
CHAPTER FIVE

PRESENTATION AND ANALYSIS OF RESULTS

5.1 Introduction

Results from the study are presented and discussed in this chapter of the work. It commences with the descriptive statistics for the dependent as well as all the independent variables used in the regression. It then proceeds to the presentation and discussion of regression results. All the analyses are carried out using SPSS, Excel 2010 and STATA version 13 (Stata Corp, 2011).

5.2 Descriptive Statistics

Statistics of workers with respect to gender, marital status, level of education, residency, and occupational skill requirement are described in this section of the study. Variations in mean monthly wages of paid workers are discussed with respect to the above-mentioned characteristics as well as the region of residence. The population aged 15 years and above who were born in Ghana and out of school was represent by a total of 35,373. From this sample, 34,814 were in employment at the time of interview that is, they did work for profit, pay or gain within 7 days prior to the day of interview. Out of this number 20,204 were to receive pay for their work. However, information on earnings of these individuals was only obtained for 15,184 individuals representing 75.2% of the selected sample. Table 5.1 gives the number of observations, means and standard deviations of some selected variables.
Table 5.1  Summary Statistics for Selected Independent Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Observations</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monthly earnings (GHS)</td>
<td>15184</td>
<td>436.8</td>
<td>1516.979</td>
</tr>
<tr>
<td>Age (years)</td>
<td>35373</td>
<td>40.0</td>
<td>16.856</td>
</tr>
<tr>
<td>School starting age</td>
<td>22338</td>
<td>7.3</td>
<td>1.647</td>
</tr>
<tr>
<td>Work starting age</td>
<td>29266</td>
<td>15.3</td>
<td>5.722</td>
</tr>
<tr>
<td>Education (years)</td>
<td>22462</td>
<td>8.9</td>
<td>3.580</td>
</tr>
<tr>
<td>Work experience</td>
<td>29266</td>
<td>24.2</td>
<td>15.706</td>
</tr>
<tr>
<td>Father education (years)</td>
<td>29364</td>
<td>3.3</td>
<td>5.166</td>
</tr>
<tr>
<td>Mother’s education (years)</td>
<td>28494</td>
<td>1.5</td>
<td>3.608</td>
</tr>
<tr>
<td>Pupil -Teacher Ratio</td>
<td>35373</td>
<td>26.4</td>
<td>4.051</td>
</tr>
<tr>
<td>Percentage of Trained Teachers</td>
<td>35373</td>
<td>61.6</td>
<td>12.568</td>
</tr>
</tbody>
</table>

Source: Author’s computation from GLSS 6

The mean monthly earnings of paid workers was 436.8 Ghana Cedis and is only slightly different from that stated in the Labour Force Report of 495.47 (GLSS 6). The varying sample size may account for this difference. This study excludes workers not born in Ghana and workers who were still enrolled in school from basic education through to tertiary education. The average age was about 40 years and average school-starting age was about 7 years. However, the data also reported individuals starting school late at the age of 15 years. The mean age at which individuals started working on regular basis was about 15 years although some started regular work at the early age of 5 years.
The mean years of education of the individual was given as 9 whereas years of working experience was about 24 years. Mean fathers’ education obtained was about 3 years which was higher than the almost 2 years of mothers’ mean years of education. The disparity between parents and individual mean years of education was about 6-7 years which indicates that average education of the population considering paid workers has increased between the generations, parents having only 1-4 mean years of education compared to a mean of 9 years of education of their children.

Table 5.2 Descriptive Statistics for the Independent Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No education</td>
<td>12,311</td>
<td>35.41</td>
<td>35.41</td>
</tr>
<tr>
<td>Primary</td>
<td>7,293</td>
<td>20.97</td>
<td>56.38</td>
</tr>
<tr>
<td>JHS/Middle School</td>
<td>9,668</td>
<td>27.80</td>
<td>84.19</td>
</tr>
<tr>
<td>Secondary</td>
<td>3,812</td>
<td>10.96</td>
<td>95.15</td>
</tr>
<tr>
<td>Tertiary</td>
<td>1,687</td>
<td>4.85</td>
<td>100</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>15,814</td>
<td>44.72</td>
<td>44.72</td>
</tr>
<tr>
<td>Female</td>
<td>19,554</td>
<td>55.28</td>
<td>100</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>19,717</td>
<td>55.74</td>
<td>55.76</td>
</tr>
<tr>
<td>Unmarried</td>
<td>15,653</td>
<td>44.26</td>
<td>100</td>
</tr>
<tr>
<td>Residence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>21,271</td>
<td>60.13</td>
<td>60.13</td>
</tr>
<tr>
<td>Urban</td>
<td>14,102</td>
<td>39.87</td>
<td>100</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skill level 1</td>
<td>1,190</td>
<td>4.07</td>
<td>4.07</td>
</tr>
<tr>
<td>Skill level 2</td>
<td>26,080</td>
<td>89.13</td>
<td>93.20</td>
</tr>
<tr>
<td>Skill level 3</td>
<td>547</td>
<td>1.87</td>
<td>95.07</td>
</tr>
<tr>
<td>Skill level 4</td>
<td>1,444</td>
<td>4.93</td>
<td>100</td>
</tr>
</tbody>
</table>

*Source: Author’s computation from GLSS 6*
Table 5.2 shows descriptive statistics for the independent variables. About 44.72% of the workers were males while 55.28% were females. Also, 55.74% of workers were married, whereas 44.26% were not married. While some 35.41% of workers had never had any formal education, another 20.97% were reported to have attained primary education. Furthermore, 27.80% and 10.96% had obtained Junior and Senior High education respectively. However, only 4.85% of workers are counted to have had tertiary education. Figure 5.1 gives a graphical presentation of the survey’s responses with regards to the educational attainment of workers.

Figure 5.1: Pie Chart Showing the Level of Education of Workers

![Pie Chart](image)

Source: Author’s computation GLSS 6

Individuals with no formal education are the majority of worker whiles those with tertiary education are the least. Those with Junior or Middle School qualification are the second highest followed by Primary education.
Concerning workers region of residency, 60.13% of workers inhabit rural regions and 39.87% inhabit urban regions.

The survey revealed that 4.93% of workers are in occupations which require that workers be skilled at level 4 and 1.87% are in those that required skill level 3. Almost 90% of workers are in occupations which require only skills at level 2. This shows that majority of the working force are involved in jobs that typically involve performance of task, such as operating machinery and electronic equipment, driving of vehicles, maintenance and repairs of electronic equipment, etc. Again, 4.07% of workers are engaged in occupations which required skills at level 1.
Table 5.3 Mean Monthly Earnings of Paid Workers

<table>
<thead>
<tr>
<th>Variable</th>
<th>mean monthly earnings (Cedis)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level of education</strong></td>
<td></td>
</tr>
<tr>
<td>No education</td>
<td>262.04</td>
</tr>
<tr>
<td>Primary</td>
<td>392.55</td>
</tr>
<tr>
<td>JHS/Middle School</td>
<td>413.96</td>
</tr>
<tr>
<td>Secondary</td>
<td>517.87</td>
</tr>
<tr>
<td>Tertiary</td>
<td>1,100.83</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>538.99</td>
</tr>
<tr>
<td>Female</td>
<td>333.63</td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>496.69</td>
</tr>
<tr>
<td>Unmarried</td>
<td>347.47</td>
</tr>
<tr>
<td><strong>Residence</strong></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>343.13</td>
</tr>
<tr>
<td>Urban</td>
<td>523.30</td>
</tr>
<tr>
<td><strong>Occupation</strong></td>
<td></td>
</tr>
<tr>
<td>Skill level 1</td>
<td>348.477</td>
</tr>
<tr>
<td>Skill level 2</td>
<td>382.51</td>
</tr>
<tr>
<td>Skill level 3</td>
<td>642.04</td>
</tr>
<tr>
<td>Skill level 4</td>
<td>1,018.20</td>
</tr>
</tbody>
</table>

Source: Author’s computation from GLSS 6

Earnings of paid workers varied largely by gender, level of education, marital status, region of residence, among many. Table 5.3 represents mean monthly earnings of the various independent variables. While the mean monthly earnings of males was about 538.99 Ghana Cedis, that of females was about 333.63 Ghana Cedis. In Ghana, females are mainly brought up and trained to take up responsibilities at home rather than engage in high income earning economic activities.

Moreover, whereas workers who are married earn a mean monthly wage of about 496.69 Ghana Cedis; unmarried paid workers earn a mean of about 347.47 Ghana Cedis.
Cedis monthly. While one would expect unmarried paid workers to have ample time to work more hours and earn more than their married colleagues, results from the survey proved otherwise. This is probably because in Ghana, hours of work are relatively fixed and most workers are not paid per number of hours worked. Also, singles are more likely to be younger, have fewer years of work experiences, high rate of job tenure and consequently have lower earnings relative to married workers.

Mean monthly earnings also varied with level of education. Paid workers who had no education earned a mean monthly wage of about 262.04 Ghana Cedis. Those with primary education also earned about 392.55 Ghana Cedis whereas workers with Junior High or Middle School education had slightly higher monthly mean earnings of about 413.96 Ghana Cedis. Additionally, the mean monthly wages of paid workers with secondary and tertiary education were approximately 517.87 Ghana Cedis and 1100.83 Ghana Cedis respectively. This implies that educational attainment has a positive relationship with one’s earnings (Psacharopoulos, 1994).

Information from the GLSS 6 dataset showed a disparity between mean monthly wages of paid workers in urban dwellings and rural dwellings. Not only do paid workers in urban areas have the opportunity to enjoy better social facilities, but also tend to receive relatively more earnings for monthly work done. On the average, paid workers in urban areas earn about 180.17 Ghana Cedis more than paid workers in rural areas. This is probably because the standard of living for workers in urban areas are relatively higher than those in rural areas. It could also be that jobs in rural areas do not require much skills and education as those in urban areas and therefore their returns are lower.
Furthermore, variation in the mean monthly earnings of occupations at different skill levels of 1 and 4 is enormous. While the former receives a mean monthly wage of about 348.477 Ghana Cedis, the latter receives about 1100.83 Ghana Cedis. Yet, the disparity between the earnings of paid workers in skill level 1 and 2 are minimal. Also, Whereas paid workers in skill level 2 have 382.51 Ghana Cedis as their mean monthly earnings, skilled level 3 paid workers have 517.87 Ghana Cedis. Evidently, a change in a worker's status from being in skill level 1 to skill level 2 does not improve one’s earnings that much. Figure 5.3 shows the mean monthly earnings of paid workers by regions.

**Figure 5.3 Mean monthly Earnings of Paid Workers by Regions**

![Chart showing mean monthly earnings by region](https://example.com/chart.png)

*Source: Author’s computation from GLSS 6*

Going by regional classification of earnings, paid workers in the Greater Accra Region of Ghana have the highest mean monthly wage of nearly 531.09 Ghana Cedis. Those of the Central Region also had a high mean average monthly wage of almost 498.87 Ghana Cedis. About six of the regions had mean monthly earnings above the
sample mean earnings, whereas four, namely Volta, Upper East, Eastern and the least being Northern, had their mean below the sample mean of 436.8 Ghana Cedis.

Information on school quality is proxied by the average percentage of trained teachers (PTT) and pupil-teacher ratio (PTR) in basic schools in a given region. These values are obtained from years 1988/1989 through to 2013/2014. Since pupil-teacher ratio and percentage of trained teachers change over time and individuals would have attended different classes in different years, an individual’s years of basic schooling was obtained and the averages of the percentage of trained teachers and pupil-teacher ratios during their years of schooling were computed and used. Because of lack of information obtained on the school quality variables, individuals who schooled before the year 1988, had data in 1988 used for them as data older than 1988 were not obtained. Other variables which could have been used as measures of school quality such as availability of textbooks, sitting places, drinking water and others were only reported in the regional profiles of the basic schools from the year 2001/2002. Therefore, the pupil-teacher ratios and percentage of trained teachers which was available over the years were used.

The values for pupil-teacher ratio and pupil-teacher ratio computed for the various year groups and various regions are reported in appendix A4. The values show disparities in percentage of trained teachers and pupil-teacher ratio within the regions and by years as well. However, their means throughout the various years over the regions are shown in the graph below.
Overall, greater Accra seems to have the highest number of trained teachers with an average of 86.4% followed by Volta and then Ashanti Region over the years. Percentage of trained teachers seems on average to be low in the Northern, Western and Brong Ahafo Regions. The Eastern Region has the lowest mean pupil-teacher ratio of 23.7 whereas the Upper East Region has the highest.

5.3 Presentation and Discussion of Results

Log earnings of individuals are used as the dependent variable for the estimation. Figure 5.5 gives a histogram showing the distribution of log of earnings. The histogram is symmetric which means the log earnings of the workers are normally distributed and therefore OLS can be used for the estimation.

A pairwise correlation of the dependent and independent variables was run to check for multicollinearity between variables. According to Gujarati (2006) multicollinearity is considered to be a problem in a model when the pairwise
correlation coefficient is greater or equal to 0.8. However, the correlation matrix in appendix A5 show none of the variables having a correlation coefficient of more than 0.8. Also, the correlation coefficient are all significant at 1% except one.

Figure 5.5: Histogram of Log of Earnings

![Histogram of Log of Earnings](image)

*Source: Author’s computation from GLSS 6*

Table 5.4 represents the results from the OLS estimates of the earnings equation for paid workers. Estimations in column 1 represents estimated coefficients using the basic Mincer Equation of regressing log of earnings on years of education, experience and experience squared. The next column includes the school quality variables whereas column 3 includes specifications in column 2 along with controls for marital status, residence, gender and skill levels in occupation. These variables are included to control for differences in earnings opportunity for the married and unmarried, those living in the urban or rural areas, earning opportunities for male and female as well as
earning differences between occupations characterized by the four different ISCO skill levels. Robust standard errors are also used in order to eliminate the presence of heteroskedasticity.

Table 5.4 OLS Estimates of Independent Variables

<table>
<thead>
<tr>
<th>Log earnings</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education (years)</td>
<td>0.105***</td>
<td>0.105***</td>
<td>0.052***</td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.003)</td>
<td>(0.003)</td>
</tr>
<tr>
<td>Work experience</td>
<td>0.028***</td>
<td>0.022***</td>
<td>0.021***</td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>0.003</td>
<td>(0.003)</td>
</tr>
<tr>
<td>Work experience²</td>
<td>-0.001***</td>
<td>-0.001***</td>
<td>-0.001***</td>
</tr>
<tr>
<td></td>
<td>(0.00005)</td>
<td>(0.00005)</td>
<td>(0.00005)</td>
</tr>
<tr>
<td>School quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage of trained teacher</td>
<td>0.003**</td>
<td>0.002**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
<td>(0.001)</td>
<td></td>
</tr>
<tr>
<td>Pupil-teacher ratio</td>
<td>-0.014***</td>
<td>-0.006*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.003)</td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td>0.197***</td>
</tr>
<tr>
<td>Married</td>
<td></td>
<td></td>
<td>(0.023)</td>
</tr>
<tr>
<td>Residence</td>
<td></td>
<td>0.485***</td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td></td>
<td></td>
<td>(0.023)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td>0.381***</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
<td>(0.022)</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td>-0.132***</td>
<td></td>
</tr>
<tr>
<td>Skill level 2</td>
<td></td>
<td></td>
<td>(0.041)</td>
</tr>
<tr>
<td>Skill level 3</td>
<td></td>
<td>0.260***</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.066)</td>
<td></td>
</tr>
<tr>
<td>Skill level 4</td>
<td></td>
<td>0.504***</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.054)</td>
<td></td>
</tr>
<tr>
<td>_cons</td>
<td>4.155***</td>
<td>4.401***</td>
<td>4.192***</td>
</tr>
<tr>
<td></td>
<td>(0.044)</td>
<td>(0.116)</td>
<td>(0.116)</td>
</tr>
<tr>
<td>Observations</td>
<td>11634</td>
<td>11624</td>
<td>11617</td>
</tr>
<tr>
<td>Prob &gt; F</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.103</td>
<td>0.105</td>
<td>0.182</td>
</tr>
</tbody>
</table>

Source: Author’s computation from GLSS 6
Notes: ****, ** and * denote 1%, 5% and 10% levels of significance respectively. Robust standard errors in parenthesis.
The F-statistics for all the models show that the variables in each model are jointly significant at 1%. The model for the first column explains about 10.3% of the variations in earnings. That of column 2 explains about 10.5%. However, when the control variables are added, the R-square for column 2 increases to 18.2%. The R-squares are generally low, but this common with cross-sectional data. Individually, all the variables are statistically significant in each model.

The first column shows that an additional year of education is associated with a 10.5% returns. However, this rate of return to education remains just about the same when the quality variables are introduced into the equation. This is confirmed in the findings of Montenegro and Patrinos (2013) and Psacharopoulos (1994) of 10% returns to a year of education all over the world. However, this is quite low compared to 13% returns estimated for sub-Saharan countries. When the marital status, gender, residence and occupational variables are included returns drops sharply to 5.2%, reducing the marginal rate of return by more than half.

Models 2 and 3 include school quality variables indicated by the percentage of trained teachers and pupil-teacher ratio. They are both statistically significant in the models and have their expected signs. This suggests that school quality has an impact on earnings of individuals implying that workers educated in regions with better school quality do tend to be rewarded with higher earnings. Percentage of trained teachers shows a positive relationship with earnings which indicates that as percentage of trained teachers increases, earnings also increase. Its coefficient shows that, if the percentage of trained teachers is to increase by 1, then earnings would increase by 0.3% and by 0.2% when controls are added. However, with a standard deviation of
12.6, a one standard deviation of percentage of trained teachers would lead to about a 2.52%-3.78% increase in earnings. This is consistent with the findings of Bedi and Edwards (2001) which suggest that school quality increases earnings by 2.7% to 4.5% depending on the variable used as the proxy for quality of school.

Similarly, the pupil - teacher ratio exhibits a negative relationship with earnings. As the pupil - teacher ratio falls, an indication of better quality, earnings of individuals increase. By proportion, if the pupil - teacher ratio falls by 1, earnings increases by 1.4% (Model 2) and 0.6% (Model 3). This impact rises to a 2.4% and 5.6% increase when the pupil - teacher ratio falls by a standard deviation using models 3 and 2 respectively.

The disparities in earnings opportunity between the married and unmarried is given by the coefficient of the married variable. The results suggest that the married earn about 19.7% more than the unmarried. Similarly, those who live in urban areas also earn about 48.7% more than those in the rural areas. Both variables are significant at 1%.

The influence of occupation on earnings is assessed by the coefficients of the various levels of skills required for the occupation in reference to occupations requiring skills at level 1. Paid workers engaged in occupations which require skill level 2 earn about 13.2% less than paid workers engage in occupations for skill level 1. This is quite surprising. However, since majority of workers are engaged in occupations that require skills at level 2, returns would generally be low because of the high competition. Also, workers in occupations that require skills at level 4 earn 50.4% more than those in occupations requiring skill level 1. All the skill variables are
significant at 1% and thus suggests that earnings increase in response to skill levels, especially for those occupations where workers are not clustered.

Appendix A7 shows the estimates of the earnings equation by gender. The F-statistics show that all variables for both male and female are jointly significant at 1% and explain variations in earnings by 16.76% and 15.05% respectively. The OLS estimates suggest that females have on the average a higher returns of 5.7% to males, 4.6%. This finding confirms the work of Psacharopoulos (1994), Nunoo (2009) and Aslam (2005) which suggest that return to female education are higher than those of males.

With respect to school quality, pupil-teacher ratio is significant at 5% for males and shows a negative relationship with earnings. This indicates that male workers who were educated in regions with better school quality where pupil-teacher ratio is low, have on average higher earnings than those educated in schools with higher pupil-teacher ratios. A unit change in pupil-teacher ratio is associated with 1.3% increase in earnings. Percentage of trained teachers, however, does not have a significant impact on earnings of male workers.

On the other hand, impact of percentage of trained teachers is positive and significant at 5% for females. This suggests that as percentage of trained teachers increases, earnings of female workers educated in regions with higher percentage of trained teachers also increase. A 1% increase in percentage of trained teachers is associated with a 0.3% increase in earnings of female workers. Consequently, pupil-teacher ratio does not show a significant impact on earnings of female workers although works by
Dearden et al. (2002) and Betts (2001) suggests that pupil-teacher ratios are significantly negatively related to women’s earnings.

In relation to the other control variables, married men earn more than married women but the returns to workers in urban areas for both sexes are almost the same (48.2% and 48.8%). Females in occupations requiring skills at skill level 3 earn more than their male counterparts and this is the same for occupations requiring skills at level 4. Whereas males earn about 13.4% and 58.2% more for skill levels 3 and 4 compared to skill level 1, females earn 52.8% and 76.5% more for skill levels 3 and 4 compared to those in skill level 1. This shows that returns to skill levels are higher for females than men. This could be because females are fewer in occupations requiring skills at levels 3 and 4 and therefore their returns are marginally higher.

Following the concern in earnings literature that education may be positively correlated with unobserved ability or may be influenced by individual and household characteristics, the years of education variable may be endogenous rather than exogenous. If schooling is endogenous, then estimating the earnings equation with OLS without testing for endogeneity may lead to biases of estimates of the returns to education. Therefore, to be sure the findings are not due to the failure to allow for endogeneity, effort is made to address the problem of endogeneity by using parental education as instruments for workers’ years of education.
Table 5.5 IV Estimates of Independent Variables.

| Log of earnings | Co-efficient | Robust Std. Err. | Z     | P>|z| |
|-----------------|--------------|------------------|-------|-------|
| Education (years) | 0.109        | 0.016            | 6.90  | 0.000 |
| Work experience  | 0.018        | 0.003            | 5.65  | 0.000 |
| Work experience$^2$ | -0.0004    | 0.00005          | -8.16 | 0.000 |
| School quality   |              |                  |       |       |
| Percentage of trained teachers | 0.002 | 0.001 | 1.81 | 0.071 |
| Pupil-teacher ratio | -0.006     | 0.004            | -1.60 | 0.109 |
| Marital status   |              |                  |       |       |
| Married          | 0.141        | 0.026            | 5.47  | 0.000 |
| Residence        |              |                  |       |       |
| Urban            | 0.399        | 0.033            | 12.12 | 0.000 |
| Gender           |              |                  |       |       |
| Male             | 0.333        | 0.030            | 11.05 | 0.000 |
| Occupation       |              |                  |       |       |
| Skill level 2    | -0.135       | 0.049            | -2.78 | 0.005 |
| Skill level 3    | 0.159        | 0.091            | 1.75  | 0.000 |
| Skill level 4    | 0.24         | 0.111            | 2.17  | 0.030 |
| _cons            | 3.872        | 0.153            | 25.28 | 0.000 |

Observations = 9219
Prob > F = 0.000
$R^2$=0.1658

Source: Author’s computation from GLSS 6

The Hausman test is used to test the null hypothesis that years of education is exogenous. The alternative hypothesis is that the variable is not exogenous. A reduced form regression with education as the independent variable and all exogenous variables including the instruments and the explanatory variables is run. An F-test is run to show whether fathers’ and mothers’ years of education are both statistically significant in determining the individuals’ educational attainment. Results are reported in appendix A6 and shows that both fathers’ and mothers’ years of education are significant in determining workers years of education. When the residuals of the reduced form equation are put back into the structural equation, the variable is
significant. This suggests that years of education of workers are actually endogeneous. The null hypothesis is therefore accepted indicating that there is endogeneity bias and therefore using OLS would produce biases in the estimates. It is therefore appropriate to use Instrumental Variables.

Table 5.5 shows estimates of the regression equation using parental education as instruments for workers’ years of education. The results show that all variables are jointly significant at 1% and explain 16.58% of the variations in earnings. Again, the R-square is low but not unexpected with cross-sectional data. All variables are significant except the pupil-teacher ratio.

Returns to education rises to 10.9% even with the inclusion of the various explanatory variables. This is significant at 1%. Percentage of trained teachers suggests a 0.2% increase in earnings as it increases by 1%. However, percentage of trained teachers is associated with a 2.52% increase in earnings given an increase by one standard deviation. These are however the same as the OLS estimates indicating that the IV test does not influence returns to percentage of trained teachers on earnings.

Estimates for the control variables: gender, marital status, residence and occupational skill levels, also show statistical significance but they do not indicate any change in their relationship with earnings except a reduction in all their values compared to that of the OLS estimates. This suggests that the OLS estimates of the control variables are biased upwards.
With respect to gender, in controlling for endogeneity of years of education, the IV estimates increases the returns to years of education for both male and female to 11.8% and 10% respectively. Both are significant at 1% and suggest that male workers have higher returns to years of schooling than female workers. Percentage of trained teachers is however still insignificant for male workers whereas pupil-teacher ratio is significant at 10%. The impact of pupil-teacher ratio on male workers is however still positive but drops to a 0.9% increase in earnings with a unit decrease in pupil-teacher ratio. Consequently, the impact of pupil-teacher ratio on earnings of female workers is still insignificant whiles percentage of trained teachers although significant at 10% drops to a 0.29% increase in earning with a unit increase in percentage of trained teachers.
CHAPTER SIX

SUMMARY, CONCLUSION AND POLICY

RECOMMENDATIONS

6.1 Summary

Education is an important issue at the heart of every economy whether developing or developed. The skills and knowledge it imparts makes it an essential component of human capital. Basic education which forms the foundation of higher educational attainment must be well structured in order to encourage enrolment and make it more accessible and this can be achieved through its quality. Quality education which involves having the essential and basic inputs for a smooth delivery in the educational process is the instrument needed to achieve the desired outcomes in education.

The strong and positive link between years of schooling and earnings of students once they enter the labour market has led to many researches investigating this link by examining the rate of return to years of schooling at various educational levels. However, it is the omission of school quality from the earnings equation though its importance is recognized universally, and the few researches on Ghana addressing the quality of schools in the country that motivated the study to investigate the impact of school quality on earnings in Ghana.

An overview of education in Ghana showed the development of education in Ghana from the castle schools, missionary school systems and the many policies by various governments both before and after independence. Also included was a statistical overview on basic education in Ghana with emphasis on access, enrolment, quality and labour market outcomes. Although generally, access and enrolment had increased
overtime, the rural areas still faced some challenges in these areas including quality of education. The availability of Core textbooks, drinking water, toilet facilities and classrooms that need major repairs were alarming. Much improvement however, seem to be seen in percentage of trained teachers and pupil-teacher ratios over the years.

The study employed secondary data from the sixth round of the Ghana Living Standards Survey (GLSS 6) conducted in 2012/13. Information on individual earnings, education, personal characteristics and parental educational information were obtained. School data was also obtained from MoE and the study employed the theoretical framework by Mincer (1974) and empirical framework by Bedi and Edwards (2001). Factors that dominated the literature also informed the choice of the model. The OLS model was used to estimate the economic effects of school quality while controlling for other factors such as gender, marital status, residence and occupational skill requirements. In addition, attempt was made to solve the endogeneity of years of schooling by using IV estimates with parental education as instruments.

Literature reviewed showed that whiles few researches had been conducted in developing countries; most developed countries especially the United States had mixed evidence on the impact of school quality on earnings. Literature reviewed showed little or no impact of school quality on earnings in those countries.

6.2 Conclusion

The study revealed the total number of workers as 34,814. Out of this number 20,204 were workers aged of 15 years and above, born in a region in Ghana and who were
not currently schooling at the time of interview. However, information on earnings of these individuals was only obtained for 15,184 individuals representing 75.2% of the selected sample and the number further reduced to 9,216 when the IV method was used.

Statistics of workers with respect to gender, marital status, level of education, residency, and occupational skill requirement were discussed along with variations in mean monthly wages of paid workers. Variations in pupil-teacher ratio and percentage of trained teachers by region was also discussed.

After obtaining estimates using OLS, there appeared to be a significant relationship between school quality represented by percentage of trained teachers and pupil-teacher ratio and earnings of individuals. Thus suggesting that individuals educated in regions with better quality schooling earned significantly higher than those educated in regions with low-quality schools. Although significantly small, it suggests that school quality plays an important role in earnings of individuals and is thus consistent with findings of Bedi and Edwards (2001) and Godana and Ashipala (2006). Pertaining to gender, pupil-teacher ratio has a significant impact on earnings of male workers but not on female workers. However, percentage of trained teachers has a significant impact on earnings of female workers but not for male workers. The IV estimates however suggest that the impact of school quality on earnings is significant with the percentage of trained teachers measure of school quality and more so males educated in regions with lower pupil-teacher ratio earned significantly more than those men educated in regions with higher pupil-teacher ratios in schools. Females also educated in regions with higher percentage of trained teachers earned
significantly more than those educated in regions with low percentage of trained teachers in schools.

6.3 Policy Recommendations

The results of this study have the following policy implications for education and the labour market in Ghana.

- Findings from the study show that an additional year of schooling is associated with higher rates of return. This means that as individuals move higher on the academic ladder, their earnings are more likely to increase. Therefore, in order to encourage higher educational attainment government should implement policies that would increase access to higher educational institutions. This would also help individuals improve upon their skills and expertise in their various occupations. From the results, individuals employed in occupations that require higher skills (skill level 3 and 4) have higher earnings than those engaged in less skill required occupations. What distinguishes the various skill levels is the level of education. Therefore an individual who is able to attain more education would obtain more skills and therefore be engaged in occupations at skill levels 3 and 4 which have higher earnings. It is therefore necessary that government assess all avenues that hinder attainment of higher education and develop structures that would increase access to higher education.

- The gender dimension of the rates of return to schooling completed by workers from the IV estimates reveal that males on average have higher rates of return to years of schooling than females, indicating that on average, males tend to attain
higher levels of education than females. It is therefore important that efforts be made by Ministry of Education, Ministry of Gender, Children and Social Protection as well as Non-Governmental Organizations and the public as a whole to empower women to attain higher levels of education in order to bridge the gap between educational attainment of males and females. This can be done through scholarships targeted at females and through campaigns centred on female education. Notwithstanding, employers should avoid discrimination by gender in terms of employment in order to encourage females pursue higher careers and bridge the gap between earnings and rate of returns to male and females schooling.

- As results of the study show significant link between earnings of individuals and school quality, there is the need for educational stakeholders and policy makers to view school quality as an important aspect of educational policy in order to improve enrolment, skill, knowledge and earning of citizens with particular attention given to percentage of trained teachers. Percentage of trained teachers should be increased especially in regions where they are low (Upper West, Upper East, Western Region). Scholarships schemes as well as incentives such as study leave with pay and educational loans should be made available particularly for teachers teaching in deprived regions in order to help increase trained teachers in these regions were percentage of trained teachers are low and also upgrade the levels of training of these teachers.

- The issue of high pupil teacher ratio in some regions must also be addressed. From the findings, pupil teacher ratio significantly affects the income of male
workers. Since it is unlikely that teachers from regions with less pupil-teacher ratio be moved to regions with higher pupil-teacher ratios, it is recommended that graduates from teacher training institutions and other recognised educational institutions who are not from regions with high pupil-teacher ratios be posted to the regions where there are higher pupil-teacher ratios (Northern, Upper East, Western Region). This would not only help reduce disparities in the pupil-teacher ratio but would also serve as an additional channel of increasing trained teachers across the regions. This would further help in reducing the income inequality gap between regions.

- Although other measures of school quality such as access to drinking water, good sanitation, availability of textbooks among others were not included in the regression analysis because of inadequate data, information from the Ministry of Education show disparities in them. Therefore, in order to attain equity in educational outcomes, it is recommended that these measures and others including school-feeding programmes, improved dwelling and medical care, which may improve household equity and compensate for household inequity should be encouraged. This can be done through NGOs and communal help especially in the rural areas. This is because the results suggest lower earnings to individuals in rural areas than the urban areas. When facilities are improved in the rural areas particularly educational facilities, the rural folks have a better opportunity of improving their skills and creating their own job opportunities. This will lead to a reduction of the rural-urban migration and an improvement in the economic activities of the rural folks. This means there would be less pressure also on the facilities available in the urban areas.
6.4 Limitations to the Study and Areas for Further Research

The main objective of the study was to investigate the impact of school quality on earnings in Ghana. However, the use of secondary data on demographic characteristics and earnings of individuals posed limitations to the study. Although data from the Ghana Living Standards Survey is widely accepted as a good dataset, there is the typical problem of accuracy of earnings and those reported were only for individuals who had received earnings at the time of interview omitting those who were working but yet to receive pay. Also, since most informal sector workers do not keep accurate recodes of their earnings, there is the possibility of earnings under-statement or over-statement.

Financial as well as resource constraints partly contributed to the limitation of the scope of the study. School-level data, individual’s actual school attended, and other proxies of school quality other than percentage of trained teachers and pupil-teacher ratio which limit aggregated errors and present a wider scope of school quality could not be used. Rather, the use of region of birth as a proxy for region individual attended school and regional-level averages of percentage of trained teachers and pupil-teacher ratio were employed.

Further research is therefore required to establish the relationship between school quality and earnings by deeper analysis of education quality using more quality measures and school-level data. In so doing, efforts could be channeled towards the school quality indicators that require more attention in improving earnings of individuals.
REFERENCES


APPENDICES


Source: World Bank (2013), WDI

A2: Net Enrolment Ratios (1999-2013)

Source: World Bank(2013), WDI

A3: ISCO-08 Skill Level Grouping

<table>
<thead>
<tr>
<th>ISCO-08 Major Groups</th>
<th>Skill Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Managers</td>
<td>3+4</td>
</tr>
<tr>
<td>2. Professionals</td>
<td>4</td>
</tr>
<tr>
<td>3. Technicians and Associate Professionals</td>
<td>3</td>
</tr>
<tr>
<td>4. Clerical Support Workers</td>
<td>2</td>
</tr>
<tr>
<td>5. Services and Sales Workers</td>
<td>2</td>
</tr>
<tr>
<td>6. Skilled Agricultural, Forestry and Fishery Workers</td>
<td>2</td>
</tr>
<tr>
<td>7. Craft and Related Trades Workers</td>
<td>2</td>
</tr>
<tr>
<td>8. Plant and Machine Operators, and Assemblers</td>
<td>2</td>
</tr>
<tr>
<td>9. Elementary Occupations</td>
<td>1</td>
</tr>
<tr>
<td>0. Armed Forces Occupations</td>
<td>1+2+4</td>
</tr>
</tbody>
</table>

Source: International Labour Office (ILO)
## A4: Percentage of Trained Teachers and Pupil-Teacher Ratios

<table>
<thead>
<tr>
<th>Region</th>
<th>Percentage of Trained Teachers</th>
<th>Pupil-Teacher Ratios</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Years</td>
<td></td>
</tr>
<tr>
<td>Western</td>
<td>44</td>
<td>46</td>
</tr>
<tr>
<td>Central</td>
<td>59</td>
<td>63</td>
</tr>
<tr>
<td>Greater A.</td>
<td>70</td>
<td>70</td>
</tr>
<tr>
<td>Volta</td>
<td>63</td>
<td>65</td>
</tr>
<tr>
<td>Eastern</td>
<td>63</td>
<td>64</td>
</tr>
<tr>
<td>Ashanti</td>
<td>65</td>
<td>68</td>
</tr>
<tr>
<td>Brong A.</td>
<td>50</td>
<td>52</td>
</tr>
<tr>
<td>Northern</td>
<td>44</td>
<td>45</td>
</tr>
<tr>
<td>Upper E.</td>
<td>35</td>
<td>45</td>
</tr>
<tr>
<td>Upper W.</td>
<td>67</td>
<td>69</td>
</tr>
</tbody>
</table>

*Source: Ministry of Education, EMIS*
A5: Pairwise Correlation of Variables

<table>
<thead>
<tr>
<th></th>
<th>lwge</th>
<th>eduyrs</th>
<th>exp1</th>
<th>exp2</th>
<th>ma11</th>
<th>MM2</th>
<th>R2</th>
</tr>
</thead>
<tbody>
<tr>
<td>lwge</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>eduyrs</td>
<td>0.2991</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>exp1</td>
<td>-0.1416</td>
<td>-0.0660</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>exp2</td>
<td>-0.1702</td>
<td>-0.0653</td>
<td>0.9500</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ma11</td>
<td>0.1940</td>
<td>0.1489</td>
<td>0.0225</td>
<td>0.0256</td>
<td>1.0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MM2</td>
<td>0.0729</td>
<td>0.0026</td>
<td>0.2207</td>
<td>0.1279</td>
<td>0.0358</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>R2</td>
<td>0.2585</td>
<td>0.2851</td>
<td>-0.1378</td>
<td>-0.1292</td>
<td>-0.0200</td>
<td>-0.0739</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>skills4</th>
<th>skills2</th>
<th>skills3</th>
<th>nwPTT</th>
<th>nwPTR</th>
</tr>
</thead>
<tbody>
<tr>
<td>skills4</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>skills2</td>
<td>-0.6524</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>skills3</td>
<td>-0.0314</td>
<td>-0.3952</td>
<td>1.0000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>nwPTT</td>
<td>-0.0790</td>
<td>0.0897</td>
<td>-0.0319</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>nwPTR</td>
<td>-0.0613</td>
<td>0.0452</td>
<td>-0.0287</td>
<td>0.0877</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

A6: Instrumental Variables Test Results

Hausman test of endogeneity of education

. test ( fatheruyrs=0) ( motheruyrs=0)
(1) fatheruyrs = 0
(2) motheruyrs = 0
F(2, 13683) = 513.64
Prob > F = 0.0000
Weak exogeneity test
First-stage regression summary statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Adjusted R-sq.</th>
<th>Partial R-sq.</th>
<th>Robust R-sq.</th>
<th>F(2,9206)</th>
<th>Prob &gt; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>eduys</td>
<td>0.3453</td>
<td>0.3445</td>
<td>0.0609</td>
<td>311.262</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Test of exogeneity of instruments (over identifying restrictions)
Score chi2(1) = .197696 (p = 0.6566)

A7: Co-efficient Estimates by Gender

<table>
<thead>
<tr>
<th>Variable</th>
<th>OLS</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MALE</td>
<td>FEMALE</td>
</tr>
<tr>
<td>Education (years)</td>
<td>0.046***</td>
<td>0.057***</td>
</tr>
<tr>
<td></td>
<td>(0.005)</td>
<td>(0.006)</td>
</tr>
<tr>
<td>Work experience</td>
<td>0.014***</td>
<td>0.027***</td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
<td>(0.004)</td>
</tr>
<tr>
<td>Work experience$^2$</td>
<td>-0.00004***</td>
<td>-0.0055***</td>
</tr>
<tr>
<td></td>
<td>(0.00006)</td>
<td>(0.00007)</td>
</tr>
<tr>
<td>School quality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage of trained teachers</td>
<td>0.0013</td>
<td>0.0032**</td>
</tr>
<tr>
<td></td>
<td>(0.0013)</td>
<td>(0.0015)</td>
</tr>
<tr>
<td>Pupil-teacher ratio</td>
<td>-0.013**</td>
<td>0.0031</td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
<td>(0.005)</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>married</td>
<td>0.319***</td>
<td>0.091***</td>
</tr>
<tr>
<td></td>
<td>(0.033)</td>
<td>(0.032)</td>
</tr>
<tr>
<td>Residence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>0.482***</td>
<td>0.488**</td>
</tr>
<tr>
<td></td>
<td>(0.030)</td>
<td>(0.034)</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skill level 2</td>
<td>-0.220***</td>
<td>0.060</td>
</tr>
<tr>
<td></td>
<td>(0.050)</td>
<td>(0.068)</td>
</tr>
<tr>
<td>Skill level 3</td>
<td>0.134*</td>
<td>0.528***</td>
</tr>
<tr>
<td></td>
<td>(0.079)</td>
<td>(0.117)</td>
</tr>
<tr>
<td>Skill level 4</td>
<td>0.382***</td>
<td>0.765***</td>
</tr>
<tr>
<td></td>
<td>(0.067)</td>
<td>(0.091)</td>
</tr>
<tr>
<td>_cons</td>
<td>4.98***</td>
<td>3.6432***</td>
</tr>
<tr>
<td></td>
<td>(0.159)</td>
<td>(0.176)</td>
</tr>
</tbody>
</table>

Number of obs = 6313
Prob > F = 0.000
R-squared = 0.1676
R-squared = 0.1500

Source: Author’s computation from GLSS 6
Notes: ***, ** and * denote 1%, 5% and 10% levels of significance respectively. Robust standard errors in parenthesis.