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**INEQUALITY OF OPPORTUNITY AND CHILDREN'S  
EDUCATIONAL AND HEALTH OUTCOMES IN GHANA**

**BY**

**GEORGE ADAYI-NWOZA ADIAH  
(10120614)**

**THIS THESIS IS SUBMITTED TO THE UNIVERSITY OF GHANA,  
LEGON IN PARTIAL FULFILLMENT OF THE REQUIREMENT  
FOR THE AWARD OF PHD DEVELOPMENT STUDIES DEGREE**



**Institute of Statistical, Social and Economic Research (ISSER)  
University of Ghana  
Legon**

**JULY, 2014**

## DECLARATION

I, George Adayi-Nwoza Adiah, the author of the thesis titled **“Inequality of opportunity and children’s educational and health outcomes in Ghana”** do hereby declare that this piece of work is entirely my own work and that neither the whole nor part of this work has been presented for another degree elsewhere.

Signature..... Date.....

PhD Candidate: George Adayi-Nwoza Adiah

We, the undersigned supervisors, certify that this is an original work we supervised the candidate to produce. We are convinced that the thesis meets all the required standards set by the University of Ghana for the award of a Doctor of Philosophy degree.

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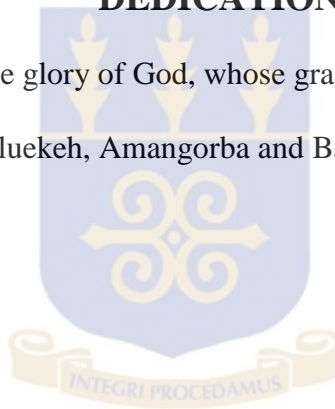
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JULY, 2014

## DEDICATION

This work is dedicated to the glory of God, whose grace has enabled me to complete this work, and to my children Aluekeh, Amangorba and Badwo.



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## ABSTRACT

What a child experiences during the early years lays down a critical foundation for the entire life course. A child's development, including physical, social–emotional and language–cognitive domains, during the early years strongly influences basic learning, school success, economic participation, social citizenry and health. A healthy child population is not only one of the indicators of a society's present health, but it is also an index of the society's future well being and productivity.

Using the Ghana Living Standard Survey Round 5 Plus (GLSS 5+) data conducted in 2008, the study employed Roemer's equality of opportunity model adopted from Checchi and Peragine (2005) to examine the determinants of inequality of opportunity in educational outcomes of children aged 5-12 years and health outcomes of children aged 0-59 months in Ghana. The study used cognitive ability as a measure of educational outcome for children aged 5-12 years while anthropometric measures were used for short and long term nutritional and health status of under-five children in Ghana.

Employing quantile regression analysis, the study found that there was inequality of opportunity in children's educational and health outcomes in Ghana. It then recommended that, Government should, therefore, invest more resources on high quality early childhood education programs that integrate both schooling and nutrition so that Ghanaian children who do not have adequate access to resources that privileged Ghanaians provide for their kids, could have a good basis of development at the early stages of life.

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## **ABBREVIATIONS / ACRONYMS**

|        |   |
|--------|---|
| ADEA   | Association for the Development of Education in Africa                |
| AESR   | Annual Education Sector Report  |
| APM    | Advanced Progressive Matrices   |
| ARI    | Acute Respiratory Infections  |
| BECE   | Basic Education Certificate Examination                               |
| BMI    | Body Mass Index   |
| CAAP   | Comprehensive African Agricultural Development Programme              |
| CEE    | Common Entrance Examination   |
| CEPA   | Centre for Policy Analysis  |
| CHO    | Community Health Officer  |
| CHPS   | Community Based Health Planning and Service Programme                 |
| CIDA   | Canadian International Development Agency                             |
| CPM    | Coloured Progressive Matrices   |
| CREATE | Consortium for Research on Educational Access, Transitions and Equity |
| CRISE  | Centre for Research on Inequality, Human Security and Ethnicity       |
| CSAE   | Centre for the Study of African Economies                             |
| DAAD   | German Academic Exchange Service                                      |
| DACF   | District Assembly Common Fund   |
| DFID   | Department for International Development, UK                          |
| DHS    | Demographic and Health Survey   |
| DIC    | District Implementation Committee                                     |
| DMHIS  | District Mutual Health Insurance Scheme                               |

|         |   |
|---------|---|
| DP      | Development Partner                                     |
| EA      | Enumeration Area  |
| ECD     | Early Childhood Development                             |
| EOC     | Emergency Obstetrical Care                              |
| EOp     | Equality of Opportunity                                 |
| ESR     | Education Sector Review                                 |
| ESPR    | Education Sector Performance Report                     |
| FAO     | Food and Agriculture Organization of the United Nations |
| FBO     | Farmer Based Organization                               |
| FBOs    | Faith Based Organizations                               |
| FCUBE   | Free Compulsory Universal Basic Education               |
| GCE     | General Certificate of Examination                      |
| GDHS    | Ghana Demographic and Health Survey                     |
| GDP     | Gross Domestic Product                                  |
| GES     | Ghana Education Service                                 |
| GETFund | Ghana Education Trust Fund                              |
| GHS     | Ghana Health Service                                    |
| GLSS 5+ | Ghana Living Standards Survey, Round 5 Plus             |
| GoG     | Government of Ghana                                     |
| GMA     | Ghana Medical Association                               |
| GPRS    | Ghana Poverty Reduction Strategy                        |
| GSFP    | Ghana School Feeding Programme                          |
| GSS     | Ghana Statistical Service                               |

|          |   |
|----------|---|
| HDI      | Human Development Index                                     |
| HEDG     | Health, Econometrics and Data Group                         |
| HIV/AIDS | Human Immunity Virus /Acquired Immunity Deficiency Syndrome |
| ICT      | Information Communication Technology                        |
| IFPRI    | International Food Policy Research Institute                |
| IGF      | Internal Generated Fund                                     |
| IIPS     | International Institute for Population Sciences             |
| ISODEC   | Integrated Social Development Centre                        |
| ISSER    | Institute of Statistical, Social and Economic Research      |
| IZA      | Institute for the Study of Labour                           |
| JSS      | Junior Secondary School                                     |
| KVIP     | Kumasi Ventilated Improved Pit                              |
| LPF      | Level Playing Field   |
| MDG      | Millennium Development Goal                                 |
| MENA     | Middle East and North Africa                                |
| MiDA     | Millennium Development Authority                            |
| MOESS    | Ministry of Education, Science and Sports                   |
| MOFEP    | Ministry of Finance and Economic Planning                   |
| MOH      | Ministry of Health  |
| NBER     | National Bureau of Economic Research                        |
| NEPAD    | New Partnership for African Development                     |
| NDPC     | National Development Planning Committee                     |
| NGO      | Non Governmental Organization                               |

|        |  |
|--------|--|
| NPM    | New Public Management                                    |
| OECD   | Organisation for Economic Cooperation and Development    |
| OLS    | Ordinary Least Squares                                   |
| OPHI   | Oxford Poverty and Human Development Initiative          |
| PCA    | Principal Component Analysis                             |
| PEM    | Protein Energy Malnutrition                              |
| PIRLS  | Progress in International Reading Literacy Study         |
| PISA   | Programme for International Student Assessment           |
| PNDC   | Provisional National Defence Council                     |
| PTR    | Pupil to Teacher Ratio                                   |
| QR     | Quantile Regression                                      |
| RECOUP | Research Consortium on Outcomes to Education and Poverty |
| RPM    | Raven's Progressive Matrices                             |
| SES    | Socioeconomic Status                                     |
| SHARE  | Survey of Health, Ageing and Retirement in Europe        |
| SIC    | School Implementation Committee                          |
| SPM    | Standard Progressive Matrices                            |
| SSS    | Senior Secondary School                                  |
| SSSCE  | Senior Secondary School Certificate Examination          |
| SSA    | Sub-Saharan Africa                                       |
| TIMSS  | Trends in Mathematics and Science Study                  |
| TRCHS  | Tanzania Reproductive and Child Health Survey            |
| TVI    | Technical and Vocational Institute                       |

|        |   |
|--------|---|
| UDHR   | Universal Declaration of Human Rights                             |
| UNDP   | United Nations Development Programs                               |
| UNESCO | United Nations Educational, Scientific, and Cultural Organization |
| UNICEF | United Nations International Children's Educational Fund          |
| USAID  | US Agency for International Development                           |
| VAD    | Vitamin A Deficiency  |
| WB     | World Bank  |
| WDI    | World Development Indicators                                      |
| WFP    | World Food Programme  |
| WHO    | World Health Organisation   |
| WIFA   | Women in the Fertile Age  |
| WISC   | Wechsler Intelligence Scale for Children                          |
| ZEF    | Centre for Development Research                                   |

## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.0 Background**

The first few years of a child's life are the starting point for inequality of opportunity. Physical, cognitive, and psychological development occurs early in life. The first three years of children's lives, when their synapses (connections within the brain) are forming at peak levels, are the most important for brain development (UNESCO, 2006). Some have described the first few years of life as "an extended critical period, a window of opportunity for development, closed by age three" (UNESCO, 2006, p. 109). These early years are also a period that is particularly sensitive to the conditions in which a child lives. Child development is quite fragile in the face of issues like poor nutrition. Any developmental deficits that occur in early childhood may be permanent (UNESCO, 2006). This crucial childhood period also represents a time when individuals have the least control over their circumstances. Being born to a poor family, or in an underserved geographic location, is entirely outside of a child's control, but determines the child's opportunities to accumulate crucial health assets that could determine his or her entire life course.

Child health and nutrition play an important role in a variety of dimensions of child development and adult outcomes. Under-nutrition negatively impacts cognitive development, motor development, and social development and these effects can persist into adulthood (UNESCO, 2006). Health, especially child health, can drive later labour market outcomes and productivity. For instance, height accumulated in childhood is

connected to labour market outcomes later in life (Strauss & Thomas, 1998). Child under-nutrition, including stunting (excessively low height for one's age) and wasting (excessively low weight for one's height) increases the risk of child mortality, child illness, and poor adult health outcomes (Black et al., 2008). Height for age at two years old is the best predictor of human capital later in life, and under-nutrition is associated with lower human capital (Victora et al., 2008). Early health deficiencies have been shown to result in shorter adult height, lower attained schooling, reduced adult income, and decreased offspring birth weight (Victora et al., 2008). It is well established in the public health literature that health and nutrition in the first years of life are crucial to health and wellbeing later in life (Assaad, Krafft, Hassine, & Salehi-Isfahani, 2012). Growth and development in childhood is determined by genotype (nature) and phenotype (nurture), with the influence of the latter being particularly crucial in the first two or three years of life (Martorell & Habicht, 1986).

Malnutrition is one of the most important health and welfare problems among infants and young children in Ghana. It is a result of both inadequate food intake and illness. Inadequate food intake is a consequence of insufficient food available at the household level, improper feeding practices, or both. Improper feeding practices include both the quality and quantity of foods offered to young children as well as the timing of their introduction. Poor sanitation puts young children at increased risk of illness, in particular diarrheal disease, which adversely affects their nutritional status. Both inadequate food intake and poor environmental sanitation reflect underlying social and economic conditions. Malnutrition in Ghana has been most prevalent under the form of Protein Energy Malnutrition (PEM), which causes growth retardation and underweight. About 54

percent of all deaths beyond early infancy are associated with PEM, making this the single greatest cause of child mortality in Ghana (Van de Poel, Hosseinpoor, Jehu-Appiah, Vega & Speybroeck, 2007).

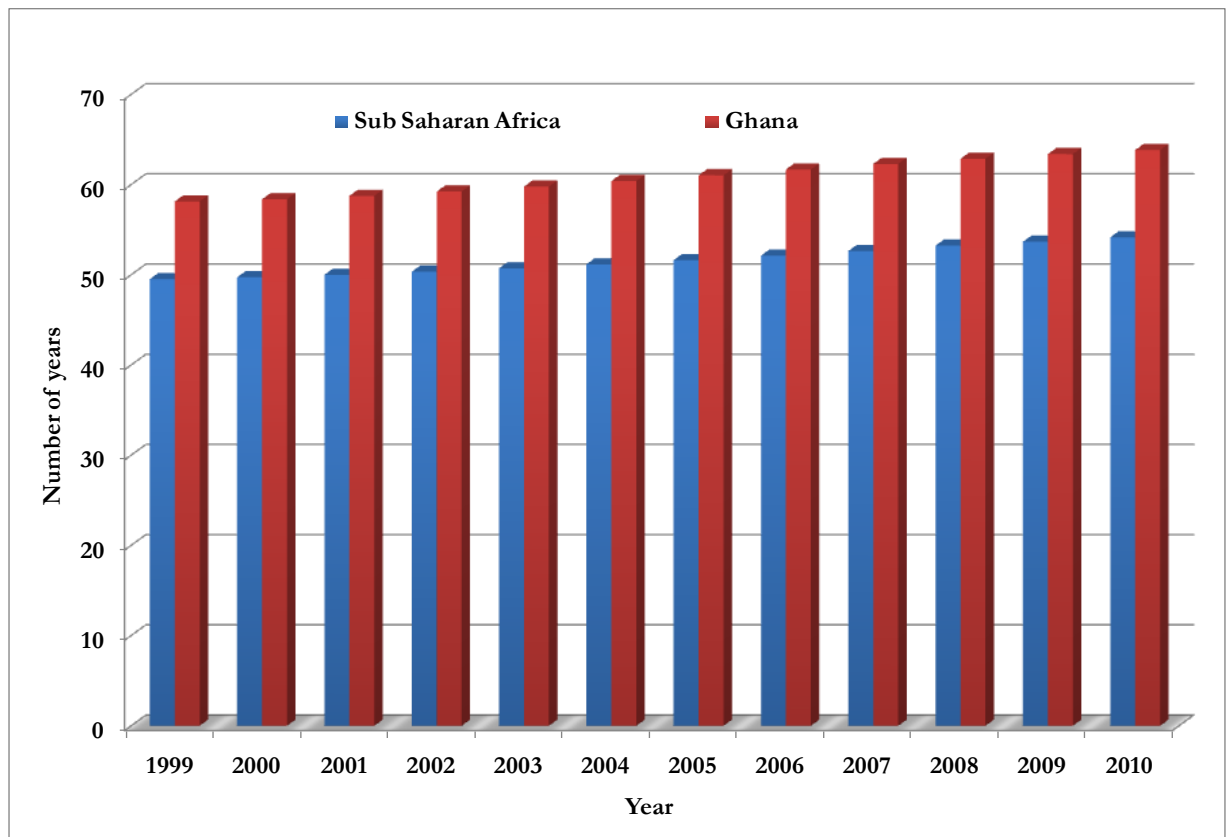
Malnutrition has significant health and economic consequences, the most serious of which is an increased risk of death. Other outcomes include an increased risk of illness and a lower level of cognitive development, which results in lower educational attainment. In adulthood, the accumulated effects of long-term malnutrition can be a reduction in workers' productivity and increased absenteeism in the workplace; these may reduce a person's lifetime earning potential and ability to contribute to the national economy. Furthermore, malnutrition can result in adverse pregnancy outcomes.

Inequality poses a significant development challenge for Ghana, and has increased in the last 15 years (Coulombe & Wodon, 2007). Since the 1990 World Conference on Education for All in Jomtien, many countries have made significant progress towards achieving Universal Primary Education. In many countries access to education has improved dramatically, nevertheless a significant number of children are dropping out of primary schooling without even acquiring the most basic skills. The schooling experience of these children dropping out of primary school consists frequently of limited learning opportunities in overcrowded classrooms with insufficient learning materials and under-qualified teachers (Alexander, 2008). The study will investigate the extent to which inequality of opportunity in education and health influences children's cognitive ability and anthropometric measures in Ghana.

### 1.1 Assessment of some of the health indicators in Ghana

Ghana has experienced remarkable gains in health from the immediate post-independence era due to increasing investment in health. Ghana has made steady progress towards achieving the Millennium Development Goals. However, the nutrition, health and mortality situation of young children and women, as well as persistent regional disparities need to be addressed. Ghana's life expectancy improved from 58 years in 1999 to 64 years in 2010 (World Bank, 2012). Furthermore, the improved life expectancy over the years and the prevention of a range of communicable diseases improved child survival and development. From Figure 1.1, it is clear that Ghana's life expectancy has been better than that of sub-Saharan Africa averages over the years (from 1999 to 2010).

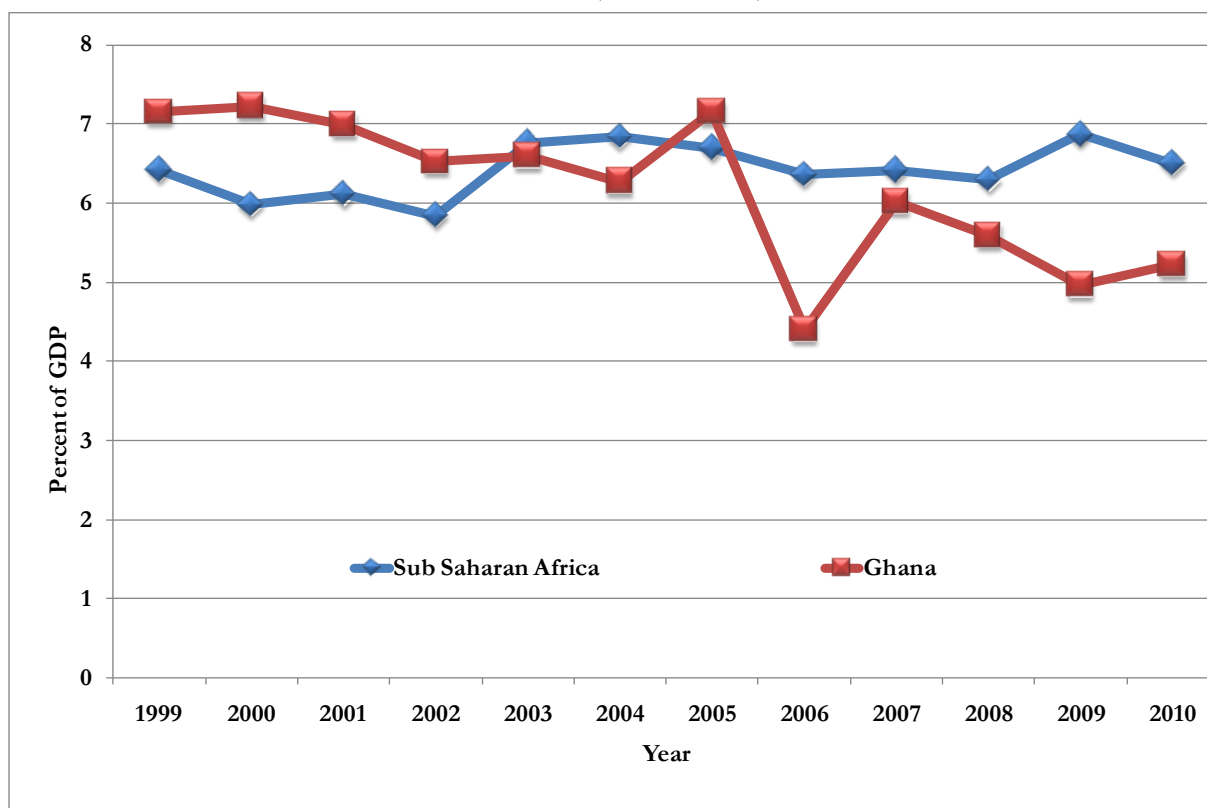
Figure 1.1: Life expectancy at birth, Ghana and sub-Saharan Africa (1999 – 2010)



Source: World Bank, 2012

There were marginal increases and dips in Ghana's health expenditure share of GDP for the period 1999 to 2010. However there was significant cut in health expenditure share of GDP from 7.1 percent in 1999 to 4.4 percent in 2006 before increasing to 6 percent in 2007. This declined marginally to 5.6 percent in 2008 and further to 5 percent in 2009 before increasing marginally to 5.2 percent in 2010 (World Bank, 2012). Ghana's health expenditure share of GDP peaked in 2005 at 7.1 percent but went below that of sub-Saharan Africa average from 2006 until 2010 (Figure 1.2).

Figure 1.2: Trends in Total health expenditure as percentage of GDP, Ghana and sub-Saharan Africa (1999 - 2010)

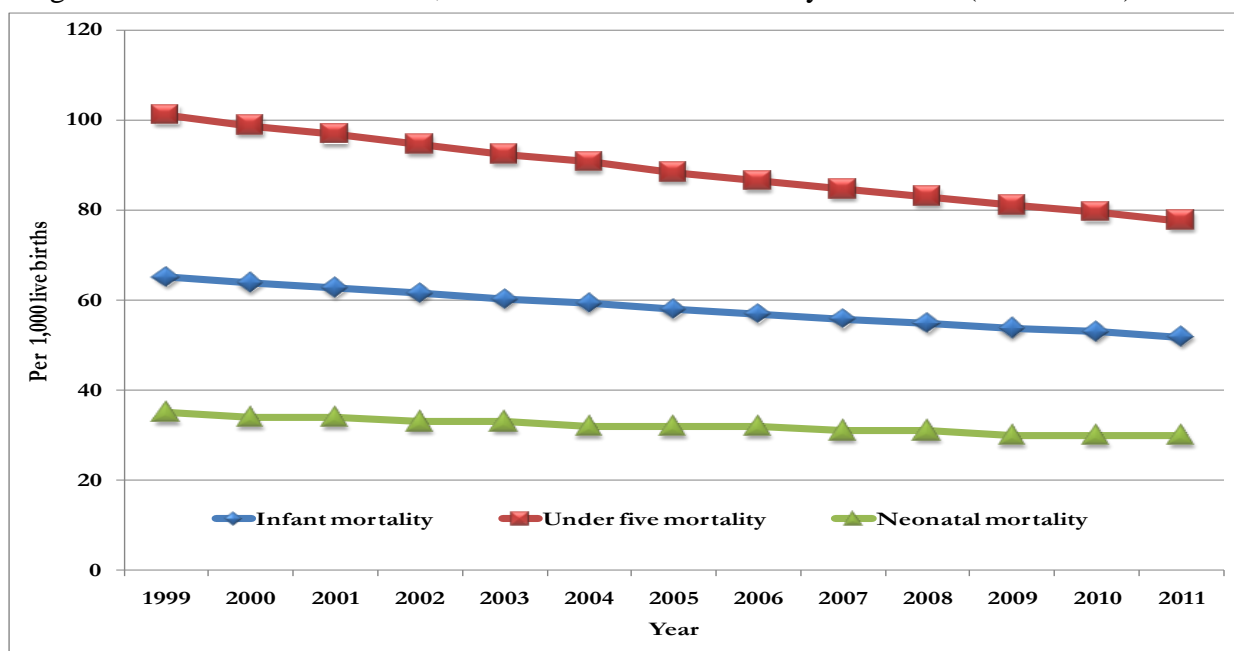


Source: World Bank, 2012

There has been gradual improvement in Ghana's under-five and infant mortality rates between 1999 and 2011 (Figure 1.3). Ghana's under-five mortality rate improved from 101 per 1000 live births in 1999 to 78 per 1000 live births in 2011. The same can be said

of infant mortality which also improved marginally from 65 per 1000 live births in 1999 to 52 per 1000 live births in 2011 (World Bank, 2012). The trend in early child mortalities in Ghana has shown a gradual decline in neonatal, infant and under-five mortality. This augurs well for the country's bid to achieve MDG4. There have been no deaths from measles in Ghana for the past seven years. Most of the decline in childhood mortality has been in the under-five, where immunization has contributed greatly to reducing preventable deaths. Neonatal mortality has however shown little decline and there is the need to concentrate efforts in reducing this further.

Figure 1.3: Trends in under-five, neonatal and infant mortality for Ghana (1999- 2011)



Source: World Bank, 2012

Low access to health services and to safe water and sanitation, high incidence of malaria and malnutrition are the underlying factors among the main causes of mortality. Childhood immunization coverage still needs to be increased. Inadequate antenatal care coverage and unsupervised deliveries entail a high level of maternal mortality. There had

been gradual improvement in the maternal mortality ratio of 550 per 100,000 live births in 2000 to 440 per 100,000 live births in 2005 and further to 350 per 100,000 live births in 2010 (World Bank, 2012). Ghana's Human Development Index (HDI), a measure combining life expectancy, literacy, education and standard of living, has been worsening too; after improving from 0.467 in 1980 to 0.556 in 2000, the HDI dropped to 0.541 in 2011 (UNDP: Human Development Report, 2012). These feats that Ghana chalked are better than the sub-Saharan Africa averages.

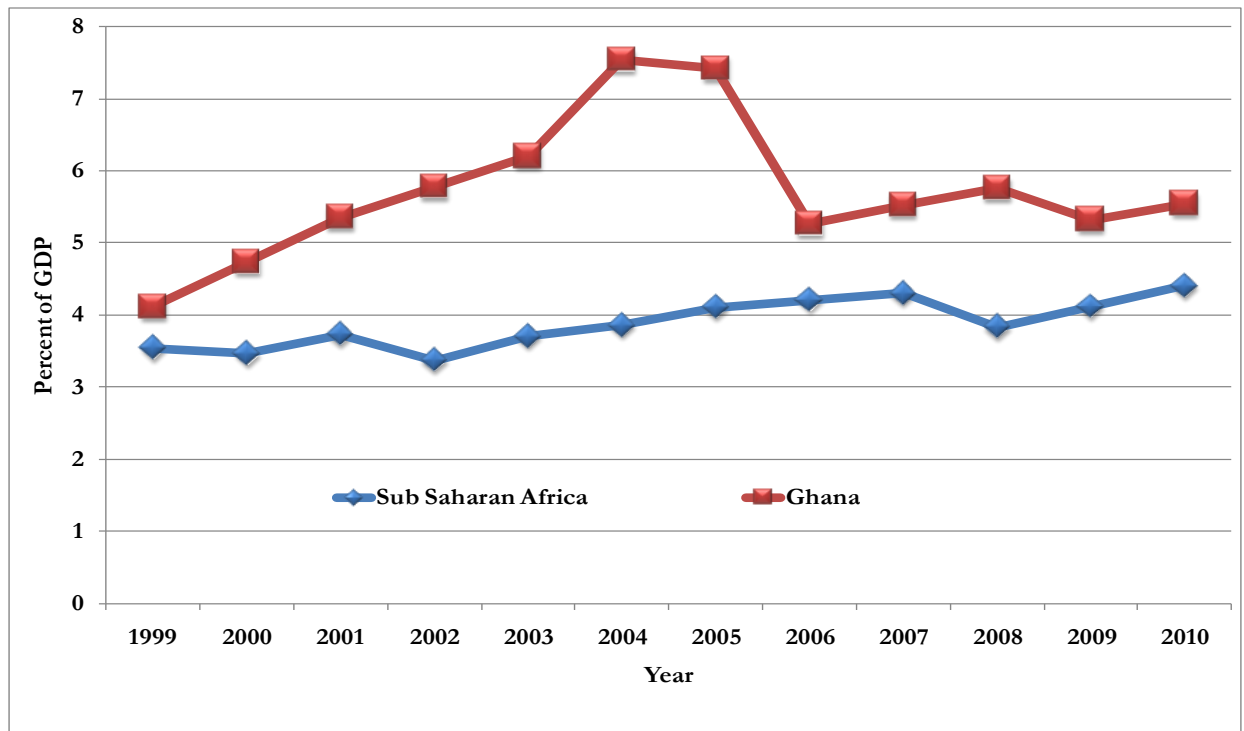
## **1.2 Ghana's spending on education**

Ghana has been promoting free compulsory universal education since the 1950's and has put in several measures including Development Partner (DP) financed programmes to improve access, quality and management efficiency in the system. A large amount of resources have been committed to the sector with increased investments from US\$384.5 million in 1999 to US\$1 billion in 2006 (World Bank, 2010).

Thirty percent of the Government of Ghana budget is spent on education, 25 percent of which is for teacher salaries (ESPR, 2008). The education share of GDP for Ghana increased from 4.1 percent in 1999 to 7.5 percent in 2004 where it peaked and dipped marginally to 7.4 percent in 2005. It dipped further to 5.3 percent in 2006 and assumed an undulating character until it reached 5.5 percent in 2010 (Figure 1.4). Clearly, Ghana's educational share to GDP has been higher than that of sub-Saharan Africa averages from 1999 to 2010 (Figure 1.4). Ghana spends more than any other African country on education which is far above Fast Track Initiative targets. Donors contribute 5.5 percent to the education budget (World Bank, 2010). The Government of Ghana (GoG) is calling on more private sector financing and Faith-Based Organizations (FBOs) to invest in

education to increase education delivery at all levels (AESR, 2009). There are also new resource channels assisting the sector including: the GETFund which is the 2<sup>nd</sup> largest and Internal Generated Fund (IGF), the 3<sup>rd</sup> largest contributor to the education sector budget after Ministry of Finance and Economic Planning (MOFEP). Other sources such as the District Education and MP Common Funds (DACF) also contribute to financing the education sector at the district level.

Figure 1.4: Trends in Public spending on education as percentage of GDP, Ghana and sub-Saharan Africa (1999- 2010)



Source: World Bank and UNESCO data, 2012

Preliminary observations by Ghana education experts on the assessment on the impact of the model senior secondary school policy on reducing inter-district disparities in education outcomes are varying (Akyeampong, Djangmah, Oduro, Seidu, & Hunt, 2007). On one hand, criticism has been expressed about the over-emphasis on equality in distribution under the model school policy. The approach of establishing one model

school in each district reflects a tendency in Ghana to distribute public goods equally between districts (irrespective of needs) rather than targeting disadvantaged areas and marginalised populations to achieve pro-poor and geographically equalising outcomes. By failing to target resources to the poorest districts - or the districts with the worst education facilities – the government is missing an opportunity to bring districts with the weakest educational facilities and performance up to a minimal level, set by government, as acceptable (Taylor, 2005).

Ghana's commitment to education is reflected in Ghana's Free Universal Basic Education policy, which aims to provide two years of kindergarten, six years of primary school and three years of junior high school free to all children in Ghana (Government of Ghana, 2007). Significant improvements in education access indicators reflect this commitment. Both primary and secondary school enrolment has increased (World Bank, 2007b). Nevertheless Ghana's gross and net enrolment figures are still below the sub-Saharan Africa average at the primary level, although they are above average at the secondary level (World Bank, 2006) and despite free basic education, poorer people are still less able to educate their children.

Children of different ages and abilities are mixed together in single classrooms without proper recognition of teaching methods to improve learning and to induce school engagement (Little, 2008). Such schooling circumstances, together with personal and family level factors such as ill-health, malnutrition and poverty, jeopardise meaningful access to education for many children. As a result, many children are registered in

schools but fail to attend, they participate but fail to learn, they are enrolled for several years but fail to progress or they simply drop-out from school.

An important question about schools is the extent to which they offer opportunities for individual and/or group social mobility. Numerous studies have attempted to assess the independent effects of schooling on academic performance, attainment, occupational status, and income. Although the results of these studies are mixed, scholars generally agree that schools in and of themselves do not predict specified outcomes. Indeed, the effects of family background characteristics in conjunction with schooling appear to be far more powerful predictors of what we commonly call 'success'.

### **1.3 Problem statement**

Ghana has had a sustained economic growth in recent years. This has however not been equally translated into every aspect of human development, leaving the health and nutrition status of children lagging behind. Poverty and food insecurity have also decreased and as a result the proportion of people with insufficient food has declined from 37 percent in 1991 to 18 percent in 1996 and further to 5 percent in 2011. However, health outcomes such as infant and under-five mortality rates, on the other hand, have stagnated since the late 1990s, even though health service delivery such as immunization has continuously expanded.

Health is one of the basic inputs to human development and has a direct linkage to growth and poverty reduction. Health services delivery in Ghana is provided principally by government health centres and a number of private clinics and family planning and maternity homes. A few others are established by foreign non-governmental

organizations in collaboration with local counterparts. The major issue of the health service delivery in some of the districts of Ghana is the problem of inadequate access to health care for the majority of the population (Van den Boom, Nsowah-Nuamah, & Overbosch, 2004). A significant number of the population lives in scattered rural settlements. In order to make up for the inadequate coverage of health facilities, outreach services are organized to selected communities monthly. By this means, basic preventive and curative services such as immunization coverage are provided for various communities. Another issue of grave concern is the prevalence of several communicable diseases of public health magnitude. The trend shows a persistent increase year by year. In addition to these diseases are others like Buruli Ulcer, Tuberculosis and HIV/AIDS, which although do not appear among the top ten, yet cause severe suffering and death and have profound negative effect on the total development of the country. The health sector continues to grapple with sustaining adequate number of staff and an equitable distribution of midwives nationally to afford Women in the Fertile Age (WIFA) increased access to skilled attendance during delivery. There is also growing concern to increase and provide blood banks in many hospitals. Some health facilities have their service delivery being hampered by inadequate medical equipment.

Most of childhood deaths are caused by preventable or treatable health conditions. Recent analyses based on state-of-the-art epidemiological evidence show that in Ghana, 40 percent of all deaths that occur before the age of five are due directly and indirectly to under-nutrition, making it the single most important cause of child mortality. A recent study suggested that the high prevalence of under-nutrition coupled with inadequate maternal and child care behaviour (e.g. low rate of iron supplementation among pregnant

women, early or late initiation of complementary feeding among children), might be reasons for the stagnated child mortality levels in Ghana (World Bank, 2007). While there was a steady improvement of the nutritional situation in recent years, the prevalence of under-nutrition is still high. The prevalence of stunting among children under the age of five declined from 29.4 percent to 22.4 percent, and that of underweight declined from 21.8 percent to 17.8 percent between 2003 and 2006. The prevalence of low birth weight among infants with known birth weight also declined from 7 percent in 2004 to 6 percent in 2006. Protein and energy under-nutrition is the major problem, and the micronutrient deficiencies are of public health significance. A national survey in 2011 (GSS, 2012) showed that 57 percent of children aged 6-59 months and 35 percent of women aged 15-49 are anaemic.

Children from disadvantaged backgrounds diverge from their more advantaged peers quite early in their development, and gaps persist throughout life (Heckman, 2006). Childhood presents the best opportunity for preventing or remedying these inequalities. Childhood also represents a truly blameless time for inequality. Achievements in education or income later in life are shaped by individuals' efforts. However, the opportunities experienced in the conception of children and in the early years of children's lives are determined by factors the children themselves have no control over. Parental wealth, education, and access to health services shape a child's health and later life outcomes, but children have no input into these circumstances.

Ideally, a society would offer equal opportunities to its citizens. In such a society, the factors children cannot control would have no role in shaping their life outcomes.

Although genetic variation and luck alone are expected to lead to some natural variations in outcomes among children facing similar circumstances, inequality due to differences in circumstances is what concerns us here. The objective is not to fully equalize health outcomes, but to provide children with similar opportunities to develop into healthy and productive adults.

Children's educational outcomes are boosted or hindered by their families' socioeconomic background. The crucial goal of education is to make sure that every child has a chance to do well in school, both in cognitive and non-cognitive skills. Children's success in school to a large extent determines their success as adults – determining whether and where they go to college, what professions they enter, and how much they are paid.

Distance to schools especially in the remote areas of the most deprived districts, lack of school mapping with communities not in easy walking distance of primary school and schools under trees particularly in the Northern region are some of the reasons that prevent education from achieving its goal. Eleven percent of communities still do not have access to schools within a 2km radius of the village mainly in northern Ghana (GSS, 2008) and over 25 percent of communities not having a school within their own community. Over 900,000 children in Ghana are out of school and are unlikely to access education through conventional formal education systems that require complementary/alternative service delivery systems (UNICEF, 2010; Casely-Hayford, 2010). Out of school children in Ghana are from the rural poor areas of the country and mainly from the three northern regions. There are widening disparities in pupil to teacher

ratios (PTR) with often 1 trained teacher to 36 pupils in southern Ghana compared to 1 trained teacher to 130 pupils in northern Ghana (World Bank, 2010).

Van den Boom and others (2004) noted that access to health facilities remained a problem: Medical facilities were not evenly distributed across the country, with most rural areas lacking basic facilities such as hospitals and clinics as well as doctors and nurses. The study further said that “Ghanaians on average live about 16km from a healthcare facility where they can consult a doctor, but half of the population lives within a 5km radius (Van den Boom et al., 2004). By the same token, the other half cannot consult a doctor within 5km, which corresponds to a 1 hour walking distance, and one quarter even lives more than 15km from a facility where a doctor can be consulted.” The Government of Ghana embarked on a health sector reform in the early 1990s to improve the accessibility and quality of services. However, “the health situation in Ghana is still far from satisfactory.” Many people in the country rely on self-medication (Van den Boom et al., 2004).

Another key challenge to education and health is the fact that there are inequitable allocations and spending across regional and poverty endemic locations leaving rural or deprived areas underfunded and under resourced in terms of trained teachers or doctors or nurses and resources spent per student. Resources per pupil/health facility are inequitably distributed across Ghana favouring the urban wealthy and depriving the rural poor of their fair share of educational/ health resources (World Bank, 2010). The World Bank (2010) study on equity and efficiency across Ghana’s education sector also suggests growing inequities in relation to resource distribution in the country fuelled by ineffective

teacher deployment, limited targeting and other resource allocations which favour urban southern schools as against rural poor northern schools. This inequality of educational and health outcomes is widely recognized not only in Ghana but other parts of the world, and even in advanced countries such as the United States. From the foregoing it is important to address the question: What is the extent to which children's cognitive ability and nutritional status are due to factors exogenous to the child or unequal opportunities.

#### **1.4 Objective of the study**

The main objective of the study is to investigate the extent to which inequality of opportunity influences children's education and health outcomes in Ghana.

Specifically to

- Assess the inequality in the health outcomes of children in Ghana.
- Assess the inequality in the cognitive ability of children in Ghana.
- Analyze the determinants of inequality in children's cognitive ability in Ghana.
- Analyze the determinants of inequality of opportunity in children's health outcomes in Ghana.

#### **1.5 Relevance / Justification of study**

Poor health and inadequate nutrition in the first three years of life hamper a child's subsequent cognitive and physical development, leading to adverse health, productivity and wellbeing outcomes that persist into adulthood. Parental inputs, such as the quantity and quality of food, and public health inputs, such as the availability of clean water and sanitation are unequally distributed across children. Inequality of opportunity can be an

important contributor to the observed inequality in child health outcomes, and, as such, an important source of inequality of opportunity later in life.

A wide variety of family characteristics can affect the course of child development, and interventions targeting these areas can cause important improvements in child health. Mother's education can be an important contributor to child health, both in terms of receiving formal education (literacy, numeracy) and, most importantly, in terms of health knowledge (Glewwe, 1999). Improving education can therefore be an important but indirect route for improving child health. Poverty is also a substantial contributor to poor child health outcomes, and even un-conditional cash transfer programmes have been shown to improve child health outcomes in South Africa (Agüero, Carter, & Woolard, 2007).

Investments in the first few years of a child's life also have the greatest potential for substantial returns. In the context of the United States, it has been argued that, while return from early interventions to develop human capital is high, the return from later interventions is lower; it is much costly to engage in remedial programmes (Heckman, 2006). Economic constraints on family investment in early childhood and externalities make public policy interventions particularly important (Nores & Barnett, 2010). Gaps in child health emerge early, and policies to prevent these gaps are crucial to altering the life course of at risk or marginalized children. It is important to note that deficits in health outcomes as well as gaps or inequality can be substantial regardless of the absolute level of a country's income or other forms of development (Marmot, 2005).

Education and health directly affect individual employment and earnings and therefore it contributes to income inequality for a given cross section of individuals. Furthermore, children who are born from better educated parents enjoy a wider range of opportunities than those born from low educated parents (Carneiro, 2006). Parental education is not only associated with higher household income, but also with better school and home environments. Therefore, education contributes to intergenerational inequality by naturally creating inequality of opportunity for children born in different families. This study estimates inequality of opportunity due to children's educational and health outcomes in Ghana. Understanding the effect of family background on children's health and educational achievement is important, given that the family is one of the main agents in children's development of their human capital. Moreover, intergenerational mobility in education is closely related to intergenerational mobility in earnings (Woessmann, 2004; 2008; Schuetz, Ursprung, & Woessmann, 2008).

Despite many studies that have resulted in widespread agreement that social background influences children's educational experiences and successes, the association between family background and cognitive performance at the point where children enter school has received less empirical scrutiny. Many studies have evaluated the efficacy of preschool programmes designed to enhance the cognitive and social competence of disadvantaged children (such as Head Start and state-financed preschool programmes for low-income children). Many other studies have targeted the experiences of children in elementary school who have already demonstrated educational problems.

Education is an important determinant of later life chances (Mare, 1981; Shavit & Blossfeld, 1993). If a resource like education is this important, then the distribution of this resource is certainly worth studying. There is a long list of literature that has done just that, and it shows that educational attainment is unequally distributed among persons with different family backgrounds, in particular that persons from more privileged families tend to obtain more education than persons from less privileged backgrounds (Hout & DiPrete, 2006; Breen & Jonsson, 2005).

Paxson and Schady (2007) note that “If poorer children in developing countries grow up with poorer cognitive skills, leading to lower incomes in adulthood, which in turn influence the cognitive skills of their own children, then low levels of cognitive development in early childhood may be one way in which poverty is transmitted across generations” (p. 51). Thus, understanding the causal links between factors perceived to be of importance and these early childhood development (ECD) outcomes has considerable value in terms of informing policy and interventions designed to improve child welfare and break the intergenerational transmission of poverty and inequality. Of course, inequality of opportunity is crucial to overall inequality of a given society and studying the first can be important not only for social acceptance of redistributive policies, but also because in this way institutional mechanisms (education system, labour market, welfare expenditures) that generate the existing inequalities can be better analyzed.

Inequality of opportunity puts the need to eliminate unfair differences stemming from circumstances for which the individual is not responsible at the centre of the debate.

Focusing on children's educational and health outcomes help put inequality of opportunity at the centre of the policy debate since children cannot be held responsible for their family circumstances despite the fact that these circumstances make a major difference in the lives they lead. Most empirical studies were applied to Latin American, OECD and sub Saharan countries. Measuring inequalities in Ghana is relatively common but research addressing the issue of inequality of opportunity and children's educational and health outcomes in Ghana is more limited. This study makes a meaningful contribution towards establishing empirically the extent to which children's cognitive ability and anthropometric measures are due to unequal opportunities in Ghana.

### **1.6 Organisation of the study**

The study is organized as follows: Chapter one gives an introduction to the study whiles Chapter two presents the educational and health reforms in Ghana. Chapter three outlines the literature and the procedures used to infer inequality of opportunity and educational and health outcomes. Chapter four provides the methodology for the study whiles Chapter five presents an overview of the data used and reports the main results and findings. Chapter six provides a summary of the findings and suggests policy recommendations and areas for future studies.

## **CHAPTER TWO**

### **EDUCATION AND HEALTH SECTOR REFORMS IN GHANA**

#### **2.0 Introduction**

The history of education in Ghana dates back to 1592 (Isahaku, 2009). Over the centuries education has had different goals, from spreading the gospel to creating an elite group to run the colony. The problems with the Ghanaian education system today can easily be traced back to the legacy of colonialism. This legacy remains rooted in the education system not only in Ghana, but throughout sub-Saharan Africa. In brief, the British school system introduced in Ghana was designed to teach subservience and acceptance of doctrine, often through violent means and to ensure the dominance of the British. This did not encourage free and analytical thinking. After Ghana gained its independence in 1957 the education system, then modelled on the British system, has undergone a series of reforms. Especially the reforms in the 1980's geared the education system away from purely academic to more in tune with the nations manpower needs. These reforms were largely aimed at addressing the inequalities in the sector. The present structure of education, which starts at the age of 4 years, consists of 2 years of Kindergarten, 6 years of primary education, 3 years of Junior Secondary School, 3 years of Senior Secondary School and 4 years University or courses at other tertiary institutions. The first 11 years form the basic education and is free and compulsory (GES, 2014).

## **2.1 History of Ghana's education system**

### **2.1a The mercantile era**

During the early colonial period, the main goal of education was to make civilization march hand-in-hand with evangelisation. This statement gives a clear description of how education in Ghana was implemented. Initially it was the Danish, Dutch and English merchants who set up schools in their Forts (Christianborg Castle Accra; Danish, Elmina Castle; Portuguese then Dutch and Cape Coast Castle. British) to educate their mulatto children by native women. Linked to the implementation of formal education in Ghana were the Christian Missionaries, who realized that in order to spread the word of God they needed well-educated local assistants. John Von Richelieu, one of the Danish Governors to Ghana, approached the Basel Mission Society of Switzerland in 1828. They played an important role in establishing an education network in Ghana. Representatives of this organization were able to convince the Chiefs of Ghana in 1832 to send their children to the Government School at Osu. Thus creating acceptance for formal education. They also concentrated on the interior of Ghana, away from the European influences on the coast.

Besides reading, writing and arithmetic, workshops were organised for students to acquire practical skills. Carpentry, masonry, blacksmithing, shoemaking and sewing for girls were taught, as well as practical agriculture and medical and health education. One of the greatest achievements of the Basel Mission Society was the transcription of local languages (Twi, Ewe and Ga languages) to facilitate education and the spreading of the Gospel. By 1894, 62 years after their arrival in Ghana, they had established a Training

College, 3 grammar schools, seven boarding schools for boys and girls and 98-day schools.

Continuing and complementing the work done by the Basel Mission Society were those the mission initially educated and those it called to the cause of spreading the Gospel, despite numerous pioneers succumbing to death due to the tropical diseases they encountered.

### **2.1b Pre-independence era**

The British Government in 1874 had full colonial authority of the Gold Coast colony and great progress had already been made in the education sector. Various Mission Schools were now scattered over the interior of Ghana. By 1881 there were 139 schools. However the education systems used varied widely. This prompted the government to draw up its first plans in 1882 to guide the development of education. An Inspector of Schools was instated from 1887 until 1890. Then the office of the Director of Education was created.

In 1918 the first real targets for the development of education were set by Sir. Hugh Clifford:

- Primary education for every African boy and girl
- A Training College for teachers in every province
- Better salaries for teachers
- A Royal College

Ultimately the proposed targets and recommendations from several committee's such as the Phelps-Stokes Fund from America and the 1922 Committee led to the opening of the

Prince of Wales College in 1927. Later it became the Achimota College. It offered general secondary education as well as post secondary technical education and teachers training for both sexes. The former College is now a prestigious (secondary) school and the present University of Ghana has its roots in the Achimota College. Great strides were made on the education front from 1922 till 1938. Several Industrial Schools were established, focusing on technical and agricultural education. A separate Department of Education was instated to bring the neglected Northern territories in tune. At the Prince of Wales College scholarships were awarded to students to continue their studies in British universities.

By 1933 an important emphasis was placed on the training of teachers by the government. Also several local languages were approved as examinable subjects for the Cambridge University School Certificate. Many different topics such as domestic science, child welfare, bookkeeping and typewriting found their way into the secondary education system. The Second World War affected the progress of education such that all the European inspectors, teachers etc. were mobilized for war. Consequently, Mr. V.A. Tetty became the first African Director of Education.

By the 1950's there were approximately 3000 primary and secondary schools in Ghana and 6.6 percent of the 4.2 million population were in school. The British laid a solid foundation for the formal education system in Ghana, however only a small group had access to it. The Nkrumah Government in 1952 saw education as a major instrument for national development and introduced the policy of education for all.

### **2.1c Post-independent era**

The 1961 Act, (Act 87) initiated by Dr. Kwame Nkrumah was aimed at achieving Free Universal Primary Education. The Act made Education compulsory and free.

Section 2 (1): Every child who has attained the school-going age (six- years) as determined by the Minister shall attend a course of instruction as laid down by the Minister in a school recognised for the purpose by the Minister.

Section 20 (2): No fee, other than the payment for the provision of essential books or stationary or materials required by pupils for use in practical work, shall be charged in respect of tuition at a public primary, middle or special school.

The Ghanaian Education System at this point (end of the 1960's) consisted of six years of primary education, followed by four- years of secondary education. At the end of the four years suitable students went on to do a two-year sixth form course that could lead to a three-year University course. Students, who were not suitable to continue, completed two- years of pre-vocational classes. The system was soon regarded as too long and too academic.

#### **2.1.1 Dzobo education reforms of 1974**

In the early 1970s, the government of Colonel Ignatius Kutu Acheampong established an Educational Review Committee to recommend reforms in the educational system of the country. The committee was chaired by Professor N. K. Dzobo of the Faculty of Education, University of Cape Coast.

The main features of the 1974 Reforms which were to take effect from September 1975 included a Two-Year Kindergarten Education for children between the ages of four (4)

and six (6) years which will be followed by a Nine-Year Basic First Cycle Education: six (6) years Primary for children between the ages of six (6) and twelve (12); and three (3) years Junior Secondary School (JSS) for children between twelve (12) and fifteen (15) years. From the Junior Secondary School, there would be selection into the following terminal courses, namely Two- years Senior Secondary (Lower) course leading to the GCE 'O' Level, Three- years Technical, Vocational and Commercial courses. Students from Senior Secondary (Lower) would then pursue another Two-years Senior Secondary (Upper) course to obtain the GCE 'A' Level or enter the Teacher Training Colleges and the Polytechnics. Also, those from the Technical, Vocational and Commercial schools will enter the Polytechnics or Technical Teacher Training Colleges. Students from the Senior Secondary (Upper) will proceed to the University to pursue a three (3) year programme. Those from the other streams would eventually end up at the University level.

### **2.1.1a Relevance of the reform**

The reasons underlying the reforms were as follows. Firstly, it was argued that as a result of the colonial experience, Ghana had inherited an educational system which prepared people only to run an administration and an economy totally reliant on demands of other countries instead of that of Ghana. In view of this, it was strongly felt that there was the need for a new system of education that would teach Ghanaian youth to be reliant on their own resources for their rapid development.

Secondly, the schooling inherited by the colonial system did not equip people with skills that will enable them to secure appropriate employment. There was the need to place

emphasis on science and technological education which was not the case in the prevailing educational system. Thirdly, basic education needed to focus on how Ghanaians can deal with the problems of the environment, disease, deforestation and low agricultural productivity. It was therefore argued that the prevailing educational system did not address the socio-economic development needs of Ghana. Also, though it had been recognised long ago by previous governments that basic education should be free and compulsory; many children of school-going age were still not in school. There was the need, therefore, to develop a system that ensured that all children gained access to school.

The reforms completely eliminated the four-year middle school system, which had become a major waste of resources. It introduced three (3) years of basic and comprehensive Junior Secondary education for all children of school-going age. It therefore shortened pre-university education from seventeen (17) to thirteen (13) years. This reduced the time spent by students in school and in turn reduced the net expenditure on students by the state. Again, the introduction of technical and vocational courses was aimed at providing the manpower needs of the nation. These courses were to provide practical skills for school leavers to be self-employed or equip them with the requisite skills to seek employment in existing establishments.

#### **2.1.1b Strengths of the reform**

The reforms placed emphasis on practical courses which was a departure from the pre-existing educational system which was the grammar type education. This was aimed at equipping school leavers with the needed skills to be employed in the productive sectors of the economy. Secondly, there was the provision of various courses to cater for the

individual differences and interests of students. There were technical, vocational and commercial courses aside the grammar type education. This ensured that students who were not academically good in the arts find their way into technical, vocational and commercial schools. Again, there were various exit points in the educational system. This ensured that people who could not continue find something profitable doing. Leavers from the Junior Secondary School were to be equipped with some technical and vocational skills to enable them polish these skills through a few year of apprenticeship. Students from the Senior Secondary (Lower) and the Technical, Vocational and Commercial schools who did not pursue further education were expected to possess certain skills and knowledge to be employed in various sectors of the economy. Students from the Senior Secondary (Upper) who did not enter the university were to train for middle level professions in available institutions such as Polytechnics, Specialist and Teacher Training Colleges

### **2.1.1c Weaknesses of the reform**

The government did not have the political will to implement the programme nationwide. It established only 113 Junior Secondary Schools throughout the country. Specifically, it co-existed with the old system it was supposed to replace and reform. The middle schools continued to exist while the few pilot Junior Secondary Schools also existed side by side. Many parents continued to send their wards to the schools that operated the old system. Thirdly, the Junior Secondary School component of the reform was implemented in such a way that the entire initiative was defeatist in itself. Students from the Junior Secondary Schools were absorbed in the old system. That is, the Senior Secondary School

component of the entire reform package, which should have absorbed students from the Junior Secondary Schools, was never implemented.

The Junior Secondary School introduced practical subjects and activities allowing students to acquire occupational skills, which after an apprenticeship lead to the qualification for self-employment. Due to a wide range of factors such as the economic decline, bureaucracy and sheer lack of interest the JSS-system never went beyond the experimental phase. By 1983 the education system was in a state of crisis. It faced drastic reductions in Government financing, lack of educational materials, and deterioration of school structures, low enrolment levels and high dropout rates.

### **2.1.2 Evans-Anfom reforms of Junior Secondary School education of 1987**

In 1987, the government of Flt Lt Jerry John Rawlings implemented new educational reforms. The reforms were based on the report of the Education Commission headed by Dr E. Evans-Anfom of the Kwame Nkrumah University of Science and Technology, Kumasi. The Education Commission published its report in August, 1986, and it was to address the concerns and criticisms about the educational system, almost the same concerns and criticisms that necessitated the 1974 reforms.

This reform changed the structure of the educational system from seventeen (17) years to twelve (12) years at the pre-university level. The new structure further reduced the Dzobo structure of 1974 by one extra year. Thus, instead of the six (6) years Primary, three (3) years Junior Secondary, two (2) years Senior Secondary (Lower) and two (2) years Senior Secondary (Upper) proposed by the Dzobo Report of 1974, the Evans-Anfom

Report of 1986 recommended six (6) years Primary, three (3) years Junior Secondary and three (3) years Senior Secondary education.

The reforms led to a total replacement of the old pre-university educational system. The middle schools were eliminated. The Common Entrance Examination (CEE) used for selection into Secondary Schools was replaced by the Basic Education Certificate Education (BECE). At the secondary level, the General Certificate of Education (GCE) Ordinary ('O') level and Advanced ('A') level were replaced by the Senior Secondary School Certificate Examination (SSSCE).

New curriculum contents were introduced by the reforms. The new curriculum was to familiarise students with science and technology, and various vocations were to be pursued. In this regard, agricultural science, pre-technical and pre-vocational courses were introduced. Ghanaian Languages, French, cultural studies, social and environmental studies, and health protection courses were also included in the curriculum. Emphasis was placed on skills acquisition, creativity and the arts of enquiry and problem solving.

### **2.1.2a Relevance of the reform**

The 1987 reforms were aimed at providing broad-ranging manpower supply for the various sectors of the country's economy. This included the training of people to engage in agriculture to provide the needed raw materials to feed the industries and provide adequate food for the nation. It was also intended to train people in science and technology for the advancement of science and technology in the Ghanaian society, protection and conservation of the environment and raising health standards.

### **2.1.2b Strengths of the reform**

One of the strengths was that it provided a comprehensive basic education which improved access to education for more children of school-going age. Junior Secondary Schools were provided throughout the country and this helped to increase literacy levels. The reform also introduced Continuous Assessment which formed part of the final examination. This ensured that internal assessment in schools was included in the final examinations and this ended the single-shot examination existing in the old system.

### **2.1.2c Weaknesses of the reform**

The reform had several weaknesses which included insufficient textbooks for all basic schools in the country, inadequate infrastructure and teaching-learning materials, inadequate trained teachers for the Junior Secondary Schools and these affected the quality of basic education in the country.

### **2.1.3 Anamuah-Mensah reforms of Junior and Senior High School education of 2007**

On January 17, 2002, the government of John Agyekum Kufour inaugurated a Presidential Committee to Review Education Reforms in Ghana. The committee was under the chairmanship of Professor Jophus Anamuah-Mensah, Vice-Chancellor of University of Education, Winneba. It was tasked to review the entire educational system in the country with the view to making it responsive to current challenges. The committee presented its report in October 2002. The underlying factors for the introduction of the current Junior High and Senior High School reforms were to address the inadequacies and shortcomings in the previous reforms.

The reform was also introduced for the following: formation of human capital for industrial growth and for ensuring competitiveness in the global economy; ability to make use of recent developments in Science and Technology, especially Information and Communication Technology (ICT); radical transformation in the field of work and employment; and the preservation of cultural identity and traditional indigenous knowledge and creativity. The reform was intended to ensuring 100 percent access to basic education, placing high premium on technical/vocational education and training and improving the quality of instruction and making it flexible enough to accommodate diverse student abilities.

The Anamuah-Mensah Report recommended similar structure of education just like the Evans-Anfom Report of 1986. The difference was the inclusion of two (2) years of Kindergarten education as part of Basic Education and Apprenticeship training for leavers of the Junior Secondary School who are unable to or do not want to continue in the formal sector. Kindergarten was not an integral part of Basic Education and the reform incorporated it to prepare children between the ages of four (4) and six (6) years before they enter primary school. The Apprenticeship training was to formalise the training of school leavers in the various trades. The committee maintained the three (3) years Senior Secondary School but the government decided to increase it to four (4) years and rename the educational system Junior High School and Senior High School to replace the existing Junior Secondary and Senior Secondary Schools.

The change from the three (3) years Senior Secondary School to the four (4) years Senior High School was to ensure that students have adequate time to prepare for the West

Africa Senior School Certificate Examination (WASSCE). This was as a result of the large percentage of students who fail at the final examination. The new curriculum content that was introduced by the reform included French and Information and Communication Technology (ICT) as core courses at the Junior High School and Senior High School levels.

The implementation of the Anamuah-Mensah Reforms began in September 2007, and it was faced with initial problems. These problems included delay in the supply of syllabuses and textbooks for the smooth take-off of the programme, and teachers were not adequately prepared in terms of training to implement the reforms. These problems were later dealt with as the implementation of the reforms progressed. The next major problem being anticipated is the inadequate classrooms and other facilities as students will enter the fourth year of Senior High School in September 2010.

## **2.2 Current status of the education system in Ghana**

The current structure of education in Ghana is a 2-6-3-3-4 education system representing, 2 years of Kindergarten, 6 years of primary education, 3 years of Junior Secondary School, 3 years of Senior Secondary School and 4 years University course. Pre-school is compulsory. Children are expected to enter pre-school at age 4. The first eleven years form the basic education and is free and compulsory for all children of the relevant age group. An official selection process occurs at the end of the eleventh year of basic education when all pupils take the Basic Education Certificate Examination (BECE). Individuals who want to continue their formal education have the option of attending senior secondary schools, technical schools or vocational schools.

Senior High school lasts three years and ends with a West African Secondary School Certificate Examination (WASSCE). Other secondary institutions lead to various certifications and diplomas. Tertiary education is basically divided into university (academic education) and Polytechnics (vocational education). The WASSCE is needed to join a university Bachelor degree program. A bachelor degree lasts 4 years and can be followed by a 1 or 2 year Masters. The student is then free to start a Doctorate (PhD) degree, usually completed in 3 years. Polytechnics are opened to vocational students, from SHS or from Technical and Vocational Institutes (TVI). A Polytechnic curriculum lasts 2 to 3 years. Ghana also possesses numerous colleges of education. New tertiary education graduates have to serve one year within the National Service Scheme. The Ghanaian education system from Kindergarten up to an undergraduate degree level takes 18 years. The academic year usually goes from August to May inclusive. The school year lasts 40 weeks in Primary and Senior High schools and 45 weeks in JHS.

### **2.3 Ghana School Feeding Programme**

The Ghana School Feeding Programme was launched in September 2005 following African Union-New Partnership for Africa's Development (AU-NEPAD) recommendation to use home-grown foods especially for rural areas facing the dual challenge of high chronic malnutrition and low agricultural productivity. Ghana adopted the programme as one of the Millennium Development Goals (MDGs) under the Ghana Poverty Reduction Strategy I (GPRS I) and Ghana Poverty Reduction Strategy II (GPRS II). The programme is also in line with the objectives of the United Nations Hunger Task Force and the initiative of the Comprehensive African Agricultural Development Programme (CAAP), Pillar 3 of the New Partnership for African Development. Ghana

was one of ten countries in Africa which included Ethiopia, Kenya, Malawi, Mali, Mozambique, Nigeria, Senegal and Zambia selected by NEPAD to implement domestically-run school feeding programmes on a pilot basis in 2005. The programme started with one school in each of the 10 regions of Ghana. In August 2006, the programme was scaled up to two schools per district and was expanded to 200 schools covering 69,000 pupils in all 138 districts in Ghana. At the end of December 2006, the programme was in 598 schools with a total population of 234,800. This was further expanded in 2007 to 975 schools, covering 408,989 kindergarten and primary pupils. In 2009, at least two schools were enrolled in the programme in each district covering 1696 schools across the nation, with 656,624 pupils fed daily. In 2010 Ghana School Feeding Programme (GSFP) covered not more than 6 selected schools in each of the 170 districts, catering for over 1,040,000 of the school pupils nation-wide. In the long term GSFP seeks to contribute to alleviation of poverty and food insecurity in Ghana.

The basic concept of the programme is to provide children in public primary schools and kindergartens in the poorest areas of the country with one nutritious meal per day, using locally-grown foodstuffs. The target districts for implementation of the programme were those that were poor, deprived and experiencing food insecurity, low literacy, low school attendance rates and high school drop-out rates. The short term objectives of the programme were to; reduce hunger and malnutrition among children of primary and kindergarten schools in Ghana, provide nutritious meal a day to school children, increase school enrolment and attendance, increase pupil retention in schools and hence reduce drop-out rates, improve pupils academic performance in schools and boosting domestic food production. The feeding costs GH¢0.40 (~US\$0.30) per child/ day. According to the

2010 GSFP budget, the Netherlands Government and the World Food Programme are the two major partners contributing approximately 17% and 5% of the annual programme budget with the Government of Ghana bearing the largest quantum of 78% (US\$ 35.72 million) of the total cost, making it largely a Ghana Government owned programme.

### **2.3.1 Programme Implementation and Partners**

The implementation of the Programme involves key actors from different sectors of the national economy. The Ministry of Local Government and Rural Development has the oversight responsibility of the programme. However, it collaborates with the Ministry of Food and Agriculture, the Ministry of Finance, Ministry of Health, Ministry of Women and Children's Affairs, Ministry of Education and the Ghana Education Service in its implementation at the national level. The implementing agency is the Ghana School Feeding Programme Secretariat, which is responsible for the coordination and management of the programme and is located in Accra, the capital city of Ghana. It is expected to provide support to the implementation structures at the district level, ensure accountability and proper reporting of the programme.

### **2.3.2 Food procurement, preparation and feeding**

The primary responsibility of the Ghana School Feeding Programme in procuring at the national level is to abide by all national procurement policies along the entire procurement process, and to ensure that those who receive GSFP funds are also held accountable to these policies. However, there are no established procurement models or procedures that serve as guiding principles for caterers/suppliers of the foods purchased for preparation on the programme. To date, the only guideline for food procurement

under the programme is that, all foods must be procured from locally-grown (Home-Grown) commodities produced by local farmers, with emphasis on procuring from nearby farmers at community level within one's district, or sourced within regional markets or at worst, within Ghana. Food procurement is being done by Caterers who are also responsible for cooking and feeding, which is done at the school level using kitchens constructed by the programme or the community, typically known as the Caterer Model.

### **2.3.3 Community participation and involvement**

Community participation and responsibility provide the means to ensure ownership of the school feeding intervention, and the facilities provided for cooking and feeding, water and sanitation. The District Assemblies of the selected districts have a single role to provide schools with polytanks full of water and sanitation facilities. District Implementation Committee's (DICs) have the supervisory role over the various agencies involved in the implementation. The agencies are District Education, Health and Agriculture directorates of the Assembly. The DICs are to ensure among other things the training of cooks in hygiene and nutrition.

The School Implementation Committee (SIC) in a beneficiary community is made up of the headteacher, a PTA member, the school prefect and the traditional chief or his representative. The committee is assigned a monitoring role. The SIC members are also responsible for the planning and the execution of the actual feeding. Each SIC is to receive funds from the DIC to procure the needed inputs and supervise the preparation of food. They are also to mobilise the community to support the implementation of the programme and create a link between the programme and the local farmers. Finally, they

are to sensitize farmers about the opportunities offered them by the GSFP to cultivate for ready market. The implementation of GSFP is decentralized and it takes different shapes in the various districts.

## **2.4 The Capitation Grant Policy**

In recent years, there has been a worldwide momentum in which more developing countries are moving to sustain and reinforce the renewed progress toward Universal Primary Education through bolder, accelerated and scaled strategies. School fees abolition is becoming increasingly acknowledged as one of these strategies and as a key measure to achieving children's right to education. In view of this, the World Bank and UNICEF in 2005 launched the School Fee Abolition Initiative which aimed at disseminating lessons from the experience of countries that have abolished fees and provide context -specific advice to countries that are seeking to do so. Experience in several countries shows that the private costs of schooling are a major barrier that prevents many children from accessing and completing quality basic education. They are especially burdensome in countries where poverty imposes tough choices on families and households about how many and which children to send to school, and for how long. School fees represent a regressive taxation on poor families, and the enrolment of poor, excluded and vulnerable children is very sensitive to fees, even when these are small.

School fee abolition is not just about "tuition fees" (which do not necessarily constitute the main bulk of fees). School fee abolition must take into consideration the wide range of the costs of schooling to families and households. This means any direct and indirect costs/charges (tuition fees, costs of text books, supplies and uniforms, PTA contributions,

costs related to sports and other school activities, costs related to transportation, and contributions to teachers' salaries) as well as opportunity costs and other burdens on poor families. Countries that have taken bold steps to eliminate school fees and other indirect education costs saw a surge in total enrolment in the year following the abolition – 11% in Lesotho (2001), 12% in Mozambique (2005), 14% in Ghana (2006), 18% in Kenya (2004), 23% in Ethiopia (1996), 23% in Tanzania (2002), 26% in Cameroon (2000), 51% in Malawi (1995) and 68% in Uganda (1998) (ADEA, 2007).

#### **2.4.1 Capitation grant application (School Fee Abolition) in Ghana**

The Government of Ghana implemented the Free Compulsory Universal Basic Education (FCUBE) programme in 1996. This implied that there was going to be a cost sharing scheme to cover non-tuition fees determined to get children into school under which parents were expected to bear limited expenses. More importantly, no child is to be turned away for non-payment of fees. It is sad to note that this initiative did not work. Although Ghana's school enrolment rates are high as compared to some other African countries, a persistent 40 percent of children between 6 and 11 years of age remained out of school as of 2003 (Adamu-Issah, Elden, Forson, & Schrofer, 2007). One of the main reasons why these children did not attend school was that their parents could not afford to pay the levies charged by the schools. Despite the policy of fee-free tuition in basic schools, many districts charged levies as a means of raising funds, for example, for school repairs, cultural and sporting activities. This had the effect of deterring many families, particularly the poorest, from sending their children, especially girls, to school.

To meet the Millennium Development Goals (MDGs) for education and national targets as established in the 2003-2015 Education Strategic Plan, the Government took a bold step by abolishing all fees charged by schools and also providing schools with a small grant for each pupil enrolled. The programme was first piloted with World Bank support in Ghana's 40 most deprived districts in 2004 (USAID, 2007). Overall enrolment rose by an impressive 14.5 per cent; enrolment gains for pre-school were particularly significant (over 36 per cent). This success led to the nationwide adoption of what is known as the 'Capitation Grant' system in early 2005. Under this system, every public Kindergarten, Primary School and Junior High School receives a grant of about \$3.30 (GH¢4.50) per pupil per year. Schools were not permitted to charge any fees from parents.

#### **2.4.2 Impact of capitation grant on education outcomes**

The decision to replace school fees with capitation grants has yielded some dividends by impacting positively on many enrolment-related figures during the 2005/06 school year. Some of the benefits that are highlighted by a UNICEF working paper in 2007 are as follows:

- Primary school gross enrolment rose by nearly 10 per cent, bringing total primary enrolment to 92.4 per cent nationwide. Primary net enrolment increased from 62 percent to 69 per cent.
- Every region in the country experienced a rise in enrolment; Northern Region (where rates were lowest) experienced the largest increase.
- Overall enrolment in basic school increased by 16.7 per cent in the 2005/06 school year compared to 2004/05. Enrolment of girls increased slightly more than that of boys (18.1 percent vs. 15.3 percent).

### **2.4.3 Possible challenges: Capitation grant in Ghana**

Critics of the capitation grant argue that this strategy may not have the desired impact on the quality of education. The quick high increase in enrolment experience from most of the countries that have adopted the school fee abolition raises questions about its impact on the quality of education. It is argued that when classes become too large or overcrowded and resources (human and other educational resources) are not increased proportionately, the result can reverse hard-earned gains and de-motivate teachers, parents and pupils. Enrolling children in school is one thing, but keeping them there in attendance is the more important challenge. Furthermore, in most sub-Saharan African countries like Ghana, education quality is generally low to start with and any deterioration in the conditions of learning resulting from a surge in enrolment is likely to have a dramatic negative effect on completion and achievement.

The Ghana Education Service (GES) has indicated that the capitation grant scheme is not devoid of challenges. Some of the challenges identified by the GES include the following:

- ❖ Increased demand for additional classrooms
- ❖ Demand for additional teachers
- ❖ Demand for additional textbooks and other teaching and learning materials
- ❖ Difficulty of sustaining community participation
- ❖ Revision of the capitation grants and proportion between Kindergarten, Primary, JSS or between boys and girls
- ❖ Even though actual release of funds has been smooth and effective, timely release of funds to districts and schools remains an issue

- ❖ Inadequate level of transparency at school level

## **2.5 Health service in Ghana - Historical background**

The development of government health services in Ghana can be traced back to the establishment of the Gold Coast Medical Department in the late 1880s. The rudimentary services available were primarily curative and were concerned chiefly with the health of the European population, government officials especially. In the early part of the 20th century, colonial health policy became broader in scope, when, for the first time, the responsibility for the health of the indigenous population and the importance of preventive measures in maintaining public health was recognised. A Sanitary (Health) Branch (responsible for preventive health) was established in 1909, followed 10 years later by the Medical Research Institute (Laboratory) Branch. A programme to train Ghanaian paramedical personnel began in 1917 and expanded further in the 1940s. The number of hospitals increased from 9 in 1909, to 22 in 1912, and to 39 in 1927, though bed capacity remained small. A limited number of rural health stations were constructed and infant welfare clinics began to be opened in the 1920s. In the 1940s and 1950s, a major hospital building expansion programme got underway and preventive health services were further strengthened with the establishment of 'Medical Field Units' aimed at containing trypanosomiasis, yaws and other endemic diseases. However, despite considerable progress made on preventive health measures and disease control, the pre-independence health system of the 1950s had a strong emphasis on curative care at fixed centres, the majority of which were in urban areas. Coverage was extremely limited, with approximately 100 doctors and 60,000 inpatient admissions per annum nation-wide.

By the 1980s, many tropical countries faced economic crises. In Ghana, the continuing economic crises of the late 1970s and 1980s resulted in a fall of government expenditure by 70 percent in real terms between 1975 and 1983, and a reduction in health spending to 20 percent of its former level. A common characteristic of health systems in tropical countries at least since the 1980s has been inadequately funded services, as demonstrated by low salaries, shortages of drugs, materials and equipment, and poorly maintained buildings. While recognising the pervasive influence of lack of resources, criticism has centred on poor use of resources and allocative and technical inefficiencies. Allocative efficiency is providing the mixture of services likely to have greatest impact on health, and technical efficiency is avoidance of waste. Governments were considered responsible for allowing inefficiencies and inequities to persist.

### **2.5.1 Overview of Ghana's health sector**

The historical background of Ghana's healthcare system is influenced by the British. Until 1957, Ghana remained a territory of the British government and as a result the system of healthcare delivery was modelled by the British, perhaps after their own system back home (Abekah-Nkrumah, 2005). The focus of healthcare delivery at the time was the delivery of basic healthcare services to take care of the health needs of civil servants and missionaries. Thus, most healthcare facilities were located in the core administrative districts with a centralised form of administration. This system did not change until 1972, when the government at the time attempted to decentralise healthcare services to the districts with policy remaining at the centre. Several reforms that followed this attempt (1977, 1997 and 2002) resulted in what is a fully decentralised system of healthcare delivery, from national to sub-district levels (Abekah-Nkrumah, 2005).

Following from these reforms, two core functions have been identified for the health sector in Ghana;

- Policy formulation, regulation and coordination of the actions of actors in the sector.
- Implementation of policy via service delivery

The Ministry of Health (MOH) has the responsibility of carrying out the former with the latter being performed by the service providers in both the public and private sectors. In the public sector, the main service provider is the Ghana Health Service (GHS) with a national secretariat and service provision points (facilities) at the regional, district, sub-district and community levels. In the private sector, two main bodies are identified; the mission providers, who operate mainly in rural areas as private not-for-profit organisations, and the private for-profit organisations.

### **2.5.2 The health status of Ghanaians**

In Ghana, the disease pattern has changed very little over the last two decades. Like other countries in early phases of health transition, the pattern of disease in Ghana demonstrates a preponderance of communicable diseases, under-nutrition, and poor reproductive health. Epidemics of cerebrospinal meningitis, yellow fever and cholera remain a significant threat. Emerging and re-emerging diseases of increasing magnitude and threat include HIV/AIDS, tuberculosis, buruli ulcer and filariasis. Non-communicable diseases such as cardiovascular disorders, neoplasms and diabetes are emerging threats, whilst trauma and other injuries are the fifth most common outpatient condition.

The six main causes of morbidity and mortality among children have persisted as the main threat to their health over the years. However these have largely been brought under control through the Expanded Programme on Immunization. Malaria is still the number one killer among children and acute respiratory infections, including pneumonia; diarrhoea, malnutrition including anaemia; and neonatal causes continue to be major health problems. These five health problems account for about 50 percent of all childhood admissions and 30 percent of childhood deaths.

The overall morbidity and mortality pattern highlights the linkage between poverty, inequalities and health. Most of this burden results from diseases, such as malaria, diarrhoea and pneumonia whose occurrence could be dramatically reduced by low-cost and effective preventive and curative interventions. In other terms, the marginal social and economic returns from investments in health are highest in avoiding these premature deaths. Since communicable diseases in childhood are, in general, more amenable to broad-based primary prevention efforts than are non-communicable diseases, their heavy burden reflects, among other, the difficult living conditions and the inadequacy of the primary health care system.

The current mortality pattern has wide policy implications. First, it highlights the persistent burden of childhood communicable diseases, for which preventive measures (such as sanitation and health education) and simple curative measures (such as malaria treatment and oral rehydration) can be delivered efficiently through community-based care and outreach services. Therefore, better outcomes and greater savings are possible through the use of community-based care supported by the referral network. This is the

basis for the development of the CHPS (Community-based Health Planning and Services) in Ghana. However, the growing burden related to high-cost of chronic and degenerative conditions, such as hypertension, other cardiovascular diseases and diabetes, must be taken into account for planning purposes.

### **2.5.3 Organization of health services in Ghana**

The health services in Ghana include government health services, private, traditional and non-governmental providers, civil society, and community groups. It also includes collaboration and partnership with other ministries, departments, and agencies whose policies and services have a major impact on health outcomes. The health services are organized in several tiers ranging from the sub-district to national level. The sub-district level comprises health centres, health posts and clinics. As part of the effort to improve access to health services, the Community-Based Health Planning and Services has been designated as another level of health care delivery which combines public health and basic clinical care activities at the community level. The activities of the sub-districts are coordinated at the district level which would normally have a hospital designated as the first referral point. The district health service also includes the activities of private providers of both clinical and public health services. Each of the ten regions has a Regional Health Administration and a regional hospital which provides secondary level and referral services in support of the districts. National level referral facilities include two teaching hospitals, three psychiatric hospitals and a large military and police hospitals.

Government is by no means the only provider of health services in Ghana. Other providers include the mission sector, employers, private medical practitioners and an informal sector, comprising traditional practitioners of various kinds as well as pharmacies and chemical sellers of indeterminate size. Mission Health Services have a long and distinguished history in Ghana. This sector operates nearly 20 percent of hospitals and clinics in Ghana. Public health and preventive services are commonly offered by mission institutions, often in the form of outreach services or satellite clinics. The private for profit sector comprises a variety of providers ranging from the formal hospitals, clinics and diagnostic facilities to the informal drug peddlers. Traditional practitioners are also prevalent and span a multitude of provider types and treatment regimens ranging from traditional birth attendants, herbalists and bone setters to homeopaths and spiritual healers.

## **2.6 Ghana's health sector reform objectives**

In the late 1990s the Health Sector embarked on an extensive reform in response to the slow improvements in health status. It was noted that over 40 years after independence, disease patterns had changed very little, the use of services was low and other determinants of health status were poorly provided. Immunization coverage was under 50 percent and outpatient attendance was under 0.35 per capita. Close to 80 percent of disease that affected the population were still preventable and epidemics were still occurring on annual basis. Faced with these challenges the health sector had begun to observe a silent epidemic of non-communicable diseases coupled with extensive problems in nutrition. To meet these challenges the health sector reform sought to:

- Improve access to services

- Improve quality of the service
- Improve efficiency in the use of resources and avoiding waste
- Improve adequate collaboration with other partners
- Improve adequate funding for the delivery of health services

Programmes and interventions designed to achieve these objectives included the prioritization of specific interventions, development of the human resource for health care delivery and to improve financial management. A Sector-Wide Approach to planning and programming and resource mobilization and disbursement was adopted leading to a dramatic change in the way aid was coordinated. Other steps taken included the strengthening of Primary Health Services at the district level, re-orienting and strengthening secondary and tertiary services in support of the district level and providing national level support through training and management development, policy analysis, development of central support system, promoting private sector involvement and promoting inter-sectoral collaboration.

## **2.7 Ghana's health sector reforms**

Ghana's health sector has had many reforms. The most recent reform that has been in process since the early 1990s has been finally documented in what is popularly known as "Medium Term Health Strategy, 1996-2000". It aims at improving access to health services, quality of care and efficiency, strengthening links with other sectors such as the Ministries of Agriculture and Education which also have health components in their activities or impact on the health of people (Ministry of Health, 1996). Its main achievement has been the introduction of user fees.

The introduction of user fees in Ghana has also been a component of a range of strategies that are part of an international health reform agenda. They are linked to a broad set of public sector reform ideas and initiatives collectively known as the ‘new public management’ (NPM). The NPM in the health sector has other policies apart from the user fees — decentralisation of the health sector with changes in organisational management and culture, and autonomous hospital boards and deregulation, and regulation of the private sector. The main objectives of these policies are achievement of sustainable financing of health services, quality improvement, and equity with respect to access.

### **2.7.1 Institution of user fees and exemption of the poor**

Fees for health services in public facilities, first introduced in 1971, were very low and aimed at reducing unnecessary use of services rather than to generate revenue. The fees were raised slightly in July 1983 and increased substantially in July 1985 when a new hospital act was passed under the military regime of the Provisional National Defence Council (PNDC), aimed at recovering at least 15 percent of operational costs. Initially, the Act allowed health centres and clinics to retain only 25 percent of the revenue from fees collected while hospitals were allowed to retain 50 percent. In 1990, this provision was amended and some public health institutions were selected for a pilot programme and allowed to keep all revenue generated from user fees.

In 1992, the new fees were implemented nation-wide as the government, influenced by multilateral donors, abandoned a phased implementation procedure started in 1990. Since then, a decentralised system of charging fees has been operating in the public health

facilities and all revenue has been retained for operational or non-salary budget. Budget surpluses that are not invested in improving the quality of care are sent to the Ministry of Health (MoH). A revolving fund for drugs was initiated in 1992 by which all health institutions were to recover the full cost of drugs and keep this revenue to purchase drugs only. An overhead cost of 10-15 percent is added and the full cost was revised in line with inflation. The public health facilities also charged other fees for the following: Out Patient Department (OPD) cards and initial registration, consultation, admissions, gloves gauze, needles and syringes. Informal fees with various shades of legality and unauthorised fees were also collected from users.

### **2.7.2 Implementation of Ghana's health user fee policy and the exemption of the poor**

The 1992 law, however, has a clause providing for exemption for the poor and treatment of emergencies whether patients are in a position to pay immediately or not. It does not indicate the criteria by which the poor can be identified though — whether by income, geographical area, occupation, etc. Health workers were just instructed to use their discretion to grant exemption to anyone who said he/she could not afford fees. They later applied for refund from government, the exemptions that they granted. The implementation of the new user fee was described by some as successful with respect to revenue generation despite some registered abuses. Revenue raising dominated other concerns and was at the expense of health care needs, to the extent that the exemption clause had been either ignored or just labelled as difficult to implement, even in clear-cut cases where exemption could be granted.

### **2.7.3 The National Health Insurance Scheme (NHIS)**

In March 2004, President John Agyekum Kufuor launched a National Insurance Health Scheme designed to offer affordable medical care, especially to the poor and vulnerable among Ghana's populace. Under the scheme, adult Ghanaians paid a yearly minimum subscription of GH¢7.20.

In addition to free services to contributors of the Social Security and National Insurance Trust (SSNIT) and SSNIT pensioners, the government catered for health treatment of the aged, the poor as well as children of parents who both subscribe to the scheme. Approximately 8.2 million people (or 33 percent of the Ghanaian population) were covered by the insurance scheme by the end of 2011 (Gajate-Garrido & Owusua, 2013).

### **2.7.4 New Health Policy**

Currently, the health sector has initiated a new health policy that emphasises health promotion and prevention of ill-health in the promotion of healthy lifestyles, behavioural changes and healthy environment. Dubbed, "Regenerative Health and Nutrition Programme", the health sector is educating Ghanaians on the need to reduce their salt, sugar, fat and alcohol intake and rather drink enough water, consume vegetables and fruits, have physical exercises and enough rest to live healthily. The programme has the theme — "Renew Your Strength-Prevent Diseases". With this and other policies previously introduced, the health sector believes the country would be relieved of most of its health problems such as malaria, HIV/AIDS, cholera, measles, typhoid, tuberculosis, chicken pox, yellow fever, trachoma, and river blindness. Others are guinea worm,

various kinds of dysentery, river blindness or onchocerciasis, pneumonia, dehydration, venereal diseases, poliomyelitis and malnutrition, among others.

### **2.7.5 Challenges of Ghana's health sector**

It is generally believed that Ghana's health sector faces tremendous challenges in improving health outcomes. According to NDPC and GoG (2005), the country still faces the challenge of dealing with a high prevalence of communicable and preventable diseases, under-nutrition and poor levels of reproductive health. In addition to the above, review reports of MOH as well as (NDPC, 2005) is indicative that other health threatening non-communicable diseases such as obesity, diabetes, cancers, hypertension and cardiovascular diseases are increasingly becoming major public health challenges. In spite of these major challenges, it is generally agreed that tremendous progress has been made over the last couple of years and that government's commitment to the sector has improved considerably in the last couple of years, recording about 400 percent increase in budget allocation to the health sector (MOH, 2006).

The poorly kept and unhygienic environment is implicated in most of the commonly occurring diseases that afflict us as a country. The source of most infections and infestations can be traced to the environment and as slums continue to develop particularly in the peri-urban areas. The silent epidemic of non-communicable diseases can also be linked directly to the changing life styles of the average Ghanaian which is characterized by poor eating habits and lack of exercise and recreation. The major challenge is to support the drive for life style changes and the adoption of healthier habits by individuals, families and communities.

The health sector continues to suffer from severe inequities in access to health services resulting in large disparities in health outcomes across regions. Some diseases are also persistent; particularly those that intensify poverty continue to be a challenge. This may largely be due to the continuing poor environmental sanitation at the community level. There is also the increase burden of non-communicable diseases as a result of increasing risk factor emanating from unhealthy life styles. Malaria presents a particular challenge as it has vast economic and social effects on the population. Maternal and Child mortality remains very high. Although efforts have been made to improve Emergency Obstetrical Care (EOC) in the health sector, the effort has not translated into the desired reduction in maternal deaths.

Weak referral and poor emergency response systems have been noted as the key areas affecting the implementation of a seamless health service. Improvement in health infrastructure including transport, ICT continues to lag behind the demand for services. With the concept of “close to client” services, the development of CHPS compound has also remained slow. Expansion of health facilities is limited leaving large areas still without basic health services and peri-urban areas remain particularly deprived.

Human resource production and distribution and the management of the health sector wage bill are still challenges in ensuring equity in health outcomes. While the health worker to population ratio remains small, the distribution of health workers remains skewed towards urban areas. The increasing wage bill is of particular challenge. Personnel cost is on the increase taking over 90 percent of government recurrent budget.

There are broader issues of a multi sectoral origin that also impinge on health development. Development planning including improved infrastructure such as roads, houses and the provision of key amenities affect the health status in the long run. The lack of enforcement of basic laws including laws on occupational safety and health hazards has led to indiscipline in our society and specifically on our roads which in turn has contributed to numerous occupational and traffic related accidents with high human and economic tolls.

## **2.8 Equality of opportunity in Ghana**

Among the factors of inequality of opportunities in Ghana the following are particularly noteworthy: geography: (north-South and urban-rural), gender, class etcetera. Inequality of opportunities was one of the motivating grievances of Ghana's anti-colonial movement and successive Ghanaian governments and key policy documents, such as the 1992 Constitution, have declared their commitment to equal opportunities for all Ghanaians. Inequality of opportunities is the result of the combined effect of objective factors like – differential resource endowment, history and public policy, as well as subjective factors such as attitudes and prejudices. The data on health, education employment and poverty offer clear evidence of these dimensions of inequality.

Successive governments have put forward various plans and policies to level the field of opportunities. To illustrate, the 1961 Education Act which provided for free-compulsory primary education, and the investment that went with it, was an important step in reducing the gap between the social classes, the north and the south of the country and town and country, in terms of access to education and the opportunities which education opens up. The 1992 constitution also provides for Free, Compulsory and Universal Basic

Education (fCUBE), a policy position repeated in the Ghana-vision 2020 and the GPRS. Nevertheless, the cost-sharing measures introduced under the 1987 Education Reform appears to have undermined the quest for an improvement in human development conditions in some of the more seriously deprived areas. This is particularly so in the Northern savannah, where the rise in the share of costs borne by households has seriously eroded the capacity of subsistence croppers and pastoralists to access quality education for their children, even where schools are available.

Education is considered crucial for achieving success. Parents work hard to ensure that their children get education and due to recent reforms, education is now compulsory but how can the Ghanaian government ensure that each child receives a decent education? It seems nearly impossible when the challenges are considered. Despite the Ghanaian government's efforts at education reform, the system continues to be a source of suffering for the poor. The public school system in Ghana is faltering, and it is the poor (those who cannot afford private school) who suffer the most as a result. With a poor education, those already living in poverty are unable to build the cultural capital necessary for achieving success in the future.

Education is a key component of human capital and plays a fundamental role in determining household ability to access better labour opportunities and escape poverty. In Ghana, half of the population of 15 years of age and above is illiterate. Literacy rates in the northernmost regions (Upper East, Upper West, Northern) are well below the national average and rural areas have significantly lower rates compared to urban areas. There is also an urban-rural divide, with significantly higher literacy rates in urban districts compared to rural districts – nearly 73 percent versus roughly 44 percent (GLSS5,

2008). The overall literacy rate for women is 46 percent, compared to 67 percent for men. Northern regions show the most accentuated gender differences in adult literacy, and gender differences in literacy are more significant in rural areas.

The gaps are wider in rural areas and in the north: in rural areas, 29 percent of women are literate compared to 52 percent of men. The northern regions show accentuated gender differences in adult literacy; 27 percent of women are literate in Upper East, compared to 46 percent of men (GLSS5, 2008). Literacy rates also vary across age groups and gender: higher male literacy is consistent throughout all age groups. However, gender differentials decrease within lower age groups, implying that there is progress towards gender parity among younger generations, both in rural and urban areas. The highest gendered disparities in rural literacy rates are among those aged 45-64 years (GLSS5, 2008).

Access to secondary education for women and men remains low, particularly in rural areas, where the share of men and women with secondary education is 13 percent and 3 percent respectively. Vocational education constituted 27 percent of the population enrolled in 2005 and it is popular among adults, especially females. However, training in teaching and preparation for obtaining the Higher National Diploma, needs to be more accessible for women.

At higher levels of education, the difference in educational attainment between adult men and women widens. While approximately a quarter of women obtain primary education in both urban and rural areas, fewer numbers reach the secondary and post-secondary levels. This is particularly true for those in rural areas. Women with a secondary

education are less than three percent of the total population, and women with post-secondary education represent less than one percent. Urban-rural differences are also observed between individuals of the same sex. Compared to their urban counterparts, the secondary-school attainment rate for rural men is three times lower. The disparity among urban and rural women is even starker. Almost six times more urban women have completed secondary education than their rural counterparts. Furthermore, there seems to be a higher tendency for urban girls than boys to drop out of school during secondary schooling.

“Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, ...medical care ...and the right to security in the event of ... sickness, disability” (UDHR, 1948) according to Article 25 of the Universal Declaration of Human Rights (UDHR). As a result, the right to good health care is not only essential, but also a major responsibility of the government (Constitution of Ghana, 1992). The type of healthcare people seek, prefer or can afford may vary according to the health needs of different groups. It can also be attributed to provider behaviour, insurance coverage or the policies and procedures of hospitals and health systems. Ghana with a population of 24,658,823 (GSS 2010 census report) people has only 1,439 health care facilities (IRIN, 2008). A study by Van den Boom and others (2004) noted that access to health facilities remained a problem: Medical facilities were not evenly distributed across the country, with most rural areas lacking basic facilities such as hospitals and clinics as well as doctors and nurses. Ghanaians on the average live about 16km from a healthcare facility where they can consult a doctor, but half of the population lives within a 5km radius (Van den Boom et al., 2004). Similarly, the other

half cannot consult a doctor within 5km, which corresponds to a 1 hour walking distance, and one quarter even lives more than 15km from a facility where a doctor can be consulted.

The public health system faces a variety of obstacles, among them are shortages of personnel and funding, as well as an unequal distribution of health workers in the country's regions (Van den Boom et al., 2004). The country's most densely populated region, the Western Region, accommodates 10 percent of the population but only 99 doctors. There are 91 doctors living in the Volta Region and 33 in the Northern Region, compared to 1238 public and private medical as well as dental practitioners in the Great Accra Region (GMA, undated). The structure of primary health care in Ghana is designed to serve the rural and urban population according to priority. The rural areas which are mostly deprived of permanent health infrastructures have been prioritised with programmes such as the Community Health Planning Service (CHPS), which aims to transform clinic-based primary health care and reproductive health services to community-based health services. Most CHPS workers are mobile and move from community to community to educate community members on preventive practices as well as administer curative services (Ghana CHPS, 2009).

The issue of shortage of critical health staff particularly doctors and nurses in the country has been and continue to be a major concern in the health sector. A major contributing factor to the shortage has been the massive migration of health professionals to greener pastures abroad. Fortunately, to a larger extent, the attrition rate has subsided as a result of various interventions put in place such as improved salary levels, expansion and

increase intakes in the various health training institutions, opening of post basic courses, provision of staff hire purchase and tax waiver for staff imported saloon cars etcetera. Despite the fact that there has been a down trend in the attrition rate and there has also been a tremendous increase in the turnover of the medical schools, some regions particularly the three Northern Regions are regrettably not benefiting from the resultant increase in the number of doctors in the country. A large number of the health professional still want to remain in the southern part of the country and in the urban centres resulting in a stark geographical distribution of health professionals in the country with major shortages in the three northern regions. The doctor and nurse to population ratios are still low in Ghana and there is wide variation between the north and the south. Even though there has been gradual improvement in recent years (Mills, Ally, Goudge, Gyapong, & Mtei, 2012). It has been established that staff shortages and unequal workload have negative effects on access to care, quality of care and on patient demand, contributing to the overall inefficiency in health care delivery (Mills et al., 2012).

## CHAPTER THREE

### LITERATURE REVIEW

#### 3.0 Introduction

The critical distinction between outcome differences that are attributable to individual responsibility and those that are not has played a central role in political philosophy in the last 40 or so years. Before John Rawls' *A Theory of Justice* (1971), most people sought to assess the fairness or equity of a social allocation solely on the basis of the distribution of outcomes. In the 1970s, spurred on by the work of both Rawls and Robert Nozick (1974), political scientists and philosophers began to consider the fairness of processes, and how final outcomes are determined both by the opportunities a person enjoys and by what he or she makes of those opportunities. John Rawls (1971) emphasized liberty. His first basic principle of justice demanded "the most extensive liberty for each, consistent with similar liberty for others." His second principle postulated that "primary goods," which provide basic opportunities should be available to all members of society. Under his "Difference Principle," Rawls proposed that the optimal allocation of primary goods would maximize the share of the least privileged group.

Following John Rawls (1971), Ronald Dworkin (1981) equated fairness with equality of resources, rather than outcomes. Richard Arneson (1989) spoke of equality of opportunity for welfare, rather than of welfare itself. Although details and nuances differ across these various authors, the common trend was a redefinition of what Gerry Cohen (1989) calls the "currency of egalitarian justice": it seemed to most writers that fairness required the equality of something, but given the role of individual responsibility, it was

clear that it was not simply the equality of outcomes. Economists were not far behind. In his 1979 Tanner Lectures at Cambridge University, Amartya Sen famously asked “Equality of What?” (Sen & Hawthorne, 1985). He took equality as a given good that most recent theories of justice associated fairness with the equal distribution of something. But it was not obvious what this something ought to be. Since “final outcomes,” such as utility, or even intermediated outcomes, such as income, wealth, or education, depended in large part on choices made by individuals themselves, it seemed fair to hold individuals accountable for some of the final differences in achievement, so long as those differences followed from those choices. Sen defined a person’s “capabilities” as the set of possible “functionings” that he or she might enjoy, and argued that attention should focus on the distribution of those capabilities.

This chapter takes a critical review of the literature on inequality of opportunity. Furthermore, the first part of this chapter seeks to clarify inequality of opportunity and its related concepts and some causes of inequality of opportunity. The next section takes a good look at the various empirical works done by various institutions and individuals in both advanced and developing economies.

### **3.1 Theoretical underpinnings of inequality of opportunity**

Equal Opportunity, sometimes known as Equality of opportunity, is a term which has differing definitions and there is no consensus as to the precise meaning. In the classical sense, equality of opportunity is closely aligned with the concept of equality before the law, and ideas of meritocracy.

The theory of equality of opportunity that has been developed recently in the area of normative economics goes far beyond the ideas of non-discrimination and absence of legal barriers. On the other hand, it does not require equality of final achievements for individuals of different race, gender or social background. Rather, after the influential contributions by Arneson (1989), Barry (1991), Cohen (1989), Dworkin (1981), Roemer (1993; 1998) and Sen (1980), this literature has explored the conception of equality of opportunity as “levelling the playing field” according to which society should split equally the means to reach a valuable outcome among its members; once the set of opportunities have been equalized, which particular opportunity, the individual chooses from those open to her, is outside the scope of justice. As Roemer (1998) puts it, “in the notion of equality of opportunity there is a before and an after: before the competition starts opportunities must be equalized, but after it begins individuals are on their own”. Ex ante inequalities, and only those inequalities, should be eliminated or compensated for by public intervention. Translated in terms of inequality measurement, this means that ex ante inequalities (i.e. inequalities in the set of opportunities open to individuals) are inequitable while ex post inequalities (i.e., inequalities in the final achievements) are not necessarily inequitable.

In his book on Equality of Opportunity, Roemer (1998) makes an interesting intervention in these debates. He proposes that we should be committed to equality of opportunity and should embrace a level-playing-field interpretation of its requirements. An egalitarianism of opportunity embraces the idea that individuals should be held responsible for their choices insofar as these can be disentangled from the effects of circumstances that fall on individuals beyond their power to control. Once opportunities are appropriately

equalized, society has fully compensated everyone to offset the impact of unchosen circumstances, and from this fair starting point, the life outcomes that individuals reach are properly deemed to be matters of individual responsibility that do not call for further social compensation.

The level playing field conception of equality of opportunity can be contrasted with equal opportunity as non-discrimination. The non-discrimination idea requires that jobs and posts be open to all and that applicants be judged only according to the qualifications they possess that are predictive of successful performance. The most qualified are entitled to be offered the posts first. But of course in many settings, those who are most qualified will be merely lucky to possess the traits that render them especially qualified. Roemer supposes that after reflection, many of us will agree that it is unjust that social practices confer special benefits on some and meagre benefits on others on the basis of factors that are beyond the power of the individual to control. One is morally responsible and should be held responsible by society only for what lies within one's power to control.

This conception of equal opportunity proposed as the central element of distributive justice has been called the “*level playing field ideal*” (LPF) (Roemer, 1995 and 1998; and for criticism, Anderson, 1999; Pogge, 2000; Buchanan, Brock, Daniels, & Wikler, 2000). The idea is that justice requires levelling the playing field by rendering everyone's opportunities equal in an appropriate sense, and then letting individual choices and their effects dictate further outcomes.

LPF equal opportunity theorists start by distinguishing unchosen circumstances and individual choices. The former are matters imposed on an individual in ways that she

could not have influenced or controlled; these matters are just given. It makes no sense to hold the individual responsible for anything that falls in the category of circumstances. Prominent circumstances include the socialization and early environment provided by one's parents or other guardians, one's genetic makeup, and the features of the world in which one finds oneself prior to any opportunity for responsible choice. People face very unequal circumstances, but this inequality, due to unchosen good or bad luck, should be eliminated: People's initial circumstances should be made equal. But once individuals make choices to lead their lives in one or another way starting from initial equality, justice does not demand further compensation if risks taken happen to turn out badly and in fact justice demands that further compensation should not occur. At least this is so if people are making choices under conditions of interaction that are fair and no sheer good or bad luck beyond anyone's power to foresee or control intervenes. Different LPF equality of opportunity theorists propose different conceptions of how to draw the line between circumstances to be equalized and choices for which individuals themselves are properly held responsible. They also propose different conceptions of how to assess circumstances for purposes of distributive justice and how to measure them so one can determine when one individual's circumstances overall are equal or unequal to another's.

The most prominent and explicit LPF conception of distributive justice is that advanced by Ronald Dworkin in two essays published in 1981 (reprinted along with other essays in Dworkin, 2000; see also Arneson, 1989; Cohen, 1989; and Sen, 1992).

An important complication to be noted is that the LPF conception of equality of opportunity can be deployed not as the core of a theory of distributive justice but as a

rival to substantive equality of opportunity (Roemer, 1995 and 1998). So once again one distinguishes the major issue, what justifies social hierarchy and what is the morally acceptable shape of social hierarchy, from the supplementary issue, what conditions must be satisfied if the process that assigns individuals to positions in the social hierarchy is to be morally acceptable. Equality of opportunity is again proposed to answer that supplementary question. The answer now proposed is that we should level the playing field on which competition for superior positions in the social hierarchy will eventually take place. The playing field is levelled when unchosen circumstances of individuals are equalized, so that individuals can reasonably be held responsible for their choices that determine their eventual places in the social hierarchy. One might picture LPF equality of opportunity as operating in the sphere of education and socialization and health care to prepare young people for adult status when responsible agency in a field of social competitions will be expressed. Opportunities are equalized when unchosen circumstances including native talents are counterbalanced so that nothing but the quality of people's choices (to the degree they can reasonably be held responsible for them) and their foreseeable effects determines their fate in social competitions. The effects of unchosen luck are to be eliminated.

Consider educational policy from the standpoint of the LPF conception of equal opportunity. The aim of educational policy in this perspective would be to bring it about that individuals have equal opportunity for labour market and entrepreneurial success. If some individuals enter school with greater potential for market success due to favourable genetic makeup and early childhood socialization, then extra educational resources should be expended on the unlucky so that so far as is possible, when all individuals

leave school, all who exhibit equal ambition and perseverance in working toward chosen goals will have the same prospects of lifetime economic success. Perhaps we had better say that educational resources are deployed so that anyone who works as hard as can reasonably be expected in school will leave school with the benchmark equal prospect of market success.

### **3.2 Roemer's theoretical approach**

World Development Report 2006 on Equity and Development, adopts a notion of fairness that is based on equality of opportunity. This phrase has been used equally by commentators on both the political right and left. A definition of the concept useful for this discussion is that of Roemer (1998). Roemer spoke of the outcome of interest as an “advantage” and divided the determinants of advantage into two groups: “efforts,” which are subject to individual choice, and “circumstances,” which are factors that lie outside the individual's control. Equality of opportunity would prevail in a situation in which the distribution of an outcome of interest is independent of circumstances. Equal opportunity levels the playing field, and everybody has, in principle, the potential to achieve the outcomes of their choosing.

The main idea of Roemer's approach is to look behind simple inequality measures and to split total inequality into its different sources. He mainly argues that the observed inequality in outcomes, let's say years of schooling or wage levels, has very different sources. First, one might think of different effort levels of individuals, saying that people are earning more, because they work or study harder. Second, inequality might also come from different ability levels, meaning that smarter people get better education or higher

wages just because they are more able. Thirdly, inequalities might also be due to the circumstances of people, say socioeconomic background.

Table 3.1: Vocabulary used in the EOp concept by Roemer (1998)

| <i>Roemer's term</i> | <i>Definition</i>   |
|----------------------|---|
| Advantage            | As advantage Roemer considers the outcome, e.g. the years of schooling of an individual. One might also think of wages to be an advantage     |
| Opportunity          | The opportunity is the possibility to have access to a certain advantage, but does not directly imply that the advantage is actually achieved |
| Circumstance         | Circumstances are factors beyond individual's control, for instance the gender, the ethnicity or some characteristics of the parents          |
| Types                | Individuals sharing the same circumstances form a type  |

The important difference of these sources is their degree of social admissibility, meaning that inequality due to different effort levels is not seen as something unfair, whereas circumstances should not matter according to our notion of social justice. To use the words of John E. Roemer: What society owes its members, under an equal-opportunity policy, is equal access; but the individual is responsible for turning that access into actual advantage by the application of effort (Roemer, 1998).

### 3.3 Causes of inequality of opportunity

Even when we limit ourselves to exogenous sources of inequality, not all of them are perceived as being equally undesirable. Hence, to better design public policy it is also fundamental to isolate and measure each one of the components of the inequality of opportunity. In this case it may be important to differentiate three types of factors:

intrinsic and personal characteristics, access to social services and discriminatory treatment.

### **3.3.1 Intrinsic and personal characteristics**

Inequality of opportunity can arise from traits that are exogenous but intrinsic to the person: the genetic endowment of talent and motivation. To the extent that these circumstances lead to differences in productivity or achievement, or results in a meritocratic environment, the inequality of opportunity might be considered, if not just, at least acceptable.

A meritocratic society may be perceived by some as valuing same talents too much, or it may be criticized by valuing just a very narrow set of talents. Above all, for the inequality among unequally talented individual to be considered fair, we need first to demonstrate that the values we are attributing to talents are just. Ideally, we would prefer to live in a society in which, despite all human diversity, every person is equally deserving. In other words, we would prefer societies where a wide variety of talents and virtues are valued. In this case, even though individuals may be very different regarding their talents, talents' values are such that, at the end, everyone is equally productive and deserving. Even those strongly in favour of a meritocratic environment would certainly dislike a society where only one type of virtue has value and only a small fraction of the population has this virtue.

From a policy perspective, some genetic disadvantages can be fixed (for example, eyesight problems), and that can have important implications for equalizing opportunities (Jencks & Tach, 2006). Although usually public policy has not been extensively used to

modify the value of talents and virtues, it can, and probably should, be used with this role. It may be an important role for public policy to broaden the use and value of all talents (integrated and inclusive schools may be an important policy in this group). It is certainly extremely important to have a public policy that celebrates human diversity and values all types of talents. Roemer (1998) proposes that traits that are to some extent genetic (such as inherited IQ) are circumstance variables in an education production function. In principle, a society may want to invest resources to level the playing field for low-IQ individuals. How much and how far it wants to go in this compensation is a social choice.

### **3.3.2 Inequality of access to social services**

This component of the inequality of opportunity results from the unfair allocation of basic opportunities. The number of dimensions in which inequality of basic opportunities may arise is large and may operate at different stages of the life cycle. Differences in access may be generated early in life, such as access to education, health, nutrition, and basic services, or later in life in access to tertiary education, to a good quality job, or to political voice.

Basic opportunities can be defined as those opportunities that are critical for development at early stages in life, that will have a key impact on outcomes, and that countries may aspire to provide universally. Policies can and should be implemented to increase access to basic opportunities and to ensure that their provision is not systematically biased against any specific group or type of individual. Even if universal access is not

achievable in the short run, equality of opportunity implies ensuring that progress in the provision of basic opportunities is not biased against anybody because of circumstances.

Differences in conditions relating to family background and resources might differ across circumstance groups. In this case, children of poor parents are not being discriminated against; rather, they do not have equal access to services to develop and fully utilize their talents, just because their families lack the necessary resources. Among children, unequal access to basic opportunities hampers the accumulation of human and physical capital, which eventually has an impact on outcomes such as income and earnings. Lack of resources may impair not just access to basic opportunities but also the ability to benefit from them. For example, children of poor parents may have both less access to schools and learning disadvantages (such as no books at home or illiterate parents). In this case, equally talented children from different social backgrounds are not going to have the same opportunities for reasons outside their control.

Unequal access to basic opportunities may also occur because of differences in location—for example, in a society with urban-biased policies, key services may not be available in rural areas, or the quality of those services may be much lower. Whenever a child's access to or ability to benefit from basic opportunities depends on family resources, the ideal of equal opportunity is violated and social immobility is generated. Equally talented children from different social backgrounds are not going to have the same opportunities and outcomes for reasons outside their control. The role of public policy in this case is unanimously recognized—equal access to and conditions to benefit from these specific sets of social services should be provided to all. The policy

implications are critical. Countries can and have implemented policies to subsidize access to social services, at least for the poor and, in some cases, have even guaranteed minimum income to ensure that all have the necessary conditions for benefiting from available services.

There are many correlations and causal interactions between these elements of inequality of opportunity. Greater innate ability may be partly the result of early childhood stimulation (such as storytelling or playing with small children). Richer families may have access to neighbourhoods with better public schools, so that access to “better” public services is correlated with family socioeconomic background, and so on.

From the point of view of policy design, the correlation between the pattern of access to, use of, and benefit from public services and the other subcomponents of inequality of opportunity is absolutely critical. Equal access to social services must be provided to all. Equal conditions for equally benefiting from these services must also be guaranteed to all. The natural implications are (a) subsidized access to social services for all, or at least for the poor, and (b) a guaranteed minimum income to ensure that all have the necessary conditions for benefiting from available services.

### **3.3.3 Inequality of treatment and discrimination**

Inequality of opportunity does not result only from the inequality due to deserving traits in a pure meritocratic environment. Quite often, equally talented and productive individuals are treated differently in different markets, which might generate different outcomes for individuals with otherwise similar characteristics. People with different circumstances (family background, race, or place of origin) might be discriminated

against in the labour market and have access to different kinds of jobs and consequently to different incomes. Likewise, males and females may not be treated equally when under consideration for a job, and may be paid differently for performing the same task. Quite often, equally talented and productive individuals are treated differently, receiving different access to the best jobs or receiving different wages even when performing the same tasks. In this case, inequality is generated by the unequal treatment of equally deserving individuals. This unequal treatment of equals is usually referred to as discrimination.

Differences in social treatment are mostly related to discrimination across circumstance groups. If access to an opportunity is biased against certain groups of the population, inequality in acquired characteristics (such as formal education) might be generated even among equally talented persons. This, in turn, will lead to unequal outcomes even in meritocratic societies. Discrimination can also operate during the process of acquisition of a characteristic. For example, different ethnic groups may be treated equally for admission to a school, but be discriminated against while studying. In all cases of discrimination, equality of opportunity is violated because equally talented and motivated individuals are being treated differently, leading to differential outcomes.

Consensus on the unfairness of this source of inequality and on the fact that it is avoidable and unnecessary seems easy to be achieved. Nevertheless, the amount of resources societies are willing to allocate to eliminate this source of inequality could still vary considerably and be open to debate. Non-discriminatory policies would be the appropriate and necessary measure in these situations.

### **3.4 Empirical studies on developed and developing economies**

Proponents of equality of opportunity advocate a society in which there are equal opportunities and life chances for all individuals to maximise their potentials and attain positions in society. This would be made possible by equal access to the necessities of life. This position is held by technocratic socialists, Marxists and social democrats. Equality of outcome refers to a state where everyone receives equal amounts of rewards and an equal level of power in decision-making, with the belief that all roles in society are necessary and therefore none should be rewarded more than others. This view is shared by some communal utopian socialists and anarcho-communists.

The Roemer model does not specify which causal factors constitute circumstances and effort. In the case of inequality of opportunity in health, this dilemma is facilitated by the existence of medical and economic evidence on the main determinants of health in adulthood. There is a branch of economic literature devoted to the impact of childhood circumstances on health outcomes: Currie and Stabile (2004), Case, Fertig and Paxson (2005) and Lindeboom, Llena-Nozal and Van der Klaauw (2006) are recent examples. Using different data sets, these studies appraise conflicting theories about the channels by which childhood conditions influence long-term health. The most prominent among these theories are: the foetal-origins hypothesis (Barker, 1995 and Ravelli et al., 1998) according to which parental socioeconomic characteristics influence the in utero conditions for foetal growth which, in turn, condition long-term health; the life course models (Kuh & Wadsworth, 1993), which emphasise the impact of deprivation in childhood on adult health and longevity; the pathways models (Marmot, Brunner, & Hemingway, 2001) which suggest that health in early life is important mainly because it

will condition the socioeconomic position in early adulthood, which explains disease risk later in life.

Recent empirical work, such as Rosa Dias (2009) and Trannoy, Tubeuf, Jusot and Devaux (2010) suggest that differences in education are an important dimension of inequality of opportunity in health. This is in line with the earlier literature on socioeconomic inequalities in health, such as Wagstaff, van Doorslaer and Watanabe (2003) and van Doorslaer and Jones (2003), and with the large body of evidence emphasising the role of complementary educational policies in reducing long-run health inequalities. The issue of complementary policies has been brought to the fore in various fields of economics, and the reciprocal association between health and education policy has attracted particular attention. First, the way childhood health constitutes a pre-requisite for the success of educational policy is well documented: in empirical papers such as Mayer-Foulkes (2001), Miguel (2004), Alderman, Hoddinott and Kinsey (2006) and Contoyannis and Dooley (2010); in the official guidelines of policy makers, for example the World Food Program (2006); and in theoretical models of child nutrition and human capital formation, such as Currais, Rivera and Rungo (2010) and De la Croix and Doepke (2003). Second, the role of education as an input in the health production function has been established by papers such as Lleras-Muney (2005), Arendt (2005; 2008), Oreopoulos (2006), Silles (2009) and Van Kippersluis, O'Donnell and Van Doorslaer (2009); these provide evidence of the existence of positive long term health effects of successive increases in the number of years of compulsory education in Europe and in the USA.

Cutler and Lleras-Muney (2010) recently contributed to this body of evidence by carrying out an empirical assessment of the most common explanations for the relationship between years of schooling and the wide disparities observed in individual health related behaviours using different data sets from the United States and the United Kingdom. Their results show that education influences health behaviours through a series of channels, such as the acquisition of higher disposable income and the development of a better capacity for processing health-related information.

Rosa Dias (2009) proposed an empirical implementation of the concept of inequality of opportunity in health and applies it to data from the UK National Child Development Study. Drawing on the distinction between circumstance and effort variables in John Roemer's work on equality of opportunity, circumstances are proxied by parental socioeconomic status and childhood health; effort is proxied by health-related lifestyles and educational attainment. Stochastic dominance tests were used to detect inequality of opportunity in the conditional distributions of self-assessed health in adulthood. Two alternative approaches were used to measure inequality of opportunity. Econometric models were estimated to illuminate and quantify the triangular relationship between circumstances, effort and health. The results indicate the existence of a considerable and persistent inequality of opportunity in health. Circumstances affect health in adulthood both directly and through effort factors such as educational attainment. This indicates that, while the influence of some unjust circumstances can only be tackled during childhood, the implementation of complementary educational policies may be of paramount importance.

Jones, Rice and Rosa Dias (2010) examined the association between quality of schooling and health inequalities in adulthood. This is done by exploiting the wide variation in quality of the primary and secondary schools attended by cohort-members of the 1958 National Child Development Study (NCDS). Analysis of the 1958 NCDS cohort exploits the variation in type and quality of schools generated by the comprehensive schooling reforms in England and Wales. Further analysis provided evidence of a significant and economically sizable association between some dimensions of quality of education and a range of health and health-related outcomes. For some outcomes the association persists, over and above the effects of measured ability, social development, academic qualifications and adult socioeconomic status and lifestyle.

In understanding the role of social and family background on health status in people aged 50 and more in 10 European countries, Jusot, Tubeuf and Trannoy (2010) explored inequalities of opportunities in health in Europe. They compared the level of inequalities of opportunities between countries and in relation to several macro-level economic indicators. Data from the early release of Survey of Health, Ageing and Retirement in Europe (SHARE) 2004 was used and the outcome of interest was self-assessed coming from the question “would you say your health is...” reported in five categories “very good, good, fair, poor, and very poor”. Other parameters of interest are social background, parents’ health, the respondents’ age, sex and socioeconomic status (SES). Using logistic regression, the study attests to the existence of important inequalities of opportunity in health in Europe, relating both to a long-term influence of social origin and parent's health status and an indirect effect going through the influence of social and family background on descendant's social achievement.

Asenso-Okyere, Asante and Nubé (1997) utilized the Ghana Living Standards Survey (GLSS round 1 1987 / 1988) data set to analyse the principal determinants of health and nutrition of children under-five in Ghana. Using ordinary least squares (OLS) estimation procedures, their study found that, there was a positive correlation between mothers' level of education (10 years of schooling and above) and the nutritional level of children. Their study also found a strong negative effect of prolonged breastfeeding on the nutritional level of children and recommended that better weaning practices should be promoted when children are no longer fully breastfed.

Assaad and others, (2012) examined the patterns of inequality of opportunity in health outcomes as measured by anthropometric measures, for children under-five in selected Arab Countries and Turkey, using Demographic and Health Survey (DHS) data. The study decomposes inequality into a portion that is due to inequality of opportunity, and a portion due to other factors, such as random variations in health. Inequality was measured using decomposable general entropy measures, such as Theil's-L and Theil's-T indices. Parametric and non-parametric decomposition methods were used to determine the share of inequality of opportunity in total inequality. The study concluded that inequality of opportunity contribute substantially to the inequality of child health outcomes, but its share in total inequality varies significantly, both across and within countries over time. The study further highlight the relative contribution of circumstances to the inequality of child health outcomes in different countries, by simulating height and weight outcomes for the most and least advantaged child in each context. Since these simulations observed circumstances at their best and worst levels, the larger the difference in predicted

outcomes between the most and least advantaged child, the greater the inequality of opportunity facing children in that country.

However, the long-term impact of social conditions in childhood on health inequality among the elderly has been much less investigated in European comparisons. And yet, among those inequalities in health, those which are related to childhood circumstances are particularly interesting as they are considered as the most unacceptable inequalities according to the growing political philosophy literature on responsibility and compensation (Roemer, 1998; Fleurbaey, 2008; Fleurbaey & Schokkaert, 2009; Trannoy et al., 2010). Since social background and others parental characteristics are independent from the individual's own responsibility, any difference in the distribution of health in adulthood according to social and family background is recognised as inequalities of opportunities of health. There is therefore a need to measure inequalities of opportunities in health and to understand their construction and their links with political and economic context.

Several studies have already suggested that health in adulthood is influenced by social background and life course epidemiology has described two mechanisms displaying this effect: the latency model and the pathway model (Currie & Hyson, 1999; Elstad, 2005; Hertzman, Power, Matthews & Manor, 2001; Power & Hertzman, 1997; Hyde, Jakub, Melchior, Van Oort & Weyers, 2006; Melchior, Lert, Martin & Ville, 2006b; Melchior et al., 2006a; Trannoy et al., 2010). The latency model shows the direct influence of social and family living conditions in childhood on health in adulthood following a latency period (Barker, 1996 and Wadsworth, 1999). The pathway model relies on social

background having an indirect influence on the health status in adulthood subsequent life trajectories and particularly through a transmission of socioeconomic status (SES) over different generations. Furthermore scholars have confirmed the correlation existing between health statuses across generations (Ahlburg, 1998; Cournil & Kirkwood, 2001; Trannoy et al., 2010).

Boudon, (1974) describes the educational differences across socioeconomic group as primary and secondary effects of social stratification. While primary effects are associated with the children's cognitive abilities and socio-cultural resources of their background, secondary effects depend upon the educational choices pupils make in direct reference to their social origin. Differences in attitudes and (rational) behaviours are expressed by secondary effects of social stratification which comprise the differences of how individuals evaluate the benefits of higher education, including the financial and social costs and the expectation of educational success.

Osei, Owusu, Asem and Affutu-Kotey (2009) threw light on how capitation grant impacted on key educational outcomes in Ghana. Using gross enrolment rates at the Junior High school level, the pass rates for the national examinations at the Junior High school level and the gap in the examination performance of boys and girls as their key educational outcomes, they employed econometric estimation model to assess how capitation grant affects these variables. The district level data over the period 2005-2007 was used and across the country, the study found that capitation grant did not have any significant effect on these key education outcomes. The study then concluded by noting that although the results are not consistent with a priori expectations, the findings may

reflect the fact that the capitation grant in Ghana only started in 2005 and so it is too early to begin to see its effects.

Higgins (2009) explores the education dimensions of spatial inequality in Ghana and examines the model secondary schools policy, which was adopted by the Government of Ghana (GoG) in an attempt to address this disparity. In her study, critics of the model secondary school policy argued that, establishing one model school in each district reflects a tendency in Ghana to distribute public goods equally between districts (irrespective of needs) rather than targeting disadvantaged areas and marginalised populations to achieve pro-poor and geographically equalising outcomes. By failing to target resources to the poorest districts - or the districts with the worst education facilities – the government is missing an opportunity to bring districts with the weakest educational facilities and performance up to a minimal level, set by government, as acceptable (Don Taylor, DFID Ghana, pers. comm.). In addition, there is concern that this policy further entrenches vertical, or class-based, divisions (Don Taylor, DFID Ghana, pers. comm.). However, the potential for this policy to reduce regional inequalities in senior secondary education in Ghana is recognized.

Langer, Mustapha and Stewart (2007) in their study on the regional dimension of inequality in Ghana posited that, a combination of circumstances and policies were accountable for the inequalities in the developmental North-South divide. They concluded that, three things explained the observed inequalities differences in Ghana. First, the geographical concentration of agricultural resources and activities (such as cocoa, minerals and forest resources) in the Southern regions. Secondly, the British

colonial legacy of investing more heavily in regions where exploitable resources, such as gold, diamonds, timber and cocoa were available and cheap to produce and export. Finally, development strategies and the post-colonial investment patterns.

Equality in educational outcomes is a crucial determinant of the extent of equality of opportunity and intergenerational mobility achieved by societies. Nickell (2004) shows that a large part of the existing cross-country variation in earnings inequality can be attributed to cross-country variation in skill dispersion. It is, therefore, of prime policy interest to understand the effects of education policies such as pre-school education, length of the school day and educational spending on the educational success of children from various family backgrounds. The direction of these effects is, however, by no means straightforward from a theory point of view, and empirical evidence is limited.

Studies on how intergenerational mobility is related to education have shown that more educated parents provide “better” educational environment for their children even though the degree of relation varies across countries in a wide way (UNICEF, 2002 and Chevalier, Denny & McMahon, 2005). The relation between family social class and children’s academic development has been well studied and there is evidence that there is a direct positive relation between children’s level of education and cognitive development and their parents’ education (Wolfe & Haveman, 2002). Also studies have shown that the age at which parents left school affects the probability that the child stays more at school (Bynner & Joshi, 2002; Feinstein & Symons, 1999 and Gregg & Machin, 2000). Studies have shown that characteristics of the family of origin (such as parental socioeconomic status and education, cultural assets, social networks, and parental

motivation) are associated with educational outcomes (e.g., de Graaf, Kraaykamp & de Graaf, 2000; Duncan & Brooks-Gunn, 1997 and Gamoran, 2001)

Blanden, Gregg and Macmillan (2007) focus on the intergenerational transmission of variables that are related to family incomes and have a return in the labour market - education, cognitive ability, non-cognitive skills and labour market experience - and evaluate the importance of these variables in the extent of socioeconomic mobility between parents and their sons as adults among a 1970 cohort in the UK. They show that these variables (i.e. education, ability, non-cognitive skills, experience) account for half of the association between parental income and children's earnings, with the cognitive variables accounting for 20 percent of intergenerational persistence.

Recent empirical research has shown the importance of cognitive skills for individual earnings, distribution of income and economic growth. (Barro, 2001; Bishop, 1992; Nickell, 2004 and Hanushek & Wössmann, 2008). Consequently, a substantial part of inequality of opportunity in income finds its origin in inequality of opportunity in schooling (Brunello & Checchi, 2007). Understanding the drivers of fairness in education is thus a major issue. Since the Coleman (1966) report, the impact of family background and peer effects on the quality of education has been investigated in a wide range of literature. Using data from respectively the US and Brazil, Betts and Roemer (2005) and Waltenberg and Vandenberghe (2007) show that not the redistribution of public budgets, but institutions are the key in increasing equality of opportunity in schooling. As shown in OECD (2006), school composition is important in explaining educational achievement.

Glewwe (1996), Hanushek and Woessmann (2008) and Heineck and Anger (2010) , find that cognitive skills play an important role for income generation while Heckman and Vytlacil (2001) suggest that cognitive abilities are a key determinant of educational achievement. In Guatemala, recent evidence indicates that cognitive skills such as reading and vocabulary skills and non-verbal problem solving skills (as measured by Ravens Progressive Matrices) are causally linked to higher wages (Behrman et al., 2009). Many of these skills are formed early in life (Heckman, 2000, 2005; Carneiro & Heckman, 2003 and Cunha & Heckman, 2007). In Guatemala, Maluccio and others, (2009) find that exposure to a nutrition supplement has detectable effects on cognitive skills 30 years later.

Internationally comparable datasets on school performance, such as the Programme for International Student Assessment (PISA) data (OECD, 2001a, 2004c), or the Trends in International Mathematics and Science Study (TIMSS) and Progress in International Reading Literacy Study (PIRLS) studies have confirmed the well recognized fact that students' socioeconomic background is one of the most important determinants of educational attainment (Bourdieu & Passeron, 1977 and Coleman et al., 1966). Although socioeconomic background does not account for differences in student-performance between and within schools as assumed – implying ability is a stronger predictor (Marks, 2006) – for policymakers socioeconomic background is a central focus.

Previous evidence has suggested that family views of education and family educational aspirations play an important role in educational achievement (Brody & Flor, 1998; Brody, Flor & Gibson, 1999; Brody et al., 1994; Davis-Kean, 2005; Gutman & Eccles,

1999 and Linver, Brooks-Gunn & Kohen, 2002). There has been a substantial literature that has suggested that the linkage between SES and educational achievement arises because children from socially disadvantaged families tend to be exposed to school environments that limit their opportunities for educational success (Bowman, Donovan & Burns, 2001; Ma & Wilkins, 2002; Phillips, Voran, Kisker, & Howes, 1994; Pianta, La Paro, Payne, Cox, & Bradley, 2002 and Posner & Vandell, 1994).

Plug and Vijverberg (2003) designed a study to identify the impact of genetics on educational attainment analysing the differences between adopted children and children who are their parents' offspring. Their results show that parental ability (IQ) directly affects children's school success: the more schooling years and the higher the parents' IQ, the greater the probability that children attend college. The effect is statistically significant for both groups, but substantially higher for offspring children. Therefore, they conclude that the biological children enjoy the effect of both genetic and cultural transfers, while adopted children only cultural transfers. The studies conducted by Dearden, Machin and Reed (1997) and Sacerdote (2002) analysed the impact of adoptive father years of schooling on children education, and report positive and significant effects that are almost identical to the effects found for fathers and their own-birth sons. All these results confirm the argument that beyond the nature aspects the environment and context play a substantial and relevant role in educational transmission (Collins, Maccoby, Steinberg, Hetherington & Bornstein, 2000; Rutter, 1997) and that in a completely equal education system and society is expected to find variation according to parent-child genetic transmission (Bowles & Gintis, 2002).

Oreopoulos, Page and Stevens (2003) analyse the direct effect of parental education on children's attainment (net of genetics and other social factors). With U.K and U.S. data sets, Blanden, Gregg and Machin (2003), Blanden and Machin (2004), and Machin and Vignoles (2004), analyse the impact of parental relative income position on child educational outcomes. Their results argue that the educational gap between children with rich and poor parents has widened over time. Also their results suggest a widening gap in educational attainment for children based on parental education, although the gap in cognitive ability has declined. Galindo-Rueda and Vignoles (2005) further find that educational attainment increased far more for those with low ability and high income than for those with high ability and low income.

Nonetheless, this literature leaves important questions unanswered. One such question, underlined in Cutler and Lleras-Muney (2008, p.22), concerns the existence of health returns to different qualities of education. This is a topical policy issue, since evidence on the existence of such returns is vital to inform the design of complementary policy interventions connecting the educational and healthcare sectors. Education enriches and expands people's lives in many ways, including through their employment opportunities, their civic and political involvements and the quality of their personal lives. It is important to recognize that these educational investments don't occur in a vacuum. Larger social structures -- law and government, markets and property rights, practices and patterns of racial and gender inequality, and others -- provide a framework that conditions education's effects. Deep inequalities in family circumstances and social environments pose serious challenges to the attainment of equal educational opportunity. And even for persons with good educational opportunity, a variety of other factors in family and

community life influence their prospects. While these observations should not be used to excuse schools from doing their utmost to improve the prospects of students from disadvantaged backgrounds, we need to understand better how larger social structures and the contexts in which schooling occurs (including family circumstances, health and nutrition, public safety, housing, transportation, libraries, and so on) influence the ability of schools to shape educational and social outcomes.

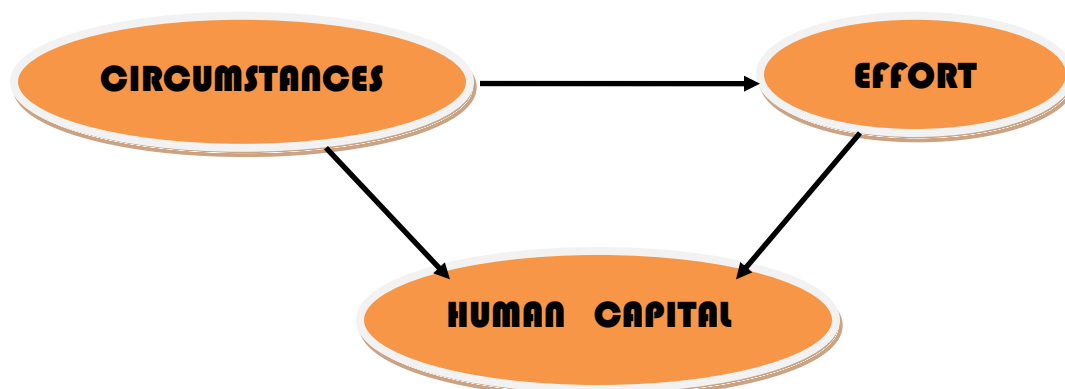
### **3.5 Conceptual framework**

The study adopts the concept of equality of opportunity by Roemer (1998). Equality of opportunity would prevail in a situation in which the distribution of an outcome of interest is independent of circumstances. Roemer then described the outcome of interest as an “advantage” and divided the determinants of advantage into two groups: “efforts,” which are subject to individual choice, and “circumstances,” which are factors that lie outside the individual’s control. This is illustrated in Figure 3.1. Figure 3.1 shows circumstances variable, effort variable and an outcome of interest variable which is human capital. Equal opportunity levels the playing field, and everybody has, in principle, the potential to achieve the outcomes of their choice. When some of the inequality observed in the outcome of interest can be attributed to exogenous circumstances, such as a person’s gender or family background, it reflects inequality of opportunity in a society.

Furthermore, inequality of opportunity can be estimated by decomposing outcome inequality into a portion resulting from circumstances that lie beyond the individual’s control, and a residual component that rewards choices made, effort put forth, luck, and

talent. Individuals cannot be held accountable for the component resulting from circumstances such as birthplace, gender, ethnicity, or parental background because they are exogenous and beyond their control. Moreover, there is a social consensus that these exogenous circumstances should not have an effect on individual outcomes. In other words, inequality of opportunity measures differences in observed outcomes that correspond to differences in circumstances (family background) rather than differences in effort since inequalities due to circumstances is considered unfair.

Figure 3.1: Conceptual framework for inequality of opportunity



Source: Adapted from Barros, Ferreira, Vega and Chanduvi (2008)

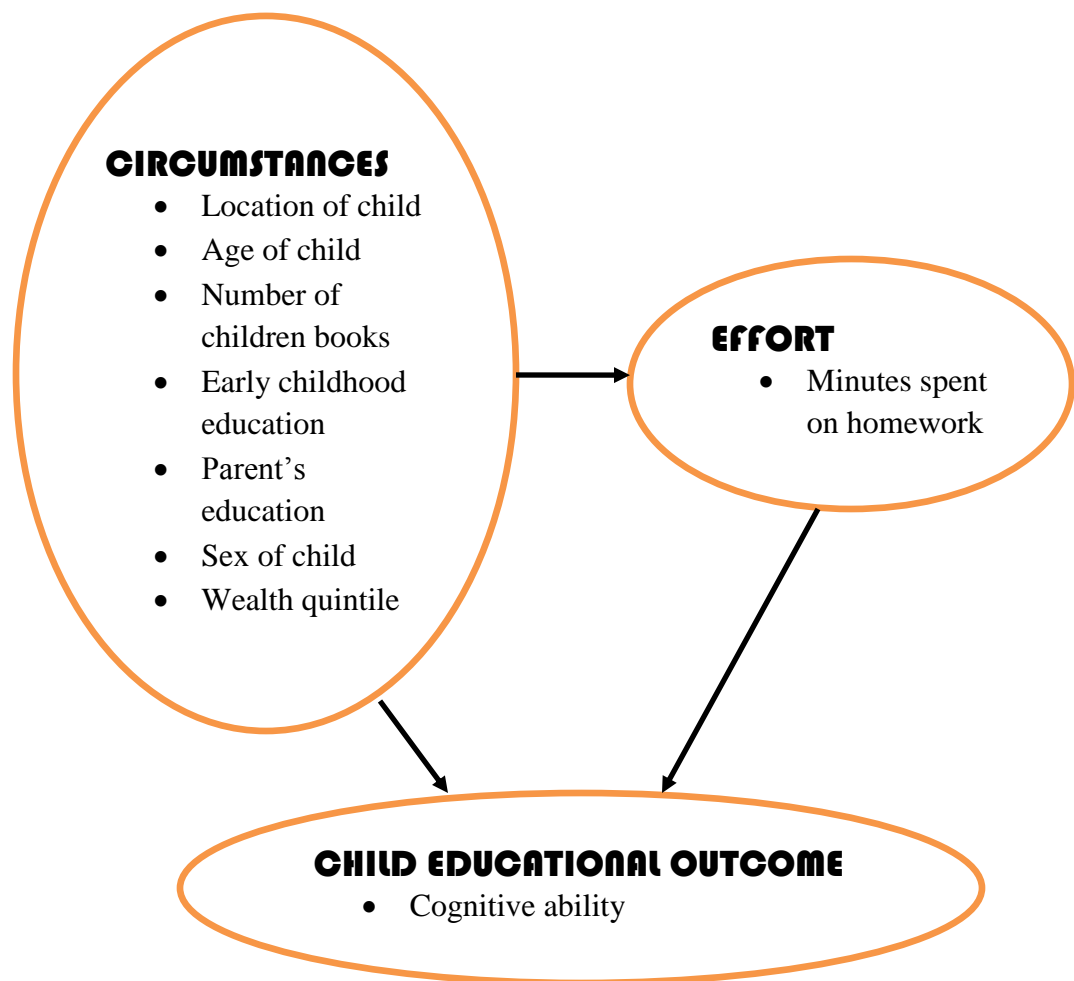
### 3.5.1 Framework for inequality of opportunity in child education

The educational outcome variable is measured by cognitive ability of children arising from two basic sources (see Figure 3.2). The first is inequality associated with differences in circumstances that the child cannot be held accountable for and that lead people to face different opportunity sets: gender, the family and socioeconomic group into which they were born, the place where they were born, as well as any mental or physical characteristics they inherit at birth. As long as these predetermined

circumstances affect the outcome of interest—and there is a social agreement that they should not—through any mechanism, the differences generated will be attributable to inequality of opportunity. The remainder of outcome inequality reflects differences in variables that are, to some extent, under the control of the individual. This is minutes spent on homework. This is known as inequality resulting from effort and choice, but because it also includes differences resulting from postnatal random shocks (luck), it is preferably called “residual inequality”.

For each child, the situation of parents represents the set of circumstances the child is faced with and might influence the effort level of the child. However, the effort level is also influenced by other factors we are not able to observe. Children with identical levels of effort should enjoy identical outcomes. Any inequality in outcomes would map perfectly to differences in effort. In this situation, circumstances might still influence the cognitive ability since they affect the effort of the child. Furthermore, the distribution of cognitive ability should be stochastically independent of any circumstances.

Figure 3.2: Conceptual framework for inequality of opportunity in child educational outcome



Source: Adapted from Barros, Ferreira, Vega and Chanduvi (2008)

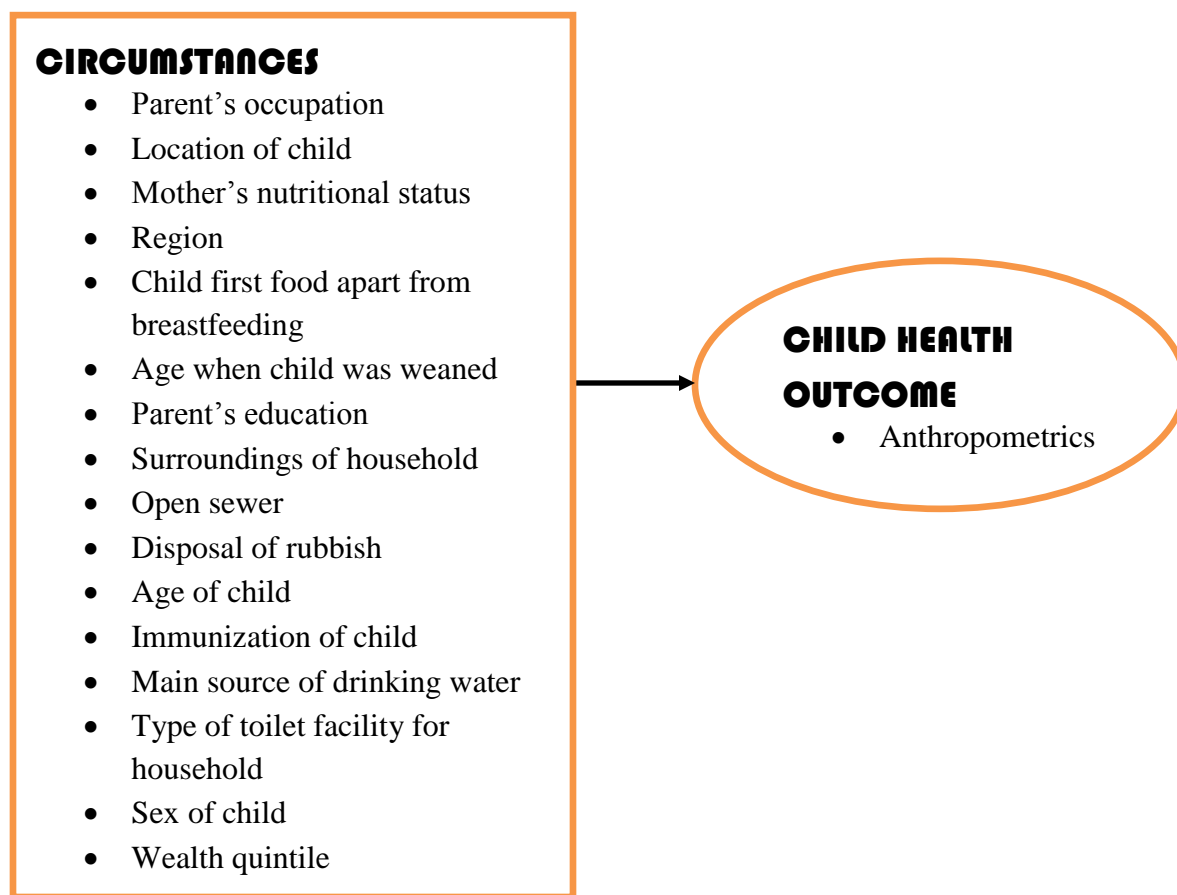
### 3.5.2 Framework for inequality of opportunity in child health

The study draws on recent and growing body of literature on the distinction between inequality of opportunity and inequality of outcomes and on ways to measure the contribution of inequality of opportunity. The conceptual framework inspiring this literature is due to Roemer (1998), who made the distinction between circumstances and effort as determining individuals' rewards. In the case of child health, all observed health

inequality would be inequality of opportunity, since a child is not accountable for any part of their health outcomes by age five (see Figure 3.3). Inequality of opportunity is defined as inequalities that are due to observable circumstances such as parental education, wealth, and place of residence. Genetic variation and luck are unmeasured and therefore included in the residual inequality, which is not attributable to differences in opportunities.

In the context of child health, equality of outcome would imply that all children of the same age and sex would have the same height, which is clearly not realistic. Equality of opportunity means that, although individual children have different heights, differences in height are distributed independently of parent's education or other circumstances. For opportunity to be equal with circumstances  $C$  and outcome  $y$ , the distribution of  $y$  given  $C$  should be equal to the distribution of  $y$  unconditional on  $C$ , i.e.  $F(y|C) = F(y)$ . Inequality of opportunity is therefore the degree to which  $F(y|C)$  is not equal to  $F(y)$  (Ferreira & Gignoux, 2008).

Figure 3.3: Conceptual framework for inequality of opportunity in child health outcome



Source: Adapted from Barros, Ferreira, Vega and Chanduvi (2008)

## **CHAPTER FOUR**

### **METHODOLOGY**

#### **4.0 Introduction**

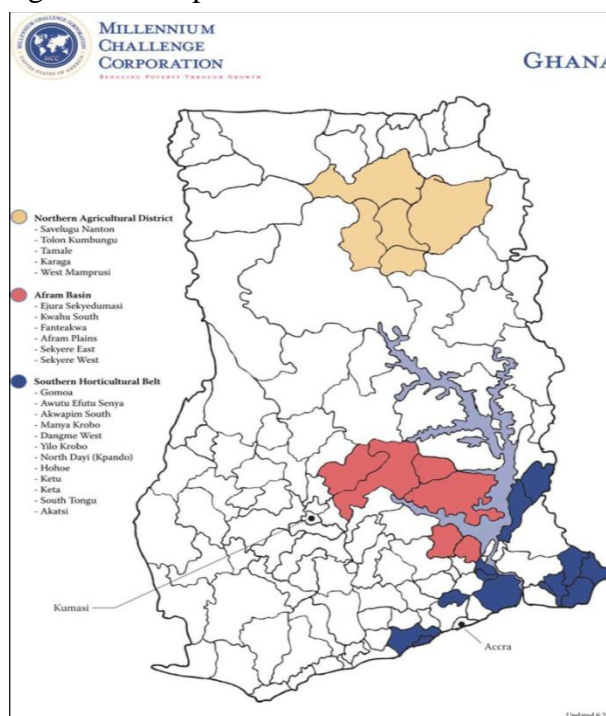
The study uses mixed methods, a technique that combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study (Johnson & Onwuegbuzie, 2004). The strength of the technique is seen as reducing bias while adding credibility. Mixed method was used as a complementarity; that is seeking elaboration, enhancement, illustration, and clarification of the results from one method with results from the other method (Greene, Caracelli & Graham, 1989). An in depth analysis of the model specifications used to investigate the extent to which inequality of opportunity in education and health influences children's cognitive ability and nutritional status in Ghana is presented in this chapter. The study adopts the concept of equality of opportunity by Roemer (1998) to identify the determinants of inequality of opportunity in children educational and health outcomes in Ghana and expert interviews for clarification of the results.

#### **4.1 Study Area**

The Government of Ghana, through the Millennium Development Authority, implemented the five-year \$547 million Compact signed with the Millennium Challenge Corporation (MCC) of the United States of America. The Compact was aimed at reducing poverty through economic growth and agricultural transformation. Three projects in the area of agriculture, transportation and rural development form the basis for the achievement of the programme objectives. The projects operated essentially in 23

districts (see Figure 4.1) in Ghana of which five districts were in the Northern Agriculture Zone (Northern Region), six districts were in the Afram Basin Zone (Ashanti and Eastern regions), and twelve districts were in the Southern Horticultural Belt (South-East Coastal Plains). These districts were among the poorest districts in Ghana. The data was collected by the Institute of Statistical, Social and Economic Research (ISSER), University of Ghana and Ghana Statistical Service (GSS) in 2008 as part of monitoring and evaluation process for assessing the impact of the Millennium Challenge Account (Ghana Compact) and was sponsored by the Millennium Development Authority (MiDA), the implementing authority set up for that purpose by the Parliament of the Republic of Ghana. About 230,000 individuals were expected to benefit directly from the Compact interventions while about 1,000,000 people were expected to obtain indirect benefits.

Figure 4.1: Map of MiDA intervention areas in Ghana



Source: Osei, Ackah and Domfe (2013)

## **4.2 Sampling / Data description**

The data used for the study was round one of the Ghana Living Standards Survey, Round 5 Plus (GLSS 5+) which was jointly conducted by the Institute of Statistical, Social and Economic Research (ISSER), University of Ghana and Ghana Statistical Service (GSS) in 2008 in the original 23 programme districts. The GLSS 5+ data was used specifically because of the Raven Coloured Progressive Matrix test and the Wechsler Intelligence Scale for Children Digit Span test. Using the GLSS 5+ community and household questionnaires, 3,166,227 estimated number of individuals were interviewed. The survey provides district level indicators for three zones distributed in six regions of Ghana. Fifteen households were selected from each of the enumeration areas (EAs). The selection of the EAs and the households from these EAs was representative at each level. In all, 9,315 households from 621 Enumeration Areas (EAs) were interviewed and all the communities that fall in these geographical areas were studied in detail. The main objective of GLSS 5+ was to provide information on patterns of household consumption and expenditure at a greater level of disaggregation and to provide the baseline information to support long-term monitoring of the Millennium Development Authority (MiDA) programme.

The study used household questionnaire which consisted of sections; parts A and B. Sections on demographic characteristics of the respondents, education and skills training, health and fertility behaviour, employment and time use, information on all non co-resident siblings, parents and other non-household members, housing and housing conditions and digit span and raven pattern cognitive assessment were used. A two-stage sample design was used for the survey. The first stage involved selecting

sample points or clusters from an updated master sampling frame constructed from the 2000 Ghana Population and Housing Census in the second half of 2007. A total of 621 clusters (census enumeration areas) were selected from the master sampling frame. The clusters were selected using systematic sampling with probability proportional to size. A complete household listing was conducted in September 2007 in all the selected clusters to provide a sampling frame for the second stage selection of households. The second stage selection involved the systematic sampling of 15 of the households listed in each cluster. The primary objective of the second stage of selection was to ensure adequate numbers of completed individual interviews to provide estimates for key indicators with acceptable precision at the district level. Other sampling objectives were to facilitate manageable interviewer workload within each sample area and to reduce the effects of intra-class correlation within a sample area on the variance of the survey estimates.

Since the design is not self-weighting, household sample weights were computed and applied for the estimation of the survey results. This was to facilitate estimation of the true contribution of each selected cluster in the sample. For a detailed description about the sampling procedure, see Appendix 4.1.

#### **4.3 Data collection on health and education experts**

In order to seek elaboration and clarification of results for the determinants of inequality of opportunity for children's educational and health outcomes in Ghana, expert interviews were conducted. Snowball sampling technique was used to select the experts who had special knowledge and experiences which resulted from their actions, responsibilities and obligations of their specific functional status within their organisation

or institution on the topic under discussion. Ten experts were interviewed using a semi-structured interview guide (Holstein & Gubrium, 1995). The interviews, which typically lasted for 40 minutes, were conducted at their work place using a digital recorder with a subsequent transcription. The approach of an expert interview is a specialty within the semi-structured interview methodology as the experts are determined deliberately (Meuser & Nagel, 1991; Schnell, Hill & Esser, 1999). The experts were senior academics and senior managers in the education and health sectors. The experts were chosen so that they could contribute to the discussion on the determinants of inequality in children cognitive ability and children under-five nutritional status in Ghana.

#### 4.4 Method of data analysis

Table 4.1 gives a summary of how each objective in the study was analysed.

Table 4.1: Summary of how each objective was analysed

| Objective   | Method of estimation   |
|---|--|
| 1. Assess the inequality in the health outcomes of children in Ghana                            | Two-way frequency analysis and correlation analysis, F-tests and Theil-T index |
| 2. Assess the inequality in the cognitive ability of children in Ghana                          | Correlation analysis, F-tests and Theil-T index                                |
| 3. Analyze the determinants of inequality in children's cognitive ability in Ghana              | Quantile and Ordinary Least Squares Regressions                                |
| 4. Analyze the determinants of inequality of opportunity in children's health outcomes in Ghana | Quantile and Ordinary Least Squares Regressions                                |

#### 4.5 Methodology for health outcome

This methodology consists of computing standardized nutritional indicators, calculating decomposable General Entropy measures of inequality for these indicators, and then decomposing these measures into a portion that is due to observable circumstances and a residual; the former being the share that can be attributed to inequality of opportunity.

The study undertook this decomposition using both parametric and non-parametric methods in order to ascertain the influence of functional form assumption on the parametric estimates.

#### **4.6 Child health production functions**

In focusing on the determinants of child height and weight, the study drew on the child health production function literature to include variables at the child and household level that are theoretically relevant to the determination of child health. The study adapts Strauss and Thomas (1998) and posits the following health production function:

$$H = h(N; A, B', \varepsilon_h)$$

where  $H$  is a set of measured health outcomes, which are a function of a vector of health inputs,  $N$ . The inputs  $N$  can be partially controlled by parents, and depend on the parents' motivations and circumstances. There are also environmental and public service or infrastructure dimensions to these health inputs, which is referred to as  $B'$ . Health should be generally increasing with health inputs. The underlying health production technology may vary with socio-demographic characteristics;  $A$ , and with environmental and public health characteristics;  $B'$ . Included within the random disturbance;  $\varepsilon_h$  are the elements of genetic variation, both observable and unobservable, as well as measurement error.

In terms of outcomes, the study focused on child height-for-age and weight-for-height after appropriate standardization to account for variations in sex and age. Although child health can be characterized by a number of different measures, height is a preferred indicator for child health status because it is also a good measure of general health status and represents the accumulation of episodes of poor nutrition or illness (Pradhan, Sahn &

Younger, 2003). Weight-for-height is also examined as an outcome. Although more weight for a given height is not necessarily healthier (Pradhan et al., 2003), it is a measure that is more sensitive to short-term variations in nutrition.

Theoretically, relevant child level variables include gender and birth order, and whether a child is part of a multiple birth. Household-level variables include things such as mother's and father's schooling, parental occupation, mother's anthropometrics, mother's age at birth, access to piped water, and availability of flush toilets, as well as geographical location (Pradhan et al., 2003; Blau, Guilkey & Popkin, 1996; Aturupane, Deolalikar & Gunawardena, 2008; Kabubo-Mariara, Ndenge & Mwabu, 2008).

#### **4.6.1 Anthropometric measures**

Anthropometric indicators are commonly used to assess both long-term and short-term malnutrition among children under-five. Since malnutrition in childhood is the result of both inadequate food intake as well as an inability to absorb or assimilate nutrients due to disease or infections, it is a good indicator of the child's overall health. It is standard practice in child health studies to use z-scores computed by comparing the observed anthropometric measures to reference distributions of height and weight for healthy children of the same age and sex. Since the transformations involved in computing these distributions would alter the scale of the measure and therefore change inequality indices in arbitrary ways, the study relied on standardized height and weight measures that retain the original scale of the measures (i.e. centimetres and kilograms) but standardize for age and sex differences (see Pradhan et al., 2003).

Nutritional status reflects a larger set of deprivations related to the living conditions to which a child is exposed and to the social and economic opportunities of her care-takers. A set of underlying determinants of nutritional status have been identified as potential obstacles to progress. They go from little access to good-quality food, to a lack of sanitation and clean water, poor health services and absence of immunization programmes, from low levels of education, to gender discrimination, or lack of knowledge on breastfeeding practices. As emphasized by Braveman and Egerter (2008, p.23): “Behaviours, as well as receipt of medical care, are shaped by living and working conditions, which in turn are shaped by economic and social opportunities and resources.”

Anthropometry-based nutritional assessment has the advantage of being a universally applicable, inexpensive and non-invasive method. This procedure also is applicable to large sample sizes. It can be used to identify target groups of population or areas for intervention, as a tool for nutritional surveillance, and in cross-sectional evaluation. Anthropometric indicators were constructed using data on the children's age, height and weight. In order to abstract from normal variations in height and weight, it is typical in the child health literature to use a reference distribution for children put together by the World Health Organisation (WHO, 2006). The child growth standards were generated using data collected in the WHO Multicentre Growth Reference Study (WHO, 2006) and the z-score (being the child's deviation from the median of the reference distribution measured in units of standard deviations of the reference distribution) were calculated for children under-five. The study used a z-score unit of measure to determine the nutritional

status of a child. Each child's anthropometric index is compared to a reference distribution for the index of interest. The z-score is defined as follows:

$z_i = (A_i - A_r) / (SD_{\text{Reference population}})$  where:  $A_i$  is the value of the index of child  $i$ ;  $A_r$  is the value of the index for the median child in the reference population; and  $SD$  is the standard deviation of the index for the reference population.

#### 4.7 Model specification for educational outcome

The outcome variable (cognitive assessment, (*COGAS*), of child  $i$ ), depends on the child circumstance variables,  $C_i$ , (family and environmental characteristics), effort,  $E_i$ , (study, commitment) and random factors,  $u_i$ :

$$COGAS_i = f(C_i, E_i, u_i)$$

The distribution of scores conditional on the characteristics of the child is equal to the non-conditional distribution if and only if the cognitive assessment does not depend on the child circumstance variables (equality of opportunity principle). The higher the contribution of circumstances to the outcome variable, the more unequal the distribution of opportunities will be. Inequality of opportunity is measured by estimating the difference between the conditional and non-conditional distribution of scores,  $F(COGAS|C) \neq F(COGAS)$ . The study adapts Checchi and Peragine (2005) which proposes three possible estimates for the distribution of results conditional on circumstances variables.

The study defines subgroups of children who possess a vector of common characteristics. These “types” of children share exactly the same circumstance variables. The difference in results that exists between the subgroups is attributable to inequality of opportunities, while the differences within each subgroup are attributable to different levels of effort or

luck factors. Let  $M^N = \{m_i^n\}$  be the distribution of individual child scores comprising subgroup “n” of children that share the same circumstance variables.

The smoothed distribution or the first distribution of scores,  $M_I^N = \{\mu^n\}$ , corresponds to the average result of each subgroup of children who share the same characteristics. All children within subgroup n are assigned the average *COGAS* score of the group. By applying an inequality measure on distribution  $M_I^N$ ,  $n = 1 \dots N$ ; the study capture inequality among types, which reflects inequality of opportunities.

Multiplying the individual scores of each child by the ratio between the average score of all children and the average score of their subgroup gives the second distribution. By applying an inequality measure to this distribution  $M_{II}^N = m_i^n \frac{\mu}{\mu^n}$  it captures inequality within each subgroup, which may be interpreted as inequality produced by individual responsibility.

The third distribution is parametric,  $M_{III}^N = F(\bar{C}, E(\bar{C}, \varphi\tau_i), \varphi_i)$  which arises from regression *COGAS* results on circumstances and effort,  $COGAS = f(C, E(C))$  through a linear model. Where  $\bar{C}$  corresponds to the average circumstance variables of all children, and variables  $\tau_i$  and  $\varphi_i$  correspond to error terms.

The function is summarized in the following equation:

$$COGAS = C\delta + E\gamma + u \quad \text{where} \quad E = \sigma C + v$$

This is reduced to  $COGAS = (\delta + \sigma\gamma)C + v\gamma + u$  , which can be estimated in a regression as  $COGAS = \beta C + \rho$ . Under this specification, the standardized parametric distribution is obtained as follows:

$$M_{III} = \hat{\beta}\bar{C} + \hat{\rho}$$

Bourguignon, Ferreira and Menéndez (2007) proposed this distribution  $M_{III}$  , explaining that it allows all circumstance differences to be eliminated, and therefore allows the inequality of results arising from the differences in individual efforts to be observed.

Three different inequality of opportunity estimators are constructed using the above mentioned score distributions. Firstly,  $P_I = I(M_I^N)/I(M^N)$  corresponds to the ratio between the inequality of the smoothed distribution and the inequality of the non-conditional distribution, where  $I(.)$  represents an inequality indicator. The estimator can be interpreted as the percentage of the between groups inequality out of total inequality. One minus the ratio between inequality in the standardized distribution and the inequality of the original distribution ie.  $P_{II} = 1 - [(I(M_{II}^N)/I(M^N))]$  gives the second alternative. This ratio  $I(M_{II}^N)/I(M^N)$  captures the aggregate inequality within the subgroup and therefore, one minus this ratio is an alternative measure to the inequality between subgroups as long as function  $I(.)$  can be expressed as a sum of intra and intergroup components. This method was proposed by Checchi and Peragine (2005). The third alternative,  $P_{III} = 1 - [(I(M_{III})/I(M^N))]$  , is the parametric alternative to  $P_{II}$ . The chosen inequality function  $I(.)$  corresponds to the entropy index  $GE(0)$ ,  $GE(1)$  and  $GE(2)$ .  $GE(0)$ , corresponds to the logarithmic mean deviation, whiles  $GE(1)$ , is known as the Theil index, and finally  $GE(2)$ , corresponds to half of the square of the variation

coefficient. The entropy index is additively decomposable between subgroups of the population which is in contrast to other inequality indicators.

In their study on the results of the 2001 PISA test, Ferreira and Gignoux (2008a) used the index  $GE(2)$ , since this indicator is invariant to the linear transformations in the scale and the variance of the distribution being evaluated. This issue is relevant to the extent that the PISA test results reported are a standardization of the original distribution, such that an indicator like  $GE(2)$ , can evaluate the characteristics of the underlying distribution. In the case of the *COGAS* assessment, only a standardization of the variance of the distribution is carried out, so any indicator of the entropy family  $GE(.)$ , would be appropriate.

The standardization of the variance of the *COGAS* assessment results does not allow the trends in the inequality of scores for the population as a whole to be known. Nonetheless, aspects such as the contribution of subgroups of determinants of total inequality can be known. This is precisely the case, since inequality of opportunities is measured as the contribution of circumstance variables on the non-conditional of *COGAS* assessment results.

The non-parametric estimators do not have to assume a functional form for the relationship between the *COGAS* assessment results and the explanatory variables. Conversely, this estimate presents problems when there are many subgroups, which may lead to cells with few or no observations. This may lead to estimators with very large variances, which makes them less precise and therefore less reliable. As such, there is an upper limit of subgroups and categories to consider, which also depends on the quantity

of data available. On the other hand, the parametric estimate allows the data to be used more efficiently, since it is not necessary to restrict or limit them.

The parametric distribution allows the partial effects of one of the circumstance variables to be estimated, or of a group of them, controlling for the others. This distribution is specified by the following function:

$$M_{IV} = \hat{\beta}^J \bar{C}^J + \hat{\beta}^{j \neq J} C^{j \neq J} + \hat{\rho}$$

This allows the proportion of inequality specific to that circumstance variable to be obtained. The estimator is then defined by:  $P_{IV} = 1 - [(I(M_{IV})/I(M^N))]$

Ferreira and Gignoux (2008a) revealed that, there is no certainty regarding the most efficient estimator, since while non-parametric methods are more flexible (since they do not require a specification of the functional form) parametric methods are more efficient in data use and are less demanding on the number of observations.

In view of the above, both types of estimators are used rendering an interval of inequality of opportunity measures. All the three methods described shall be applied to the *COGAS* assessment results of children between the ages of five to twelve years, in order to identify what percentage of the inequality of educational outcomes is explained by inequality of opportunities.

## **4.8 Measurement of children's cognitive ability**

### **4.8.1 Raven Progressive Matrices**

Raven's Progressive Matrices (RPM), is a nonverbal group test typically used in educational settings to measure the ability to make sense of complex situations, create

meaning out of ambiguity or confusion and think clearly. It is the most common and popular test administered to groups ranging from 5-year-olds to the elderly in assessing the general cognitive abilities in children and adults. It is made of 60 multiple choice questions, listed in order of difficulty. In each test item, the subject is asked to identify the missing element that completes a pattern. Many patterns are presented in the form of a four by four, three by three or two by two matrix. The matrices are available in three different forms for participants of different ability.

#### **4.8.1a Standard Progressive Matrices (SPM)**

The SPM is designed for the general population (6 years and older) and candidates of average intellectual ability. The booklet comprises five sets (A to E) of 12 items each (for example, A1 through A12), with items within a set becoming increasingly difficult. Thus, requiring greater cognitive capacity to encode and analyze information. All items are presented in black ink on a white background. The administering time is 40-60 minutes or untimed.

#### **4.8.1b Coloured Progressive Matrices (CPM)**

The CPM is designed for young children aged 5-12 years, the elderly and persons of limited intellectual ability or who have special needs. This test contains sets A and B from the standard matrices, with a further set of 12 items inserted between the two, as set Ab. Most items are presented on a coloured background to make the test visually stimulating for participants. The administering time is 20-45 minutes or untimed.

#### **4.8.1c Advanced Progressive Matrices (APM)**

The APM is designed for persons aged 11 years and older of above average ability. It is also suitable for graduates of particular value for assessing managerial and scientific ability. The advanced form of the matrices contains 48 items, presented as one set of 12 (set I), and another of 36 (set II). Items are again presented in black ink on a white background, and become increasingly difficult as progress is made through each set. These items are appropriate for adults and adolescents of above-average intelligence. The administering time is 15-30 minutes or untimed.

#### **4.8.2 Wechsler Intelligence Scale for Children (WISC) Digit Span**

The WISC Digit Span is a measure of working memory and ability to concentrate and has both a forward and backward component. The respondent repeats a string of numbers to the enumerator and is scored by whether or not they repeat the full string correctly. In the Digit Span Forward, the child must repeat the string of numbers exactly as stated by the enumerator. The string of numbers increases in length as the child answers correctly. With the Digit Span Backward, similar strings of numbers are to be repeated in the reverse order from that stated by the enumerator until the child can no longer continue. The forward digit sequence is completed prior to the backward digit sequence.

The study used the Wechsler Intelligence Scale for Children (WISC) Digit Span and the Raven's Coloured Progressive Martice (CPM) to measure children aged 5-12 years cognitive ability. Both tests do not require formal schooling to be able to answer the questions. The Raven's CPM is a measure of fluid intelligence or problem solving ability. The test does not depend heavily on verbal skills, making it relatively "culture free"

(Borghans, Duckworth, Heckman & ter Weel, 2008). The child respondent is asked to select the image that is missing in order to complete the picture. This type of question is novel to the children in Ghana, thus providing a more natural or true measure of problem solving skills. Twelve questions were asked from the Raven's CPM. To control for the relationship between age and raw test scores, z-scores were calculated for each child measured as, the child's raw test score minus the average score for the same age children divided by the standard deviation of test scores for children of that age. Therefore, the mean of the Raven's z-score is zero and the standard deviation is one for each age and across all ages.

The Digit Span Forward consisted of 8 questions comprising of "A" and "B" making it 16 in total. The Digit Span Backward also consisted of 7 questions comprising of "A" and "B" making it 14 in total. A total combined score of the forward and backward digit spans were calculated. The overall test was calculated over 42 marks. As with the Raven, WISC Digit Span age-adjusted z-score was calculated to control for age effects. The study combined all three tests and standardized the scores to have a mean of zero and a standard deviation of one.

#### **4.9 Quantile regression**

Quantile regression (QR) generalizes the concept of a univariate quantile to a conditional quantile given one or more covariates. QR provides a complete picture of the covariate effect when a set of percentiles is modeled, and it makes no distributional assumption about the error term in the model. Ordinary least-squares (OLS) regression models the relationship between one or more covariates  $X$  and the conditional mean of the response

variable  $Y$  given  $X = x$ . Quantile regression, which was introduced by Koenker and Bassett (1978), extends the regression model to conditional quantiles of the response variable, such as the 90th percentile. Since any quantile can be used, it is possible to model any predetermined position of the distribution.

Quantile regression is particularly useful when the rate of change in the conditional quantile, expressed by the regression coefficients, depends on the quantile. While OLS can be inefficient if the errors are highly non-normal, QR is more robust to non-normal errors and outliers. QR also provides a richer characterization of the data, allowing us to consider the impact of a covariate on the entire distribution of  $y$ , not merely its conditional mean. In practice we often prefer using different measures of central tendency and statistical dispersion to obtain a more comprehensive analysis of the relationship between variables. QR can be used when the dependent variable is continuous. The main advantage of quantile regression over least-squares regression is its flexibility for modeling data with heterogeneous conditional distributions.

Another application of quantile regression is in the areas of growth charts, where percentile curves are commonly used to screen for abnormal growth (see Wei, Pere, Koenker & He, 2006; and Wei & He, 2006). In general the quantile regression estimator is more efficient than OLS. The efficient estimator requires knowledge of the true error distribution. The study used the median quantile.

#### **4.10 The choice of inequality index**

Although there are a number of inequality measures such as the well-known Gini index or the decile dispersion ratio index, only a few of these measures are decomposable into within and between group inequality. This property is necessary to estimate the contribution of inequality of opportunity. The study used a general class of decomposable inequality measures called the general entropy (GE) measures (Duclos & Araar, 2006). The GE class of measures depends on a parameter  $\alpha$  that determines the degree of sensitivity of the index to differences in the welfare measure at different points in the distribution. A well-known special case is  $GE(\alpha=0)$ , which is known as the Theil-L index or the mean logarithmic deviation.  $GE(0)$  puts more weight on deviations from the mean at the lower end of the distribution. It is also the only measure of inequality among the decomposable inequality indices that is path independent.

Another special case is  $GE(1)$ , or the Theil-T index. This shifts the emphasis to deviations from the mean in the middle of the distribution.  $GE(2)$  is equal to half the square of the coefficient of variation. This measure puts more weight on deviations from the mean higher up in the distribution. The study estimated inequality using all three GE measures, but since they produce similar results,  $GE(1)$ , the Theil-T index was used. Typically, at least three-quarters of inequality in a country is due to within-group inequality, and the remaining quarter to between-group differences.

#### **4.11 Children in the data**

There were 8,376 children aged 5-12 years and 4,687 children aged 0-59 months in the GLSS 5+ data. Out of this number, 4,422 representing 52.8 percent of the children aged

5-12 years completed all three cognitive tests (raven coloured progressive matrices, digit span forward and the digit span backward). Data cleaning and missing data reduced the observations further to 1,094 for children aged 5-12 years and 1,337 for children aged 0-59 months for the final analysis.

#### **4.11.1 Definition of variables used for the study**

The observation unit in this study is children aged 5-12 years for the education outcomes and children aged 0-59 months for the health outcomes.

#### **4.11.2 Dependent variable**

The dependent variable for educational outcomes which was cognitive ability for children aged 5-12 years was measured using the total sum of the three test scores namely, the raven progressive matrice, digit forward span and digit backward span. The raven matrice consisted of 12 questions while the digit forward span consisted of 8 questions comprising of “A” and “B” making it 16 in total with the digit backward span also consisting of 7 questions comprising of “A” and “B” making it 14 in total. The overall test was marked over 42 marks. It was normalized at the child level to have a mean of 0 and a standard deviation of 1. The dependent variable provides the major precision for cognitive assessment for children aged 5-12 years. The study uses the variable named “**cogas**” as a dependent variable.

On the other hand, the height-for-age and weight-for-height z-scores were used for the long and short run nutritional status of children aged 0-59 months for the health outcomes. Anthropometric indicators were constructed using data on the children's age, height and weight. The child growth standards were generated using data collected in the

WHO Multicentre Growth Reference Study (WHO, 2006) and the z-score (being the child's deviation from the median of the reference distribution measured in units of standard deviations of the reference distribution) were calculated for children under-five.

#### **4.11.3 Circumstance variables**

The following circumstance variables that were beyond individual's responsibility or control were used for the study: Age of the child, location of the child, sex of the child, parent's education and occupation, the number of children books in household, whether name attended early childhood education, wealth quintile for socioeconomic status were used for the educational outcomes.

Type of toilet facility, region, surroundings of household, mother's nutritional status, main source of drinking water, immunization of child, age when child was weaned, age when child first received food, open sewage, rubbish disposal, age of the child, location of the child, sex of the child, parent's education and occupation and wealth quintile for socioeconomic status were used for the health outcomes.

#### **4.11.4 Effort variable**

On the other hand, the selected determinant of the inequalities for the educational outcome that the child (5-12 years) is likely to control is the minutes spent on homework (effort variable). However, for very young children aged 0-59 months, it is not appropriate to talk about inequality in "efforts" since such children are too young to exert relevant effort to influence their outcomes. Hence, all differences across early childhood outcome indicators can be attributed to inequality of opportunity.

#### **4.12 Wealth index for socioeconomic status**

The wealth index based on the ownership of household assets was used as a proxy for assessing the economic status of the households (Filmer & Pritchett, 2001; Howe, Hargreaves, Gabrysch & Huttly, 2009; Montgomery, Gragnolati, Burke & Paredes, 2000; Rutstein & Johnson, 2004; Vyas & Kumaranayake, 2006). This index was constructed using household asset data. The household assets includes: furniture, sewing machine, kerosene stove, electric stove, gas stove, refrigerator, freezer, air conditioner, fan, radio, radio cassette, record player, 3 in one radio system, video player, desktop computer, laptop computer, printer, computer accessories, camcorder/video camera, satellite dish, washing machine, TV, camera, electric iron, bicycle, motor cycle, car, house, land/plot, shares, boat, canoes, outboard motor, microwave, food processor, box iron, mobile phone, generator and jewellery. Each household asset is assigned a weight generated through principal components analysis (Filmer & Pritchett, 2001; Vyas & Kumaranayake, 2006). Since the landmark papers of Filmer and Pritchett (1999; 2001), almost all asset based wealth indices have used principal component analysis (PCA) for computing the asset weights. There have been a few attempts to use other techniques for this purpose, but the outcomes differed very little from those using PCA [Booyesen, van der Berg, Burger, van Maltitz & du Rand, (2008), multiple correspondence analysis; Sahn & Stifel, (2000), factor analysis]. In line with the tradition in the field, the study used PCA for estimating the weights. PCA is a multivariate statistical technique that can be used to reduce the number of variables in a dataset by converting them into a smaller number of components; each component being a linear weighted combination of the initial variables (Vyas & Kumaranayka, 2006). The first component, which explains the

largest part of the variation in the data, is chosen as the wealth index (Filmer & Pritchett, 2001; Sahn & Stifel, 2003; McKenzie, 2005).

The wealth index was constructed using the following process. An indicator matrix of ones and zero was constructed to show the asset ownership of each household. Since the households were displayed as rows, each asset was represented by the inclusion of a column for each possible (mutually exclusive and exhaustive) ownership category of that asset. In other words, each categorical asset ownership variable was reduced to a set of binary indicators. In this way, every household will indicate a “1” in exactly one of each asset’s set of columns or categories, and a “0” in all other columns. The PCA was applied to the indicator matrix, which provided a set of category-weights from the first dimension or factorial axis of the analysis results. A household’s PCA composite indicator score was calculated by adding up the weighted responses. The calculation of the household’s asset index score can be represented as follows:

$$PCA_i = G_{i1}K_1 + G_{i2}K_2 + G_{i3}K_3 + \dots + G_{ij}K_j + \dots + G_{ij}K_j$$

where  $PCA_i$  is the  $i$ th household’s composite wealth indicator score,  $G_{ij}$  is the response of household  $i$  to category  $j$ , and  $K_j$  is the PCA weight for the first dimension applied to category  $j$ .

PCA estimates a weight for each initial indicator variable, and these estimated weights form the basis for computing the wealth index. The PCA weights are the category loadings in the first principal component arising from PCA (unrotated principal component analysis), and these category-weights are then applied to the normalized responses of the household. A household’s score is the sum of its weighted normalized

responses. This score serves as a relative measure of wealth for that household, relative to all the households used in the calculation of the weights. The weights reflect the possibility that a household that owns one specific asset also owns one of the other assets in the analysis. For example, an asset which is expensive to purchase is likely to have a high indicator weight, because if a household can afford that specific asset it is likely that it can also afford cheaper assets. The index was further categorized into quintiles. It was used for both the education and health outcomes. Appendix 4.2 gives a summary description of all the variables used for the study.

#### 4.13 A priori expectations (expected signs) of the study

Table 4.2 gives a summary of the a priori expectations between the explanatory variables and the dependent variable for both the educational and health outcomes.

Table 4.2: Summary of a priori expectations for education and health outcomes

| <b>Variables</b>                   | <b>Education outcomes</b><br>(cognitive ability of 5 - 12 years old) | <b>Health outcomes</b><br>(height-for-age / weight-for-height of 0-59 months old) |
|------------------------------------|--|---|
| Type of toilet facility            |  | positive/ negative  |
| Parent's occupation                |  | positive  |
| Parent's education                 | positive   | positive  |
| Region                             |  | positive / negative   |
| Surroundings                       |  | positive / negative   |
| Mother's nutritional status        |  | positive  |
| Location                           | positive / negative  | positive / negative   |
| Main source of drinking water      |  | positive / negative   |
| Sex of child                       | indeterminate  | positive / negative   |
| Child immunization                 |  | positive  |
| Age when child was weaned          |  | positive / negative   |
| Age when child first received food |  | positive / negative   |
| Open sewer in/around house         |  | negative  |
| Age of the child                   | positive   | positive  |
| Disposal of rubbish                |  | positive / negative   |
| Wealth quintile                    | positive   | positive  |
| Minutes spent on homework          | positive   |   |
| Early childhood education          | positive   |   |

#### **4.14 Study limitations and strengths**

The cross-sectional nature of the data limits ability to draw casual inferences. Another limitation of this study worth mentioning is that measuring wealth is problematic. The study can be criticized for using an indirect measure of household wealth. However, due to the fact that in developing countries like Ghana it is hard to obtain reliable income and expenditure data, an asset-based index is generally considered a good proxy for household wealth status. Another potential limitation of this analysis is that it does not control for diet and other health care indicators. However, household wealth status functions mainly through better access to food and health care in affecting childhood nutritional status, for example more wealthy households can afford better food in terms of quality. Despite these limitations, the study strength is significant because it is a large population-based study with national coverage.

## **CHAPTER FIVE**

### **ESTIMATION AND DISCUSSION OF RESULTS**

#### **5.0 Introduction**

The chapter provides an in-depth analysis of determinants of inequality of opportunity and assesses the inequality in children's educational and health outcomes in two parts. Furthermore, it presents the results of the estimated equations and analyses the results obtained from the estimation. The econometric package Stata version 11.1 was used to estimate the models.

#### **5.1 Education outcomes for children aged 5-12 years in Ghana**

##### **5.1.1 Characteristics of children (aged 5-12 years) and their parents in the MiDA intervention areas in Ghana**

The distribution of age for children aged 5-12 years is shown in Table 5.1. The number of female children aged 5-12 years is 48.50 percent as compared to the male children with 51.50 percent. Hence, the dominated gender among children aged 5-12 years is male. About 69 percent of the children aged 5-12 years had no children books in their households. The main source of lighting in dwelling for children aged 5-12 years were kerosene (58.47 percent), electricity (33.04 percent) and candles/torches (7.55 percent). Majority of the children (80 percent) aged 5-12 years in the study attend public schools. The housing condition for children aged 5-12 years were described as liveable (65.35 percent), good (29.19 percent) and badly damaged (5.45 percent). The two major sources of toilet facility for households with children aged 5-12 years were KVIP, pit latrine, pan, bucket (57.73 percent) and bush/beach (39.69 percent). The type of surroundings for

households with children aged 5-12 years were described by 72.87 percent of the respondents as averagely clean, 21.74 percent as clean and 5.39 percent as dirty. With regards to early childhood education for children aged 5-12 years, 57.05 percent had early childhood education while 42.95 percent did not.

About 60 percent of mothers with children aged 5-12 years had no education, 35.38 percent had basic education, 3.51 percent had secondary education and only 1.31 percent had tertiary education. Elementary occupation and Service workers were the two major occupations of parents (both father and mother) with children aged 5-12 years. Most (45.71 percent) fathers with children aged 5-12 years had basic education, 39.95 percent had no education, 7.88 percent had secondary education while 6.46 percent also had tertiary education.

Table 5.1: Characteristics of households of children aged 5-12 years and their parents in the study

| Characteristics of children aged 5-12 years in the data | Category             | Sample size (n) | Percent (%) |
|---|----------------------|-----------------|-------------|
| Age of child (years)                                    | 5                    | 8,376           | 13.49       |
|   | 6                    |                 | 12.64       |
|   | 7                    |                 | 14.63       |
|   | 8                    |                 | 12.83       |
|   | 9                    |                 | 12.13       |
|   | 10                   |                 | 12.75       |
|   | 11                   |                 | 10.42       |
|   | 12                   |                 | 11.10       |
| Sex   | Male                 | 8,376           | 51.50       |
|   | Female               |                 | 48.50       |
| Location of child                                       | Rural                | 8,376           | 76.79       |
|   | Urban                |                 | 23.21       |
| Early childhood education                               | Yes                  | 4,806           | 57.05       |
|   | No                   |                 | 42.95       |
| Type of school  | Public               | 7,002           | 80.00       |
|   | Private religious    |                 | 10.11       |
|   | Private nonreligious |                 | 9.89        |
| Child books at home                                     | No book              |                 | 68.60       |

|  |                       |       |       |
|--|-----------------------|-------|-------|
|  | 1-5books              |       | 24.56 |
|  | 6-10books             |       | 5.70  |
|  | 11-15books            | 4,320 | 0.83  |
|  | 16-49books            |       | 0.31  |
| <b>Characteristics of households of children aged 5-12 years in the data</b> |                       |       |       |
| Main source of lighting  | Electricity           |       | 33.04 |
|  | Kerosene              |       | 58.47 |
|  | Candles/torches       | 6,544 | 7.55  |
|  | Other forms           |       | 0.23  |
|  | No light              |       | 0.71  |
| Surroundings   | Clean                 |       | 21.74 |
|  | Averagely clean       | 6,537 | 72.87 |
|  | Dirty                 |       | 5.39  |
| Type of toilet facility  | Flush toilet          |       | 2.58  |
|  | Other toilet          | 6,524 | 57.73 |
|  | No toilet facility    |       | 39.69 |
| Housing condition  | Good                  |       | 29.19 |
|  | Liveable              | 6,537 | 65.35 |
|  | Badly damaged         |       | 5.45  |
| <b>Characteristics of parents of children aged 5-12 years in the data</b>    |                       |       |       |
| Mothers education  | No education          |       | 59.81 |
|  | Basic                 | 4,705 | 35.38 |
|  | Secondary             |       | 3.51  |
|  | Tertiary              |       | 1.31  |
| Mothers occupation   | Senior officials      |       | 1.50  |
|  | Service workers       | 7,467 | 39.54 |
|  | Elementary occupation |       | 58.96 |
| Fathers education  | No education          |       | 39.95 |
|  | Basic                 | 5,780 | 45.71 |
|  | Secondary             |       | 7.88  |
|  | Tertiary              |       | 6.46  |
| Fathers occupation   | Senior officials      |       | 7.29  |
|  | Service workers       | 7,894 | 20.74 |
|  | Elementary occupation |       | 71.97 |

Source: Author's computation from the GLSS 5+ data, 2008

## **5.2 Inequality in the cognitive ability of children aged 5-12 years in Ghana**

### **5.2.1 Introduction**

Wide disparities in educational outcomes have been documented by studies according to parents' socio-economic background. These inequalities tend to emerge at an early age and widen throughout childhood. This section charts educational outcomes according to the following measures of parental socio-economic status:

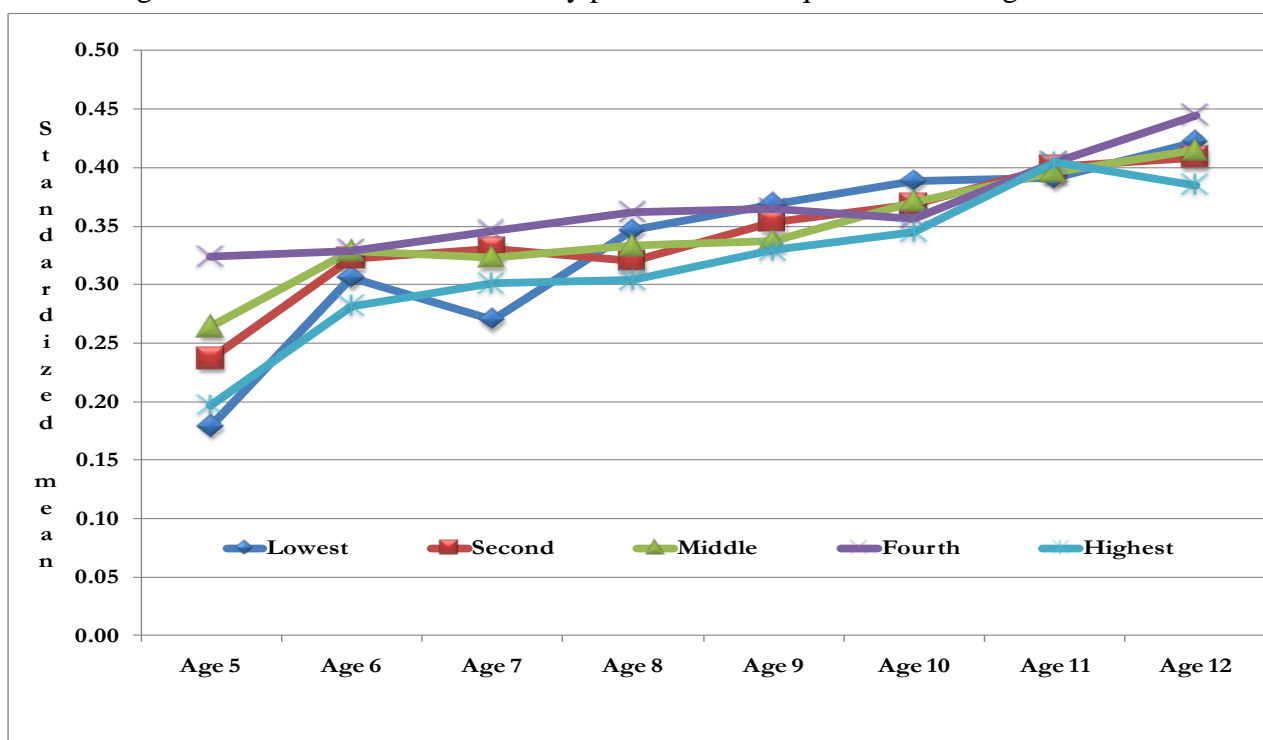
- Wealth quintile
- Parental Education (graph only shown for mother)
- Parental Occupation (graph only shown for father)

Findings about each of these dimensions of parental socio-economic status were discussed in turn using weighted sample size.

### **5.2.2 Wealth quintile of households with children aged 5-12 years in the MiDA intervention areas in Ghana**

Wealth differences are more pronounced at age 5 than all the other ages when the differences narrow considerably (Figure 5.1). The crossing and convergence of lines for the different wealth quintiles show that, except for the highest mean score in the fourth quintile at age 12 and the lowest mean score in the lowest quintile at age 5, there are no consistent rank ordering of achievement by wealth quintiles. In particular children from the fourth quintile saw the most rapid cognitive development between the ages of 5 to 9 and from 11 to 12. Surprisingly, children aged 8 to 12 years from the highest (richest) quintile saw the least cognitive development. In summary wealth differences are considerably less pronounced than other factors analysed in the study.

Figure 5.1: Educational outcomes by parental wealth quintile across ages



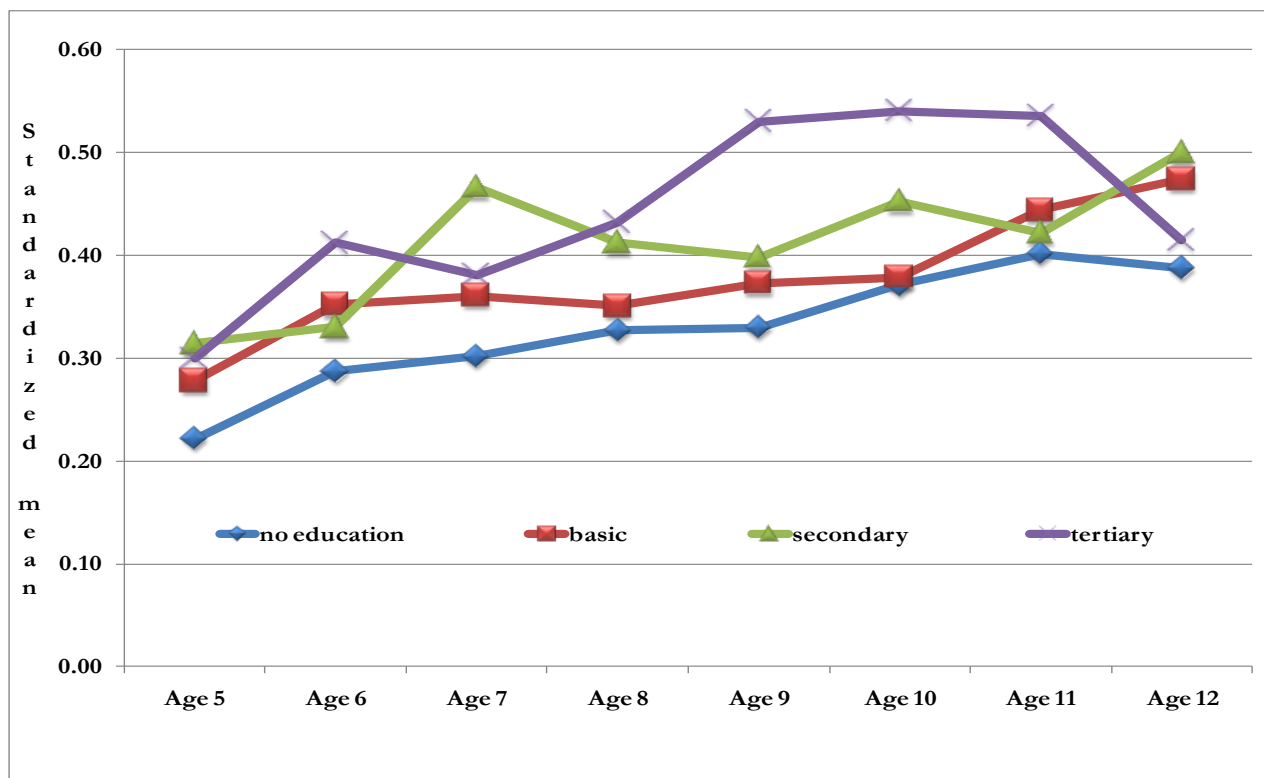
Source: Author's computation from the GLSS 5+ data, 2008

### 5.2.3 Parental education of children aged 5-12 years in Ghana

Inequalities in education outcomes according to mother's education widen throughout childhood, that is, from age 5 up to age 12 (Figure 5.2). At age 8 to 11, children with mothers who had completed tertiary education had the highest cognitive development as compared to mothers with basic and secondary education and those with no education. This supports the role that parents play in the creation of a stimulating intellectual environment for their children in order to reduce possible socioeconomic inequalities, ensure optimal and equal development, social support and opportunities to succeed related to cognitive performance in their offspring. Mothers with no education had the lowest cognitive outcomes for children across the ages of 5-12 years. The study used

results for mother's education but results for father's education are similar and are provided in Appendix 5.1.

Figure 5.2: Educational outcomes by Mothers' education across ages



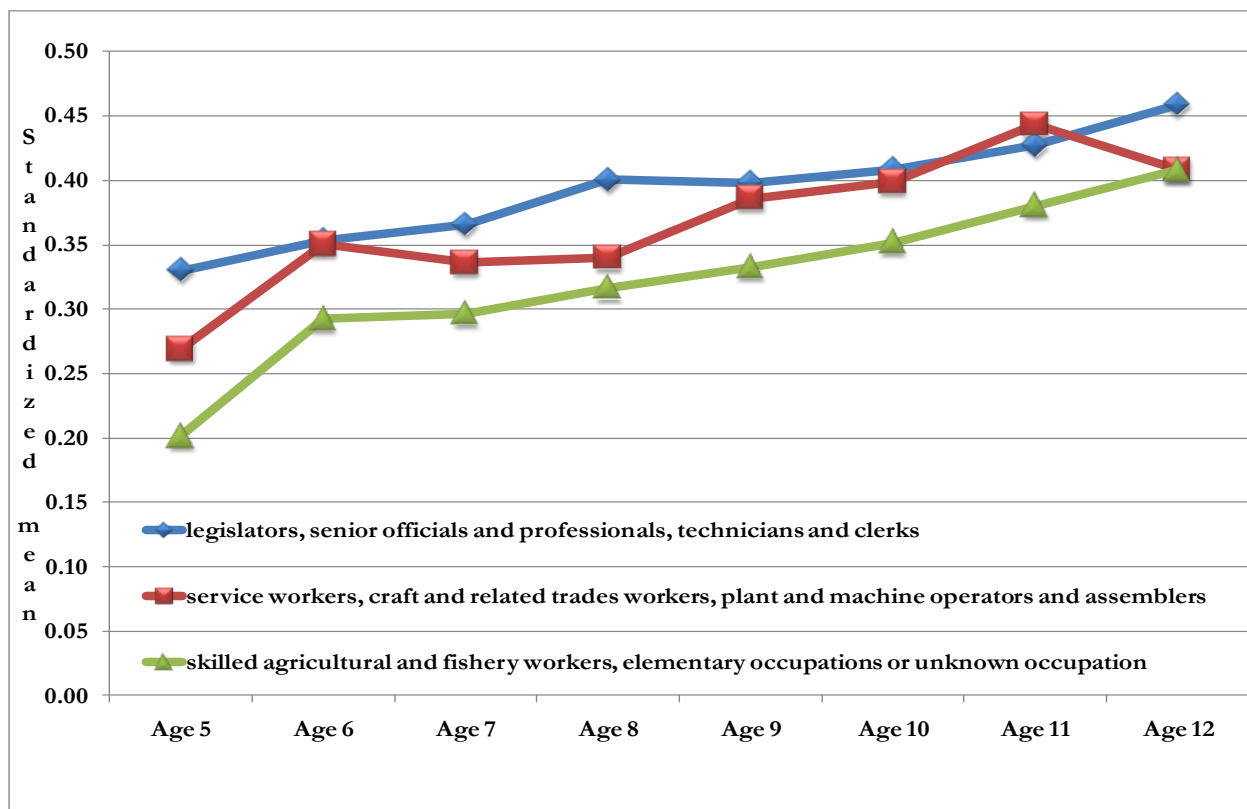
Source: Author's computation from the GLSS 5+ data, 2008

#### 5.2.4 Parental occupation of children aged 5-12 years in Ghana

Inequalities in education outcomes according to father's social class widen at age 5 but then appear to narrow slightly thereafter (Figure 5.3). Children with elementary occupation fathers are further behind in cognitive test than those with service workers fathers across ages. Between the ages of 6 and 7 and 9 and 11, differences in educational outcomes by father's social class do not widen. If anything, there is a catching up of the service workers with the senior officials and professionals. Children aged 5 to 10 with father's social class as senior officials and professionals had the most rapid cognitive

development. The study used results for father's occupation but results for mother's occupation are similar and are provided in Appendix 5.2.

Figure 5.3: Mean Educational outcomes by fathers' occupation across ages



Source: Author's computation from the GLSS 5+ data, 2008

### 5.3 Relationship between the attributes of children aged 5-12 years with their parents and the cognitive ability of the child

Using bivariate tools, the study ascertained what influences inequality of opportunity in children aged 5-12 years and tested for their association with cognitive ability (Table 5.2). The results for the educational outcome revealed that age of the child ( $\text{prob} > F = 0.000$ ), type of school ( $\text{prob} > F = 0.000$ ), type of toilet facility ( $\text{prob} > F = 0.000$ ), location ( $\text{prob} > F = 0.001$ ), surroundings of household ( $\text{prob} > F = 0.001$ ), housing condition ( $\text{prob} > F = 0.000$ ), having children books at home ( $\text{prob} > F = 0.001$ ), main source of lighting ( $\text{prob} > F = 0.000$ ) and parental (father and mother) education and occupation

( $\text{prob}>F=0.000$ ), had statistically significant influence on children aged 5-12 years cognitive ability.

Nonetheless, other variables such as early childhood education ( $\text{prob}>F=0.809$ ) and sex of the child ( $\text{prob}>F=0.945$ ) did not have any statistically significant influence on children aged 5-12 years cognitive ability.

Table 5.2: Association between children aged 5-12 years with their parents and the cognitive ability of the child

| Variable                  | F      | Prob>F   |
|---------------------------|--------|----------|
| Age of child              | 59.86  | 0.000*** |
| Sex                       | 0.00   | 0.945    |
| Location of child         | 124.17 | 0.000*** |
| Early childhood education | 0.06   | 0.809    |
| Child books at home       | 2.43   | 0.001*** |
| Main source of lighting   | 36.37  | 0.000*** |
| Surroundings              | 6.66   | 0.001*** |
| Type of toilet facility   | 51.67  | 0.000*** |
| Type of school            | 8.06   | 0.000*** |
| Housing condition         | 14.76  | 0.000*** |
| Mothers education         | 25.61  | 0.000*** |
| Mothers occupation        | 31.44  | 0.000*** |
| Fathers education         | 24.98  | 0.000*** |
| Fathers occupation        | 35.01  | 0.000*** |

Source: Author's computation from the GLSS 5+ data, 2008

\*\*\*Significant at the 1 percent level, \*\*Significant at the 5 percent level, \*Significant at the 10 percent level.

#### 5.4 Inequality index for the cognitive ability of children aged 5-12 years in Ghana

Inequality may vary from region to region; that is “between groups” inequality and also varies inside each region, adding a “within-group” component to total inequality. For policy purposes, it is useful to be able to decompose these sources of inequality so that if most of the inequality is due to disparities across regions, then the focus of policy should be on regional economic development, with special attention to helping the poorer regions. The inequality within the cognitive ability of children aged 5-12 years in the 23

selected MiDA districts in Ghana in 2008 using the Theil-T index was 11.7 percent and 0.77 percent for the between-group inequality (see Appendix 5.3). The between-group component of inequality explained a smaller share of total inequality, reflecting small differences in the cognitive ability of children aged 5-12 years from one child to the other.

### 5.5 Determinants of cognitive ability for children aged 5-12 years in Ghana

The diagnostic test showed that the model was adequately specified (see Appendix 5.6). This is indicated by the t-statistic value of 0.50 for the prediction squared for the linktest. This also implies that, the wealth quintile of the household, age of the child, children books at home, location, mothers years of education, minutes spent on homework, sex of the child and child attending early childhood education jointly determine the cognitive ability of children aged 5-12 years in Ghana (Table 5.3).

Table 5.3: Estimated determinants of cognitive ability for children aged 5-12 years  
(Dependent variable is Total Cognitive Score (COGAS))

| Variable                                   | OLS               | Quantile Regression<br>(median quantile) |
|--|-------------------|--|
| constant                                   | 0.15***<br>(6.08) | 0.14***<br>(4.72)                        |
| <i>Wealth quintile</i> (Highest=reference) |                   |  |
| Lowest                                     | 0.06***<br>(4.63) | 0.05***<br>(2.78)                        |
| Second                                     | -0.002<br>(-0.20) | -0.00<br>(-0.00)                         |
| Middle                                     | 0.005<br>(0.44)   | 0.005<br>(0.31)                          |
| Fourth                                     | 0.04***<br>(3.14) | 0.04**<br>(2.20)                         |
| Age of child                               | 0.02***<br>(6.22) | 0.02***<br>(5.27)                        |
| Child books at home                        | 0.002*<br>(1.82)  | 0.003**<br>(2.09)                        |
| <i>Location</i> (rural=reference)          |                   |  |
| Urban                                      | 0.04***           | 0.04***                                  |

|   |                    |                    |
|---|--------------------|--------------------|
|   | (4.71)             | (3.33)             |
| <i>Mother's years of education</i> (no education = ref) |                    |                    |
| Basic   | 0.02**<br>(2.38)   | 0.02<br>(1.57)     |
| Secondary   | 0.04**<br>(2.32)   | 0.03<br>(1.11)     |
| Tertiary  | 0.04<br>(1.37)     | 0.01<br>(0.26)     |
| Minutes spent on homework                               | 0.001***<br>(3.23) | 0.001**<br>(2.45)  |
| Early childhood education                               | -0.02**<br>(-2.41) | -0.02**<br>(-2.02) |
| Sex of child (female=reference)                         |                    |                    |
| Male  | 0.001<br>(0.14)    | 0.01<br>(0.51)     |
| Median regression ( $R^2$ )                             |                    | 0.12               |
| Num. of observations                                    | 1094               | 1094               |

Source: Author's computation from the GLSS 5+ data, 2008

\*\*\*Significant at the 1 percent level, \*\*Significant at the 5 percent level, \*Significant at the 10 percent level: t-ratios are in the parentheses. Both OLS and quantile regressions were done with robust standard errors.

## 5.6 Discussion of results

From the empirical results (Table 5.3), the variables that determine children cognitive ability are the assets of the household, age of the child, children books at home, child leaving in the urban area, minutes spent on homework and child attending early childhood education.

In the median regression the constant is the median of the sample. The wealth quintile for both the OLS and the quantile regression for children aged 5-12 years were statistically significant at 1 percent each and at 1 and 5 percent for both the lowest and fourth quintile in relation to the highest quintile and also had a positive effect on cognitive ability. That is, for every one unit change in the lowest wealth quintile in relation to the highest wealth quintile that the predicted value of cognitive ability of the child will increase by 0.05 for the quantile regression and 0.06 for the OLS. In particular, the positive coefficient for

both the lowest and fourth wealth quintile reveals the degree to which the distribution shifts to the right as a result of a unit change in the level of wealth, and this is the only way in which distribution change is manifested. The second and middle quintiles were not different from the highest quintile. Children from wealthier households and with more educated parents have higher scores (Paxson & Schady, 2007). The associations of test scores with wealth and maternal education are larger for older children, suggesting that these factors have cumulative effects on cognitive ability (Paxson & Schady, 2007). Higher socioeconomic status as measured by income, wealth, or parental education, is associated with better cognitive development of children<sup>1</sup>. The positive relationship between wealthier quintiles and cognitive ability is expected.

The age of the child was a determinant in the child's cognitive ability. From both regressions, it had the expected positive effect on cognitive ability and was statistically significant at 1 percent. A unit change in the ages of the child that the predicted value of cognitive ability of the child will increase by 0.02 units for both the OLS and quantile regressions. Data from cross-sectional studies of children in a variety of western cultures seem to support Piaget's assertion that all individuals will automatically move to the next cognitive stage as they biologically mature simply through normal interaction with the environment for the stages of infancy, toddler and early childhood and elementary and early adolescence (Renner et al., 1976). Genetic influences on cognition actually increase substantially with age. As children get older, their parents and teachers give them increasing autonomy to do their homework to the best of their ability, pay attention in

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<sup>1</sup> References include Smith, Brooks-Gunn and Klebanov, 1997; Blau, 1999; Guo and Harris 2000; Waldfogel, Han and Brooks-Gunn, 2002; Aughinbaugh and Gittleman, 2003; Baum, 2003; Ruhm, 2004; Taylor, Dearing and McCartney, 2004.

class, and choose their peer group. Each of these behaviours likely influences their academic development. If these types of behaviours are influenced by genes, then it would explain why the heritability of cognitive ability increases as children age. Aggregated results from 11 unique longitudinal twin and adoption studies of cognition have shown that infancy genes account for less than 25 percent of the variation in cognition, whereas the shared family environment accounts for approximately 60 percent. By adolescence, however, genes account for approximately 70 percent of the variation in cognition, and the shared environment accounts for virtually no variation. These age-related patterns were identified in cross-sectional analyses originally by McCartney, Harris and Bernieri (1990) and McGue, Bouchard, Iacono and Lykken (1993), and more recently by Haworth and others, (2009).

The urban / rural location of children aged 5-12 years was a determinant of the child's cognitive ability. The urban / rural location was statistically significant at 1 percent in both regressions. Children who lived in urban areas as compared to rural areas had a positive effect on their cognitive ability. Rural areas tend to have less noise pollution than urban ones, and chronic noise pollution has been shown to hurt verbal working memory (Tine, 2013). On the other hand, rural areas lack visual stimuli common in cities (such as traffic, crowds and signs) and this may give rural children less opportunity to develop their visual working memory (Tine, 2013). Children living in quiet urban environments are more likely to be better prepared for school than children living in rural environments. This is because urban environments are more conducive for learning than rural communities, which have predominant minority populations. Studies confirm this

fact that kids who grow up in the urban areas perform much better than their counterparts from the rural areas.

Minutes spent on homework and early childhood education were statistically significant in determining the child's cognitive ability at 1 percent for minutes spent on homework for the OLS regression and at 5 percent each for the quantile regression. Early childhood education although statistically significant, had a negative effect on children's cognitive ability and that was not expected. This means that children from poorer households or households with low socioeconomic status, and low education are those that need more interventions on early childhood education in the study area. A lengthy discussion with a Senior Lecturer at the Department of Psychology, University of Ghana also dwelled on this point. Even though he had issues with the generalisation of the results to some sections of the population in Ghana he used many other studies in this area to allude to this concluding fact: "Children from households that are at risk that is poorer households, low socioeconomic status, low education are those that benefit more from early childhood education (Senior Lecturer at the Psychology Department, Legon)."

Longitudinal studies in Guatemala and South Africa has linked early child development to later educational progress. In Guatemala, preschool cognitive ability predicted children's enrolment in secondary school (Stith, Gorman & Choudhury, 2003) and achievement scores in adolescence (Gorman & Pollitt, 1996). In South Africa, cognitive ability and achievement at the end of grade one predicted later school progress (Liddell & Rae, 2001). Nurturing is a key aspect of the child-centred preschool, which emphasizes the education of the whole child and concern for his or her physical, cognitive, and socio-

emotional development (Frost, Wortham & Reifel, 2012). Instruction is organized around the child's needs, interests, and learning styles. Emphasis is on the process of learning, rather than what is learned (Moravcik, Nolte & Feeney, 2012). Each child follows a unique developmental pattern; young children learn best through firsthand experiences with people and materials; and play is extremely important in the child's total development. Experimenting, exploring, discovering, trying out, restructuring, speaking, and listening are frequent activities in kindergarten programmes. Such programmes are closely attuned to the developmental status of 4 and 5 year old children. Tucker-Drob, Briley and Harden (2013) examined genetic and environmental influences on cognition in twin and sibling pairs from infancy to adolescence. Their findings concluded that genes influencing cognition become activated during the first decade of life and accelerate over time. Their results emphasize the importance of early literacy and education during the first decade of life.

As expected, minutes spent on homework had a positive effect in determining the child's cognitive ability. Educators for a long time have observed that homework exacerbate the academic differences between middle class and working class children, largely because middle class parents are more likely to assist effectively with homework (Rothstein, 2004). The advances in cognitive development that occur during the middle school years are mostly tied to learning such as doing of homework. As children learn more, they become increasingly skilled and develop critical areas of their brains.

Child books at home were statistically significant in determining the child's cognitive ability at 10 percent for the OLS regression and at 5 percent for the quantile regression. The positive effect of child books at home in determining the child's cognitive ability is

as expected. The more educated parents are more likely to buy books for their kids and also engage in conversation with their children that are thought provoking thus helping the kids to figure out things on their own than less educated parents, and in the process improve their cognitive ability. Children from higher SES backgrounds are far more likely to own books and to have greater access to resources such as museums or libraries (Bradley, Corwyn, Pipes McAdoo & Garcia Coll, 2001). Research has indicated that book reading has considerable impact on children's development of early literacy skills, their receptive and expressive language, and their thinking skills, which assist the development of disembedded thinking (see reviews in Scarborough & Dorch, 1994; Bus, van IJzendoorn & Pellegrini, 1995; Blok, 1999). Information books elicit more high cognitive demand discussion, which is more likely to develop young children's representational abilities (Moschovaki & Meadows, 2005). Parents who read a lot of information books and expository texts to children are more likely to engage their children in high cognitive demand discussion with an impact on both language development and the development of their representational abilities (Moschovaki & Meadows, 2005).

Gender differences in children's cognitive abilities remain an area of controversy. Whereas some studies (Iijima, Arisaka, Minamoto & Arai, 2001; Fenson et al., 1994) have found such differences, others (Wallentin, 2009; Nichelli, Bulgheroni & Riva, 2001) have failed to isolate them. Although gender was not a factor in determining the cognitive ability of children aged 5-12 years in the data, it supports the assumption that gender differences during cognitive development are minimal, appear in only a small number of tests, and account for only a low percentage of the score variance.

## **5.7 Health outcomes for children aged 0–59 months in Ghana**

### **5.7.1 Characteristics of children (aged 0–59 months) and their parents in the MiDA intervention areas in Ghana**

The distribution of age for children aged 0-59 months is shown in Table 5.4. Out of the 4,687 children aged 0-59 months, 49.88 percent were males while 50.12 percent were females. The type of housing facility for children aged 0-59 months in the area of study were mainly rooms on compound houses (37.86 percent), rooms of other type (25.27 percent) and several huts/buildings on the same compound (21.07 percent). Majority of the children (77.15 percent) aged 0-59 months lived in the rural areas. About 76 percent of households with children aged 0-59 months dispose off their rubbish through the public dump or dump them elsewhere. Majority of the households (89.07 percent) with children aged 0-59 months had no open sewer. About 98 percent of children aged 0-59 months in the data have ever been immunized. Half of the children (50.31 percent) aged 0-59 months had received food in the first six months after birth apart from breast-milk. Majority of the children (63.50 percent) aged 0-59 months were weaned between 13-24 months. Borehole and unprotected water were the two major source of drinking water for households with children aged 0-59 months. The two major sources of toilet facility for households with children aged 0-59 months were KVIP, pit latrine, pan, bucket (56.47 percent) and bush/beach (40.54 percent).

The nutritional status of mothers with children aged 0-59 months showed that, 52.87 percent were underweight, 29.43 percent were obese, 15.11 percent were normal and 2.64 percent were overweight. Most (42.92 percent) fathers with children aged 0-59 months had basic education, 38.85 percent had no education, 11.38 percent had secondary

education whiles 6.86 percent also had tertiary education. About 55 percent of mothers with children aged 0-59 months had no education, 37.59 percent had basic education, 4.87 percent had secondary education and 2.10 percent also had tertiary education. Elementary occupation and Service workers were the two major occupations of parents with children aged 0-59 months.

Table 5.4: Characteristics of households of under-five children and their parents in the study

| Characteristics of under-five children in the data               | Category                  | Sample size (n) | Percent (%) |
|--|---------------------------|-----------------|-------------|
| Age of child   | 0-12 months               | 4,687           | 21.05       |
|  | 13-24 months              |                 | 23.12       |
|  | 25-36 months              |                 | 19.62       |
|  | 37-48 months              |                 | 21.09       |
|  | 49-59 months              |                 | 15.12       |
| Sex  | Male                      | 4,687           | 49.88       |
|  | Female                    |                 | 50.12       |
| Location of child  | Rural                     | 4,687           | 77.15       |
|  | Urban                     |                 | 22.85       |
| Age when child was weaned  | 0-12 months               | 2,505           | 23.62       |
|  | 13-24 months              |                 | 63.50       |
|  | 25-36 months              |                 | 12.52       |
|  | 37-48 months              |                 | 0.29        |
|  | 49-59 months              |                 | 0.07        |
| Age when child received first food                               | 0-6 months                | 3,851           | 50.31       |
|  | 7-12 months               |                 | 41.72       |
|  | 13-24 months              |                 | 7.39        |
|  | 25-36 months              |                 | 0.58        |
| Child immunization   | Yes                       | 4,562           | 97.69       |
|  | No                        |                 | 2.31        |
| Characteristics of households of under-five children in the data |                           |                 |             |
| Type of toilet facility  | Flush toilet              | 4,677           | 2.99        |
|  | Other toilet              |                 | 56.47       |
|  | No toilet facility        |                 | 40.54       |
| Type of housing  | Separate house (bungalow) | 4,685           | 2.05        |
|  | Semi detached house       |                 | 2.34        |
|  | Flat/apartment            |                 | 3.00        |
|  | Rooms(compound house)     |                 | 37.86       |
|  | Rooms(other type)         |                 | 25.27       |
|  | Several huts/             |                 | 21.07       |

|  |   |       |       |
|--|---|-------|-------|
|  | buildings (same compound)                       |       |       |
|  | Several huts/<br>buildings (different compound) |       | 4.38  |
|  | Tents/improvised home                           |       | 0.16  |
|  | Other   |       | 3.88  |
| Surroundings   | Clean   |       | 23.25 |
|  | Averagely clean                                 | 4,685 | 70.76 |
|  | Dirty   |       | 5.99  |
| Main source of drinking water  | Private treated water                           |       | 20.88 |
|  | Public treated water                            | 4,687 | 13.18 |
|  | Borehole  |       | 32.95 |
|  | Unprotected water                               |       | 32.98 |
| Open sewer   | Yes   |       | 10.25 |
|  | No  | 4,685 | 89.07 |
|  | Drains are covered                              |       | 0.67  |
| Disposal of rubbish  | Collected                                       |       | 1.25  |
|  | Public/ elsewhere                               | 4,674 | 75.56 |
|  | Burnt/buried                                    |       | 23.19 |
| <b>Characteristics of parents of<br/>under-five children in the data</b> |   |       |       |
| Mothers nutritional status   | Underweight<br>(BMI <18.5 kgm <sup>-2</sup> )   |       | 52.81 |
|  | Normal<br>(BMI 18.5-24.9 kgm <sup>-2</sup> )    | 3,622 | 15.11 |
|  | Overweight<br>(BMI 25-30 kgm <sup>-2</sup> )    |       | 2.64  |
|  | Obesity (BMI >30 kgm <sup>-2</sup> )            |       | 29.43 |
| Mothers education  | No education                                    |       | 55.44 |
|  | Basic   |       | 37.59 |
|  | Secondary                                       | 2,422 | 4.87  |
|  | Tertiary  |       | 2.10  |
| Mothers occupation   | Senior officials                                |       | 1.79  |
|  | Service workers                                 | 3,837 | 37.55 |
|  | Elementary occupation                           |       | 60.66 |
| Fathers education  | No education                                    |       | 38.85 |
|  | Basic   |       | 42.92 |
|  | Secondary                                       | 3,081 | 11.38 |
|  | Tertiary  |       | 6.86  |
| Fathers occupation   | Senior officials                                |       | 7.82  |
|  | Service workers                                 | 4,457 | 22.33 |
|  | Elementary occupation                           |       | 69.85 |

Source: Author's computation from the GLSS 5+ data, 2008

## **5.8 Inequality in the nutritional status of children aged 0-59 months in Ghana**

### **5.8.1 Introduction**

Adequate nutrition is critical to child development. The period from birth to two years of age is important for optimal growth, health, and development. Unfortunately, this period is often marked by growth faltering, micronutrient deficiencies, and common childhood illnesses such as diarrhoea and acute respiratory infections (ARI). A woman's nutritional status has important implications for her health as well as the health of her children. Malnutrition in women results in reduced productivity, an increased susceptibility to infections, slow recovery from illness, and heightened risks of adverse pregnancy outcomes. Overall, children's health has a strong impact on their nutritional status as children exposed to diseases tend to suffer more from malnutrition. This can notably be explained by the fact that diseases (such as diarrhoea) can cause a depletion of key minerals and prevent the body from efficiently absorbing and assimilating the nutrients necessary to grow and fully develop (WHO, 1995, p. 162). For example, a woman who has poor nutritional status—as indicated by a low body mass index (BMI), short stature, or other micronutrient deficiencies—has a greater risk of obstructed labour, of having a baby with low birth weight, of producing lower quality breast milk, of dying from post-partum haemorrhage, and of contracting diseases along with her baby.

### **5.8.2 Assessing the Inequality in the nutritional status of under-five children in Ghana**

In order to assess the inequalities of children between the ages of 0-59 months, the study disaggregated levels of malnutrition indicators by locality, sex, region, child's age, mothers nutritional status as measured by their body mass index (BMI) and by wealth

quintiles. Anthropometric measurements (body dimensions and composition) are often used as proxies for assessing the eventual extent and severity of malnutrition. The most commonly used measurements are the body weight, height, age and sex of each individual, which allow calculating the following indicators: weight-for-age, weight-for-height, height-for-age and body mass index (BMI). Anthropometric measurements (height and weight) were taken for women 12-49 years and children under age five to determine their nutritional status. For the 2008 Ghana Living Standards Survey, Round 5 Plus (GLSS 5+), the nutritional status of children is calculated using growth standards published by the World Health Organisation (WHO) in 2006. These growth standards were generated using data collected in the WHO Multicentre Growth Reference Study (WHO, 2006). Each of the three nutritional status indicators described below is expressed in standard deviation units from the median of the WHO Child Growth Standards.

Each of these indices (i.e. height-for-age, weight-for-height and weight-for-age) provides different information about growth and body composition that is used to assess nutritional status. The height-for-age index is an indicator of linear growth retardation and cumulative growth deficits. Children whose height-for-age z-score is below minus two standard deviations ( $-2$  SD) are considered short for their age (stunted) and are chronically malnourished. Stunting reflects failure to receive adequate nutrition over a long period of time and is also affected by recurrent and chronic illness. Height-for-age, therefore, represents the long-term effects of malnutrition in a population and is not sensitive to recent, short-term changes in dietary intake.

The weight-for-height index measures body mass in relation to body height or length and describes current nutritional status. Children with z-scores below  $-2$  SD are considered

thin (wasted) and are acutely malnourished. Wasting represents the failure to receive adequate nutrition in the period, immediately preceding the survey and may be the result of inadequate food intake or a recent episode of illness causing loss of weight and the onset of malnutrition. Children whose weight-for-height is above +2 SD are considered over weight.

Weight-for-age is a composite index of height-for-age and weight-for-height. It takes into account both acute and chronic malnutrition. Children whose weight-for-age is below -2 SD are classified as underweight. Children whose weight-for-age is above +2 SD are considered over weight.

### **5.8.3 Body Mass Index (BMI)**

$BMI = \{ [weight \text{ (in kg)}] / [height \text{ (in metres squared)}] \}$  reflects also body mass relative to height and is mainly used for adults and adolescents. High BMI permits to assess degrees of overweight and obese people and low BMI to assess different levels of thinness (and of chronic energy deficiency). It is categorized into underweight ( $< 18.5 \text{ kgm}^{-2}$ ), normal ( $18.5 - 24.9 \text{ kgm}^{-2}$ ), overweight ( $25.0 - 30.0 \text{ kgm}^{-2}$ ) and obesity ( $> 30.0 \text{ kgm}^{-2}$ ).

### **5.8.4 Analysis of inequality in the nutritional status of under-five children in Ghana**

The following analysis focuses on the children for whom complete and plausible anthropometric and age data were collected. Table 5.5 shows the percentage of under-five children classified as malnourished according to height-for-age, weight-for-height, and weight-for age indices, by locality, sex, region, child's age, mothers nutritional status as measured by their body mass index (BMI) and by wealth quintiles.

The estimates from the six regions (Central, Greater Accra, Volta, Eastern, Ashanti and Northern) of the Ghana Living Standards Survey, Round 5 Plus (GLSS 5+) show that about 40 percent of children in the 23 survey districts were stunted in 2008 (suffering from chronic malnutrition), about 16 percent were wasted and 15 percent were underweight as compared to the national average of 28 percent of children been stunted, 9 percent wasted and 14 percent been underweight according to the Ghana Demographic and Health Survey also conducted in 2008. Male children appeared to be slightly disadvantaged as compared to female children in the 23 survey districts, but differences are limited. In 2008, 17 percent of male children were underweight as compared to 13 percent of female children, 41 percent of male children were stunted as compared to 39 percent of female children and almost 17 percent of male children were wasted as compared to 15 percent of female children.

Children aged 49-59 months (69 percent) are most likely to be stunted while those between 0-12 months are least likely to be stunted (7 percent). Male children are slightly more likely to be stunted than female children (41 percent, compared with 39 percent). The extent of stunting increases as the mother's nutritional status declines. The largest discrepancies in urban-rural differences were observed for stunting: about 44 percent of children were stunted in urban areas as compared to 39 percent in rural areas. Stunting varies by region; it is highest in the Northern region (56 percent) and lowest in the Central region (29 percent). Stunting decreases as wealth quintile increase. Stunted children in the GLSS 5+ data in 2008 was 45 percent in the first quintile, 40 percent in the second quintile, 39 percent in the third quintile and 35 percent in the fourth quintile.

This puts into light increasing inequalities between wealth groups with children from the poorest quintile being almost 1.2times more likely to be stunted than children from the wealthiest quintile. The weight-for-height index gives information about children's recent experience with food intake. Wasting represents failure to receive adequate nutrition in the period immediately preceding the survey and may be the result of recent illness or of seasonal variations of food. The prevalence rate of wasting peaks at 24.94 percent during the first 12 months of the child and declines steadily by the months until it gets to 8.95 percent in the 49-59 months of the child. Overall, 16 percent of children under-five were wasted. The level of wasting does not vary much with sex and urban-rural residence. Wasting is lowest in the Greater Accra region (9 percent) and highest in the Ashanti region (24 percent).

The rate of wasted children amongst the poorest 20 percent of the population was the lowest (9 percent) as compared to 21 percent (highest) amongst children from the highest quintile. This difference means that children belonging to the wealthiest quintile are 2.3times more likely to be wasted than children from the poorest 20 percent of the population.

Children whose weight-for-age is below minus two standard deviations (-2 SD) from the median of the reference population are considered underweight. The measure reflects the effects of both acute and chronic malnutrition. The rate of underweight children was lowest in the poorest quintile with 13 percent but highest with 16 percent in the fourth quintile, while other quintiles, went through no significant differences. The prevalence rate of underweight is lowest during the first 12 months of the child with 8 percent and

increases steadily by the months until it gets to 20 percent in the 49-59 months of the child. Inequalities in underweight are almost non-existence for the urban/rural location, with a rate of 14.98 percent in rural areas and 14.98 percent in urban areas.

The percentage of children who are underweight decreases as the mother's nutritional status increase. The proportion of underweight children ranges from 12 percent in the Volta region to 18 percent in the Northern region.

About 37 percent of young children in the survey districts of Ghana were overweight (z-scores above two standard deviations (+2 SD)). The highest proportion of overweight children is in age group 49-59 months, with 48 percent of children in that age group being overweight. A higher proportion of children in urban areas are overweight than children in rural areas (40 and 37 percent, respectively). Looking at regional patterns, the prevalence of overweight children ranges from 23 percent in the Central region to 59 percent in the Northern region.

Although variations by mother's level of education and age of mother at first birth were not large, the highest proportions of overweight children were seen among the most educated mothers and mothers whose age at first birth was 30-34 years (Table 5.6). Wasting is more pronounced with mothers who had no education and whose age at first birth is 15-19 years. Children born to mothers with basic education and whose age at first birth is 15-19 years are more likely to be underweight than children of more educated women and aged 20 or more.

Table 5.5: Prevalence rate of children under-five years classified as malnourished according to three anthropometric indices of nutritional status: height-for-age, weight-for-height and weight-for-age, by background characteristics, Ghana, 2008.

| Under- five malnutrition    |                               |                         |                         |                   |                         |                         |                   |                         |                   |                               |
|-----------------------------|-------------------------------|-------------------------|-------------------------|-------------------|-------------------------|-------------------------|-------------------|-------------------------|-------------------|-------------------------------|
| Background characteristics  | Number of children( weighted) | Weight- for- height     |                         |                   | Weight-for-age          |                         |                   | Height-for-age          |                   | Number of children( weighted) |
|                             |                               | Percent age Below -2 SD | Percent age Above +2 SD | Mean Z-score (SD) | Percent age Below -2 SD | Percent age Above +2 SD | Mean Z-score (SD) | Percent age Below -2 SD | Mean Z-score (SD) |                               |
| Wealth status               |                               |                         |                         |                   |                         |                         |                   |                         |                   |                               |
| Lowest                      | 994                           | 8.99                    | 53.44                   | -1.19             | 12.82                   | 26.90                   | -1.05             | 45.19                   | -4.74             | 994                           |
| Second                      | 964                           | 17.49                   | 34.58                   | -1.83             | 15.63                   | 27.64                   | -1.17             | 40.48                   | -3.27             | 966                           |
| Middle                      | 717                           | 13.04                   | 30.91                   | -1.11             | 14.66                   | 22.15                   | -1.01             | 38.59                   | -2.92             | 717                           |
| Fourth                      | 828                           | 19.62                   | 34.99                   | -1.77             | 15.89                   | 22.76                   | -1.04             | 35.22                   | -3.25             | 828                           |
| Highest                     | 1,182                         | 21.27                   | 31.68                   | -1.75             | 15.81                   | 21.19                   | -1.07             | 39.01                   | -2.78             | 1,182                         |
| Sex                         |                               |                         |                         |                   |                         |                         |                   |                         |                   |                               |
| Male                        | 2,338                         | 17.33                   | 39.58                   | -1.59             | 16.96                   | 23.54                   | -1.19             | 40.97                   | -3.62             | 2,338                         |
| Female                      | 2,347                         | 15.35                   | 35.15                   | -1.56             | 13.01                   | 24.76                   | -0.96             | 38.81                   | -3.25             | 2,349                         |
| Age in months               |                               |                         |                         |                   |                         |                         |                   |                         |                   |                               |
| 0 – 12                      | 985                           | 24.94                   | 32.27                   | -2.89             | 8.03                    | 67.04                   | -1.30             | 6.90                    | -2.17             | 987                           |
| 13 – 24                     | 1,084                         | 16.07                   | 35.54                   | -1.19             | 13.77                   | 19.84                   | -1.05             | 36.66                   | -2.76             | 1,084                         |
| 25 – 36                     | 919                           | 18.31                   | 32.01                   | -1.66             | 19.57                   | 7.46                    | -1.02             | 44.91                   | -3.50             | 919                           |
| 37 – 48                     | 988                           | 11.51                   | 41.91                   | -1.05             | 15.15                   | 13.26                   | -1.00             | 50.73                   | -3.70             | 988                           |
| 49 – 59                     | 709                           | 8.95                    | 47.83                   | -0.89             | 20.28                   | 7.94                    | -1.13             | 69.13                   | -4.28             | 709                           |
| Mother's nutritional status |                               |                         |                         |                   |                         |                         |                   |                         |                   |                               |
| Underweight (BMI < 18.5)    | 1,911                         | 25.61                   | 10.04                   | -1.57             | 22.98                   | 4.20                    | -1.19             | 33.96                   | -1.82             | 1,913                         |
| Normal (BMI 18.5-24.9)      | 547                           | 11.21                   | 75.33                   | -3.77             | 2.19                    | 22.70                   | -0.27             | 39.94                   | -2.27             | 547                           |
| Overweight (BMI 25-30)      | 96                            | 26.21                   | 57.05                   | -2.29             | 6.55                    | 36.82                   | -0.87             | 47.10                   | -3.26             | 96                            |
| Obesity (BMI >30)           | 1,066                         | 9.44                    | 63.70                   | -1.77             | 12.95                   | 44.17                   | -1.23             | 51.78                   | -7.72             | 1,066                         |
| Locality                    |                               |                         |                         |                   |                         |                         |                   |                         |                   |                               |
| Urban                       | 1,071                         | 14.83                   | 39.66                   | -1.47             | 14.98                   | 23.89                   | -1.02             | 44.20                   | -5.06             | 1,071                         |
| Rural                       | 3,614                         | 16.78                   | 36.68                   | -1.60             | 14.98                   | 24.23                   | -1.08             | 38.62                   | -2.97             | 3,616                         |
| Region                      |                               |                         |                         |                   |                         |                         |                   |                         |                   |                               |
| Central                     | 353                           | 16.51                   | 22.71                   | -0.85             | 13.06                   | 25.40                   | -0.82             | 28.70                   | -1.82             | 353                           |
| Greater Accra               | 160                           | 8.75                    | 33.65                   | -1.08             | 11.82                   | 31.01                   | -1.01             | 37.10                   | -2.61             | 160                           |
| Volta                       | 937                           | 15.27                   | 33.00                   | -2.13             | 11.65                   | 30.71                   | -1.04             | 33.55                   | -2.05             | 938                           |
| Eastern                     | 1,323                         | 20.16                   | 26.36                   | -1.49             | 14.50                   | 20.32                   | -1.01             | 34.06                   | -2.00             | 1,324                         |
| Ashanti                     | 574                           | 23.90                   | 29.42                   | -2.09             | 16.60                   | 24.10                   | -1.08             | 34.75                   | -2.14             | 574                           |
| Northern                    | 1,338                         | 10.92                   | 59.01                   | -1.45             | 17.96                   | 22.22                   | -1.21             | 55.60                   | -6.34             | 1,338                         |
| Total                       | 4,685                         | 16.34                   | 37.36                   | -1.57             | 14.98                   | 24.15                   | -1.07             | 39.89                   | -3.44             | 4,687                         |

Source: Author's computation from the GLSS 5+ data, 2008

Note: Each of the indices is expressed in standard deviation units (SD) from the median of the WHO Child Growth Standards adopted in 2006. Table is based on children with valid dates of birth (month and year) and valid measurement of both height and weight.

<sup>1</sup> The number of children is for weight-for-age and weight-for-height

<sup>2</sup> The number of children is for height-for-age

For example, the proportion of underweight children born to women with no education and whose age at first birth is 15-19 years is 14 and 18 percent respectively, compared to (6-8 percent) and (7-17 percent) among children born to women with secondary education or higher and mothers whose age at first birth is 20 years or more respectively.

Table 5.6: Percentage of children under-five years classified as malnourished according to three anthropometric indices of nutritional status: height-for-age, weight-for-height and weight-for-age, by age of mother at first birth and educational level, Ghana, 2008.

|   |                               | Under- five malnutrition |                         |                   |                         |                         |                   |                         |                   |
|---|-------------------------------|--------------------------|-------------------------|-------------------|-------------------------|-------------------------|-------------------|-------------------------|-------------------|
|   |                               | Weight- for- height      |                         |                   | Weight-for-age          |                         |                   | Height-for-age          |                   |
|   | Number of children (weighted) | percent age Below -2 SD  | percent age Above +2 SD | Mean Z-score (SD) | percent age Below -2 SD | percent age Above +2 SD | Mean Z-score (SD) | percent age Below -2 SD | Mean Z-score (SD) |
| <b>Age of mother at first birth (years)</b> |                               |                          |                         |                   |                         |                         |                   |                         |                   |
| 15 – 19                                     | 238                           | 17.72                    | 27.20                   | -1.23             | 17.64                   | 30.06                   | -1.17             | 30.32                   | -2.47             |
| 20 – 24                                     | 266                           | 15.46                    | 27.90                   | -1.76             | 16.74                   | 25.26                   | -1.15             | 35.30                   | -2.75             |
| 25 – 29                                     | 80                            | 5.29                     | 40.07                   | -0.53             | 6.93                    | 37.46                   | -0.87             | 36.84                   | -3.40             |
| 30 – 34                                     | 13                            | 17.57                    | 46.87                   | -1.91             | 8.33                    | 44.12                   | -1.46             | 20.07                   | -1.98             |
| 35 – 39                                     | 3                             | 0.00                     | 0.00                    | -0.87             | 0.00                    | 0.00                    | -0.62             | 0.00                    | -0.07             |
| <b>Mother's educational level</b>           |                               |                          |                         |                   |                         |                         |                   |                         |                   |
| none  | 1,342                         | 17.82                    | 32.88                   | -1.60             | 13.89                   | 23.93                   | -1.03             | 38.19                   | -2.83             |
| basic                                       | 910                           | 14.87                    | 29.89                   | -1.31             | 14.78                   | 24.72                   | -0.97             | 36.80                   | -2.68             |
| secondary                                   | 118                           | 9.33                     | 38.91                   | -0.82             | 6.45                    | 28.36                   | -0.59             | 40.31                   | -3.88             |
| tertiary                                    | 51                            | 9.08                     | 54.78                   | -1.182            | 7.61                    | 28.07                   | -0.51             | 47.14                   | -8.21             |

Source: Author's computation from the GLSS 5+ data, 2008

Note: Each of the indices is expressed in standard deviation units (SD) from the median of the WHO Child Growth Standards adopted in 2006. Table is based on children with valid dates of birth (month and year) and valid measurement of both height and weight and valid response for age of mother at first birth and mother's educational level.

When mothers are educated, they have better information on children's health care and generally earn higher incomes than mothers who are not educated. This is one of the reasons why investment in human capital, especially that of women, has great importance, given the pivotal role that women play in the upbringing of children. Stunting is predominant (37 percent) with mothers whose age at first birth is 25-29 years and whose educational level is secondary school or higher (40-47 percent).

### **5.8.5 Relationship between the attributes of children aged 0-59 months with their parents and the nutritional status of the child**

Using bivariate tools, the study ascertained what influences inequality of opportunity in under-five children and tested for their association with the long and short run nutritional status of the child (Table 5.7). The results for the long run nutritional status (height-for-age z-scores) and short run nutritional status (weight-for-height z-scores) revealed that, age of the child, type of toilet facility, surroundings of household, main source of drinking water, age when child was weaned, age when child received first food, mothers nutritional status as measured by their body mass index, disposal of rubbish, type of housing facility and father's education (long and short run nutritional status had  $\text{prob}>F=0.000$ ), mother's education (long run  $\text{prob}>F=0.004$  and short run  $\text{prob}>F=0.000$ ), mother's occupation (short run  $\text{prob}>F=0.004$ ), father's occupation (short run  $\text{prob}>F=0.008$ ), sex of the child (long run  $\text{prob}>F=0.009$ ), location (long run  $\text{prob}>F=0.007$  and short run  $\text{prob}>F=0.000$ ), child immunization (long run  $\text{prob}>F=0.000$ ) and households with no open sewers (long run  $\text{prob}>F=0.004$  and short run  $\text{prob}>F=0.001$ ) had statistically significant influence on long and short run nutritional status of children aged 0-59 months.

However, for the long term nutritional status of children aged 0-59 months, parents occupation ( $\text{prob}>F=0.601$  and  $\text{prob}>F=0.105$  for mother and father respectively) and for the short run, gender of the child ( $\text{prob}>F=0.152$ ) and child immunization ( $\text{prob}>F=0.583$ ) did not have statistically significant influence on health outcomes.

Table 5.7: Association between children aged 0-59 months with their parents and the nutritional status of the child

| Variable                           | F                       | Prob>F               |
|------------------------------------|-------------------------|----------------------|
| Age of child                       | haz=746.39<br>whz=12.97 | 0.000***<br>0.000*** |
| Sex                                | haz=6.84<br>whz=2.05    | 0.009***<br>0.152    |
| Location of child                  | haz=7.40<br>whz=75.13   | 0.007***<br>0.000*** |
| Type of toilet facility            | haz=28.14<br>whz=44.71  | 0.000***<br>0.000*** |
| Type of housing                    | haz=7.50<br>whz=5.66    | 0.000***<br>0.000*** |
| Surroundings                       | haz=8.93<br>whz=33.99   | 0.000***<br>0.000*** |
| Main source of drinking water      | haz=11.24<br>whz=56.24  | 0.000***<br>0.000*** |
| Age when child was weaned          | haz=3.88<br>whz=2.07    | 0.000***<br>0.000*** |
| Age when child received first food | haz=8.73<br>whz=6.42    | 0.000***<br>0.000*** |
| Child immunization                 | haz=164.13<br>whz=0.30  | 0.000***<br>0.583    |
| Open sewer                         | haz=5.57<br>whz=7.57    | 0.004***<br>0.001*** |
| Disposal of rubbish                | haz=12.68<br>whz=19.39  | 0.000***<br>0.000*** |
| Mothers nutritional status         | haz=7.04<br>whz=218.05  | 0.000***<br>0.000*** |
| Mothers education                  | haz=4.46<br>whz=18.16   | 0.004***<br>0.000*** |
| Mothers occupation                 | haz=0.51<br>whz=5.53    | 0.601<br>0.004***    |
| Fathers education                  | haz=7.53<br>whz=16.14   | 0.000***<br>0.000*** |
| Fathers occupation                 | haz=2.25<br>whz=4.87    | 0.105<br>0.008***    |

Source: Author's computation from the GLSS 5+ data, 2008

\*\*\*Significant at the 1 percent level, \*\*Significant at the 5 percent level, \*Significant at the 10 percent level. Note: The dependent variables are haz is height-for-age z-scores and whz is weight-for height z-scores for children aged 0-59 months.

### **5.9 Inequality index for the nutritional status of under-five children in Ghana**

The within-group inequality for the long run nutritional status of under-five children in the 23 selected MiDA districts in Ghana in 2008 using the Theil-T index was 6.6 percent and 6.3 percent for the between-group inequality (see Appendix 5.4). While the within-group inequality explains differences in the long run nutritional status of under-five children from one child to the other within a region, the between-group component of inequality explains the differences from one child to the other between one region and the other.

Consequently, for the short run nutritional status of under-five children, the within-group inequality using the Theil-T index was 7.2 percent and 5.8 percent for the between-group inequality (see Appendix 5.5). The within-group component of inequality explains an even higher share of total inequality, reflecting wide differences in the short run nutritional status of under-five children from one child to the other in Ghana.

### **5.10 Determinants of long run nutritional status of children aged 0-59 months in Ghana**

The diagnostic test showed that the model was adequately specified (see Appendix 5.7). This is indicated by the t-statistic value of -0.01 for the prediction squared for the linktest. This also implies that, mothers occupation, parents years of education, type of toilet facility of household, region, location, surroundings of household, mothers nutritional status, sex of the child and main source of drinking water jointly determine the long run nutritional status of children aged 0-59 months in Ghana (Table 5.8).

Table 5.8: Estimated determinants of health outcomes for children aged 0-59 months  
(Dependent variable is height-for-age z-score (haz06) of the child)

| Variable  | OLS                 | Quantile Regression<br>(median quantile) |
|---|---------------------|--|
| constant  | -3.66***<br>(-4.47) | -3.64***<br>(-3.15)                      |
| Type of toilet facility (no toilet=reference)                                     |                     |  |
| Flush toilet  | -0.36<br>(-0.80)    | -1.62*<br>(-1.72)                        |
| Other toilet  | -0.44**<br>(-2.17)  | -0.59**<br>(-2.28)                       |
| <i>Mother's occupation</i> (Legislators/ Senior officials<br>/Professionals= ref) |                     |  |
| Service workers/ craft and related trade  | 0.15<br>(0.25)      | -0.31<br>(-0.37)                         |
| Skilled agric. and fishery worker   | 0.33<br>(0.56)      | -0.17<br>(-0.20)                         |
| <i>Mother's years of education</i> (no education = ref)                           |                     |  |
| Basic   | -0.19<br>(-1.19)    | -0.14<br>(-0.77)                         |
| Secondary   | -0.26<br>(-0.73)    | -0.36<br>(-0.71)                         |
| Tertiary  | 0.74<br>(1.03)      | -0.02<br>(-0.01)                         |
| <i>Father's years of education</i> (no education = ref)                           |                     |  |
| Basic   | -0.02<br>(-0.10)    | 0.03<br>(0.16)                           |
| Secondary   | 0.27<br>(1.05)      | 0.25<br>(0.79)                           |
| Tertiary  | 0.29<br>(0.87)      | 0.29<br>(0.69)                           |
| <i>Region</i> (Greater Accra=reference)   |                     |  |
| Central   | 0.60<br>(1.18)      | 0.63<br>(1.05)                           |
| Volta   | 0.74<br>(1.64)      | 0.64<br>(1.24)                           |
| Eastern   | 0.67<br>(1.48)      | 0.67<br>(1.31)                           |
| Ashanti   | 0.54<br>(1.12)      | 0.73<br>(1.26)                           |
| Northern  | -0.41<br>(-0.75)    | -4.52<br>(-1.34)                         |
| <i>Surroundings</i> (dirty=reference)   |                     |  |
| Clean   | 1.28***<br>(2.98)   | 1.16***<br>(2.97)                        |
| Averagely clean   | 1.01**<br>(2.44)    | 0.95**<br>(2.57)                         |
| Mothers nutritional status  | 0.22***<br>(3.61)   | 0.51***<br>(3.25)                        |
| <i>Location</i> (rural=reference)   |                     |  |

|  |                   |                    |
|--|-------------------|--------------------|
| Urban  | 0.55**<br>(2.53)  | 0.89***<br>(2.98)  |
| <i>Main source of drinking water</i> (unprotected water=ref) |                   |                    |
| Private treated water  | -0.43*<br>(-1.68) | -0.80**<br>(-2.40) |
| Public treated water   | -0.21<br>(-0.86)  | -0.29<br>(-0.99)   |
| Borehole water   | 0.10<br>(0.50)    | 0.10<br>(0.42)     |
| <i>Sex of child</i> (male=reference)                         |                   |                    |
| Female   | 0.30**<br>(2.08)  | 0.35**<br>(2.04)   |
| Median regression ( $R^2$ )                                  |                   | 0.18               |
| Num. of observations   | 1337              | 1337               |

Source: Author's computation from the GLSS 5+ data, 2008

\*\*\*Significant at the 1 percent level, \*\*Significant at the 5 percent level, \*Significant at the 10 percent level: t-ratios are in the parentheses. Both OLS and quantile regressions were done with robust standard errors

### 5.11 Discussion of results

Results from the estimation (Table 5.8) show the variables that determine the health and nutritional status of children in the long run (haz06). These are type of toilet facility of household, type of surroundings of household, location, sex of the child, mother's nutritional status and main source of drinking water for both the OLS and the quantile regressions. In the median regression the constant is the median of the sample.

The significance of improved sanitation on children's health is reflected by the coefficient for surroundings of the household. Clean surroundings as compared to dirty surroundings of household was a predictor of height-for-age z-score for children under-five years in both the quantile and OLS regression. They were both statistically significant at 1 percent for the clean surroundings and at 5 percent for the averagely clean surroundings. Moreover, they had a positive effect on determining the height-for-age z-score for children under-five years. Children lacking access to improved water and sanitation develop more slowly relative to their age cohorts (Nutritionist, Nutrition and

Food Science Department, Legon). Medical research, documents that chronic childhood environmental exposure to fecal germs can be an important cause of stunting (Humphrey, 2009). This confirms studies that have demonstrated the existence of a causal effect of sanitation on child height (Spears, 2012a; Hammer & Spears, 2012).

Availability of flush and other toilets (pan/bucket/kvip/pit latrine) as compared to no toilet (bush/beach) facility was a predictor of height-for-age z-score for children under-five years in both the quantile and OLS regression. They were both statistically significant at 5 percent for the other toilets and at 10 percent for flush toilets for only the quantile regression. They had a negative effect on determining the height-for-age z-score. A comparative study in some developing countries (Sommerfelt & Stewart, 1994) and in Jimma, Ethiopia (Getaneh, Assefa & Taddesse, 1998) showed that unprotected water source and non-availability of latrine were associated with low child stature. According to joint UNICEF and WHO (2012) estimates for 2010, 15 percent of people in the world, and 19 percent of people in developing countries, openly defecate without using any toilet or latrine. Kabubo-Mariara, Ndenge and Mwabu (2008) using DHS datasets from Kenya concluded that children's growth is either statistically insignificant or negatively related to access to water, measured by cluster shares of households with piped water. Furthermore, children's height has a negative relationship to the share of cluster households with access to traditional toilets, but stunted growth was positively related to access to traditional toilets.

Educational attainment of mothers did not exert any positive impact on childhood nutrition, contrary to numerous previous studies (Makoka, 2013; Victora et al., 2008;

Emina, Kandala, Inugu & Ye, 2009), when it was estimated together with education of fathers. On the other hand, both basic and secondary schooling of fathers positively correlated with children's height-for-age. The insignificance of mother's educational effect might be caused by the correlation between education of mothers and education of fathers.

Mother's nutritional status as measured by their body mass index for children under-five years was a positive predictor for height-for-age z-score and was statistically significant at 1 percent level for both the OLS and quantile regressions. For every one unit change in the nutritional status of mothers that the predicted value of the height-for-age z-score for children under-five years will increase by 0.22units for the OLS and by 0.51units for the quantile regression. A woman's nutritional status in childhood, adolescence, and pregnancy has a strong influence on her child's birth weight and subsequent growth (Nutritionist, Nutrition and Food Science Department, Legon). A woman who is in poor physical and mental health provides lower quality care to her children after they are born; including the quality of breast feeding. There are at least five reasons why mothers' and children's height would be correlated: (1) mother's genetics, (2) assortative mating and father's genetics, (3) correlation of the child's early-life environment with the mother's early life environment, (4) endogenous effects of mothers' early life environments on their adult ability to care for their children (including in utero and through marriage markets), and finally (5) intrauterine growth restriction directly caused by the historically determined aspects of a mother's size. This is confirmed by Kabubo-Mariara and others, (2008) who found out that, height of the mother captures genetic effects and other family background characteristics for children's height-for-age z-score.

Children residing in urban areas were found to have much better opportunities compared to their rural counterparts as far as height-for-age z-score is concerned. The urban location of children under-five years was an important variable in explaining the height-for-age z-score of a child. It was statistically significant at 5 percent in the OLS regression and at 1 percent in the quantile regression with both regressions having a positive impact. Studies on child nutrition (Sommerfelt & Stewart, 1994; Yimer, 2000) also showed significantly higher levels of stunting among rural than urban children.

Private treated water as compared to unprotected water was statistically significant but negative for both regressions. It was significant at 5 percent for the quantile regression and at 10 percent for the OLS regression. Poor water and sanitation has been associated with increased risk of infections in children and increased malnutrition while improved water and sanitation was related to low risk of malnutrition (Nutritionist, Nutrition and Food Science Department, Legon). Studies by Strauss and Thomas (1995) and Younger and Bahiggwa (2005) noted that, it is common to find statistically insignificant and some cases results that suggest that particular water facilities increase the risk of stunted growth. According to Younger and Bahiigwa (2005), such anomalies are explained by the fact that households may be using multiple sources of water. For example, a household may use protected spring and surface water at the same time or that the latrine may be poorly constructed and as such does not adequately prevent the spread of pathogens that cause child ill-health. Such factors could lead to a situation where water and sanitation sources considered of superior technology in terms of preventing the transmission of disease; do not actually fit the purpose.

Female child as compared to male child was found statistically significant and positive at 5 percent levels in explaining the determinants of height-for-age z-score for children under-five years from both the OLS and quantile regressions. This shows that girls are more likely than boys to be of good health. The study confirms studies by Svedberg (1990) and Yamano, Alderman and Christiaensen (2003) that found that nutrition indicators are more favourable for girls than boys in Africa.

### 5.12 Determinants of short run nutritional status of children aged 0-59 months in Ghana

The model was adequately specified according to results from the diagnostic test (see Appendix 5.8). This is indicated by the t-statistic value of -1.46 for the prediction squared for the linktest. This also implies that, child immunization, father's years of education, age when child was weaned, age when child first received food, age of child, open sewer, disposal of rubbish, wealth quintile of the household, nutritional status of mothers, sex of the child and main source of drinking water jointly determine the short run nutritional status of children aged 0-59 months in Ghana (Table 5.9).

Table 5.9: Estimated determinants of health outcomes for children aged 0-59 months (Dependent variable is weight-for-height z-score (whz06) of the child)

| Variable   | OLS               | Quantile Regression<br>(median quantile) |
|--|-------------------|--|
| constant   | -1.75*<br>(-1.69) | -2.79***<br>(-2.68)                      |
| <i>Father's years of education</i> (no education= ref) |                   |  |
| Basic  | 0.21<br>(1.22)    | 0.20<br>(1.11)                           |
| Secondary  | 0.19<br>(0.76)    | -0.02<br>(-0.08)                         |
| Tertiary   | 0.98***<br>(3.09) | 0.96**<br>(2.51)                         |
| Mothers nutritional status                             | 0.50***<br>(9.12) | 1.13***<br>(4.52)                        |
| Child immunization                                     | -1.05<br>(-1.15)  | -1.47**<br>(-2.55)                       |

|  |                     |                    |
|--|---------------------|--------------------|
| Age when child was weaned                                    | -0.03***<br>(-3.37) | -0.03**<br>(-2.19) |
| Age when child first received food                           | 0.02<br>(1.35)      | 0.03*<br>(1.83)    |
| <i>Open sewer in/around house</i> (yes=reference)            |                     |                    |
| No   | 0.24<br>(0.96)      | 0.06<br>(0.21)     |
| Drains are covered   | 1.61**<br>(2.04)    | 0.94<br>(0.81)     |
| Age of child   | 0.04***<br>(5.73)   | 0.03***<br>(3.82)  |
| <i>Disposal of rubbish</i> (burnt/ buried =reference)        |                     |                    |
| Collected  | -0.22<br>(-0.31)    | -1.13<br>(-1.58)   |
| Public/elsewhere   | 0.07<br>(0.32)      | -0.08<br>(-0.30)   |
| <i>Main source of drinking water</i> (unprotected water=ref) |                     |                    |
| Private treated water  | 0.14<br>(0.63)      | 0.50*<br>(1.79)    |
| Public treated water   | 0.08<br>(0.34)      | 0.20<br>(0.68)     |
| Borehole water   | 0.21<br>(1.07)      | 0.29<br>(1.44)     |
| <i>Wealth quintile</i> (Highest=reference)                   |                     |                    |
| Lowest   | 1.25***<br>(5.20)   | 1.06***<br>(3.73)  |
| Second   | 0.73***<br>(3.03)   | 0.79***<br>(2.92)  |
| Middle   | 0.58**<br>(2.47)    | 0.43*<br>(1.82)    |
| Fourth   | 0.48**<br>(2.09)    | 0.44*<br>(1.71)    |
| Sex of child (male = ref)                                    |                     |                    |
| Female   | -0.12<br>(-0.84)    | -0.05<br>(-0.29)   |
| Median regression ( $R^2$ )                                  |                     | 0.09               |
| Num. of observations   | 1334                | 1334               |

Source: Author's computation from the GLSS 5+ data, 2008

\*\*\*Significant at the 1 percent level, \*\*Significant at the 5 percent level, \*Significant at the 10 percent level: t-ratios are in the parentheses. Both OLS and quantile regressions were done with robust standard errors

### 5.13 Discussion of results

From the empirical results (Table 5.9), the variables that determine the short-term health and nutrition measure (whz06) are the nutritional status of mothers, father's years of education, the age of the child, age when child was weaned, age when child received first

food, child immunization, wealth quintile of the household and main source of drinking water.

The coefficient of mother's nutritional status as measured by their body mass index was positive and statistically significant at 1 percent level for both regressions. As explained earlier, there are at least five reasons why mothers' and children's weight would be correlated: (1) mother's genetics, (2) assortative mating and father's genetics, (3) correlation of the child's early-life environment with the mother's early life environment, (4) endogenous effects of mothers' early life environment on their adult ability to care for their children (including in utero and through marriage markets), and finally (5) intrauterine growth restriction directly caused by the historically determined aspects of a mother's size. This is confirmed by Martorell and Zongrone, (2012) and Chioleri, (2010) who found out that, mother's size and net nutrition before and during pregnancy influence the child's birth weight and subsequent growth.

The timing of the introduction of complementary food in addition to breast milk has important implications for the health of the child. Consequently, while the practice of exclusive breast-feeding for up to six months of age is considered beneficial, additional food prior to this age is considered to have no added advantage. After the age of six months, breast milk alone can no longer satisfy the child's increased physiological requirements for energy and specifically for macro- and micro-nutrients; therefore, other food to complement breast milk should be given. However, findings from this study showed that age when child first received food was positive and statistically significant at 10 percent in explaining the short-term health and nutrition status of children for the quantile regression. Early introduction of complementary food has already been

documented in Tanzania (TRCHS, 2000; TDHS, 1999) and in other countries such as Zimbabwe and Latin America (Petro, Levitt & Thaine, 2003).

The lowest, second, middle and fourth wealth quintile as compared to the highest wealth quintile were statistically significant and positive in determining the short-term health and nutrition status of children for both regressions. As expected, the relationship between wealth and child weight-for-height z-scores confirms that wealthier households can take better care of pregnant women and feed the children, compared to poor families. This result supports the findings of Haddad and others, (2003).

From the findings, it has been observed that father's who had completed tertiary as compared to no education had strong positive effect on the child nutritional status, independent of other factors. When fathers are educated, they have better information on children's health care and generally earn higher incomes than fathers who are not educated. Studies have shown that parental education is associated with more efficient management of limited household resources, greater utilization of available health care services, better health promoting behaviours, lower fertility and more child-centred caring practices, all factors associated with better child health and nutrition (McGuire & Popkin, 1989; Alder & Newman, 2002). The study supports Haughton and Haughton (1997) who found that the effect of father's education is stronger than that of the mothers in determining the nutritional status of children in Vietnam. There was no significant difference in the short run nutritional status between the sexes, contradicting other studies (Abate, Kogi-Makau & Muroki, 1999; Piechulek, Aldana & Hasan, 1999).

In order to ensure that infants and young children have a healthy start in life, it is essential to immunise them against communicable childhood diseases such as polio, measles and tuberculosis before their first birthday. The study (quantile regression) found that children who had ever received immunization was statistically significant at 5 percent levels but had an inverse relationship in determining the weight-for-height z-scores for children under-five years. Children's nutritional status is also more sensitive to factors such as feeding/weaning practices, care and exposure to infection at specific ages. Furthermore, as a child's age in months increases, weaning and less breast milk makes them more vulnerable to malnutrition. The study found out that, age when child was weaned was statistically significant at 1 percent levels but had an inverse relationship in determining the weight-for-height z-scores for children under-five years for both regressions. However, age of the child, was positive and statistically significant at 1 percent level in determining the weight-for-height z-scores for children under-five years for both regressions. Provision of sufficient breast milk as a child's age increases in months explains the positive effects of age in months on children's weight.

Covered drains as compared to open sewer in the house was found to be statistically significant at 5 percent and positive in explaining the short-term health and nutrition status of children for the OLS regression. Private treated water as compared to unprotected water was statistically significant at 10 percent and positive in determining the weight-for-height z-scores for children under-five years. This means that, increased use of private treated water is associated with improvements in child weight-for-height z-scores. The study supports Silva (2005) who found that access to piped water and sanitation had positive effects on children's height and weight in Ethiopia.

## **CHAPTER SIX**

### **SUMMARY AND POLICY RECOMMENDATIONS**

#### **6.0 Introduction**

The study examined the determinants of inequality of opportunity for children's (aged 5-12 years) educational outcomes and health outcomes for children aged 0-59 months in Ghana. Cross sectional data from the Ghana Living Standard Survey Round 5 Plus (GLSS 5+) conducted in 2008 was used. Cognitive ability of children was used for educational outcomes while health and nutritional status was used for health outcomes for children under-five years. Assessing these inequalities has been important for evidence-based decision-making and targeting scarce public resources to those with more need. The study utilised Roemer's equality of opportunity model adopted from Checchi and Peragine (2005). This is done within the context of relevant analytical and policy paradigms relating to inequality of opportunity in children's educational and health outcomes in Ghana.

#### **6.1 Summary**

##### **6.1.1 Inequality of opportunity in children's educational outcome in Ghana**

There were clear differences in children educational outcomes according to social class. Succeeding in education is the key to providing children with the tools they need to break intergenerational cycles of poverty and to create positive futures for them. However, without the proper support many children living in disadvantage areas simply do not have the resources they need to get an adequate education. Early intervention is crucial to

supporting these children and their families to give them the best hope of learning and staying in school, which is vitally important for both children and society.

The study found out that, household wealth was significant and positive in determining the cognitive ability of children aged 5-12. Furthermore, urban location of the child, having children's books at home, attending early childhood education, the age of the child and minutes spent on homework played a significant role in explaining children cognitive ability in Ghana.

By far the most important step that can be taken to enhance opportunity is strengthening public education. For the past decades, the focus has been on ensuring free universal basic education for all. This effort must continue, but if everyone is to have a real chance for great success we must also ensure that every child in public school can learn as much and go as far as his or her talent permits.

### **6.1.2 Inequality of opportunity in children's health outcome in Ghana**

The early years of a child's life are key to successful physical and cognitive development. While a healthy childhood lays the groundwork for success later in life, health problems in childhood are both persistent and damaging to later outcomes. This study has shown that children in Ghana face unequal opportunities in key dimensions of health, both height and weight, based on their circumstances. Circumstances entirely beyond the control of children determine their ability to develop healthily.

Mothers nutritional status as measured by their body mass index and private treated water as compared to unprotected water were mainly the indicators that matter most for

children's health outcomes. Father's who had completed tertiary education as compared to no educational was shown to contribute significantly to the inequality of opportunity in child health outcomes in the short term. Child immunization, age when child was weaned and age of the child had a large role in determining inequality of opportunity. Mother's nutritional status which captures genetic effects and other family background characteristics was a major determinant of both long and short term health status for children under-five.

The study found out that in the short run increased use of private treated water as compared to unprotected water would lead to improvements in child weight-for-height z-scores. This result suggests that the unequal distribution of public goods, such as water and health facilities plays a critical role in child health outcomes. This result is consistent with previous studies on children's weight (Kabubo-Mariara et al., 2008; Khanna, 2008; Silva, 2005; and Skoufias, 1998).

### **6.1.3 Inequality in the nutritional status of under-five children (0-59 months) in Ghana**

The study found that about 40 percent of children under-five in the 23 survey districts of Ghana were stunted in 2008 (suffering from chronic malnutrition), about 16 percent were wasted and 15 percent were underweight according to the Ghana Living Standards Survey, Round 5 Plus (GLSS 5+) data. This is in contrast to the Ghana Demographic and Health Survey also conducted in 2008 which puts the national average of children been stunted at 28 percent, wasted at 9 percent and underweight at 14 percent.

Children aged 49-59 months had the highest prevalence of stunting (69 percent) and underweight (20 percent) while children aged 0-12 months had the highest prevalence of wasting (25 percent). Finding of this study showed that the risk of stunting increases with age. This is not surprising, since stunting is a cumulative process that occurs over the course of many dietary inadequacy and/or illnesses. Children in the youngest age group, 0-12 months, were at a significantly lower risk of stunting as compared with children in the older age groups. This low risk of stunting may also be due to the protective effect of breastfeeding, since almost all children of this country are breastfed and most continue to breastfeed during their first year of life. Consistent with other studies (Yimer, 2000; Genebo, 1999; Samson & Lakech, 2000) in Ethiopia, this study has also shown a high risk of stunting among children age 49-59 months as compared with children in the age group 13-24 months. This may be an indication of either inappropriate food supplementation in quantity and/or quality during the weaning period, or exposure to disease. Boys were more stunted than girls and older children were significantly stunted compared to younger children. The predominance of stunting in older children indicates failure in growth and development during the first two years of life. The relationship of chronic malnutrition to age and gender may be linked to the timing and type of complimentary foods introduced in infants' and toddlers' diets. These findings are similar to a study by Wamani and others, (2007) which examined whether there are systematic sex differences in stunting rates in children under-five years of age, and how the sex differences in stunting rates vary with household socio-economic status using 16 demographic and health surveys in 10 sub-Saharan Africa countries.

In the study, the extent of wasting decreases as mother's nutritional status improves. Wasting was lowest in the Greater Accra region (9 percent) and highest in the Ashanti region (24 percent). Furthermore, the richer 20 percent of the population recorded the lowest (35 percent) stunted children while the poorest 20 percent of the population had the lowest wasting (9 percent) and underweight (13 percent) children.

The study also found out that older children (49-59 months) in urban areas had the highest proportion of overweight children. Northern region had the highest prevalence rate for overweight children from the study. The study found out that children born to mothers with no education and whose age at first birth was 15-19 years are substantially more likely to be wasted than children of more educated women and aged 20 or more. Furthermore, children born to mothers with basic education and whose age at first birth is 15-19 years are substantially more likely to be underweight than children of more educated women and aged 20 or more. This reemphasizes the reason why there should be investment in human capital (education), especially that of women, given the pivotal role that women play in the upbringing of children.

Malnutrition among under-five children in the 23 survey districts of Ghana appears to be a sustained crisis instead of an acute one. Stunting is the predominant nutritional problem, and the elevated prevalence in older children indicates failure in growth and development during the first two years of life. The evidence contributes to the growing scientific consensus that tackling childhood stunting is a high priority and that organizations and governments focusing on preventing malnutrition must use an

integrated approach. Nutritional supplementation and child health programmes, which are currently focused on impoverished rural areas, should not exclude informal settlements.

## **6.2 Policy recommendations**

What a child experiences during the early years lays down a critical foundation for the entire life course. A child's development, including physical, social–emotional and language–cognitive domains, during the early years strongly influences basic learning, school success, economic participation, social citizenry and health. It is evident that good health in the adult is predicated on good health in the child. Many of the key determinants governing health have their roots in the biological and social experiences that span childhood. A healthy child population is not only one of the indicators of a society's present health, but it is also an index of the society's future well-being and productivity.

The study has important policy implications. First human capital policy is a powerful tool to address the problems of inequality and poverty for future generations. Second, education policy needs to be creative and recognize that the family is the fundamental education institution in society. Therefore, improving the life-chances of disadvantaged children requires intervening at early ages when family influences are the most dramatic. Third, human capital policy has important intergenerational effects: improving the skills of the current generation not only improves their opportunities to succeed but it also has dramatic effects of the opportunities of their offspring.

The fact that socioeconomic circumstances of children affect their cognitive ability has serious policy implications. It gives us a clear idea as to where our focus should be. A good policy in this respect should target children before their school-going age. Policies

must address these inequalities at the starting gate. There should be early childhood education programmes that will let these children with unfavourable socioeconomic circumstances receive similar kinds of resources and assistance that middle class parents provide for their kids. This will help reduce the initial disparities and bring all children on a common platform before they start school.

There is also strong consensus among the experts who have studied high quality early childhood development programmes that these programmes have substantial payoffs. Follow-up studies especially in the United States of poor children who participated in these programmes have found solid evidence of markedly better academic performance and even decreased rates of criminal conduct and higher adult learning than among their non- participating counterparts. Government must, therefore, invest more resources on high quality early childhood education programmes so that Ghanaian children who do not have access to resources that privileged Ghanaians provide for their kids, would also have access to those resources, and thus making them start on similar platforms.

The environment in which children are born, grow up, live and learn and the nurturing quality of these environments have a significant impact on children's development. These environments, from the most intimate (the family) to residential communities (such as neighbourhoods), relational communities (such as those based on religious or other social bonds), the Early Child Development (ECD) service environment, the national environment and to the global environment, each insert an effect on child's development through many direct and indirect avenues. Priority should be given to improved sanitation if any comprehensive and sustainable progress on child malnutrition status is to be made.

Hence, there should be investment in sanitation since it was one of the major determinants of inequalities in the long run health status of children under-five years.

There should be access to affordable quality services by investing in early childhood education and care, improved education system, improved responsiveness of health systems in order to address the needs of disadvantaged children and reduce inequalities. This recommendation urges Ghana government to ensure that all children can make full use of their universal right to health care, including through disease prevention and health promotion as well as access to quality health services.

There should be investment in prevention particularly during early childhood years, by putting in place comprehensive policies that combine nutrition, health, education and social measures such as the school feeding programme. Preventive healthcare services and health promotion activities should be responsive towards improving socioeconomic determinants of early childhood health outcomes.

### **6.2.1 Future studies**

Future studies should investigate other factors that may account for the unexplained variation in childhood malnutrition and cognitive ability. It should also address the mechanisms that connect the individual and neighbourhood levels, that is, the means through which deleterious neighbourhood effects are transmitted to children. These mechanisms are crucial to the design of community-based interventions because these processes are more amenable to change than entrenched structural properties of neighbourhoods (e.g., concentrated poverty). Although this study does not investigate these mechanisms, the findings clearly provide evidence that social context is associated

with health and education. Scholars trying to understand variation in childhood malnutrition should pay attention to the characteristics of both children and place of residence.

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## APPENDIX

### Appendix 4.1: Sampling and computation of weights

#### **Sampling frame and sample size allocation**

A district-representative sample of households was selected from the 23 target MiDA intervention districts so as to achieve the survey objective of providing district level indicators.

The 2000 Population and Housing Census (PHC) list of enumeration areas (EAs) by the Ghana Statistical Service (GSS) was maintained for the survey design. The list also contains population information for the EAs, the number of households per EA, and topographical maps with well defined boundaries to help field workers trace the EAs. The primary sampling units (PSUs) was the EAs while the secondary sampling units (SSUs) constituted of households within each EA.

Population living within private households in the target area was defined as the universe for the survey. The institutional population (such as schools, hospitals etc), which represents a very small percentage in the 2000 PHC, is excluded from the sampling frame.

#### **Stratification**

EAs were first stratified into the 23 administrative districts in order to take advantage of possible gains in precision and consistency of the survey estimates from stratification. EAs were further sub-divided according to their rural and urban areas of location within each district.

#### **Sample size and allocation**

A total sample size of about 9,315 households were selected from the program target area in order to ensure that a reasonable statistical power could be obtained in detecting changes by the program for each district, and also to accommodate the required precision for the number of estimates to be obtained from the survey. The sample was designed to ensure that at least 400 households were selected from each district, to get adequate number of interviews that will allow for reliable estimates at the various domains of interest. A fixed number of EAs, i.e. 27 were randomly selected from the list of census EAs for each intervention district followed by a fixed take of 15 households per EA to achieve this purpose.

#### **Computation of weights**

The GLSS 5+ sample design was drawn from disproportionately larger samples from districts with smaller populations making it not self-weighting. Therefore each sample household did not have the same chance of selection into the sample. Hence, weights were computed to reflect the different probabilities of selection in order to obtain the true contribution of each selected EA in the sample based on the first and second stage probabilities of selection.

Let  $N_{hi}$  = Number of 2000 Population Census households in the  $i^{\text{th}}$  selected EA (PSU) in the  $h^{\text{th}}$  stratum or district  
 $N_{hi}^*$  = Number of households listed in the  $i^{\text{th}}$  selected EA in the  $h^{\text{th}}$  stratum (district)  
 $\Sigma N_{hi}$  = Total number of households in the  $i^{\text{th}}$  stratum (district)  
 $\alpha_h$  = Number of sample EAs allocated to the  $h^{\text{th}}$  stratum (district)  
 $\beta$  = 15 (number of selected households per EA in each district)

Then the first and second stage probabilities of selection are:

$$P_{1hi} = \frac{\alpha_h N_{hi}}{\sum N_{hi}} \quad \text{and} \quad P_{2hi} = \frac{\beta}{N_{hi}^*}$$

where  $P_{1hi}$  is the probability of selecting the  $i^{\text{th}}$  EA in the  $h^{\text{th}}$  stratum (district), and  $P_{2hi}$  is the probability of selecting a household in the  $i^{\text{th}}$  EA of the  $h^{\text{th}}$  stratum. The overall probability of selection of a household in the  $i^{\text{th}}$  selected EA of the  $h^{\text{th}}$  stratum is given by:

$$F_{hi} = P_{1hi} * P_{2hi} = \frac{\alpha_h \beta}{\sum N_{hi}} * \frac{N_{hi}}{N_{hi}^*}$$

The weighting factor (or expansion factor),  $W_{hi}$ , for a household in the  $i^{\text{th}}$  selected EA in the  $h^{\text{th}}$  stratum is the reciprocal (inverse) of the overall probability of selecting that household. The number of households successfully interviewed in each EA was used in the computation.

That is,

$$W_{hi} = \frac{1}{F_{hi}} = \frac{\sum N_{hi}}{\alpha_h \beta} * \frac{N_{hi}^*}{N_{hi}}$$

The final weight for the sample households in the  $j^{\text{th}}$  segment within the  $i^{\text{th}}$  sample PSU in stratum  $h$  is given by:

$$W'_{hi} = W_{hi} * \frac{\beta'}{\beta''},$$

Where:

$\beta'$  = The number of interviews plus the number of no interviews in the sample segment

$\beta''$  = Total number of interviewed sample households selected in the  $j^{\text{th}}$  sample segment within the  $i^{\text{th}}$  sample PSU in stratum  $h$

Appendix 4.2: Summary description of variables used for the regression analysis

| Variables                                 | Measure-<br>ment scale | Original<br>coding  | Recoding for the<br>current study   | Interview<br>question   | Comment   |
|---|------------------------|---|---|---|---|
| Independent variable                      |                        |   |   |   |   |
| Circumstance                              |                        |   |   |   |   |
| Age of child                              | Continuous             | Month/Year<br>of birthday   | Eligible children:<br>5-12 years and<br>0-59 months<br>selected.  | 1. What is<br>(NAME) date<br>of birth?<br>Probe: what is<br>(NAME)<br>birthday?<br>2. How old<br>was (NAME)<br>at his/her last<br>birthday? | Age is<br>continuous<br>variable<br>coded in<br>completed<br>years.                     |
| Sex                                       | Categorical            | Male=1<br>Female=2  | Male=1<br>Female=0<br>(for children aged<br>5-12 years) and<br>Male=0<br>Female=1<br>(for children aged<br>0-59 months)           | Sex   | It was used<br>mainly for<br>children<br>aged 0-59<br>months<br>and from<br>5-12 years. |
| Region                                    | Categorical            | Central=2<br>Greater<br>Accra=3<br>Volta=4<br>Eastern=5<br>Ashanti=6<br>Northern=8        | Central=2<br>Greater Accra=3<br>Volta=4<br>Eastern=5<br>Ashanti=6<br>Northern=8   |   | It was used<br>only for<br>children<br>aged 0-59<br>months                              |
| Location of<br>child                      | Categorical            | Urban=1<br>Rural=2  | Urban=1<br>Rural=0  |   |   |
| Parent's<br>occupation<br>(father/mother) | Categorical            | Professional /<br>technical=1<br>Administrative/<br>managerial=2<br>Clerical=3<br>Sales=4 | Legislators,<br>senior officials<br>and professionals,<br>technicians and<br>clerks, security<br>personnels=1<br>Service workers, | 1. What kind<br>of work has<br>(NAME's)<br>father/mother<br>done for most<br>of his/her<br>life?  | This<br>variable<br>refers to<br>the<br>biological<br>father/mot-<br>her of             |

|   |             |   |  |  |   |
|---|-------------|---|--|--|---|
|   |             | Service=5<br>Agric / animal husbandry=6<br>Production and related works=7<br>Workers not elsewhere classified=8<br>Homemaker =9<br>Other=10<br>Don't know =11<br>Armed forces and other security personnel=12 | craft and related trades workers, plant and machine operators and assemblers=2<br>Skilled agricultural and fishery workers, elementary occupations or unknown occupation=3                         | 2. During the last 7days, what were the main tasks and duties in the job (NAME) spent most of his/her time on?                       | children aged 0-59 months and 5-12 years.   |
| Parent's years of education (father/mother) | Categorical | None=1<br>Primary=2<br>Middle/JSS=3<br>Voc/comm.=4<br>"O" level=5<br>"SSS" =6<br>"A" level=7<br>Training college=8<br>Tech/prof=9<br>Tertiary=10<br>Don't know=11<br>Other=12                                 | None=no<br>education=0year<br>Primary, Middle/JSS= Basic = 6-9 years<br>Voc/comm./SSS, "O" level, "A" level=Secondary=11-13 years<br>Training college / Tech/prof, Tertiary=Tertiary = 15-16 years | 1. What was (NAME's) father/mother highest education level completed?<br>2. What was the highest educational qualification attended? | This variable refers to the biological father/mother of children aged 0-59 months and 5-12 years. |
| Wealth quintile                             | Categorical | Yes=1<br>No=2   | Lowest=1<br>Second=2<br>Middle=3<br>Fourth=4<br>Highest=5  | Does any member of the household own any of the household assets?  | It was used for households with children aged 0-59 months and from 5-12 years.                    |
| Child books at home                         | Continuous  |   |  | How many children's / picture books  | It was used for households  |

|                             |             |   |  |   |  |
|-----------------------------|-------------|---|--|---|--|
|                             |             |   |  | are there in household?   | with children aged 5-12 years.                             |
| Early childhood education   | Categorical | Yes=1<br>No=2   | Yes=1<br>No=0  | Does (NAME) attend any organized learning or early childhood education programme, such as a private or government facility, including kindergarten or community child care? | It was used for households with children aged 5-12 years.  |
| Type of toilet facility     | Categorical | Flush toilet=1<br>Pit latrine=2<br>KVIP=3<br>Pan/bucket=4<br>Public toilet (flush/bucket/kvip)=5<br>Toilet in another house=6<br>No toilet facility (bush/beach)=7<br>Other=8 | Flush toilet=1<br>Other toilet ( pit latrine, KVIP, pan/bucket, toilet in another house, Other)=2<br>No toilet facility (bush/beach)=3 | What type of toilet is used by the household?   | It was used for households with children aged 0-59 months. |
| Surroundings                | Categorical | Clean=1<br>Average=2<br>Dirty=3   | Clean=1<br>Average=2<br>Dirty=3  | How are the surroundings of the house?  | It was used for households with children aged 0-59 months  |
| Mother's nutritional status | Continuous  |   | Log of Body Mass index of mothers [weight (kg) /   | Height, weight, hip size, waist size, arm   | It was used for households with                            |

|                                  |             |  |   |   |   |
|----------------------------------|-------------|--|---|---|---|
|                                  |             |  | height <sup>2</sup> (m <sup>2</sup> )]<br><18.5 kg m <sup>-2</sup> ,<br>(Underweight)<br>18.5-24.9 kg m <sup>-2</sup> ,<br>(Normal)<br>25.0-30.0 kg m <sup>-2</sup> ,<br>(Overweight)<br>>30.0 kg m <sup>-2</sup><br>(Obesity)  | circumference<br>(mid-upper<br>arm) of<br>household<br>member                       | children<br>aged 0-59<br>months   |
| Main source of<br>drinking water | Categorical | Indoor<br>plumbing=1<br>Inside<br>standpipe=2<br>Water<br>truck/tanker<br>service=3<br>Water<br>vendor=4<br>Pipe in<br>neighbouring<br>household=5<br><br>Private<br>outside<br>standpipe=6<br>Public<br>standpipe=7<br>Sachet/<br>bottled<br>water=8<br>Borehole=9<br>Protected<br>well=10<br>Unprotected<br>well=11<br>River<br>stream=12<br>Rain water<br>/spring=13<br>Dugout/pond/<br>lake/dam=14<br>Other=15 | Private treated<br>water(Indoor<br>plumbing, inside<br>standpipe, water<br>truck/tanker<br>service, water<br>vendor, pipe in<br>neighbouring<br>household,<br>private outside<br>standpipe, Sachet/<br>bottled water )=1<br>Public treated<br>water(Public<br>standpipe)=2<br>Borehole(Bore-<br>hole, Protected<br>well)=3<br>Unprotected<br>water(Unpro-<br>tected well, river<br>stream, rain water<br>/spring, dugout/<br>pond/lake/dam,<br>other)=4 | What is the<br>main source<br>of drinking<br>water supply<br>for this<br>household? | It was used<br>for<br>households<br>with<br>children<br>aged 0-59<br>months |
| Child<br>immunization            | Categorical | Yes=1<br>No=2  | Yes=1<br>No=0   | Has (NAME)<br>ever been<br>immunized?   | It was used<br>for<br>households<br>with                                    |

|  |             |   |   |  |   |  |
|--|-------------|---|---|--|---|--|
|  |             |   |   |  |   | children<br>aged 0-59<br>months  |
| Age when child<br>was weaned             | Continuous  |   |   |  | At what age<br>was (NAME)<br>weaned?  | It was used<br>for<br>households<br>with<br>children<br>aged 0-59<br>months  |
| Age when child<br>first received<br>food | Continuous  |   |   |  | At what age<br>did (NAME)<br>receive any<br>food other<br>than breast-<br>milk for the<br>first time? | It was used<br>for<br>households<br>with<br>children<br>aged 0-59<br>months  |
| Open sewer                               | Categorical | Yes=1<br>No=2<br>Drains are<br>covered=3  | Yes=1<br>No=2<br>Drains are<br>covered=3  |  | Is there any<br>open sewer /<br>drain in/<br>around the<br>house?                                     | It was used<br>for<br>households<br>with<br>children<br>aged 0-59<br>months. |
| Disposal of<br>rubbish                   | Categorical | Collected=1<br>Public<br>dump=2<br>Dumped<br>elsewhere=3<br>Burned by<br>household=4<br>Buried by<br>household=5<br>Other=6 | Collected=1<br>Public/elsewhere<br>dumped(public<br>dump, dumped<br>elsewhere)=2<br>Burnt/buried by<br>household(burned<br>by household,<br>buried by<br>household)=3 |  | How does<br>your household<br>dispose of<br>refuse?   | It was used<br>for<br>households<br>with<br>children<br>aged 0-59<br>months. |
| Effort                                   |             |   |   |  |   |  |
| Minutes spent<br>on homework             | Continuous  |   |   |  | How many<br>hours and<br>minutes of<br>homework<br>did (NAME)<br>do last week?                        | It was used<br>for<br>households<br>with<br>children<br>aged 5-12<br>years.  |
| Dependent<br>variable                    |             |   |   |  |   |  |
| Cognitive<br>ability                     | Continuous  |   |   |  | Digit span<br>forward and   | It was<br>administer   |

|                           |            |   |  |
|---------------------------|------------|---|--|
|                           |            | backward cognitive assessment and Raven's pattern cognitive assessment  | ed to households with children aged 5-12 years only. The correct answer was assigned one and zero otherwise. |
| Height-for-age z-score    | Continuous | 1. Sex of child<br>2. When (NAME's) height was being measured, was (NAME) standing or lying down?<br>3. Region where child comes from?<br>4. Child's height and weight. | It was used for children aged 0-59 months.   |
| Weight-for-height z-score | Continuous | 1. Sex of child<br>2. When (NAME's) height was being measured, was (NAME) standing or lying down?<br>3. Region where child comes from?<br>4. Child's height and weight. | It was used for children aged 0-59 months.   |

Source: GLSS 5+ data, 2008.

**Institute of Statistical, Social and Economic Research (ISSER, University of Ghana)****Inequality of opportunity and children's educational and health outcomes in Ghana****Interview Guide for children's educational outcome (cognitive ability)**

1. What factors determine children cognitive ability?
2. How does household wealth influence children's cognitive ability?
3. Are there differences in the cognitive ability of children from poorer households and richer households? Explain your answer.
4. Can you please explain why children in poorer household have higher cognitive ability than their counterparts in richer households?
5. How does the age of the child influence the child's cognitive ability?
6. Through what mechanism does the urban/rural location of a child influences its cognitive ability?
7. Could you explain why early childhood education can be significant but yet have a negative effect in determining children's cognitive ability?
8. How does minutes spent on homework influences the child's cognitive ability?
9. How does children books at home influences the child's cognitive ability?
10. What's your take on gender differences in determining children's cognitive ability?
11. Is there any policy on childhood development in Ghana?
12. What's your view on school feeding?
13. Do you know of any study that links school feeding to cognitive ability?

*Thank you!*

**Institute of Statistical, Social and Economic Research (ISSER, University of Ghana)**

**Inequality of opportunity and children's educational and health outcomes in Ghana**

**Interview Guide for children's health outcome (nutritional status)**

1. Can you educate me about the school feeding programme?
2. How was the implementation of the programme done?
3. What are some of the challenges of the school feeding programme?
4. What are some of the issues with schools that are not on the school feeding programme? How do children there feed themselves?
5. How do you check the quality of food been served to children?
6. How do you ensure that children are well fed?
7. How do parent's contribute to the school feeding programme?
8. Is there any policy on childhood education?
9. Have you ever worked in a village, private or public school before?
10. How are things done differently in terms of feeding?
11. How can you improve upon the feeding programme in your school?

*Thank you!*

**Institute of Statistical, Social and Economic Research (ISSER, University of Ghana)**

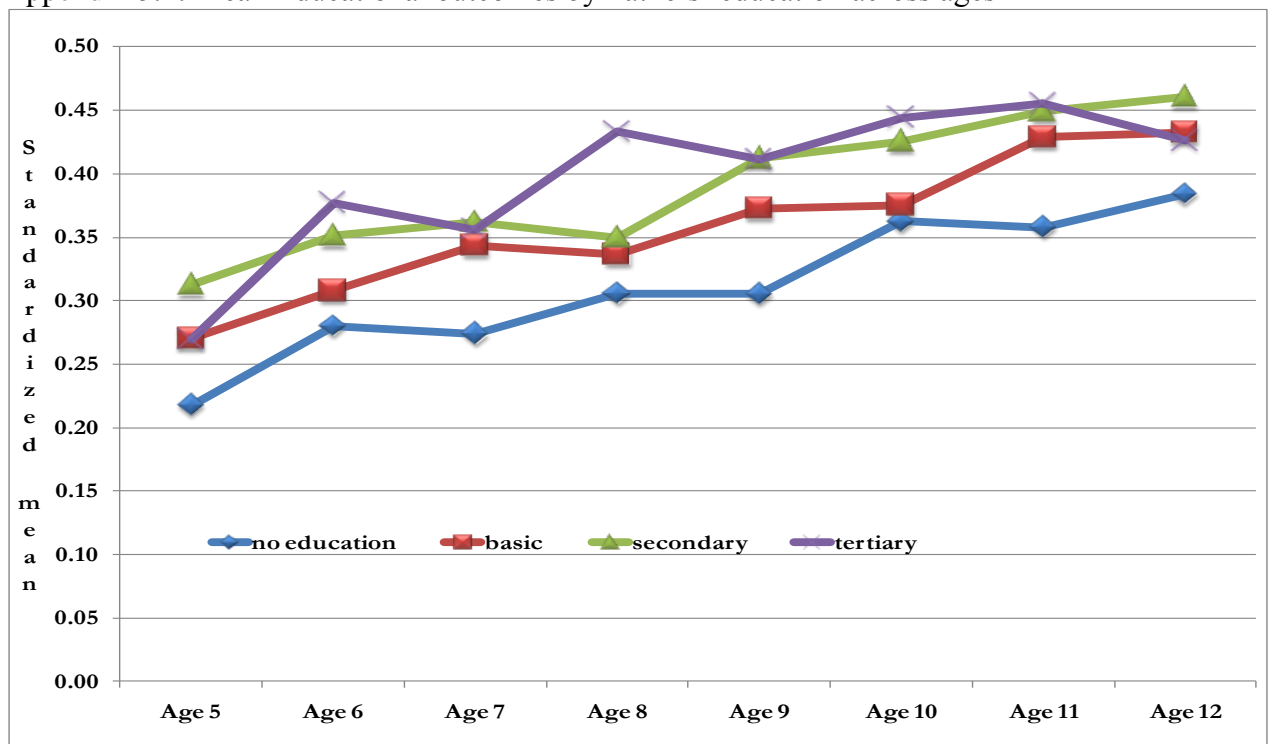
**Inequality of opportunity and children's educational and health outcomes in Ghana**

**Interview Guide for children's health outcome (nutritional status)**

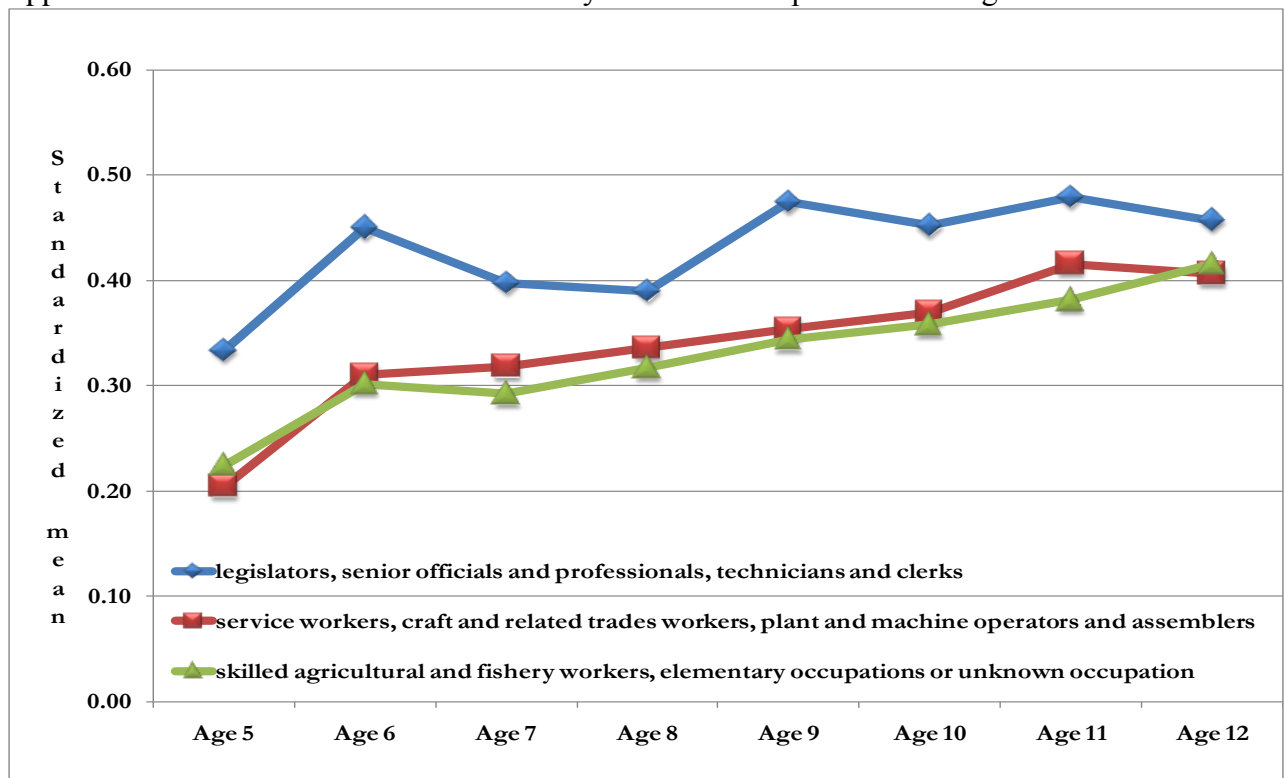
1. What factors determine the long run nutritional status of under-five children in Ghana?
2. How does each of the factors you mentioned influence the nutritional status of under-five children in Ghana?
3. What factors determine the short run nutritional status of under-five children in Ghana?
4. How does each of the factors you mentioned influence the nutritional status of under-five children in Ghana?
5. Is there any government policy on the nutritional status of under-five children in Ghana? If yes name it.

*Thank you!*

Appendix 5.1: Mean Educational outcomes by Fathers' education across ages



Appendix 5.2: Mean Educational outcomes by Mothers' occupation across ages



Appendix 5.3: Inequality index for children aged 5-12 years cognitive abilityWithin-group inequality, GE\_W(a)

| <b>All obs</b> | <b>GE(-1)</b> | <b>GE(0)</b> | <b>GE(1)</b> | <b>GE(2)</b> |
|----------------|---------------|--------------|--------------|--------------|
|                | 0.19442       | 0.14240      | 0.11690      | 0.10563      |

Between-group inequality, GE\_B(a):

| <b>All obs</b> | <b>GE(-1)</b> | <b>GE(0)</b> | <b>GE(1)</b> | <b>GE(2)</b> |
|----------------|---------------|--------------|--------------|--------------|
|                | 0.00828       | 0.00794      | 0.00773      | 0.00763      |

Appendix 5.4: Inequality index for the long run nutritional status of under-five childrenWithin-group inequality, GE\_W(a)

| <b>All obs</b> | <b>GE(-1)</b> | <b>GE(0)</b> | <b>GE(1)</b> | <b>GE(2)</b> |
|----------------|---------------|--------------|--------------|--------------|
|                | 0.11831       | 0.08334      | 0.06634      | 0.05904      |

Between-group inequality, GE\_B(a):

| <b>All obs</b> | <b>GE(-1)</b> | <b>GE(0)</b> | <b>GE(1)</b> | <b>GE(2)</b> |
|----------------|---------------|--------------|--------------|--------------|
|                | 0.08446       | 0.07033      | 0.06347      | 0.06112      |

Appendix 5.5: Inequality index for the short run nutritional status of under-five childrenWithin-group inequality, GE\_W(a)

| <b>All obs</b> | <b>GE(-1)</b> | <b>GE(0)</b> | <b>GE(1)</b> | <b>GE(2)</b> |
|----------------|---------------|--------------|--------------|--------------|
|                | 0.13111       | 0.09125      | 0.07162      | 0.06288      |

Between-group inequality, GE\_B(a):

| <b>All obs</b> | <b>GE(-1)</b> | <b>GE(0)</b> | <b>GE(1)</b> | <b>GE(2)</b> |
|----------------|---------------|--------------|--------------|--------------|
|                | 0.07172       | 0.06247      | 0.05821      | 0.0573       |

Appendix 5.6: Test for model specification for education outcomes (cogas)

| <b>cogas</b>  | <b>Coef.</b> | <b>Std. Err.</b> | <b>t</b> | <b>P&gt;   t  </b> | <b>[95% Conf. Interval]</b> |
|---------------|--------------|------------------|----------|--------------------|-----------------------------|
| <b>_hat</b>   | 0.504506     | 0.987951         | 0.51     | 0.610              | -1.43399 2.443005           |
| <b>_hatsq</b> | 0.717846     | 1.425831         | 0.50     | 0.615              | -2.07984 3.515527           |
| <b>_cons</b>  | 0.084012     | 0.169457         | 0.50     | 0.620              | -0.24849 0.416511           |

Note: If the model is correctly specified, then regressing cogas on the prediction and the prediction squared, the prediction squared would have no explanatory power (not significant).

## Appendix 5.7: Test for model specification for health outcomes (haz06)

| <b>haz06</b>  | <b>Coef.</b> | <b>Std. Err.</b> | <b>t</b> | <b>P&gt;   t  </b> | <b>[95% Conf. Interval]</b> |          |
|---------------|--------------|------------------|----------|--------------------|-----------------------------|----------|
| <b>_hat</b>   | 0.999555     | 0.090396         | 11.06    | 0.000              | 0.822222                    | 1.176889 |
| <b>_hatsq</b> | -6.2E-05     | 0.010497         | -0.01    | 0.995              | -0.02065                    | 0.02053  |
| <b>_cons</b>  | 0.000135     | 0.132331         | 0.00     | 0.999              | -0.25946                    | 0.259734 |

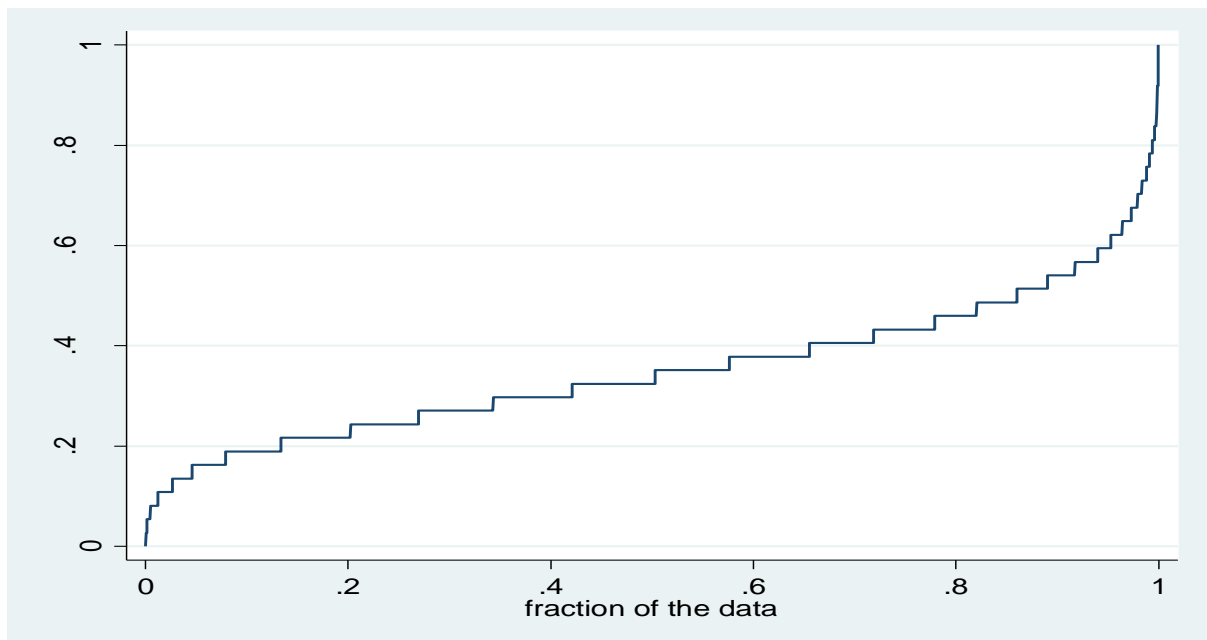
Note: If the model is correctly specified, then regressing haz06 on the prediction and the prediction squared, the prediction squared would have no explanatory power (not significant).

## Appendix 5.8: Test for model specification for health outcomes (whz06)

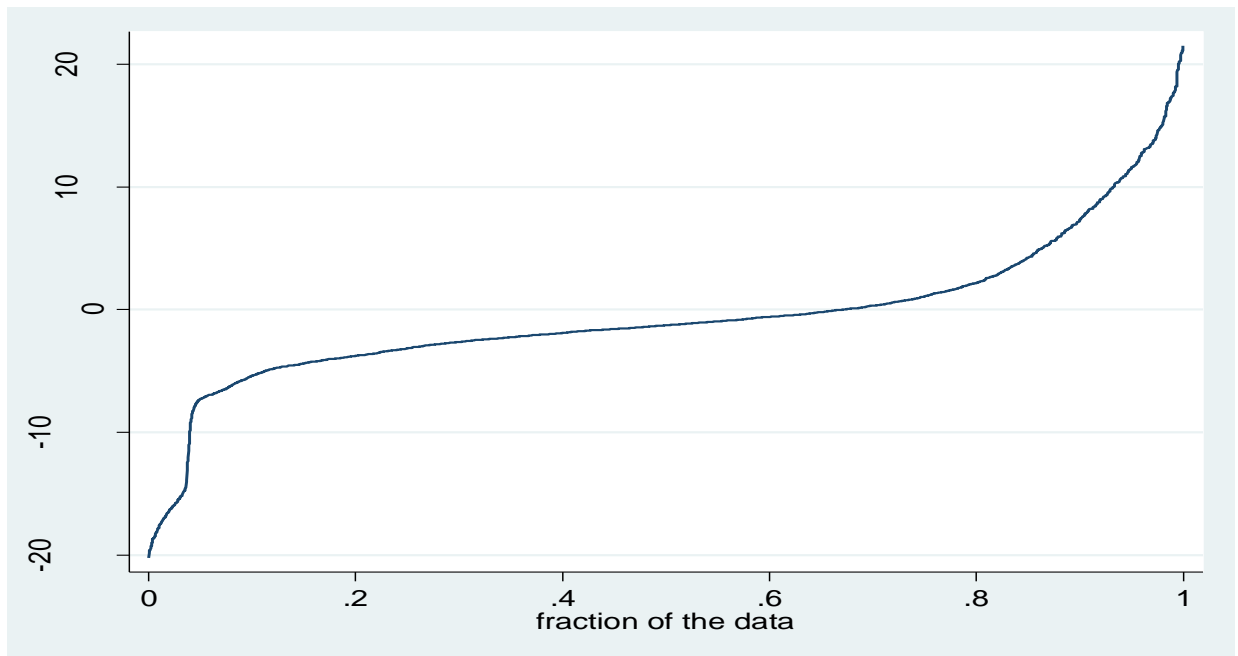
| <b>whz06</b>  | <b>Coef.</b> | <b>Std. Err.</b> | <b>t</b> | <b>P&gt;   t  </b> | <b>[95% Conf. Interval]</b> |          |
|---------------|--------------|------------------|----------|--------------------|-----------------------------|----------|
| <b>_hat</b>   | 1.110172     | 0.087593         | 12.67    | 0.000              | 0.938337                    | 1.282008 |
| <b>_hatsq</b> | -0.00288     | 0.001966         | -1.46    | 0.144              | -0.00673                    | 0.000979 |
| <b>_cons</b>  | -0.22243     | 0.699862         | -0.32    | 0.751              | -1.59539                    | 1.150521 |

Note: If the model is correctly specified, then regressing whz06 on the prediction and the prediction squared, the prediction squared would have no explanatory power (not significant).

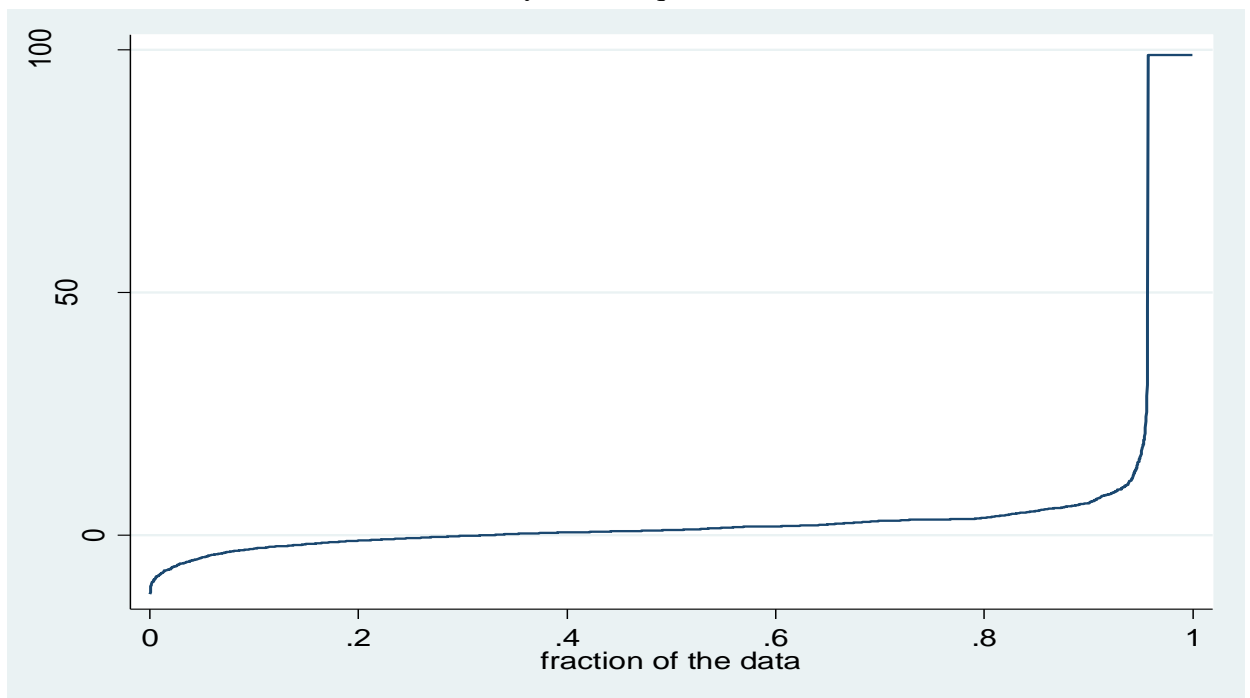
## Appendix 5.9: Graph of the dependent variable of children aged 5-12 years educational outcome (cogas) by median quantile



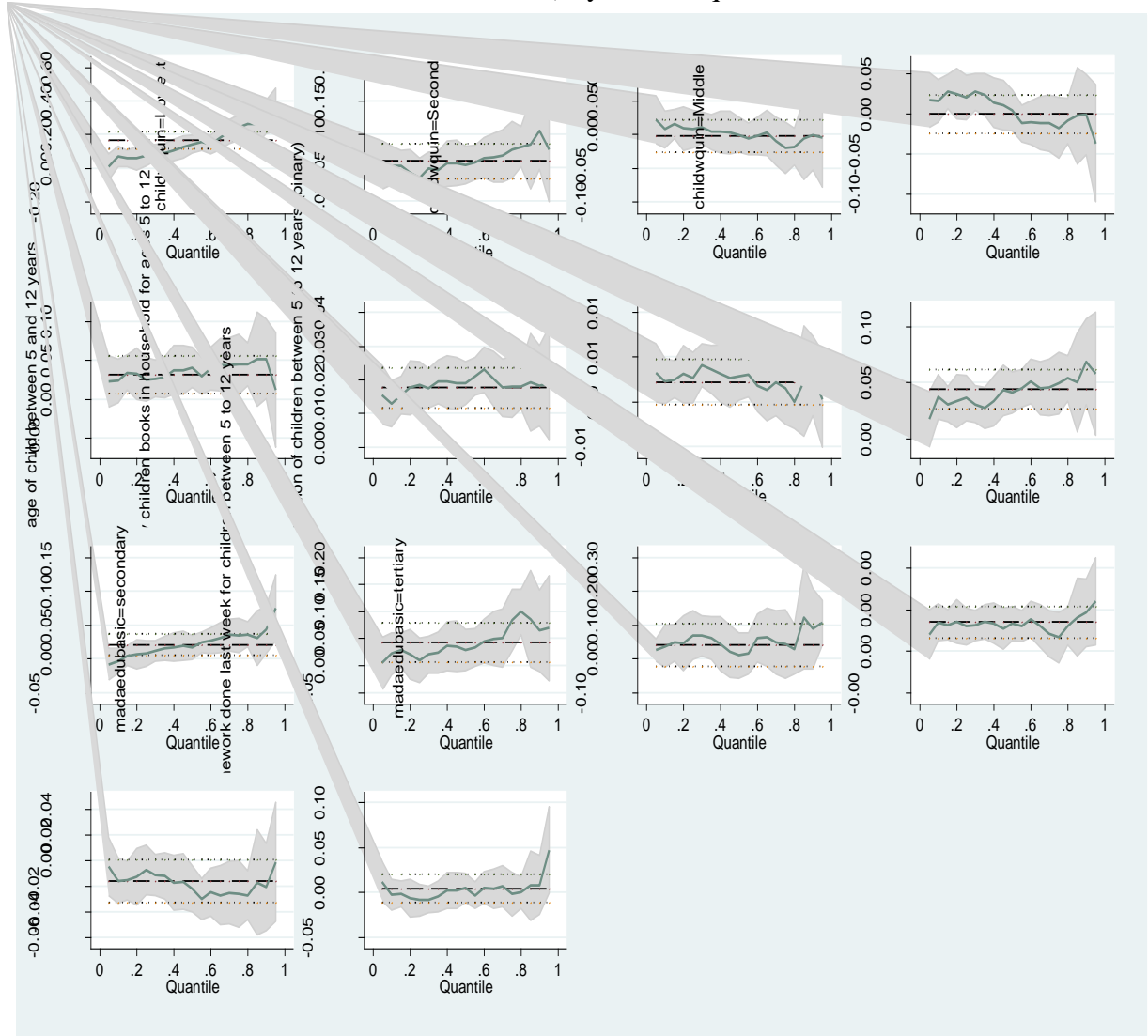
Appendix 5.10: Graph of the dependent variable of under-five children health outcome (haz06) by median quantile



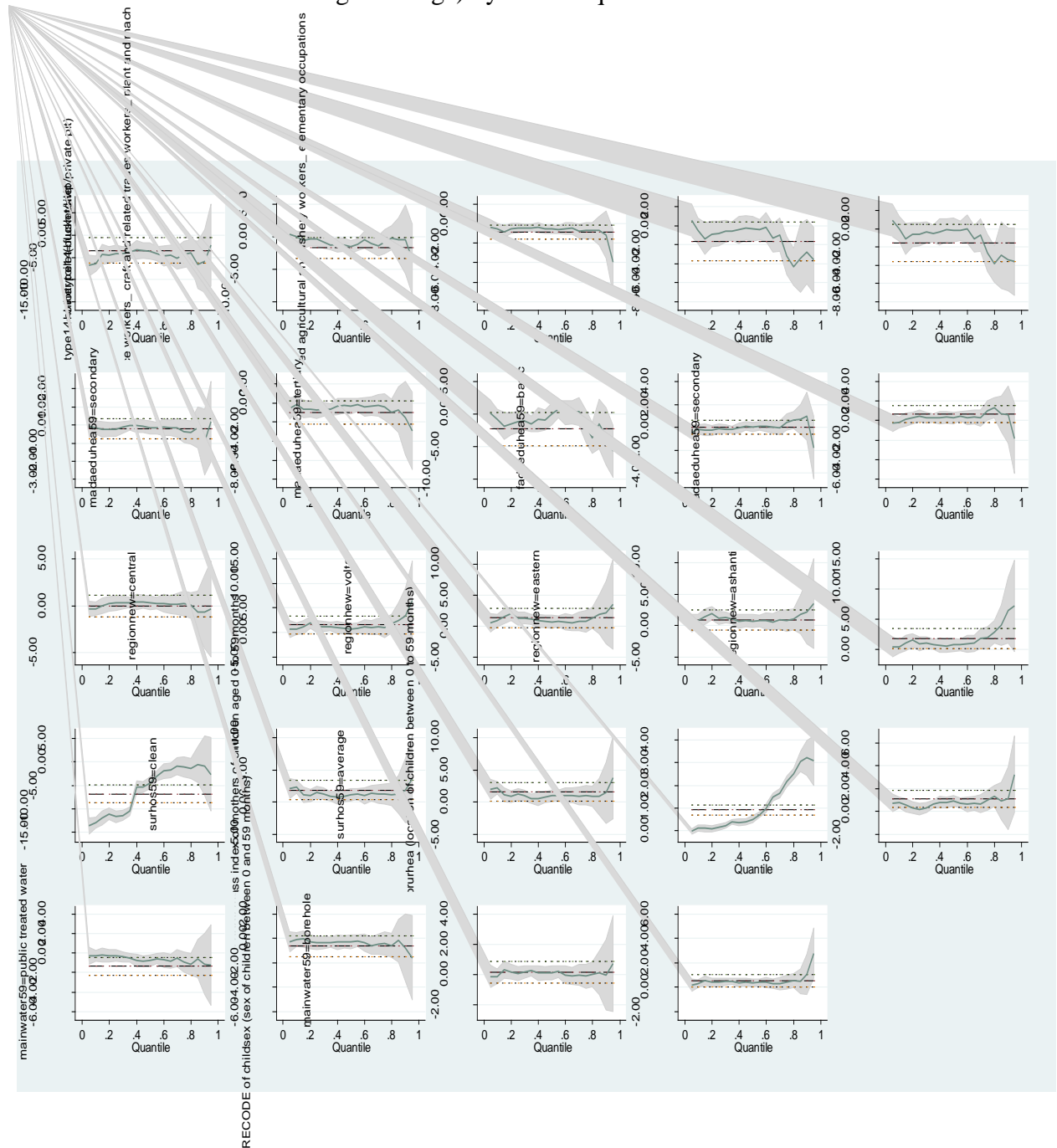
Appendix 5.11: Graph of the dependent variable of under-five children health outcome (whz06) by median quantile



Appendix 5.12: Graph of the coefficient of each regressor (children aged 5-12 years educational outcomes) by median quantile

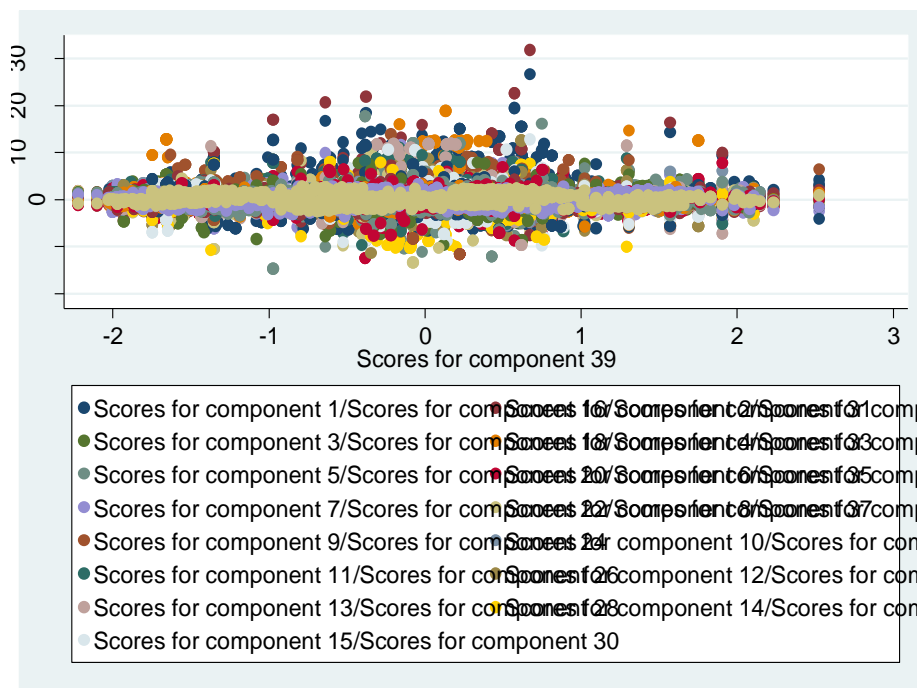


Appendix 5.13: Graph of the coefficient of each regressor (under-five health outcomes-height-for-age) by median quantile





Appendix 5.15: Graph of the scores of wealth index for children aged 5-12 years in Ghana



Appendix 5.16: Graph of the scores of wealth index for under-five children in Ghana

