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IMPACT OF HEALTH INSURANCE ON HOUSEHOLD SAVINGS AND CHILDREN'S EDUCATIONAL INVESTMENT: QUASI-EXPERIMENTAL EVIDENCE FROM GHANA

BY

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DECLARATION

I, FAUSTINA BECHAIYIRI do hereby declare that this thesis is based on my own research work under the supervision of my supervisors. No part of this work has been submitted to this university or any other university for an academic award. All references used in this work are duly acknowledged.

…… ……

FAUSTINA BECHAIYIRI **DATE**

CERTIFICATION

We hereby certify that this thesis was supervised according to the laid down procedures of the university.

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DEDICATION

This study is dedicated to my husband Eugene S. Abraham, my mother Anastasia Bebenubo, my brothers (Eric, Boniface, Augustine, Patrick and Alex), my late father Mr. Andrews Bechaiyiri, my friends (especially, Elizabeth Okeley, Dorcas Sowah and Harriet Nmai), the Bechaiyiri and Abraham families.

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LIST OF ABBREVIATIONS

AIH	Absolute Income Hypothesis
ATE	Average Treatment Effect
ATT	Average Treatment effect on the Treated
ATU	Average Treatment effect on the Untreated
BHPS	British Household Panel Survey
CHNS	China Health and Nutrition Survey
CEI	Children's Educational Investment
CIA	Conditional Independence Assumption
DD	Difference-in-Difference
DSGF	Dynamic Stochastic General Equilibrium
ECOWAS	Economic Community Of West African States
ERP	Economic Recovery Program
GDP	Gross Domestic Product
GLSS	Ghana Living Standard Survey
GSS	Ghana Statistical Service
HSA	Health Savings Account
HRS	Health Retirement Survey
IV	Instrumental Variable
LCH	Life Cycle Hypothesis
MDGs	Millennium Development Goals
NCMS	New Cooperative Medical Scheme
NHIA	National Health Insurance Authority
NHIC	National Health Insurance Council
NHIF	National Health Insurance Fund

NHIS	National Health Insurance Scheme
OLS	Ordinary Least Squares
PIH	Permanent Income Hypothesis
PSM	Propensity Score Matching
PTA	Parents Teachers Association
RCTs	Randomized Control Trials
RDD	Regression Discontinuity Design
RIH	Relative Income Hypothesis
SCF	Survey of Consumer Finance
SHI	Social Health Insurance
SAP	Structural Adjustment Program
SSNIT	Social Security and National Insurance Trust
UHC	Universal Health Coverage
UHCS	Universal Health Coverage Scheme
UNICEF	United Nations International Children Emergency Fund
UK	United Kingdom
US	United States of America
WHA	World Health Assembly
WHO	World Health Organization

ABSTRACT

In recent times, health insurance which seeks to reduce the financial bottlenecks that surrounds access to healthcare has gained much prominence in low-income countries. This may partly be attributed to the observed negative impacts of unanticipated health shocks on poor and vulnerable households in developing countries. A number of African countries in recent years have piloted universal health insurance schemes to provide some basic coverage for all their citizens. However, the impact of universal coverage of health insurance beyond health care utilization in developing countries is not well understood. Ghana introduced the National Health Insurance Scheme (NHIS) in 2003, in this regard, to provide healthcare services to its citizens at an affordable cost, to remove the challenges that exist as a result of incurring excessive out-of-pocket health expenditure in the event of health shocks and to eliminate the traditional system of 'cash and carry' (pay before treatment).

This study empirically examines the impact of health insurance coverage on household savings behavior and children's educational investments in Ghana. In terms of impact on educational investments, the study further explores heterogeneous effects of NHIS on different components of children's educational investments. Data for the empirical analysis was obtained from the nationally representative sixth round of the Ghana Living Standards Survey (GLSS 6) 2012/2013. Addressing possible endogeneity due to the non-random enrollment to the NHIS, the propensity score matching (PSM) estimation technique was adopted to examine the causal impacts of NHIS coverage on household savings and children's educational investment. The analysis reveals that households enrolled in NHIS tend to save approximately 15 percent more than

households that are not enrolled. In terms of educational investments, the study finds that households enrolled in NHIS tend to invest approximately 20 percent more in their children's education than households that are not enrolled. The disaggregated effects show that the extra income from health insurance coverage is channeled into payments for extra classes or tuition and the purchase of books. The study finds little impact of NHIS on regular tuition, examination fee payments and payments for sport activities. Overall, households on average invest more in their children's education than save.

Keywords: National Health Insurance Scheme, household savings, Educational investment.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

The health status of individuals and households are of great importance to all countries. A healthy person is more likely to engage in productive activities to generate income. Low-income households are deeply affected when faced with unanticipated health shocks (Kolukuluri, 2018). Without health insurance mechanisms, households would have to make out-of-pocket health expenditure to mitigate the effect of health shocks. This situation leads to poor health conditions especially when households have less income to embark on such expenditures. Also, it increases the risk of bad economic outcomes (Kolukuluri, 2018). Health shocks have the tendency to aggravate poverty situations by reducing savings and investments in children especially in low-income countries.

Studies by Whitehead et al (2001) and Kolukuluri (2018) maintain that, households in low-income countries may fall into long lasting poverty due to high cost of healthcare. Their view is not different from Leive and Xu (2008) and Wagstaff (2008) who both maintained that, poor households are at a higher risk of sinking deeper into poverty due to health shocks. In the event of health shocks, households will have to spend so much on healthcare. Such expenses range from medical services to purchasing drugs (Asenso-Okyere et al., 1997; Leive & Xu, 2008; Alfers, 2013). This situation may prevent households from saving and investing, which are needed to break the poverty cycle. Again, households would have to withdraw their savings and investment in order

to take care of these unanticipated health needs. The situation may give rise to lower savings and investments and perpetuate poverty.

Access to quality healthcare at an affordable cost can therefore create an avenue for individuals or households, especially the less privileged in society to better deal with health shocks. The World Health Organization (WHO) recommended Universal Health Coverage (UHC) to ensure that every individual has access to healthcare without any financial hardships. In recent times, many sub-Saharan African countries such as Ghana, Kenya, Nigeria, Uganda and Tanzania have introduced universal health insurance schemes to increase access to healthcare and mitigate the detrimental effect of health shocks on households. However, the impact of health insurance on household behavior have not been well examined and for that reason this study seeks to examine the impact of health insurance coverage on households savings and investment in children's education in Ghana.

Ghana started the implementation of a Universal National Health Insurance Scheme (NHIS) in 2003. Prior to the introduction of the NHIS, the system that operated was the "Cash and Carry" System where patients have to pay before treatment is given even in car accident situations. This system prevented many poor households with little savings from accessing healthcare and this heightened the inequality in access to healthcare in Ghana (see Asuming, 2013). Under this system, the poor cannot afford to make out-of-pocket expense and therefore are faced with prevalence of ill-health and continuation of the poverty cycle. The evidence on the impact of health insurance on individual and household savings is inconclusive. For example Chou et al. (2003) is of the view that, in order not to be caught by surprise in the event of health shocks,

households tend to save more to mitigate the effect of unanticipated shocks. Similarly, Cheung and Padieu (2013) opined that higher savings is needed to address the problems that arises from unanticipated health shocks. Starr-McCluer (1996) on the other hand maintain that, with health insurance coverage households do not have to spend so much money on medical expenditure in the event of shocks, as such they can save for purposes other than health, consume more and invest. One form of this investment is the investment in children's education. The study of Hsu (2013) and Qui (2016) were consistent with the findings of Starr-McCluer (1996). Specifically, Hsu (2013) maintained that health insurance coverage reduces household's health expenditure and increase savings. Also, Qui (2016) is of the view that households with health insurance coverage stands a higher chance of owning stocks and investing large fractions of their assets in stock compared to uninsured households.

Households engage in saving for several reasons some of which include; the need to leave behind inheritance for children and family members (bequest motive), future uncertainties (precautionary motives) and the means to cater for temporary inequalities between consumption and expenditure (life cycle motives) (Kimball, 1990; Horioka & Watanabe, 1997; Ercolani, 2016). Some scholars have argued that savings can alleviate poverty through the provision of investment opportunity (Dupas & Robinson, 2009), quasi insurance (Dupas & Robinson, 2009) and mental accounting (Dupas & Robinson, 2009; Rutherford & Arora, 2009). Klasen et al. (2015) opined that savings increase resilience to economic shock and reduce vulnerability to poverty. This goes to confirm that savings is a very important socio-economic variable that cannot be over looked.

It is important to reduce current poverty but also very critical to break intergenerational poverty from parents to children. For this reason, the study also examines the impact of NHIS on household's investment in children's education. The failure to invest in education may be costlier than the actual cost of investing in education (Levin, 1972; Levin, 2008). According to Surr (2017) a household will not be able to compete if it fails to invest more in its members. Heckman et al. (1999) are of the view that investing in early education and for that matter children's education can yield higher returns in the future.

At the macro level, education leads to the development of human capital which is a prerequisite for a country's development (Suryadarma & Suryadiha, 2006; Foster & Rosenzweig, 2010). Otieno (2016) on his part stated that, educational investment is very important for economic growth and development. Evidence available suggests that the average rate of returns for an additional year of schooling in lower and middle-income country is about 10 percent.

The direct benefit of education is accrued to the household and therefore the need for the households to invest in the education of its members, especially children (Levin, 2008). Failure to invest in education has two major consequences thus micro and macro level implications; at the micro level, inadequate or no investment in education will lead to lower levels of education and income. This situation makes it difficult to break the poverty cycle leading to intergenerational poverty. In a quest to generate income and sustain consumption levels, victims of less or no education tend to involve themselves in risky job (risky activities) with huge health risk that normally also yields lower returns. Less education also hinders the socio-economic stability of households. At the macro

level, failure to invest in education can lead to higher public spending (Levin, 1972; Levin et el., 2007).

1.2 Problem statement

Researchers such as Nurkse (1953) and Myint (1967) opined that low income countries are faced with a vicious cycle of low income which translates into low savings, low investment and back to low income. This vicious cycle if not tackled through measures that seek to improve savings can lead a country into poverty and perpetual stagnation. Whereas savings have doubled in Eastern Asia and some developed countries, there has been a drastic reduction in savings in Sub-Saharan Africa (SSA) (Elbadawi & Mwega, 2000; Nwachukwu & Odigie, 2011) of which Ghana is not an exception (Larbi, 2013). The average savings rate in Ghana has been fluctuating since the 1970s. Private savings declined from 14.14 percent of GDP in 1974-79 to 7.33 percent of GDP in 1980-85 (Larbi, 2013). There was a further decline to negative 0.15 of GDP in 1986-93 (Aryeetey & Harrigan, 2000).

In recent times the savings rate in Ghana is far below that of other countries in the sub-region. For example, the average savings in Ghana between 1980 and 2001 was 6.4 percent of GDP compared to 37.4 percent of GDP in Botswana, 21.4 percent in Cameroon, 21.6 percent in Nigeria, 13.9 percent of GDP in Kenya for the same period (World Bank, 2003). Between 2000 and 2004, Ghana recoded an average savings of 6.87 percent of GDP (Larbi, 2013). The savings rate in Ghana declined from 6.1 percent of

GDP in 2006 to 3.8 percent of GDP in 2007. In 2008 when Ghana is said to have recorded the highest growth (8.1%) in decades, its savings rate was 2 percent of GDP.

Currently, the saving rate of Ghana is lower than the average for the ECOWAS region. Data from OECD National Accounts and World Bank national accounts data files indicates that the average savings rate in Ghana was 5.7 percent of GDP in 2017, which is far below that of the ECOWAS region (9.9%) in the same period. This low rate of savings is quite alarming and therefore there is the need for attention to be focused on improving savings.

Ghana introduced the NHIS in 2003 as social intervention to provide healthcare services to citizens at an affordable cost (Alfers, 2013). Since its inception coverage has been on a rise. As at 2013, about 67.6% of the population were registered or covered on the scheme. Out of the total registered and covered population, 54.59% are females and 45.41% are males (Ghana Statistical Service (GSS), 2014). With 67.6 percent of the population on NHIS in 2013 as compared with 17 percent in 2005, indicates the benefits (including reduction in uncertain health expenditures) that the Scheme provides (GSS, 2008, 2014). According to a report from NHIA, in-patient utilization of the scheme rose from 1.43 million in 2012 to 1.61 million in 2013 (NHIA, 2013).Thus health expenditure for individual and households will reduce, this means that households and individual now have the option to invest, save or consume their surplus income. However, less is known about the impact of health insurance on savings and investment in Ghana. Also, studies on the impact of health insurance on savings in other countries have provided mixed results (Starr-McCluer, 1996; Gruber & Yelowitz, 1999; Chou et al., 2003; Guariglia & Rossi, 2004; Cheung & Padieu, 2013; Hsu, 2013; Qiu, 2016). The specific impact of

health insurance on savings in Ghana is unknown. Additionally, studies in Ghana on the health insurance sector have focused on the extension of the Scheme to the poor and informal workers in relation to premium levels (Alfers, 2013; Asuming, 2013). This study therefore investigates the impact of NHIS on savings.

Education is key to societal development. The more citizens of a country are educated the more human resource available for that country. To be able to acquire this human resource through education, there is the need to start with children. This is to say that educating children creates an avenue to generate the necessary human resource in the future (Levin et al., 2007; Levin 2008).

Data from global data source indicates that, 250 children in the world are estimated to have no reading and writing skills and cannot do basic mathematics. Most of these vulnerable children are hard to reach in the world, thus they are from the poorest households. They are mostly out of school and engage in labour activities to complement earnings of their families. Out of school rate in Africa is far above the rest of the world, for example Sub Saharan Africa (SSA) countries had an out of school rate of 29.6 million in 2012 compared to 9.9 million of South and West Asia and 18.4 million for the rest of the entire world (UNESCO, 2018). According to Ghana's 2010 population and housing census, children between the ages of one (1) and fifteen (15) years constitute 36.8 percent of the entire population. Out of school rate of children between ages one (1) and fifteen (15) years rose from 12.3 percent of the population of children in that age bracket in 2015 to 16.6 percent in 2016. The figure further rose to 18.6 percent in 2017 (UNESCO, 2018). Education plays a key role in economic development as such the continuous increase in Ghana's out of school rate especially for children needs to be looked at. With

the introduction of NHIS, the unexpected expenses on health made by households will be reduced. Households now have the option to reallocate their windfall gains into investment or consumption. The study also examines the impact of NHIS on children's educational investment.

Experimental design or Randomized Control Trials (RCTs) is considered as the gold standard in impact evaluation. In order to assess the impact of an intervention using RCTs there is the need to build in the evaluation methodology as part of the design from the beginning (Baker, 2000). The control and treatment groups have to be established and baseline data collected before the intervention. Thus the intervention has to be randomly assigned. However, in our case NHIS was not randomly assigned and no baseline data was collected. This makes it impossible to estimate the impact of NHIS through an experimental means. A quasi experimental method specifically matching methods helps to address challenges that arise from non-randomly assigning treatment by matching the treatment group to the control group based on observable characteristics. This then makes the treatment group and the control group similar in all characteristics except the intervention.

The Ghana living standard Survey (GLSS) is a cross sectional data that captures both individual and household information. Currently six rounds of this data have been collected. Since 2005 the GLSS data has capture information on NHIS coverage and it utilization. However, this data has not been utilized effectively to investigate savings, educational investment and health insurance. It is on this backbone that the study employed a quasi-experimental method (an impact evaluation tool) in conjunction with the recent Ghana Living Standard Survey data set (GLSS 6) to address the existing

literature gap on: Impact of health insurance on household savings and children's educational investment in Ghana.

1.3 Objectives of the study

1.3.1 General Objective

The general objective of the study is to investigate the impact of the National Health Insurance Scheme (NHIS) on household savings and children's educational investment in Ghana.

1.3.2 Specific Objectives

The specific objectives are:

- To evaluate the impact of National Health Insurance Scheme on Households' savings.
- To examine the impact of National Health Insurance Scheme on children's educational investment.
- To investigate the impact of National Health Insurance Scheme on the components of children's educational investment.

1.4 Research Questions

Based on the foregoing, the following research questions arise:

- What is the impact of National Health Insurance Scheme on households' savings?

- What is the impact of National Health Insurance on the household's investment in children's education?
- Does National Health Insurance Scheme have heterogeneous impact on the components of children' educational investment?

1.5 Significance of the study

The aggregate effect of a reduction in a household's future health expenses on savings and children's educational investment has significant implications on the macro-economy (Jung & Tran, 2016). This study is therefore significant in the following respects. First, it will inform policy makers with regards to "how much" the introduction of the NHIS has impacted on household savings. Its indirect impact on consumption will aid monetary and fiscal policy makers to understand how healthcare reforms impact the macro-economy and design stringent policies to address such issues as inflation.

Secondly, the study will reveal the efforts households are putting in place in terms of education and also inform educational policy makers to implement policies that will complement the efforts of households. Again, the study would be of importance to policy makers at the National Health Insurance Authority (NHIA). The results would aid the NHIA in the design of its actuarial policies for onward expansion of the scheme and sustainability. Finally, the study will be of immense benefit to academicians and researchers in the field of savings, education and health economics, as it adds to the literature in this field.

1.6 Scope of the study

Primarily, the study is limited to household analysis of the savings and children's educational investment in relation to health insurance. As a result, it is basically a micro-level study, based on the Ghana Living Standard Surveys collected by the GSS. Based on the aforementioned, the study is therefore confined to how health insurance affects household savings and investment in children's education in Ghana.

1.7 Organization of the study

The study is organized into five main chapters. The background, problem statement, research objectives, research questions, significance of the study, and the scope of the study are encapsulated in chapter one. Chapter two presents the review of the literature in fields of saving, health insurance and educational investment. It starts with a theoretical literature on savings and educational investment. The chapters also provides empirical works on health shocks, health insurance, savings, educational investment, impact evaluation techniques and finally end with a theoretical framework. The third chapter of this study discusses the econometric model and impact evaluation technique used. It also presents the variables and the data source. Chapter four presents the analysis and discussions of the study results. The final chapter presents the summary of major findings and conclusions of the study. It also briefly outlines some recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter reviews theoretical and empirical literature in relation to the subject of the study. It starts with a theoretical literature on savings and educational investment. The chapter continues with empirical studies on health insurance, savings, educational investment and impact evaluation techniques. Some of the sub topics discussed in this chapter includes; health shocks and coping strategies, social health insurance, healthcare finance in Ghana, national health insurance scheme, savings and health insurance, educational investment and health shocks and adoption of impact evaluation techniques. Finally, the chapter ends with the theoretical framework for the study.

2.1 Theoretical Review

This section presents and discusses the theories on consumption and savings, and educational investment. The section begins with theories of consumption and savings and move on to provide theoretical literature on educational investment.

2.1.1 Theories of Consumption and Savings

Most scholars have come out with theories on the patterns of savings and saving behavior of individuals and households. This section critically examines the various saving theories. These theories include: Absolute Income Hypothesis (AIH) by Keynes,

Friedman's Permanent Income Hypothesis (PIH), Modigliani's Life Cycle Hypothesis (LCH) and Relative Income Hypothesis (RIH) by Duesenberry.

Absolute Income Hypothesis (AIH)

The AIH, sometimes referred to as the Keynesians consumption function, was propounded by John Maynard Keynes in 1936. The theory revealed that individuals save out of their current income to smoothen their future consumption; this mode of precautionary motive of saving is as a result of uncertainty about the future. The theory assumes that, because the future is uncertain there is the need to defer part of current consumption to stabilize utility levels in the future. One major proposition of Keynes theory is that expenditure on current consumption depends solely on current disposal income. This ignores the fact that there may be incomes generated in the future. The theory also suggests that as income levels increases individuals consume a decreasing percentage and save an increasing percentage of their income.

Relative Income Hypothesis (RIH)

James Duesenberry in his book titled "income, saving and the theory of consumer behavior" propounded the RIH (Duesenberry, 1949). Prior to the RIH, Maynard Keynes's AIH was dominant. Unlike the AIH which opines that the future is uncertain therefore as income increases the percentage of income spent on consumption decreases, Duesenberry's hypothesis postulates that individual's present consumption is dependent on previous consumption level. Individuals for that matter care more about status or their

wellbeing in comparison to past moments. Therefore, individuals do not want their consumption standards to fall in so far as they are better off than others.

In other words, he hypothesized that present consumption is influenced by the level of consumption attained in the previous year. This goes to mean that individuals will not allow their consumption levels to decline. Duesenberry fervently argued that his relative income hypothesis is evidenced in both cross sectional and time series data. In the former, he concluded that aggregate saving is independent of aggregate income and concluded in the latter that the saving decision of an individual at any point in time is an increasing function of his percentile rank in the income distribution.

The Life Cycle Hypothesis

Modigliani, Ando, and Brumberg developed the life cycle hypothesis. The theory has to do with consumption and saving attitude of economic agents throughout their life time. It takes into account an individual's life time earnings and spending. This is to say that consumption does not only depend on current income but most importantly on the expected flow of life time income. The authors predicted that there exist three cycles in an individuals' life, namely: young age, middle age, and retirement age. They postulate that in order for individuals to smoothen consumption, they accumulate debt in the young age to take care of expenses. These individuals will work in the middle age to pay off the debt accumulated and also save for the retirement age (where there is no work) in order to sustain their consumption levels. The theory predicts that a change in current income that

has no impact on average expected future income will not impact consumption (Modigliani & Brumberg, 1954; Modigliani & Ando, 1963).

Permanent Income Hypothesis (PIH)

The theory of PIH as propounded by Friedman, (1957) established that, individuals spend a fixed amount of their lifetime income in a way that smoothens their lifetime consumption. Permanent income is defined as the present value of future flow of income. The level of current consumption depends on once life time income (permanent income) which emanates from both human and non-human wealth. This therefore means that any increase in current consumption without an increase in permanent income will result in the reduction of future consumptions. The difference between current and future income is known as transitory income, which can either be positive or negative. A positive transitory income is as a result of excess current income over permanent income leading to a positive saving. An individual will save less when permanent income is more than current income and save more when current income exceeds permanent income. Friedman argued that households with higher transitory income save more to smoothen consumption.

2.1.2 Educational Investments

The theory of human capital development was developed by Becker (1964). Becker (1964) argues that investing in education will provide skill for citizens that will increase working ability and eventually lead to economic growth. The 1984 World Development

Report provides several literature on the role education plays in improving maternal health and lowering fertility (Mundial, 1984). Behman, 1990 reviewed literature on human resources and poverty and found strong evidence of maternal years of schooling on child health. For the past three decades most studies have laid more emphasis on the positive role that primary education plays on the health of households. Also, some empirical studies have focused attention on the advantages of care programs and children education on children development (Burger, 2010). These studies have confirmed the positive impact of educational policies in reducing poverty and inequality, improving health and economic welfare, and improving democracy and political systems.

Alternatively, there are limited studies on household investment in education because most researchers have not focused attention to these concepts. Nonetheless, in the framework of household decision- making, some studies in economics have dealt with the concept of how resources are allocated among children by their parents. Whereas some proponents believe that investment in education is an individual responsibility (Becker 1967, 1981), others are of the view that educational investment should be a family responsibility especially at lower levels of education (Behrman et al., 1982; McMahon, 1984).

Becker (1967, 1981) investigated the individual maximization model, in which educational investment decisions are based on consideration efficiency. Behrman et al. (1982) came up with the 'family' model which has other considerations. The authors concluded that educational investment decisions (most especially lower level educational decisions) are made by families and hardly by the individual concerned. The future-oriented utility function was developed by McMahon (1984) to elucidate reasons behind

family educational investment in U.S. Variables included in his demand and supply functions for investment were expected non-monetary returns, tax subsidies, family size, family disposal income, student loan and order of birth. Parent educational level and academic scores were used to estimate the demand function.

In recent times Tunali (2000) examined the factors that affect school attainment of girls and boys in Turkey. The author included community, household and individual factors, introducing fixed effects for regions. Tilak (2002) explained the elasticity between private and institutional expenditures, by analyzing the factors that impact household expenditure on education in India. The author also employed households' demographic characteristics.

2.2 Empirical Studies

2.2.1 Health shocks and coping strategies of households

Health shocks impose economic costs such as medical expenditure and loss of income to households. Health shocks can place a dual financial load on households; thus aside having to endure the high expenses on medical treatment, household also lose income as a result of inability to work (Leive & Xu, 2008). Health shocks to poorer parents might damage the welfare of their children by reducing investments in human capital hence the children future potential earnings. These situations can lead a household into extreme poverty (Wagstaff, 2008). To neutralize the impact of these health shocks, households employ diverse coping strategies including transfers, credit, remittances and sale of assets or livestock to elude any deficit in consumption arising from these economic costs. These

actions depend on the economic resources owned by the household (social, physical, human and financial capital) (Dhanaraj, 2015). When households espouse expensive coping strategies, they substitute longer-term economic viability' for 'short-term consumption needs (Bird & Prowse 2008). This in turn has consequences for future savings, investments, productivity, vulnerability to future shocks and intergenerational transmission of poverty (Dhanaraj, 2015). Thus, knowledge on the economic repercussions of health shocks and their coping strategies helps inform public policy.

Leive and Xu (2008) established that, borrowing and selling of assets is a common means of coping with healthcare finance especially in many African countries. Specifically, they estimated that about 68 percent of households in Burkina Faso and 23 percent of households in Zambia borrow and sell assets to pay for healthcare cost. Nonetheless, Kurk et al. (2009) revealed that the degree of coping is not peculiar in Africa but spans to other non-African countries as well. The authors conducted a study on hardship financing which covered over 50 percent of the world's population; their findings revealed that 22 percent of households borrowed to cope with the cost of illness.

Although coping mechanisms may help households take care of their current basic needs, there can be substantial repercussions in the future (Flores et al., 2008). Selling of assets or livestock which often forms an essential resource of a household may be the initiator of a vicious cycle of poverty and increase economic vulnerability. Children may enter the labour force by dropping out of school. The consequence of this action is the failure to advance in school leading to low educational attainment and lower future earnings (Duryea et al., 2007). Also borrowing may cause a household to remain in debt for a long time even after the health shock (Damme et al., 2004). Most family and

friends assist affected households through donations especially in SSA countries where there exist strong sharing obligations. Though these donations may help households to come out of shocks, the impact on the donating family member(s) or friend(s) can be very severe. Grimm et al. (2011) used a theoretical model on a sample of entrepreneurs in Burkina Faso. Their results indicated that, donations to the (extended) family, particular donations that go into health expenditure may require abandonment of profitable investments which impede long-term growth of the enterprise of the donor. The consequences of these coping strategies factors have stimulated the interest in health insurance in protecting households especially the poor against health shocks.

2.2.2 Health Insurance and Healthcare Finance

2.2.2.1 Social Health Insurance (SHI)

In 2005, the World Health Assembly (WHA) recommended that all health systems must be aimed at achieving universal coverage. The major aim of the Universal Health Coverage (UHC) is to provide adequate healthcare for all. According to WHO (2015) health standard should be acceptable, affordable and most importantly should be made available exactly the time it is needed. A report from IMANI Africa[1] suggest that on yearly bases about 100 million people in the world fall beneath the poverty threshold because they are forced to make out-of-pocket expenditure on health.

SHI exist to address the inequalities in general healthcare delivery and to alleviate the effect of out-of-pocket health expenditure. It is a government initiative that pool

[1] A policy Think Tank based in Ghana

resources/funds and risk of people in order to remove their financial and health burden (Fenny et al., 2018). In other words, it has to do with the pooling of peoples' risks and financial resources which are made available to beneficiaries when it is needed (Unicef, 2012). The system readily provides the health needs of individuals registered on the schemes when the need arises, it also provides a better health service to individuals (Brugiavini & pace, 2016). SHI is partly financed by governments and contributions from enterprises, employers, households and individuals who are beneficiaries of the insurance.

2.2.2.2 Social Health Insurance (SHI) in Developed Countries

Over the years, most countries across the globe have rolled out SHI programs to provide financial and health relieve for their citizenry (Jacobs & Goddard, 2000; Wagstaff, 2009; Carapinha et al., 2010; Ellis et al., 2014). Developed countries such as Germany, US, Canada, Japan, France, Netherlands, Singapore and UK have subscribed to SHI for the past four (4) decades (Jacobs & Goddard, 2000; Wagstaff, 2009; Ellis et al., 2014). Germany has a SHI system that is mandatory and covers about ninety percent of the population not leaving out temporary workers staying in Germany (Jacobs & Goddards, 2000; Ellis et al., 2014). The remaining ten percent are mostly the upper class who usually purchase the private health insurance package. SHI in Germany is financed through income tax usually between ten to fifteen percent. This cost is borne by both the employer and employee.

The government provides subsidies for the unemployed in other for them to benefit from the insurance (Ellis et al., 2014). This is not quite different from other developed countries like Canada, France, Japan and UK. For instance, in Canada there is the mandatory SHI program which covers every citizen and permanent residents. Japan has a SHI for various categories of people living in the country. Salaried workers have the employment based insurance and whiles non-salary workers are enrolled on national health insurance (Ellis et al., 2014).

Singapore has a unique case of a mandatory self-insurance which is supported by sponsored saving. This mandatory income based health policy requires that, every individual contribute between six to nine percent of their income in a compulsory Health Savings Account (HSA). Income in the HSA can be use used to finance health expenditure in accordance to the preference of the consumer. In some situations, the funds can be spent on health expenditure of friends and other family relations of the contributor. Unlike the SHI of other countries where funds are made available to specific individuals who are covered by the scheme, in the case of Singapore if the insured is not able to use the fund on his/her health, it can be transferred to a friend or relative (Ellis et al., 2014). This indicates that health is very important and as such there is the need to make available healthcare at little or no cost to it citizenry to improve upon their lives and productivity growth. These countries have taken this initiative to ensure the wellbeing of their citizens.

2.2.2.3 Social Health Insurance (SHI) in Developing Countries

The SHI is not a developed country affair but has also manifested in developing countries and Africa, especially, Sub-Saharan Africa. This started with a social health insurance for formal sector workers where contributions are jointly made by both employers and employees (Carapinha et al., 2010). African countries such as Tanzania, Kenya, Ghana, Nigeria, Uganda and South Africa have instituted the SHI program (Mclntyre et al., 2008; Carapinha et al., 2010; Brugiavini and Pace, 2016; Fenny et al., 2018). Following the 2001 Abuja Declaration, African heads of States agreed to channel fifteen percent of their annual budget to the health sector. This was to enable them achieve the Millennium Development Goals (MDGs) on health. As at 2011 six African countries (Rwanda, Niger, Botswana, Malawi, Zambia, and Burkina Faso) have achieved this target.

Community based health insurance can be attributed to Rwanda and Ethiopia with Rwanda's system being compulsory and segment of the population have exemption; whereas in Kenya and Tanzania there is a distinct insurance schemes for formal and informal sector workers. The government of Kenya instituted the National Hospital Insurance Fund (NHIF) and the Dutch HIF cooperates with Pharm Access and the Africa Air Rescue Health Insurance Ltd. to provide low-cost health insurance to selected target groups in Kenya. Tanykina Dairy Plant Ltd and Lelbren Dairies Ltd were the first groups to qualify for this insurance from the NHIF.

The SHI of these African Countries are mostly financed through taxes, government contribution and household premium from beneficiaries (Fenny, 2018). To be eligible for the SHI, consumers have to register on the scheme and informal sector consumers will have to pay premium as in the case of Ethiopia, Ghana, Kenya and

Tanzania. Over the years membership on the SHI has been on the rise, for instance, in 2006 Ghana's NHIS covered about seventeen percent of the population and subsequently increased to 67.6 percent in 2014 (GSS, 2008; 2014). Tanzania and Rwanda have twenty-one and eighty percent of their population covered on their SHI as at 2015 respectively.

2.2.3 Evolution of Healthcare Finance in Ghana

Prior to the postcolonial era, the system of healthcare finance in Ghana was out-of-pocket. Thus patients will have to finance their health from their personal income. The first post-colonial government instituted a tax-financed healthcare system where there is no payment for healthcare expenditure by citizenry. This was made possible because by then Ghana's major export (cocoa) has higher international prices which boosted the economy and it supported the healthcare financing arrangement. All payments for healthcare were abolished in all government facilities; this enabled even the poorest household to have access to healthcare (Mclntyre et al., 2008; Asuming, 2013; IMANI, 2017).

In spite of the free healthcare, there were inequalities (geographically) in the distribution of health facilities and medical staff. Most rural communities had no medical facilities and medical staff as majority of doctors were centered in the urban areas even though not more Ghanaians were residing in the urban centers at that time. This action led to an increase in mortality rate of children under five (IMANI, 2017).

Ghana's economy began to deteriorate in the 1960s as there was a fall in price of export on the international market. For this reason there were problems in financing the

free healthcare system as there was severe shortage in the provision of medical equipment (Asuming, 2013). The period of the Structural Adjustment Program (SAP) saw major health reforms with the intension of co-payment of health services as a result of the fact that, in the early part of the 1980s there was economic downturn (Asenso-Okyere et al., 1997; Ramachandra & Hsiso, 2007; Mclntyre et al., 2008). The situation led to the adoption of the Economic Recovery Program (ERP), which removed all subsidies on healthcare and required that citizens make payment for all health services provided, including payments for drugs.

In 1992, in the quest to recover cost, the system of healthcare finance fully developed into payment system known as the Cash-and-Carry System. The system deprived most people especially the poor access to medical care (Wadding & Enyimayew, 1990) because they had to make cash payment before they are attended to at the various healthcare centers. Outpatient attendance to hospitals reduced drastically (IMANI, 2017), mounting pressure on the government to find other means of financing healthcare. In response to this, the mutual health insurance was instituted in the 1990s to provide some form of Social Protection to the vulnerable group. Members were required to pay periodic premium in other to enjoy the benefit of the scheme. People who were unable to fully pay the premium received subsidies through various methods; one of such is church offering. This system continued until 2003 when the National Health Insurance Act (650) was passed.

2.2.3.1 National Health Insurance Scheme (NHIS)

Ghana passed the NHIS Act (650) in 2003. In addition to seeking accessible and quality healthcare system, the NHIS sought to remove the financial bottleneck that surrounded the then system of healthcare financing popularly known as the Cash-and-Carry System. This Cash-and-Carry System created a lot of problems in accessing healthcare, most especially for the poor (Alfers, 2013). The system led to most patients losing their lives as they will have to deposit cash before they are attended to (Alfers, 2013). The NHIS Act saw the institution of the National Health Insurance Authority (NHIA) to oversee the affairs of the NHIS.

The vision of the NHIA is "to be a model of a sustainable, progressive and equitable social health insurance scheme in Africa and beyond" and their mission is "to provide financial risk protection against cost of quality basic healthcare for all residents in Ghana and to delight our subscribers and stakeholders with an enthusiastic, motivated, and empathetic professional staff who share the value of accountability in partnership with all stakeholders."

The NHIS started full operation in 2005 with its membership being on a continuous rise. In 2005, 1,348,160 Ghanaians were registered on the scheme. This number rose to 14,511,777 in 2009 (NHIA, 2009). As at 2016, about 67.6 percent of Ghanaians were registered and covered by the NHIS (GSS, 2014). Active membership of the scheme in 2010 was 8,163,714 and further increased to 8,227,823 and 8,885,757 in 2011 and 2012 respectively (NHIA, 2010, 2012). Active membership has to do with registered members who have unexpired cards and for that matter can access healthcare

using their cards. This is calculated over a twelve month period based on the number of people who have renewed their membership.

NHIS in Ghana is financed from the National Health Insurance Fund (NHIF). This is made up of donor funds, 2.5 percent NHIS levy added to VAT, 2.5 percent contribution from the Social Security and National Insurance Trust (SSNIT), monies from investments made by the National Health Insurance Council, funds allocated to the scheme by parliament and premium paid by beneficiaries. The NHIF subsidizes the contributions of the elderly and children. The introduction of health insurance in Ghana has since reduced the financial stress on households in relation to healthcare and reduced the impact of health shocks (UNDP, 2007). Health insurance is therefore a necessary tool to combat the consequences of health shocks and enable households make investment decisions.

2.2.4 Health Insurance and Savings

The health insurance and savings argument stem from the ability of health insurance to reduce expenditure on health. Insured households can channel their windfall gain generated as a result of reduction in the risks of uncertainty into savings or investment (i.e. bequest and life cycle motives of saving) (Kimball, 1990). With the reduction of health expenditure, households will decrease their savings for precautionary reason (Kimball, 1990; Chou et al 2003; Mody et al., 2012; Buter, 2015) but the composite effect on savings depends on the magnitudes of the savings motives. Empirical studies on savings and health insurance however have provided mixed findings. Whereas some

researchers found negative effect of health insurance on savings, (Gruber & Yelowitz, 1999; Engen & Gruber, 2001; Chou et al., 2003; Cheung & Padieu, 2013) others found positive impact or no impact of health insurance on savings (Starr-McCluer, 1996; Guariglia & Rossi, 2004; Hsu, 2013; Qiu, 2016; Kirdruang & Glewwe, 2018).

Gruber and Yelowitz (1999) conducted a study to assess the impact of Medicaid on savings in US, using data on asset holdings and consumption. Employing instrumental variable regression, the authors found a strong negative effect of health insurance on savings. Their result was confirmed by a strong positive relationship between health insurance and consumption. A similar study conducted in Taiwan by Chou et al. (2003) revealed that on average, National Health Insurance (NHI) reduces the savings of Taiwanese households by 8.6–13.7 percent. The effect was greater on lower saving households. Their study was not subject to selection bias because NHI covered everyone. Also, to single out the effect of NHI on saving and consumption behavior, they exploited the difference across various insurance policies before NHI was implemented. Difference-in-difference estimation technique was used to estimate the result in this study.

Cheung and Padieu (2013) assessed the effect of the New Cooperative Medical Scheme (NCMS) on the savings of rural households in China. Their data was sourced from the China Health and Nutrition Survey (CHNS) to explore NCMS impact on savings across income distribution of households. Both estimates from the IV and PSM techniques revealed that health insurance has a negative significant impact on household savings, especially on the savings of middle-income households. The findings of these researchers are however not consistent with other studies (Starr-McCluer, 1996;

Guariglia & Rossi, 2004; Hsu, 2013; Qiu, 2016) that use various types of health insurance and found positive impacts.

Starr-McCluer (1996), investigated the effect of health insurance on household savings among American working-age population. The author used the 1989 data on the Survey of Consumer Finance (SCF). After controlling for household characteristics and other determinants of savings (through the use of several econometric methods), the results was significant and revealed that health insurance coverage impact savings positively. Hsu (2013) set out to investigate the findings of Starr-McCluer, the author's main objective was to establish whether SHI will have a positive impact on savings as found by Starr-McCluer (1996). The author built a Dynamic Stochastic General Equilibrium (DSGE) model that combined two institutions with heterogeneous agents who made decisions with respect to health insurance, saving and labor supply endogenously. The findings were consistence with Starr- McCluer, (1996) indicating that health insurance has a positive and significant impact on savings.

Similarly, Guariglia and Rossi (2004) studied the impact of private health insurance on private savings. The authors focused on finding out whether private health insurance will crowd out private saving in UK. Their study employed the 1996 to 2000 British Household Panel Survey (BHPS) data to investigate the hypothesis that "individuals who are not covered by private medical insurance, and who are therefore more exposed to facing unexpected health care expenditures or loss of income while waiting for treatment, tend to save more than insured individuals". After using numerous econometric techniques the hypothesis was rejected. Their findings indicated that medical insurance impact saving positively and do not crowd out private saving.

More recently, Qiu, (2016) used data from the SCF and Health Retirement Survey (HRS) databases to examine the impact of health insurance on household portfolio choices. The author found a strong positive relationship between health insurance coverage and portfolio choices. The results indicates that health insurance households own stock and invest a substantial amount of assets in stock than households without health insurance coverage. The results did not change after the authors controlled for both unobservable and observable characteristics. Also, the results were consistent in both SCF and HRS data sets. These findings notwithstanding, Kirdruang and Glewwe, (2018) found in Thailand that, Universal Health Coverage Scheme (UHCS) has no impact on savings both in the short and long run. They argued that UHCS produces two effects. First of all, UHCS will reduce risk of uncertainty thereby decreasing precautionary savings. Secondly, UHCS has an income effect that will increase savings and consumption. The authors concluded that the two savings effects rising from the coverage on UHCS are of opposite signs and might have concealed out hence no impact on savings.

A critical analysis of the conflicting result from studies on the impact of health insurance on savings may depend on the component of savings these studies focused on. Most of the studies that found positive impact of health insurance on savings focused on savings as a whole. This type of savings includes savings for all purpose, thus for life cycle motive, bequest motive and precautionary. The life cycle motive and bequest motive of saving increases with income especially transitory income. Once there is health insurance health expenditure will reduce hence there will be an increase in transitory income. This could be the possible reason why some studies found positive impact of

health insurance on savings. On the other hand, studies that found negative impact of health insurance on savings dwelt much on the precautionary component of savings (Chou et al 2003). Precautionary savings is the money set aside to cater for uncertainties. Health insurance is expected to eradicate the uncertainties that surround health and as such savings for this reason may fall when there is health insurance.

2.2.5 Educational Investment Income and Health Shocks

Health status has a great impact on the level of investment made in education. The healthier an individual or a household is the more likely it is that income will not be spent on health. This income can be channeled into investments. Out-of-pocket expenditures on health have the tendency of decreasing investment (Demenet, 2016). Health insurance coverage means that household expenditure on health will be minimized. According to Kolukuluri (2018) social insurance prevents households from incurring expensive self-insurance mechanisms such as reduction in children's educational expenditure and foregoing the consumption of durable goods. Few studies have focused on the health shocks on educational investment (Glick et al., 2016; Frankenberg & Thomas, 2017) with majority shifting attention to the impact of income shocks on schooling and educational attainments (Lokshin & Sawada, 1999; Ginja, 2010; Nordman et al., 2017).

Lokshin and Sawada (1999) found evidence in Pakistan for communities that, children left school in relation to temporary income shocks. Ginja, (2010) conducted a study in America to investigate the link between income shocks and parental investment in children’s education. The author found that income shocks decrease expenditure on

children's education. Similarly, Nordman et al. (2017) employed a household panel data to explore the impact of income shocks on children's education and work status in rural households in India. The authors used rainfall deviations as a proxy for income shocks and found that income shocks reduce household educational investment. They found that the effect is very strong for girls and low class households. Dhanaraj (2015) used the 'Young lives' longitudinal data from India to examine the intergenerational effect of parental health shocks. The health shocks of parents who are poor leads to a decline in investment in children and eventually reduce future earnings. This finding is confirmed by Demenet (2016) who used a panel data in Vietnam and found that health shocks reduces investment and crowds out expenditures related to business.

Investment has a positive relationship with income; one component of investment is educational investment. Income shocks impact negatively on education because education is a form of investment. Once there is an income shock, households will not have the necessary means to invest and as such investment in education will fall. Health shocks also have a similar effect on education. Health shocks have two channels through which it impacts education. First of all, when there is a health shock households lose a lot of income because they spend so much on healthcare. The lost in income will prevent households from embarking on an investment journey and one of such investment is education. Secondly health shocks make its victims physically unfit and as such may not be able to engage in labour activities. This reduces labour productivity and hours of work leading to a decline in income. Once income level falls there will be low investment hence low educational investment.

This negative effect of education as a result of various shocks experienced by households can be mitigated by a perfect insurance system (Blundell et al., 2008). In relation to health, if household have a system of healthcare that allows them to access healthcare at little or no cost then the consequences of the shocks will not be experienced. Households that have NHIS coverage will be able to cover their health expenses and focus their resource in other forms of investments.

2.2.6 Adoption of Impact Evaluation Techniques

Empirical studies using impact evaluation have been conducted in many areas, ranging from agriculture productivity, environmental programmes, educational programmes, earnings and healthcare on variables such as income, savings and labour market outcome. Majority of these studies employ quantitative methods, with most of the effects estimated using quasi experimental designs (Higgins & Alderman, 1996; Dedah & Mishra, 2009; Owusu et al., 2011; Hartwig & Grimm, 2011; Wainaina et al., 2012). Few studies have however employed experimental design and non-experimental design to evaluate impact of a program or an intervention (Karlan et al., 2015; Abebe et al., 2016).

For instance, Owusu et al. (2011) employed PSM to investigate the impact of non-farm work on household income and food security among farm households in the Northern Region of Ghana. The authors found a positive significant impact of non-farm work on household income and food security. This indicates that non-farm work increase income and food security which helps to alleviate poverty in rural areas of developing countries. Dedah and Mishra, (2009) conducted a study on farm households in U.S using

large cross sectional data. The authors used the IV approach to investigate the significance of precautionary saving on U.S farm households. They found that wealth accumulation by U.S farm household is significantly determined by precautionary saving. Specifically, the authors found that 49 Percent increase in wealth accumulation by U.S farm households is accounted for by precautionary saving.

Some studies have shifted attention to evaluating the effect of certain occurrence or activities on specific outcomes. Whereas some of these studies found negative impact of the activities on specific outcomes, (Mensah et al., 2017) others found little or no impact of certain event on specific outcomes (Hartwig & Grimm, 2011). In Ghana, Mensah et al. (2017) evaluated the effect of mining activities on educational outcome of the host communities. Employing the difference-in difference approach to address a potential problem of endogeneity, they found a negative impact of mine opening on years of schooling. Specifically, the authors found that mining activities reduces years of education because of the potential reduction in income particularly income of household engaged in agriculture related activities.

Also, Hartwig and Grimm (2011) examined the 2002 food crisis in Malawi on children's health. Employing the difference-in-difference estimation technique, the authors examined the causal impact of the food crisis. Surprisingly, the authors found that the net impact of the 2002 food crisis was low. They also found that the crisis did not result in general or lasting weight or height lost in children below five years of age.

Largely, most of the literature on impact evaluation used quasi-experimental designs and employed propensity score matching to assess intervention or treatment effects and

this is mainly due to its ability to deal with the problem of endogeneity and selection bias. This study adopts the PSM approach as used by Cox-Edwards and Rodriguez-Oreggia (2009) and Owusu et al. (2011) to correct issues of endogeneity and selection bias since NHIS coverage was not randomized. This technique does not make assumptions about the functional form in specifying the relationship between the predictors and the outcomes. The PSM is also preferred in this case over difference-in-difference (DD), Regression Discontinuity Design (RDD) and the Heckman's Two Stage approach due to the following:

- The DD approach requires that there is a baseline date on both the treatment and control group which is not available.
- There was no clear cut rule that got households to receive NHIS coverage hence RDD cannot be used.
- Heckman's Two Stage approach deals with the restrictive assumption that the standard error term is normally distribute.

The PSM estimator focuses the estimation on the region of 'common support' which excludes participants whose 'p scores' which in this case refers to the probability of household coverage based on observable covariates are lesser or larger than any participant. Some regression techniques in literature use the whole sample in PSM estimation. Rubin and Thomas (2000) however, argued that using the whole unmatched sample leads to robustness misspecification of the regression function and generates bias estimates as compared to using the matched samples.

2.3 Theoretical Framework

This study is based on Friedman's Permanent Income Hypothesis (PIH) which states that individuals or households level of consumption depend on their lifetime income (i.e. defined as expected long term average income). The theory argues that, income is made up of two components: permanent (anticipated) income and transitory (unexpected) income or windfall gain; and that savings will increase (decrease) when there is an increase (decrease) in transitory income. With NHIS coverage for a household, the negative impact of health expenditure on household income will be minimized and therefore income earned either permanent or transitory can be saved or channeled into other investments.

Figure 1 below presents the conceptual framework that informs the analysis of this study. From this conceptual framework, households have a decision to make on whether or not they will enroll on the health insurance. Households that enroll on health insurance, in the event of health shocks do not have to spend so much on healthcare. Households that do not enroll on health insurance will spend a lot on healthcare in the event of health shocks. However, households that decide to enroll on health insurance will have to pay a relatively small amount as premium in order to enjoy the benefits of the scheme. This premium payment will decrease current consumption but in the event of health shock these households will not have to spend so much to access healthcare.

On the other hand, households that do not enroll on health insurance will not have to pay premium. This implies that, their current consumption will rise but in the event of health shocks they have to spend more on healthcare. These expenses in many cases may

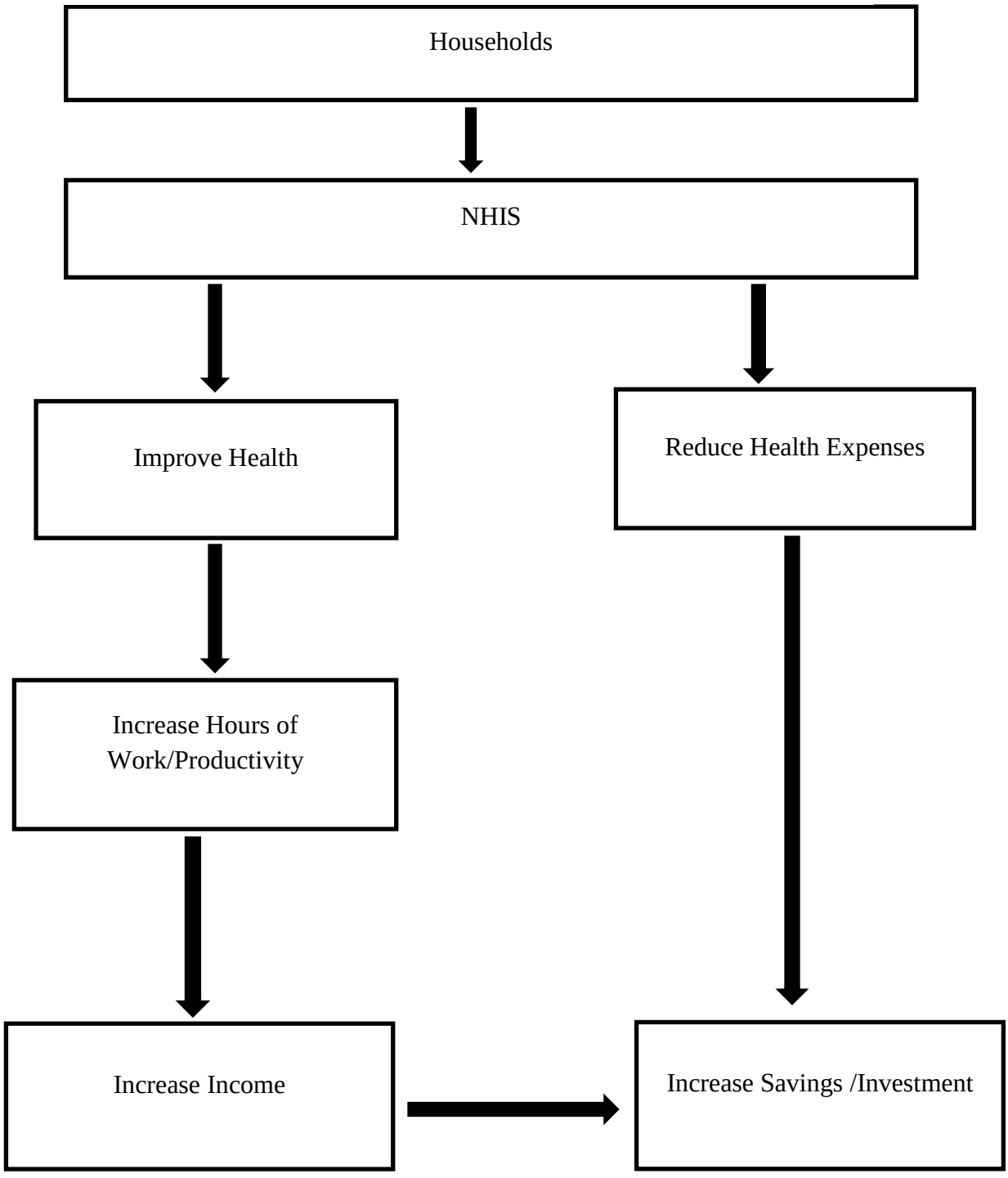
be higher than the premium they would have paid if they had enrolled on the health insurance scheme.[2]

Households that enroll on health insurance will have reduced health expenditure in the event of health shocks. The income that emanate from reduction in health expenditure can be channeled into savings and investment. Also households that enroll on health insurance will be able to access healthcare anytime; this will lead to improvement in their health. Once they are healthy their labour productivity and hours of work will also increase leading to an increase in income. Income and savings or investments are positively related, as income increases there is likelihood that savings and investment will increase.

Households that do not enroll on health insurance will increase their health expenditure in the event of health shocks. This health expenditure increase will lead to a fall in income and a decline in savings and investment. Again without health insurance coverage, access to healthcare becomes a challenge especially for low-income households. This means that their health status will deteriorate leading to a decrease in productivity and reduction in income. The end effect is that, savings and investment will decrease.

[2] Between 2012/2013 NHIS premium was GH₵ 24.00
Currently the NHIS premium is GH₵ 27.00

Figure 1: Conceptual Framework



Source: Author's Construct

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter discusses the research design, econometric model and the impact evaluation technique employed in the study. The variables, matching algorithms and the source of data are also captured in this chapter.

3.1 Empirical Model Specification

Evaluation of programs can be done through various experimental or non-experimental designs. Ideally, a randomized experiment is the best approach, where the sample is randomly assigned into a control and treatment group. Randomized assignment ensures that the two groups are similar based on pretreatment characteristics which helps to reduce or eliminate the problem of selection bias or endogeneity. The problem of counterfactual will not arise in experimental or randomized assignment. This is because, there is an opportunity to examine the direct effect of treatment by observing the behavior of subjects before intervention and after intervention. In experimental design, the difference in outcome between the treated and the control group is the impact of treatment.

This study used an observational data, as a result estimating causal inference or treatment effect can be biased. This is because in observational study and many social policies, treatment is not randomly assigned (Nicholas, 2007). To measure impact, a

comparison of enrolled households with non-enrolled households has to be done. Khandker et al. (2010) proposed that one can mimic randomization by constructing a counterfactual group to overcome the biases that arise as a result of the non-random assignment of treatments. This biassedness of estimates may occur in this study, because there are variables such as income that impact savings and investment, and at the same time impact NHIS enrollment. The situation results in a problem known as endogeneity.

It econometrics this situation occurs due to wrong model specification where both observed and unobserved covariates might be statistically different from zero for the treatment to pass for exogeneity. For instance, in a simple regression model like

$$y_i = \beta_0 + \beta_1 z_i + \mu_i$$

selection of z or omitted variables in z based on observed and unobserved variables [(E (z, ε)] in z may result into a situation of reverse causality, where there is a likelihood that treatment (NHIS) will correlate with unobserved determinants of the outcome variables (savings and children's educational investment). Li (2013) also cited measurement error and simultaneity as causes of endogeneity. Thus, savings can impact NHIS and investment and also savings and investment can impact NHIS. According to Li (2013), measurement error weakens the effect size of regression estimators in explanatory variables while simultaneity occurs when at least one of the independent variables is determined simultaneously along with the outcome variable.

Again, household participation decision may stem from the benefit available from participation. This will result in a problem of selection bias. Selection bias arises when there are unobservable features that affect the error term and the outcome variable, which

result in a correlation between the outcome variable and the error term. This study used Propensity Score Matching (PSM) to estimate the Average Treatment effect on the Treated (ATT) in order to overcome the problem of endogeneity (Cox-Edwards & Rodriguez-Oreggia, 2009; Khandker et al, 2010).

3.1.1 Propensity Score Matching

Propensity score matching estimates the probability of each household receiving a binary treatment by using a probit or logit model (Nicholas, 2007). This helps to generate the counterfactual group. The process involves finding the necessary observable characteristics that presumably account for a household's decision to enroll on NHIS. This is then used to predict enrollment probability for both the enrolled and non-enrolled households. According to Faltemeier and Abdulai (2009), estimating the probability of enrollment against non-enrollment using a probit or a logit model does not really matter because they return similar outcomes. PSM also addresses the issues of multidimensionality and the counterfactual.

The counterfactual represents what the treatment group would have been in the absence of the treatment. This is generated in PSM by matching households enrolled on NHIS to households without NHIS coverage but with similar pretreatment characteristics. The process reduces the biasness level between the two groups and ensures that the counterfactual group is the same as the treatment group except NHIS coverage.

3.1.1.1 Propensity Score

The first step in PSM is to estimate the probability of unit or household receiving the intervention (NHIS) based on observable characteristics. The conditional probability of household having NHIS given observable household characteristics *(Zi)* is known as the propensity score *p(Zi)* (Rosenbaum & Ruben, 1983; Owusu et al 2011). This is given by

$$p(Z)_i = \Pr[(NHIS)_i = |Z_i| = E(NHIS)_i\,|Z_i\,]; p(Z)_i$$
$$= F\{h(Z_i)\} \qquad [1]$$

Where: (N*HIS*) is a dummy variable (1, 0) which indicates whether a household is enrolled on NHIS (1) or not (0), Z_i represents a vector of pre-NHIS household characteristics. This vector comprises of household income, household size, household location, and characteristics of the household head such as educational level, gender, age, marital status, and employment status. The choice of these variables was based on the literature.

$F\{h(Z_i)\}$ is a Probit cumulative distribution.

The equation below gives the propensity scores

$$NHIS_i = \beta_0 + \beta_1 AGE_i + \beta_2 MALE_i + \beta_3 HHSIZE_i + \beta_4 MARRIED_i + \beta_5 EDU_i$$
$$+ \beta_6 EMPLOYED_i + \beta_7 INCOME_i + \beta_8 RURAL_i + \beta_9 REGION_i + \mu_i \quad [2]$$

The next step is to match the sample base on the propensity scores. Matching involves comparing treatment and control samples with similar observable characteristics. Where there are no matches, samples are dropped because a common point for comparison does

not exist. According to Dehejia and Wahba (2002), when the relevant differences between the two samples are captured in the observable (pretreatment) characteristics or covariates, (which occur when outcomes are independent of assignment to treatment conditional on pretreatment covariates) matching methods can yield an unbiased estimate.

Also, matching assumes a region of common support where individuals with the same characteristics (z) should have a positive but not perfect probability (pr) of being either enrolled or non-enrolled. In Heckman et al. (1999), the common support condition ensures that treatment observations have comparison observations "nearby" in the propensity score distribution. The statistical expression of the common support region is given as:

$$0 < Pr(NHIS_i = 1| Z_i) < 1 \qquad [3]$$

Given that households who are enrolled on NHIS may have different characteristics from the rest of the population prior to enrolling on NHIS, it is important to match enrolled and non-enrolled with similar pre-intervention covariates (z). This helps to draw a sample that has similar characteristics with each having an equal chance of being enrolled or non-enrolled.

3.1.1.2 Balancing Test

The balancing assumption and conditional independence assumption (CIA) must be satisfied to ensure robustness in the propensity score estimation. The balancing assumption explains that based on propensity scores each household must have the same

likelihood of enrolling on NHIS just like a randomized experiment. Hujer et al., (2006) are of the view that, the balancing assumption is satisfied when household characteristics, *Zi*, is balanced. The argument of the CIA is that controlling for observable household characteristic, *Zi*, the correlation between enrollment on NHIS (treatment variable) and the outcome variables (savings and children's educational investment) must be equal to zero. According to Khandker et al (2010), the 'p scores' for the treatment and control groups can be the same, but if misspecification exists in the equation, the distributions can be observationally dissimilar and therefore the need to ensure the balancing property is achieved.

To estimate how reliable the matches are, Rosenbaum and Rubin (1983) suggested there should be a "before" and "after" matching comparison of conditions to attest if there have been changes after conditioning on the propensity score. The propensity scores can be re-estimated for enrolled and non-enrolled household to assess the matching quality. This quality is achieved if there are balanced covariates, which requires a very low pseudo-R^2 and F-statistics with a probability of zero after matching (Sianesi, 2004). Statistically the balancing is expressed as;

$$Pr(Z_i \,|NHIS_i = 1) = \Pr(\, Z_i \,|NHIS_i = 0) \qquad [4]$$

3.1.1.3 Treatment Effects

After the balancing condition is satisfied, treatment effect is then computed using the predicted propensity scores. Average Treatment effect on the Treated (ATT), Average Treatment effect for the Untreated (ATU), and Average Treatment Effect (ATE) are the

most common effects. ATT measures the effect of the treatment on the enrolled households; ATU determines the treatment effect on the non-enrolled households and the treatment effect of the entire sample is captured by ATE. In propensity score estimation, the effect of interest is the ATT. This is because impact evaluation analysis seeks to find the effect of an intervention on the treated group (Becker & Ichino, 2002).

Below are the three effects that are evaluated, given the $p(Z)_i$;

$$ATT = \mathrm{E}[E\{Y^*{}_i|(NHIS)_i = 1,\ p(Z_i)\} - E\{Y_i|(NHIS)_i = 0, p(Z_i)\}|(NHIS)_i = 1] \quad [5]$$

$$ATU = \mathrm{E}[E\{Y^*{}_i|(NHIS)_i = 1,\ p(Z_i)\} - E\{Y_i|(NHIS)_i = 0, p(Z_i)\}|(NHIS)_i = 0] \quad [6]$$

$$ATE = \mathrm{E}[E\{Y^*{}_i|(NHIS)_i = 1,\ p(Z_i)\} - E\{Y_i|(NHIS)_i = 0, p(Z_i)\}] \quad [7]$$

The counterfactual outcomes of enrollment and non-enrollment in NHIS are captured by $Y^*{}_i$ and Y_i respectively.

For NHIS to improve savings and children educational investment, ATT, ATE and ATU must be positive. But the extent to which NHIS has improved savings and children educational investment depends on their magnitudes. The treatment effect is estimated with several matching algorithms.

3.1.1.4 Matching Techniques

Several matching algorithms are available for use. The most common ones among them include: kernel matching, nearest neighbor matching methods, stratification matching and caliper or radius matching. In spite of all these matching algorithms, the specific one to be used depends on the data available.

The nearest neighbor matching algorithm matches enrolled households to a closest non-enrolled household based on propensity scores. Here, matching may be carried out "with" or "without" replacement. Matching a non-enrolled household more than once is considered as matching with replacement whereas matching without replacement deals with matching non-enrolled household only once in the process. Matching with replacement provides a better estimate because enrolled households are matched with closest comparison group; hence biasness is reduced (Khandker et al, 2010). Matching without replacement produces a bias estimate, especially when the control group is small.

Kernel matching uses the weighted average outcome of the non-enrolled household (with the highest weight being placed on those with scores closest to the enrolled household) to match each enrolled household to the non-enrolled household. This method produces low variance as a result of the volume of information used in the estimation (Heinrich et al., 2010).

In caliper matching a maximum propensity score distance is specified, where several of the non-enrolled are matched within pre-defined propensity score radius. This method of matching is advantageous because the matching is done based on the available

comparison units within the caliper. Hence allows for the rest of the units to be used when good matches are not found (Dehejia & Wahba, 2002). Caliper matching gives room for matching "with" or "without" replacement.

Stratification matching ensures that the common support of the propensity scores is subdivided into strata. Here the treatment effect within each stratum is calculated using the mean difference in the outcome variable. Rosenbaum and Rubin (1983) refer to this as the sub-classification or interval matching. Literature provides that five subclasses are mostly enough to remove about 95 percent of bias associated with one single covariate (Cochran & Chambers, 1965).

All the above algorithms may produce poor matches hence there is the need to make use of the common support condition to serve as a check on the poor matches. The type of algorithms used depends on the research as there is no clear rule that make one technique better than the other (Becker & Ichino, 2002). Enrolled households and non-enrolled household can be matched one-to-one or one-to-many based on their propensity scores. In one-to-one matching one enrolled household is matched to only one close related non-enrolled household whereas in one-to-many matching each enrolled household is matched to more than one closely related non-enrolled household.

Table 1: Household Characteristics Used To Estimate the Propensity Scores

Variables	Meaning	Measurement
Age	Age of the household head	Years
Gender	Gender of the household head	Male =1 Female = 0
Marriage	Marital status of the household head	Married = 1 Unmarried = 0
Educ	Educational level of the household head	None = 0 Primary = 1 Secondary = 2 Tertiary = 3
HHsize	Household size	Number of persons in the household
Empsta	Employment status of the household head	Employed=1 Unemployed=0
Income	Household income	Continuous
Rural	Location of household	Rural = 1 Urban= 0
Region	Region of the household	Western=0 Upper West=1 Central=2 Greater Accra=3 Volta=4 Eastern=5 Ashanti=6 Brong Ahafo=7 Northern=8 Upper East=9

Source: Author's Definition, 2018.

3.2 Impact Evaluation

Impact evaluation seeks to answer the cause-and-effect question by assessing the net effect of a program or an intervention (Blackstock et al., 2007). According to Kumar (2005), impact evaluation is the most widely practiced type of evaluation used to assess what changes can be attributed to a particular intervention, policy or program. For *ex post* evaluation, the evaluation is mostly carried out after the program has been adopted for some time or after the program has ended. Quantitatively, impact evaluation can be performed in two ways: "before and after" (randomized control trials) and "with and without" (*ex post*) analysis.

"With and without" (*ex post*) estimation compares the changes in outcome variables of the participant group with the outcome variables of the non-participant group (Wainaina et al., 2012). This estimation technique uses the comparison group as a proxy for what would have happened to the participant group if the intervention did not take place (Wainaina et al., 2012). Counterfactual establishment in impact evaluation is, very critical. This is because the counterfactual outcome tells the alternative situation or outcome in the absence of the program or the intervention (Baker, 2000). The counterfactual outcome is not observed hence estimated using statistical methods. Two main types of evaluation designs are mostly used to estimate the counterfactual outcome; these include randomized (experimental) and comparison group (quasi-experimental) designs.

3.2.1 Experimental Design

Experimental design or the Randomized Control Trials (RCTs) is considered as the 'gold standard' for impact evaluation. In this evaluation design, each individual, household or participant has an equal chance of being selected into either the control or treatment group. Thus, selection into each group is random. The groups are however differentiated based on the chance of receiving the program or the intervention (Heinrich et al., 2010). The treatment group receives the intervention and the control group does not. The control group is similar in characteristics to the treatment with the exception of the intervention; hence serves as a measure for what would have happened to the treatment group without the intervention. The difference in means between the treatment and control group measures the impact of the intervention. According to Baker (2000) experimental design evaluation technique is the most robust and considered the best in estimating the effect of an intervention or a program. Measuring the effect of an intervention through randomization is relatively simple.

However, this design comes with some challenges. These include: (1) problems with ensuring that samples are randomly selected into treatment and control groups, (2) the possibility of individual in either of the two groups (control or treatment) to switch group or drop out of a group and (3) experimental design are mostly expensive and time consuming especially in periods of data collection.

3.2.2 Quasi-Experimental Design

Quasi-experimental designs are adopted when there is no room to apply the RCTs (Wainaina et al., 2012). In other words, quasi-experimental designs are used to evaluate interventions that do not allow random assignment of sample into treatment and control groups (Wainaina et al., 2012). Thus, in the case of health insurance, policy makers cannot randomly assign some households to receive health insurance whiles other household do not receive health insurance. This definitely will raise ethical concerns. Quasi-experimental methods allow the evaluation of intervention in which treatment status is not randomly assigned.

This type of design results in two sources of bias: (1) targeting bias or project placement, which occurs when the target population or location of an intervention is not random and (2) selection bias, which arises when participant of an intervention choose to participate or not participate in an intervention (Davis et al., 2010).

In quasi-experimental design, a comparison group with similar observable characteristics to the treatment group is generated to deal with any possible biases i.e., selection bias, which arises when participant of an intervention choose to participate or not participate in an intervention (Davis et al., 2010). The comparison group produces the counterfactual outcome. To estimate the impact of the intervention, the difference between the mean outcome variables of the treatment group is compared with that of the comparison group. Several econometric methods are used to properly assess the effect of the intervention (Wainaina et al., 2012). These methods link the treatment group to the comparison group based on similar characteristics. Due to the challenges with randomly assigning interventions, majority of literature on program evaluation are therefore

centered *ex post* evaluation. Quasi experimental design can be performed after program implementation and on already existing data. The methods include: matching methods, Double Difference, Regression Discontinuity Design (RDD), Instrumental Variable (IV), and Heckman's Two Stage model. The most commonly used matching method is Rosenbaum and Rubin's Propensity Score Matching technique (PSM) (Rosenbaum & Rubin, 1983).

3.3 Definition of Variables

3.3.1 Dependent Variables

The dependent variables are described in this section. The variables are household savings and children's educational investment. The section also discusses how these variables are measured.

Household savings

This variable is measured with a question that asked respondent or households how much money they currently have in their household formal savings and informal savings accounts (referred to locally as 'susu' in Ghana) account. Zeller (1994) opines that cash set aside as savings can be in the form of physical cash in one's wallet, interest bearing asset, savings account or informal savings mechanisms known as "susu" in Ghana.

Children's Educational Investment (CEI)

This comprises of all expenditures for the purpose of education made on children in the household and that is children of ages 2 to 15 years. These expenditures include: school fees, extra classes fees, books and supplies, Parent Teacher Association (PTA) contributions, uniforms, examination fees, sport wears, transportation 'to and from school' and feeding while in school. The sum of these expenditures is used as a proxy for household education investment.

These expenses are mostly documented and receipts are given to prove payment hence very accurate. The sample is restricted to households with children from the ages of two (2) to fifteen (15) years because most households do not keep their children above two years at home. On average by age two, children start schooling. The Labour Law, 2003 (Act 651) in Ghana provides that a person aged sixteen (16) years and above can engage or enter the labour market and as such seen as an adult. Thus restricting the age from two (2) to fifteen (15) best captures children, hence expenses made on their education is described as children's educational investment.

3.3.2 Independent Variables

National Health Insurance Scheme (NHIS)

A household is classified as covered on NHIS if at least half of the household members are covered under the scheme. This results in a binary independent variable given by:

$NHIS_i$ = 1 if household is covered by the scheme

$NHIS_i$ = 0 if household is not covered by the scheme

Educational level

Education plays a key role in determining an individual or household's savings through income level. Households headed by highly educated individuals are likely to save more than households that are headed by less or uneducated individuals (Gordon & Craig, 2001). Highly educated heads of households have a better knowledge on savings and investment. Also, Individuals with higher education stand a better chance of earning higher income (Pszcharopoulos, 1995) and improve their savings. According to Gordon and Craig (2001), higher education has a positive relationship with wealth and further raises the probability of acquiring a higher paid job. The increase in income that results from higher education means that household will now have enough income to save after they have made their necessary expenses.

Once the head of the household is highly educated, he or she will want same for the household members, most especially children. This is because they want their children to be at higher level in society and possibly take after them when they are no more. Most children also look up to their parents or adult members of the household or community as they grow up. Thus, a household headed by a highly educated individual is most likely to invest more in children's education. Each household falls within four categories of educational level. That is, no education, primary, secondary, and tertiary levels of education. Education is expected to be positively related to savings and

children's educational investment. The magnitude of the increase depends on the category one falls in.

Age

Age is a continuous variable and is measured in years. The age of the household head is very much significant in determining household savings and children's educational investment. The older an individual is the less likely the person will save and invest in children's education. As a person becomes old the energy with which he/she uses in work activities reduces, leading to reduction in income. Once income level falls, savings will fall and educational investment will decline. Also, households headed by older persons have accumulated a lot of assets according to the life cycle theory hence are well prepared against vulnerabilities as compared to household headed by younger individuals (Modigliani & Brumberg, 1954; Modigliani & Ando, 1963).

Gender

Gender indicates the sex of the household head. This variable was coded 1 for males and 0 for females thus making it dummy. Whereas some studies found female headed households to save and invest more, other studies found male headed households to invest and save more. The expected impact of gender on savings and children's education investment is therefore ambiguous.

Household Size

A person or group of persons, who are related or unrelated, share cooking arrangement, recognize an adult female or male as the head, and live in the same house together is known as a household (GSS, 2014). The size of a household is prominent in determining savings level and children's educational investment. A large household is likely to spend more and have high expected income. If there are more household members in the working category, it is expected that there will be more income and hence higher savings and vice versa. Further to this, investment in children's education will not be high because there are less of them in the household.

Marital Status

Marriage plays a very important role in children's education and household savings (Haveman & Wolfe , 1995; Glewwe, 2002). This variable is coded 1 if household head is married and 0 if the household head is not married. A household is more likely to save more and invest highly in children's education, if the household head is married. This is due to the likelihood of a higher income, because income from the spouse will add up to the family income. Also, the couple will make joint decisions as to how to make use of the income in terms of investments that would yield a maximum return for the household. It is therefore expected that a household will save more and invest highly in its children's education if the head of the household is married.

Employment Status

The household head's employment status is very essential in determining the household savings and investment in children's education. Employed household members have a source of regular income and can make regular savings and investment decisions. Employment status is a dummy, with 1 denoting employed and 0 assigned to the unemployed. It is expected that employment will impact positively and significantly on household savings and children's educational investments.

Household Income

This is measured as the sum of all monthly monetary income received by the household regardless of source in a year. It is a continuous variable. Income is one important variable in household savings and investment decisions. (Keynes, 1936; Modigliani & Ando, 1963). The Permanent Income Hypothesis and Absolute Income Hypothesis both predict a positive relationship between income and savings. Kibet et al. (2009) and Sameroynina (2005) show that income positively influences saving. Thus, a positive relationship is expected between income, savings and children educational investment.

Household Expenditure

This is a continuous variable which measures the monthly expenditures made by households. Economic theory has it that saving plus expenditure equals one's income. With this, it is expected that as the expenditure levels reduce, savings will increase and

vice versa. A household with higher expenditure is expected to save less and invest less in children's education.

3.5 Source of Data

This study used the Ghana Living Standards Survey (GLSS) round six conducted in 2012/2013. The survey was undertaken by GSS with support from World Bank. It is a nationally representative survey which collects data on different households at a point in time. Information collected includes demographic characteristics, income and expenditure, education, assets and liabilities, employment, health, savings, migration, remittance and household agriculture.

The GLSS is the most reliable data for household analysis in Ghana. Currently, six rounds of the data have been collected with the last one being the round six. 16772 households in 1200 enumeration areas were interviewed in the round six of the survey. Aside the health information, the GLSS 6 asked NHIS related questions. That is, whether a household is registered or covered on NHIS and also if the household has accessed healthcare using the NHIS.

Ghana implemented the NHIS in 2003; this means that NHIS coverage as a variable can only be seen in GLSS5 (2005/2006) and GLSS6 (2012/2013). The GLSS6 data set as stated earlier, has the NHIS coverage as a variable. Despite the fact that GLSS5 has that same variable, GLSS6 is much appropriate for this study because within that period the NHIS has gained grounds and coverage has increased compared to GLSS5. Also, the period is the most recent of all the GLSS data sets and contains current information

(income level. educational level, marital status, age, consumption and savings level) on households.

3.5 Chapter Summary

This chapter focused on the data and methodology of the study. It further described the variables and the source of data for the study. The econometric model and empirical estimation technique are spelt out in this chapter. To achieve the study's objective, the propensity score matching (PSM) estimation technique was espoused to assess the impact of NHIS on household savings and children's educational investment.

CHAPTER FOUR

ANALYSIS AND DISCUSSIONS

4.0 Introduction

This chapter presents and discusses the results of the study in accordance with the objectives stated in chapter one. The chapter is made up of two sections: first of all, descriptive statistics of enrolled NHIS households and non-enrolled NHIS households as well as the descriptive statistics of factors that determine household NHIS enrollment are captured in the first section. The second section presents the results of the Propensity Score Matching (PSM) impact estimations and findings from the various matching algorithms.

4.1 Descriptive Statistics

The round 6 of the GLSS collected data on 72,372 individuals in 16,772 households. This study focuses on the household level analysis. The summary statistics of the variables used in this study are presented in Tables 2, 3 and 4, respectively. Table 2 and 3 presents the summary statistics of the entire 16,772 households whereas Table 4 shows the disaggregated summary statistics for NHIS and non-NHIS households.

As shown in Table 2, 71.89 percent of households in the sample are male headed whereas 28.11 percent of households are headed by females. In terms of NHIS coverage, 43.51 percent of the households captured in the data is covered under NHIS whiles 56.49 percent are not covered. Out of the 4,716 female headed households, 2,191 representing

46.45 percent are covered under NHIS whiles 2525 households representing 53.55 percent are not covered. 5107 (42.36%) households out of the 12,056 male headed households have NHIS coverage whereas 6949 (57.64%) do not have NHIS coverage. This indicates that, more female headed households have NHIS coverage as compared to their male counterparts (See Table 2).

Table 2: Household NHIS Coverage by Gender

Sex of HH Head	NHIS	No NHIS	Total	
	Count	Count	Count	%
Male	5107	6949	12,056	71.89
Female	2191	2525	4716	28.11
Total	7298	9474	16772	100

Source: Author's Estimations from GLSS 6 data

From Table 3, the average age of a household head in the sample is 45.7 years. On average, households are made up of four (4) members with an average income, expenditure and savings of GH₵7,296, GH₵8,115 and GH₵ 765 respectively. The estimates show that, on average households spend more than their income. 67 percent of household heads are married. In terms of employment, almost all household heads indicated some form of employment (99.63%). In terms of educational attainment, 28.37 percent have no education, 3.33 percent and 21.03 percent have pre-school and primary education as their highest level of education respectively. The results also show that

majority of household heads (37%) have secondary education as their highest level of educational attainment whiles 10.27 percent of household heads have tertiary education. Households invest an average of GH₵ 427.17 in children's education.

Table 3: Characteristics of Household Head: Income, Expenditure, Savings and Children's Educational Investment

Variables	Obs	Mean	Std. Dev.	Min	Max
Age of Head	16,772	45.79678	15.89304	15	98
Marital Status of Head	16,769	0.6739944	0.4687633	0	1
Household Size	16,772	4.254188	2.784496	1	29
Educational level of Head					
Tertiary	16,772	0.1027088	0.3035872	0	1
Secondary	16,772	0.3704408	0.4829371	0	1
Primary	16,772	0.2102887	0.4075257	0	1
Pre-school	16,772	0.0333254	0.1794902	0	1
Employment Status of Head	16,321	0.996385	0.0600177	0	1
Household Expenditure	16,772	8115.021	7579.569	31.2	146345.4
Household Income	16,772	7296.01	22691.11	-423640.3	1232713
Household Savings	16772	765.1671	4267.044	0	420000
Household Child. Educ. Invest.	16,772	427.1706	1353.664	0	59884

Source: Author's Estimations from GLSS 6 data

4.2 Descriptive Statistics of Enrolled and Non-Enrolled NHIS Households

The summary statistics of NHIS (Enrolled) and non-NHIS (Non-enrolled) households are presented in Table 4. From the balancing table, the results suggest that differences exist between enrolled and non-enrolled households based on the explanatory and outcome variables. For instance, gender, marital status and average age differ significantly between enrolled and non-enrolled households. Again, average household size, household income and household expenditures vary significantly between enrolled and non-enrolled households. This implies that marital status, age, gender, household size, household income and household expenditure may be significant in determining household's decision to enroll NHIS. There are also statistical differences between enrolled and non-enrolled household with regards to the outcome variables (savings and children's educational investment). Post matching balancing test is carried to check where the matched sample used for the impact estimates are balanced.

Table 4: Descriptive Summary Statistics of Enrolled and Non-Enrolled Households

Variable Names	Enrolled Households Mean	Non-Enrolled Households Mean	Mean Difference	t-value
Treatment Variable				
NHIS Enrollment 1=Yes, 0=No				
Outcome Variables				
Household Savings	780.5898	751.2401	29.3497 ***	3.3190
Household Invest. in Child Education	480.3225	386.8217	93.5007***	4.4404
Independent Variable				
Household size	4.4063	4.1356	0.2707***	6.2582
Age of Household Head	47.1133	44.7722	2.3409***	9.4936
Gender of Household Head	0.6992	0.7330	-0.0338***	-4.8213
Marital status of Household Head	0.6969	0.6562	0.0407***	5.5826
Employment status of Household Head	0.9960	0.9966	-0.0006	-0.06205
Education of Household Head	1.6072	1.6081	-0.0009	-0.0475
Household Income	8293.632	6532.792	1760.84***	4.9893
Household Expenditure	8733.481	7643.413	1090.06***	9.2651
Household location (Rural)	0.5343	0.5706	0.0363***	4.7002

*,**, and ***=10% ,5%, 1%Significant level respectively Diff in mean =mean(enrolled) – mean(non-enrolled)

Source: Author's Computation from GLSS6

4. 3 Determinants of NHIS Enrollment

In order to estimate the probability of a household enrolled in NHIS, PSM used a probit regression model. Table 5 presents the output of the probit regression yielding the factors that influence household's decision to enroll on NHIS. The result shows that, household's as well as household head characteristics influences household's decision to enroll in NHIS.

Characteristics of the household head such as marital status, age, gender and educational level significantly influence household's decision to enroll on NHIS. From Table 5 it is observed that households that are male headed are less likely to enroll on NHIS as compared to their female counterparts. This agrees with the findings of Asenso-Okyere et al., (1997) who found that male accounted for 63 percent of wiliness to enroll on NHIS. The household head's marital status is positive and significantly influences the household decision to enroll on NHIS. The age and educational level of the household head positively determines the household's decision to enroll on NHIS. Similar to the findings of Asenso-Okyere et al., (1997) a year increases in schooling increases the wiliness to enroll on NHIS by 3.4 percent. This means that households who are headed by relatively older and educated people are more likely to enroll on NHIS compared to relatively younger and less educated ones. A year increase in age increases the likelihood of NHIS enrolment by 0.5 percent. These variables are statistically significant at 5 percent.

Household characteristics that also influence household's NHIS enrollment decision include household expenditure and remittances. The results show that, households that receive remittances are 25 percent more likely to enroll on NHIS as

compared to households that do receive remittances. The probable reason for the positive relationship between remittances and NHIS enrolment is that households that benefit from remittances are able to pay their NHIS premium. Asuming (2013) noted that the challenge of premium payment is one of the reasons most households (especially poor households) are not enrolled on NHIS. Households with higher expenditure are more likely to enroll on NHIS compared to households with less expenditure. A cedi increase in household expenditure result in a 9.2 percent chance of enrolling on NHIS.

Furthermore, other factors such as region, influenceNHIS enrollment decision of households. Table 5 reveals that the household head's employment status has no significant influence on household's decision to enroll on NHIS. The result indicates that a household's NHIS enrollment decision is not influenced by employment status of the household head.

4.4 Propensity Score Matching Estimates

As stated earlier, the first step in propensity score estimation is to generate a propensity score (p score) based on the household observable characteristics. These p scores help to match the treated households to similar households in the control group. In addition to estimating the likelihood of households enrolling on NHIS, the probit estimation in Table 5 also helps to estimate the p scores on which the sample is matched.

Table 5: Probit Regression Estimating the Probability of Household Enrollment on NHIS

Variables	Coefficients	Std. Err	Z	P>|z|
Age of Head	0.0056246***	0.0010425	5.40	0.000
Gender of Head	-0.200127***	0.0426196	-4.70	0.000
Marital Status of HH	0.171582***	0.0446388	3.84	0.000
Educ. Level of Head	0.0344966**	0.0146095	2.36	0.018
Household Expense	0.0920025***	0.0149064	6.17	0.000
Household Size	-0.0112125	0.0072695	-1.54	0.123
Employ. Status of Head	-0.2990937	0.2524841	-1.18	0.236
Household Remittance	0.2494133***	0.0586779	4.25	0.000
Region	0.059326***	0.0071114	8.34	0.000
Survey Year	0.3019673***	0.0437807	6.90	0.000
Constant	-1.625433***	0.2860679	-5.68	0.000
Log Likelihood	-3556.6703			
Pseudo R2	0.0291			
P> chi2	0.0000			

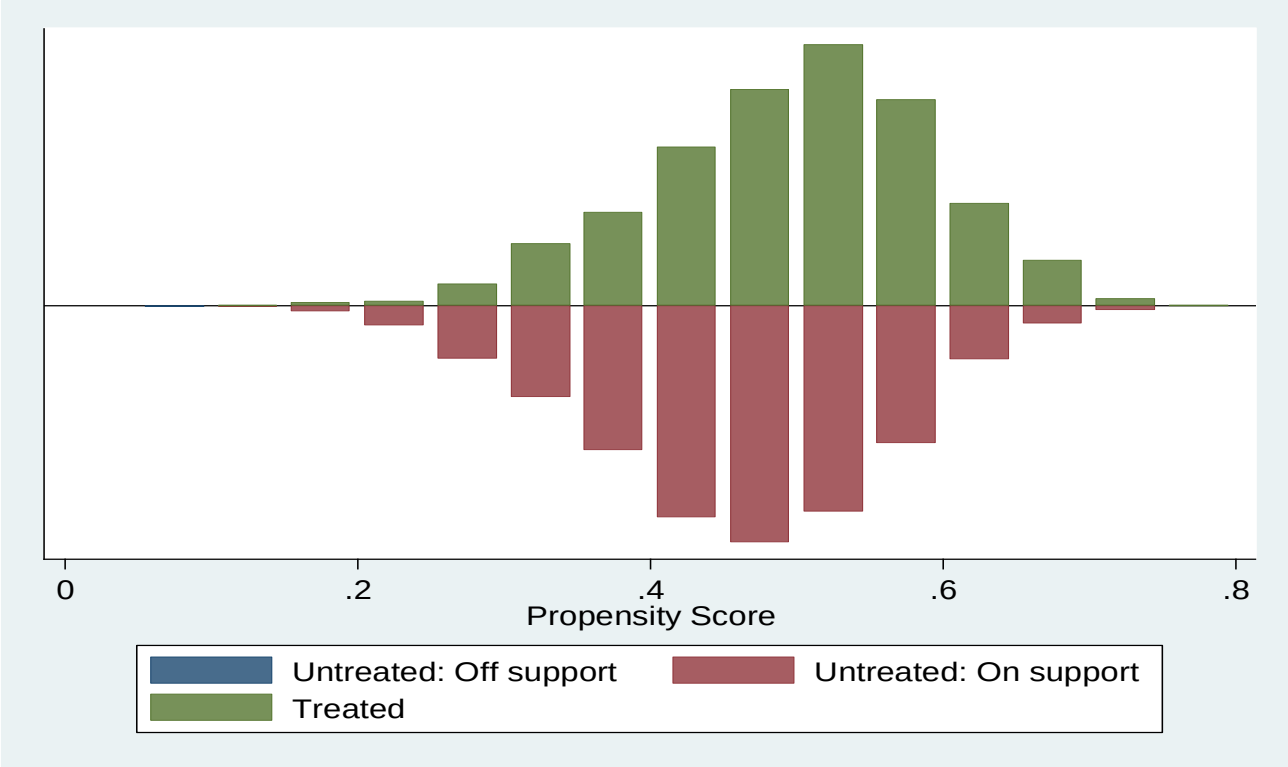
*, **, and *** = 10% , 5%, 1% Significant level respectively

Source: Author's Computation from GLSS6

As indicated in chapter three, there are some conditions that must be met in order to estimate the treatment effect. One of such is the balancing property which says that all observed household characteristics must be balanced between the treatment and control in the matched sample. In order to satisfy the balance condition and ensure that the observed household characteristics between the control (households without NHIS) and treated (households with NHIS) are balanced, the study estimated the propensity scores by employing a probit regression model. The study followed (Leuven & Sianesi, 2008) to estimate the treatment effect.

Figure 2 below shows the distribution of propensity score for the matched sample. The graph indicates that the covariates of the control and treated are balanced after matching. This confirms that p score estimation balance effectively the enrolled and non-enrolled households sample used for the impact estimation.

Figure 2: Propensity Score Graph



Source: Author's Estimation

4.4.1 Test for Matching Quality

Table 6 below presents the indices of the matching quality. The outcome indicates a significant decrease in the absolute bias of the outcome variable, savings and children's educational investment. Here, the decline in the mean absolute standardized bias between matched and unmatched samples is used to determine the balancing powers of the estimation. From Table 6, the mean bias before matching was 29.3 whiles mean bias after matching is 1.3 for the savings outcome. For children's educational investment mean bias before and after matching were 33.5 and 1.9 respectively. It can be observed that after matching, the mean bias in the covariates is below 20 percent level of bias reduction as

proposed by Rosenbaum and Rubin (1985). Thus, the covariates were significantly balanced by employing the propensity score matching approach.

Table 6 also presents the pseudo-R2 before and after matching with their p-values in the parenthesis. As shown in the second and third columns, the pseudo R2 after matching is fairly low and the diagnostic statistics is not significantly different from zero. The pseudo-R2 before and after matching for household savings is 0.422 and 0.004 respectively whiles pseudo R2 before and after matching for children's educational investment is 0.576 and 0.007 respectively with their p-values in parenthesis. This implies that there exist no significant differences between enrolled households and non-enrolled households after matching. The p-value reduced from a highly significant level of 0.004 and 0.007 before matching to a highly insignificant level of 0.723 and 0.125 respectively after matching. Thus, there is no systematic variance in the distribution of covariates between households enrolled on NHIS and households who are not enrolled. This implies that the general outcome from the matching process is sufficient in balancing the covariates between NHIS enrolled households and non-enrolled households (Sianesi, 2004).

Table 6: Indices of the Matching Quality

Outcome Variables	Pseudu R2 (Unmatched)	Pseudu R2 (Matched)	Mean bias (Unmatched)	Mean bias (Matched)	Bias Reduced (%)
HH Savings	0.422	0.004	29.3	1.3	66
	(0.0009)	(0.723)			
HH Child Edu. Invest.	0.576	0.007	33.5	1.9	58
	(0.0005)	(0.125)			

p-values in parenthesis

Source: Author's Estimation

Table 7 below also assesses the matching quality by performing post matching balancing test. The results indicate that after matching the characteristics used in estimating the p scores were balanced in both groups. From Table 7, income which is one of the most important drivers of savings and investment is not significant (t value = -0.88) after matching, indicating that there is no significant difference between the income levels of the treatment and control households. Household size is insignificant as well (t value =0.04), meaning that there is no difference between the control and treatment group in terms of household size of the matched sample.

Also, gender, age, marital status, employment status and educational level of the household head were not significant after matching. This is indicative of the facts that on average enrolled and non- enrolled households are of the same age, have the same level of education and are employed. Thus, there are no differences between enrolled are non-

enrolled households after matching. Since these covariates are balanced, any differences in savings and investments cannot be attributed to differences in pretreatment characteristics across the two groups.

Table 7: Test for Matching Quality

Variable Names	Enrolled Households Mean	Non-Enrolled Households Mean	Mean Difference	t-value
Treatment Variable				
NHIS Enrollment 1=Yes, 0=No				
Outcome Variables				
Household Savings	2468.2	2636.3	-168.1	0.35
Household Invest. in Child Education	667.81	569.78	98.03	1.53
Independent Variable				
Household size	4.4137	4.4094	0.0043	0.04
Age of Household Head	46.943	46.878	0.065	0.10
Gender of Household Head	0.65157	0.63484	0.01673	0.89
Marital status of Household Head	0.69225	0.67245	0.0198	1.09
Employment status of Household Head	0.9954	0.99647	-0.00107	-0.43
Education of Household Head	1.7905	1.7839	0.0066	0.16
Household Income	9718.6	10322	-603.4	-0.88
Household Expenditure	10737	9902.1	834.9**	2.44
Household location (Rural)	0.44973	0.49685	-0.04712**	-2.41

*,**, and ***=10% ,5%, 1%Significant level respectively Diff in mean =mean(enrolled) – mean(non-enrolled)

Source: Author's Computation from GLSS6

4.4.2 Treatment Effects

4.4.2.1 Treatment Effect of NHIS coverage on Household Savings

Table 8 below represents the ATT impact estimates from the nearest neighbor matching for savings as an outcome variable. The results show an ATT effect of 0.14 implying that households that are enrolled in NHIS save 14 percent more than households that are not enrolled. This difference is statistically significant at 10 percent. Similar to the nearest neighbor matching, the Kernel matching estimation results as presented in Table 9 also shows a statistically significant ATT effect of 0.15 at 5 percent (t-statistics =2.11), suggesting that NHIS enrollment in Ghana increased savings by approximately 15%. In monetary terms, households with NHIS coverage tend to save an average of GH₵173.82 whiles households without NHIS coverage save GH₵ 150.50. The result indicates that households with NHIS coverage save about GH₵ 23.32 more than households without NHIS coverage. This finding indicates that, the relationship between NHIS and savings could be more than just uncertainty and precautionary savings (Starr-McCluer 1996).

This result is consistent with the findings of Starr-McCluer (1996) who found a positive impact of social health insurance and wealth holdings in the US. Similarly, the findings are consistent with the results of Guariglia and Rossi (2004), Hsu (2013) and Qiu (2016). These authors found a positive impact of various health insurance on savings. Specifically, Hsu (2013) and Qiu (2016) found that Health Insurance increases savings and investment in stock respectively for US households.

However, the result contradicts the findings of some researchers such as Gruber and Yelowitz (1999), Chou et al. (2003), Cheung and Padieu, (2013) who found a

negative impact of health insurance on savings in Taiwan. The probable reason for the different results between Starr-McCluer 1996 and Chou et al. 2003 is that the latter focused on the impact of National Health Insurance on only precautionary saving. This study focuses on the total savings balance of household and not just precautionary saving and this might have accounted for the positive results.

Kirdruang, and Glewwe, (2017) argued that NHIS coverage can increase income through the reduction of health expenditures. This will lead to an increase in savings and consumption. Also, NHIS coverage has the tendency to decrease precautionary savings. The author concludes the two savings effects are of opposite sign hence if the increase and decrease values are the same will cancel out. The positive effect of NHIS on savings could mean that the magnitude of increase in savings was greater than the decrease in precautionary savings.

Table 8: Treatment Effect on Savings (Nearest Neighbor Matching)

Variable	Sample	Treated	Control	Difference	Std Error	T-stats
HH Savings	Unmatched	5.16066247	5.01095147	0.149710999	0.067114438	2.23
	ATT	5.15801016	5.01400616	0.144003996	0.074936208	1.92

Source: Author's Estimation

Table 9: Treatment Effect on Savings (Kernel Matching)

Variable	Sample	Treated	Control	Difference	Std Error	T-stats
HH Savings	Unmatched	5.16066247	5.01095147	0.149710999	0.067114438	2.23
	ATT	5.15801016	5.01103645	0.14697371	0.06976751	2.11

Source: Author's Estimation

4.4.2.2 Treatment Effect of NHIS coverage on Children's Education

The impact of NHIS on children's educational investment is presented in table 10 and 11. Generally, NHIS impacts investment in children's education positively. The result from the nearest neighbor matching as shown in table 10 indicates that, NHIS increased children's educational investment by 18 percent. In other words the impact of NHIS on children's educational investment is 18 percent. Statistically this finding is significant at 5 percent (t-statistics = 2.55). Kernel matching algorithm in Table 11 also produced a significant result and showed an increase in children's educational investment by 19.9 percent (t = 2.99), suggesting that NHIS enrollment in Ghana increased investment in children's education by approximately 20%.

In monetary terms, the nearest neighbor matching result indicates that, households with NHIS coverage invest GH₵374.48 in children's education whiles households without NHIS coverage invest GH₵ 312.31 in children's education. The result indicates that households with NHIS coverage invest GH₵ 62.17 more in children's education compared to households without NHIS coverage. The kernel matching result showed a similar result for the NHIS enrolled household (GH₵374.48) however, the result for the

non-enrolled households is slightly different thus households without NHIS coverage invest GH₵ 306.89 in children's education. Both results from the two matching algorithm indicates that households with NHIS coverage invest over GH₵ 60 more in children's education compared with households without NHIS coverage.

This outcome indicates that NHIS coverage increases investment in Children's education significantly. The results are indirectly consistent with researches that found negative effect of health and income shocks on educational investment (Ginja, 2010; Dhanaraj, 2015; Demenet, 2016; Nordman et al., 2017). These studies found that health shocks reduce investments. Specifically, Dhanaraj, (2015) found that parental health shocks reduce children'seducational investment. The finding from Dhanaraj (2015) confirms this result that NHIS increases children's educational investment. Thus NHIS coverage reduces health expenditure and mitigates the impact of health shocks leading to an increase is children's educational investment.

Also, NHIS coverage indirectly increases household income; this income can then be channeled into investment or savings. Ginja, (2010) and Nordman et al., (2017) found a negative impact of income shock on household educational investment. Since NHIS coverage increase household income (through the reduction health expenditure), households will have more income to invest in education which is an important variable for human capital accumulation.

From the result of the impact of NHIS on savings and children's educational investment, it is observed that households invest more into educational investment than

savings. Whiles NHIS increased savings of enrolled households by GH₵ 23 more, NHIS increased educational investment of enrolled households by GH₵ 62 more.

Table 10: Treatment Effect on Children's Educational Investment (CEI) (Nearest Neighbor Matching)

Variable	Sample	Treated	Control	Difference	Std Error	T-stats
HH CEI	Unmatched	5.92610585	5.77393131	0.152174548	0.063896037	2.28
	ATT	5.92553749	5.74399726	0.181540231	0.071087737	2.55

Source: Author's Estimation

Table 11: Treatment Effect on Children's Educational Investment (CEI) (Kernel Matching)

Variable	Sample	Treated	Control	Difference	Std Error	T-stats
HH CEI	Unmatched	5.92610585	5.77393131	0.152174548	0.063896037	2.38
	ATT	5.92553749	5.72650058	0.199036909	0.066553888	2.99

Source: Author's Estimation

4.4.2.3 Treatment Effect on the disaggregated components of Children's Educational Investment

Table 12 and 13 show the results from disaggregated components of children's educational investment, specifically extra tuition and books. The results show that NHIS coverage increased expenditure in extra tuition and books. The ATT on extra tuition and

books are 12 and 25 percent respectively (10% and 1% significance level respectively). The results specifically suggest that investment in extra classes and books increased significantly as a result of NHIS coverage.

In monetary terms, households with NHIS coverage invest GH₵63.36 in providing extra tuition for children whiles households without NHIS coverage invests GH₵ 55.89 in in providing extra tuition for children. The result indicates that households with NHIS coverage invest GH₵ 7.47 more in children's education compared to households without NHIS coverage. Also, in terms of books purchase, households enrolled on NHIS invest GH₵19.38 into purchasing of books for children whiles non-enrolled households invest GH₵ 15.08 into purchasing books for their children. This indicates that, NHIS enrolled households invest about GH₵4.30 more in purchasing children's books compared to non-enrolled NHIS households.

The reasons surrounding these results are that, expenditures in relation to school fees, sports, PTA levy, feeding and transportation are fixed. Once there is an increase in income (as a result of reduction in health expenditure), if households want to invest in education, they can increase the expenditure that are not fixed, such as purchase of books and increase in extra tuition. This is confirmed by the study of Lokshin and Sawada (1999) who found that households with surplus income invest in providing private tuition for their children. Also the study is consistent with the findings of Ginja 2010 who found that, low income households invest part of their unexpected income into purchasing supplies or books for their children.

Table 12: Treatment Effect on Extra Tuition (Kernel Matching)

Variable	Sample	Treated	Control	Difference	Std Error	T-stats
Extra Tuition	Unmatched	4.15243347	4.0135405	0.138892969	0.065848524	2.11
	ATT	4.14878756	4.02333165	.125455912	0.0680519	1.84

Source: Author's Estimation

Table 13: Treatment Effect on Books (Kernel Matching)

Variable	Sample	Treated	Control	Difference	Std Error	T-stats
Books	Unmatched	2.96682724	2.73018801	0.236639225	0.073622372	3.21
	ATT	2.96417288	2.71328261	0.250890265	0.076202546	3.29

Source: Author's Estimation

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter presents the summary of the major findings of the study. It is based on the main objectives of the study. The chapter also provides conclusions as well as policy recommendations.

5.1 Summary of Key Findings

Health insurance is becoming a primary means of financing healthcare for low income households. It helps to remove the financial bottlenecks that surround access to healthcare. Most households enroll on health insurance in order to overcome the effect of unanticipated health shocks. This section provides summaries of the major findings in this study in relation to the objectives of the study.

The study set out to examine the impact of NHIS on savings and children's educational investment. It also addresses the key determinants of household's decision to enroll on NHIS. Data was sourced from the nationally representative wave six Ghana Living Standards Survey (GLSS). The GLSS data is a cross sectional data that capture NHIS enrollment information as well as information on both individual and household characteristics. Hence, a counterfactual group was constructed using a propensity score via the probability of a household enrolling on NHIS to estimate the impact of NHIS on household savings and investments. This propensity score estimation were based on

common pretreatment covariates that were likely to increase a household's chance of enrolling on NHIS. Based on these estimated scores, an average treatment effect on enrolled households was measured using nearest neighbor and kernel matching algorithm.

Estimates from the total sample disclosed that about 43.51 percent of households have NHIS coverage. Further estimates showed that there are major differences between households enrolled on NHIS and households that are not enrolled in terms of gender, age, and marital status of the household head before matching. Matching ensured that these covariates were balanced for the causal impact estimations. Thus, the covariates were balanced effectively after matching and provide robust estimation of the impact of NHIS.

The nearest-neighbor matching and kernel matching algorithms show that, households that are enrolled in NHIS save approximately 14 percent more than households that are not enrolled. In monetary terms, NHIS enrolled households save about GH₵ 23.32 more than households not enrolled on NHIS. These results were significant and robust across all the estimators. The results are consistent with the findings of Starr-McCluer (1996) and Hsu (2013) who found that health insurance increases savings for United States. It also confirms the hypothesis that health insurance reduces the risks of uncertainties. The results however contradict the findings of Chou et al. (2003) in Taiwan who found that, health insurance decrease savings.

The study also examined the impact of NHIS on children's educational investment. The ATT estimates for evaluation shows that, households that are enrolled on

NHIS on average invest approximately 20 percent more in their children's education than households that are not enrolled. This result is robust and very significant across all matching estimators. In monetary terms, NHIS enrolled households invest over GH₵ 60 more in children's education compared to households not enrolled on NHIS. The result is indirectly consistent with Dhanaraj (2015) who found that parental health shocks decreases investment in children's education and lead to future poverty. Thus, NHIS reduces the negative impact of health shocks and increase educational investment. This also confirms Pistaferri and Preston (2008) hypothesis that, a perfect insurance system can mitigate the negative effect of education arising from various shocks experienced by households.

Furthermore, households with NHIS coverage channel more of their investment to children's education into paying for extra tuition and purchase of books. Households with NHIS coverage increased investment in extra tuition and purchase of books by 12 percent and 25 percent respectively more than households than are not enrolled. This result is robust and significant at 10 percent and 1 percent respectively. In terms of the comparison between savings and investments, the results shows that, gains from health insurance enrollment goes more into children educational investment compared to savings. Specifically, households invest more in their children education than savings.

Finally, the finding from this study affirms Friedman's permanent income hypothesis that individual or household's consumption is based on their permanent income other than current income. Thus individuals or households channel their transitory income or windfall gains from enrolling on NHIS into savings and children investment. This was depicted by an increase in both savings and children's educational

investment. Thus the introduction of NHIS decreased health expenditure of enrolled households and increased their windfall gains which eventually increased savings and educational expenditure increased.

5.2 Conclusions

In conclusion, this study presents evidence on the impact of NHIS which goes beyond healthcare utilization. The study has shown that household enrollment in health insurance in Ghana has multiple effects on savings and investments in children's education, and thus has the potential of aiding in the reduction of both household and intergeneration poverty. The result from the estimation established that 43.51 percent of households in Ghana have NHIS coverage whereas 56.49 percent do not. Considering the health, savings and children's educational investment benefits of enrollment, more has to be done by policy makers to encourage increase enrollment. In terms of gender, 46.45 percent of female headed households have NHIS coverage whiles 42.36 percent of male headed households are covered. The study supports the arguments and the evidence from the US that health insurance improves savings and investment. Friedman's argument that, savings will increase when transitory income increase (thus current income exceeds permanent income) is also affirmed by this study.

5.3 Recommendations

The major conclusions drawn from this study have a number of significant suggestions for policy. The results obtained in this study suggest that NHIS coverage increases

household savings and children's educational investment. To ensure that the full potential of NHIS in improving health and increasing savings and investment is realized, the following policy recommendations are worth considering:

First, in terms of NHIS coverage the NHIA should increase public sensitization. The study found that NHIS coverage increase savings and educational investment however, over 51 percent of households in Ghana are not registered and covered on NHIS. If the NHIA implements measures to increase public sensitization, it will encourage or influence uncovered households to enroll on the scheme. This will mitigate the effect of health shocks on the households and also increase savings and educational investment for economic growth and development.

Government should empower and resource the NHIA to ensure sustainability of the scheme. Once the NHIA is well resourced, it will ensure that they provide better services to their subscribers and ensure the continuous operation of the scheme. This will mean that, households that are covered will be able to utilize the scheme to improve their health and also enjoy the other benefits that comes with the NHIS coverage.

The monetary authorities and the government should implement sound macroeconomic policies to enable citizens obtain jobs to increase their income. To ensure the continuous existence on the scheme there is the need for households to pay a yearly premium. Once there is sustainable income, households will be able to spend less on premium and this will prevent them from spending so much on healthcare when there is an unanticipated health shocks.

Government should increase health infrastructure across the various regions in the country. This will ensure that healthcare service is made available to all especially, those in deprived communities. Through this, households with NHIS coverage will be able to utilize the health insurance leading to improvement in their health and also to achieve the findings of this study.

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APPENDIX

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. pstest HH_Savings HHteduin HHAGEY HH_MARST HHSEX TOT_HH_INC_NET HHEMSTAT HHSIZE HH_EDLEV HHEXP_N Rur
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Variable	Mean Treated	Mean Control	%bias	t-test t	t-test p>|t|	V(T)/ V(C)
HH_Savings	2468.2	2636.3	-1.3	-0.35	0.723	0.66*
HHteduin	667.81	569.78	6.6	1.53	0.125	0.58*
HHAGEY	46.943	46.878	0.4	0.10	0.917	0.95
HH_MARST	.69225	.67245	4.2	1.09	0.278	.
HHSEX	.65157	.63484	3.5	0.89	0.373	.
TOT_HH_INC_NET	9718.6	10322	-3.9	-0.88	0.376	0.60*
HHEMSTAT	.9954	.99647	-1.7	-0.43	0.667	.
HHSIZE	4.4137	4.4094	0.2	0.04	0.968	0.97
HH_EDLEV	1.7905	1.7839	0.6	0.16	0.876	0.80*
HHEXP_N	10737	9902.1	9.8	2.44	0.015	1.13*
Rural	.44973	.49685	-9.4	-2.41	0.016	.

* if variance ratio outside [0.90; 1.11]

Ps R2	LR chi2	p>chi2	MeanBias	MedBias	B	R	%Var
0.004	15.87	0.146	3.8	3.5	15.6	1.06	71

* if B>25%, R outside [0.5; 2]

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Treatment Effect on Extra Tuition (Nearest Neighbor Matching)

Variable	Sample	Treated	Control	Difference	Std Error	T-stats
Extra Tuition	Unmatched	4.15243347	4.0135405	0.138892969	0.065848524	2.11
	ATT	4.14878756	4.02490234	0.123885223	0.073796492	1.68

Source: Author's Estimation

Treatment Effect on Books (Nearest Neighbor Matching)

Variable	Sample	Treated	Control	Difference	Std Error	T-stats
Books	Unmatched	2.96682724	2.73018801	0.236639225	0.073622372	3.21
	ATT	2.96417288	2.7076567	0.256516179	.081991424	3.13

Source: Author's Estimation

Treatment Effect Sports (Nearest Neighbor Matching)

Variable	Sample	Treated	Control	Difference	Std Error	T-stats
Extra Tuition	Unmatched	17.8295918	15.642735	2.18685679	1.10651351	1.98
	ATT	17.8510216	15.7782933	2.07272836	1.22923458	1.69

Source: Author's Estimation

Treatment Effect on PTA (Nearest Neighbor Matching)

Variable	Sample	Treated	Control	Difference	Std Error	T-stats
Extra Tuition	Unmatched	7.32067669	8.0180865	-0.69740980	0.957446137	-0.73
	ATT	7.32986198	7.66286073	-0.33299874	1.10669628	-0.30

Source: Author's Estimation