UNIVERSITY OF SOUTHAMPTON

Faculty of Social, Human & Mathematical Sciences

Division of Social Statistics and Demography

Examining Health Insurance as a Strategy to Move Towards Universal Health Coverage in the Context of Population Ageing: Evidence from Ghana

by

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ABSTRACT

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Universal Health Coverage (UHC) aims to provide quality healthcare to all without financial hardship. Efforts to meet the aim of UHC will be greatly influenced by the global population ageing phenomenon. Ghana is currently undergoing a profound demographic transition, with large increases in the number of older adults. These adults require greater levels of healthcare due to increasing illness and disability as ageing occurs, which complicates progress to UHC. Ghana presents a crucial case study for the implementation of policies aimed at UHC in the context of population ageing in low and middle-income countries. This thesis examines the success of Ghana in implementing its National Health Insurance Scheme (NHIS), designed to help achieve UHC, amongst older adults. Previous studies have mainly focused on enrolment of young and middle aged adults.

Using two waves of the Demographic and Health Surveys, the WHO Study on Global Ageing and Adult Health and the Ghanaian Living Standards Survey, the correlates of NHIS enrolment among younger, middle aged and older adults are compared. Supplementary spatial and aspatial determinants of NHIS enrolment for individuals over the age of 50 are examined through the application of multilevel regression and spatial cluster analysis. Furthermore, this thesis examines the impact of NHIS membership on healthcare utilisation by applying propensity score matching.

From a policy perspective, the results of this thesis indicate that NHIS coverage does indeed increase the usage of healthcare among older adults but that geographical and socioeconomic inequalities remain in the utilisation of care and enrolment. NHIS coverage was found to differ particularly by wealth and residence. This thesis argues that the removal of financial barriers when enrolling in the NHIS is not sufficient to ensure equal usage of care among older adults. Additional policy initiatives should be considered like travel reimbursement, better provision of services and enlargement of the insurance benefit package to respond to the needs of older adults and stimulate an age-friendly health sector.

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DECLARATION OF AUTHORSHIP

I, Nele van der Wielen declare that this thesis and the work presented in it are my own and have been generated by me as the result of my own original research.

Examining Health Insurance as a Strategy to Move towards Universal Health Coverage in the Context of Population Ageing:
Evidence from Ghana

I confirm that:

1. This work was done wholly or mainly while in candidature for a research degree at this University;
2. Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
3. Where I have consulted the published work of others, this is always clearly attributed;
4. Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
5. I have acknowledged all main sources of help;
6. Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
7. None of this work has been published before submission:

Signed: .....

Date: .....

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Definitions and Abbreviations

AMA	Accra Metropolitan Assembly
ATE	Average treatment effect
ATT	Treatment effect on the treated
CHPS	Community Health Planning and Service
CPC	Centre for Population Change
DALYs	Disability-adjusted life-years
DHS	Demographic and Health Surveys
DMHIS	District Mutual Health Insurance Scheme
EA	Enumeration Area
GDP	Gross Domestic Product
GHS	Ghana Health Service
GIS	Geographic Information System
GLSS	Ghana Living Standards Survey
GPS	Global Positioning System
IPUMS	Integrated Public Use Microdata Series
LEAP	Livelihood Empowerment Against Poverty
LSMS	Living Standards Measurement Study
MDGs	Millennium Development Goals
MOH	Ministry of Health
NN	Nearest neighbour
NHIA	National Health Insurance Authority

NHS	National Health Service
NHIS	National Health Insurance Scheme
PSM	Propensity Score Matching
PSU	Primary Sampling Unit
SAGE	Study on Global Ageing and Adult Health
SSNIT	Social Security and National Insurance Trust
SDG	Sustainable Development Goals
UHC	Universal Health Coverage
UK	United Kingdom
US	United States
USAID	United Sates Agency for International Development
VAT	Value Added Tax
WHO	World Health Organization
WHS	World Health Survey

Chapter 1: Introduction

The World Health Organization (WHO) (2015b) estimates that 400 million people globally lack access to essential healthcare and that over 100 million people each year are pushed into poverty by financial hardship when paying for healthcare. Universal health coverage (UHC) has been described as "the single most powerful concept that public health has to offer" (Chan, 2013). The aim of UHC is "to ensure that all people obtain the health services they need without suffering financial hardship when paying for them" (WHO, 2014b). UHC is beneficial in many ways as it not only improves health but can also be seen as a tool to reduce poverty and enhance economic growth (Cotlear et al., 2015).

Population ageing presents considerable challenges for UHC, especially where such coverage is still in its infancy. Population ageing is associated with an increasing demand for healthcare due to greater prevalence of disabilities and morbidity in older age (United Nations, 2015b). Older adults have been side-lined in the pursuit of UHC in low and middle-income countries, even though they are substantial consumers of health services. As Lloyd-Sherlock (2005) points out "the needs of older people have been either excluded from or marginal to all the main international health policy initiatives applied in the developing world over the past half century" (p. 23).

This thesis investigates the implementation of health insurance coverage as a strategy to move towards UHC in the context of population ageing. In low and middle-income countries, the introduction of social health insurance has become a popular technique for moving towards UHC. In particular, this thesis examines whether social health insurance enrolment improves progress towards UHC using Ghana as a case study. Ghana has witnessed a profound recent demographic transition, including large increases in the number of older adults, which have coincided with the development and implementation of policies aimed at UHC.

1.1 Importance of Studying Health Insurance Coverage in the Context of Population Ageing

Older adults are often marginalized by health policies in low and middle-income countries (Pillay and Maharaj, 2013, Parmar et al., 2014). However, the increasing share of older adults in a population shows the importance of this research. It is estimated that by 2050, 22% of the world's population will be aged 60 and over (WHO, 2015d). In 2050, a historic turning point is forecast, when the number of people that are aged 60 and over globally will exceed the number of children aged under 15 years (United Nations, 2015b). Today, two-thirds of the world's 868 million people

who are aged 60 and over are living in low and middle-income countries. By 2050, it is projected that 8 in 10 people who are classified as older adults will live in countries that are less developed (United Nations, 2015a). In Sub-Saharan Africa alone, the number of people aged 60 and over is expected to rise from just over 46 million in 2015 to over 161 million people by 2050, accounting for 7.6% of the population in the region (United Nations, 2015a).

As fertility remains relatively high, population ageing in Africa has not received enough attention from policymakers or researchers and as a result, the needs of older adults are less salient when policies are formulated at the national level. This marginalization has, until recently, been explained by a proclivity among policymakers and researchers to prioritize the needs of younger groups who account for the greater share of the population. Africa is considered a youthful continent with 40% of the population below 15 years of age (Pillay and Maharaj, 2013). Furthermore, many health policies in low and middle-income countries have focused on tackling specific diseases like AIDS, malaria and tuberculosis — known as 'killer diseases' (Lloyd-Sherlock, 2010). The Millennium Development Goals (MDGs) helped to frame the discussion on public health in many low and middle-income countries around the reduction of maternal and child mortality, which has further contributed to the marginalisation of other important groups, such as older adults (Lloyd-Sherlock, 2010).

It is expected that the number of older adults in low and middle-income countries will grow faster than in high-income countries, which presents considerable challenges for policymaking, requiring a shift in focus (United Nations, 2015a). The WHO holds that "governments must prepare now to deal with an increasingly aging world […] the growing burden of chronic disease will seriously affect the quality of life of older people and create economic and other hardships for national health systems" (Schlein, 2014). Channon et al. (2012) point out that "the rapidly increasing older adult population in low and middle-income countries provides a challenge for the provision of sufficient healthcare to this group" (p.3). However, in Africa in particular, a lack of data, research and awareness of the effect of population ageing makes it difficult to make informed decisions about interventions aimed at improving the lives of older adults at the national level (Pillay and Maharaj, 2013).

Health insurance affiliation has been recognized as a key indicator of universal coverage (Haas et al., 2012). Pooled funding through health insurance can be seen to redistribute income, equalising the ability of the poorest groups to access care and pay for services. Older adults often suffer from high levels of poverty, particularly in low and middle-income states where 80% of older adults are left without a regular income (Hutton, 2008). Poverty in old age is also a major contributor to ill health and social protection schemes in low and middle-income countries are needed in order to

protect older adults (WHO, 2015d). In countries without social security systems, it is left to the individual to finance healthcare expenditures (United Nations, 2013). Due to changing family structures in Africa, support from extended family for older adults is decreasing (Aboderin, 2004). This trend reinforces the essentiality of social security. Progress towards UHC is of great importance in helping individuals to avoid catastrophic expenditures[1] in times of unforeseen serious illness.

By 2030, it is estimated that Ghana will have the largest share of older adults among all low and lower-middle-income countries in Sub-Saharan Africa (United Nations, 2015a). Different countries have experimented with different approaches to achieving UHC. The implementation of a National Health Insurance Scheme (NHIS) in Ghana in 2005 has been described as "one of the most ambitious plans for universal health coverage in Africa" (Blanchet and Acheampong, 2013, p. 1). Ghanaian attempts to improve risk pooling, raising of revenue, and the organizing of healthcare through public and private providers, have been exceptional in Sub-Saharan Africa. Therefore Ghana, with its recent experience of health systems reform specifically aimed at achieving UHC, provides a unique opportunity for a case study that can inform the population of cases of low and middle-income countries more generally (Blanchet and Acheampong, 2013).

1.2 Research Questions

The Ghanaian NHIS aims to offer affordable access to healthcare to all people by offering financial protection when seeking care. However, limited research has been done on whether the NHIS is beneficial for older adults (Parmar et al., 2014). Due to the fast pace at which population ageing is occurring, the windows of opportunity to react and implement reforms are limited (United Nations, 2013). Rapid population ageing is a relatively new phenomenon and therefore precedence for adaptation is limited (Bloom et al., 2015). The time has come for policymakers and researchers to place a special emphasis on older adults. New analysis from Ghana can inform other low and middle-income countries' choices when it comes to considering health insurance coverage as a strategy towards UHC.

This thesis intends to contribute to the literature on global ageing and UHC by analysing NHIS enrolment in Ghana and its impact on the utilisation of healthcare among older adults. The specific research questions of the thesis are:

1. What is the most suitable survey for analysing insurance coverage specifically among older adults in Ghana?

[1] Defined as "out-of-pocket spending for health care that exceeds a certain proportion of a household's income with the consequence that households suffer the burden of disease" (Li et al., 2012).

2. Which socio-economic and demographic factors determine NHIS enrolment, reenrolment and drop out?
3. Do those factors differ from those determining enrolment, reenrolment and drop out for younger and middle aged adults?
4. Do spatial and aspatial barriers prevent NHIS enrolment among older adults?
5. Does NHIS enrolment increase utilisation of healthcare among older adults?

1.3 Contribution to Knowledge

Research in this thesis adds to knowledge of insurance coverage as an approach towards UHC and enhances the dialogue on global population ageing.

Studies examining the effect of healthcare reforms on older adults in Africa are lacking (McIntyre, 2004). This deficiency is probably due to the low political saliency of population ageing in low and middle-income countries. The thesis is an attempt to fill part of this gap as a rapid increase in the saliency of this population group is justifiably anticipated as the group's numbers rise.

The research contributes a quantitative approach in understanding health insurance enrolment and it examines comprehensively whether the introduction of the social insurance scheme in Ghana has improved the utilisation of healthcare, particularly among older adults. Though some previous research has examined NHIS coverage for all adults (Ayitey et al., 2013, Osei-Akoto and Adamba, 2011) and the impact of this programme for women in reproductive age (Mensah et al., 2009, Blanchet et al., 2012, Johnson et al., 2015b), the demand and benefits of NHIS coverage among older adults remains under-researched. In order to improve healthcare utilisation among older adults in Ghana, correlates of insurance coverage and insurance benefits on healthcare usage need to be properly understood.

This thesis makes use of different nationwide surveys in order to avoid restricting itself to specific regions or districts. It assesses the quality of three different surveys— the Global Study on Ageing and Adult Health (SAGE), the Ghanaian Living Standards Survey (GLSS) and the Demographic and Health Surveys (DHS), providing further value for future researchers who will carry out research on health insurance coverage.

All in all, this thesis contributes an understanding of who is covered (and who is not covered) under the NHIS and examines whether the recent healthcare reform of government-supplied insurance coverage in Ghana is improving the usage of healthcare among older adults.

1.4 Organisation of the Thesis

The thesis consists of eight different chapters. *Chapter 1* outlines the rationale of this study, listing the objectives of the research and highlighting its contribution to knowledge.

Previous contributions to the research field are highlighted in *Chapter 2*. This review of literature is divided into two main parts which discuss the two central aspects of this thesis: UHC and population ageing. The chapter outlines the background of the UHC concept and how insurance coverage is being used as a strategy towards UHC. In addition, global and African population trends are highlighted and what is known of the effect of population ageing on transitions towards UHC is discussed. Moreover, key terminology used in this thesis is outlined, including a definition of UHC and an 'older' adult.

Chapter 3 provides background information on Ghana. This includes trends in population ageing in Ghana and geographical information about Ghana, followed by a historical account of healthcare reforms in the country. Furthermore, the current health system situation and purpose of the NHIS are described.

Chapter 4 analyses the quality of different datasets that include information on health insurance coverage in Ghana. This quality analysis is essential in order to assess which datasets are suitable for analysis of health insurance coverage both in this thesis and for future research. Reliable data disaggregated by key stratifiers, including demographic characteristics, place of residence, and socioeconomic status are needed in order to monitor progress towards UHC (WHO and The World Bank, 2015, WHO, 2016b). Without accurate data on health service coverage and financial protection, the measurement of the effect and success of health interventions aimed at improving UHC is not possible.

Chapters 5 through *7* turn to the quantitative analysis of this thesis. No separate methods chapter is included. Rather, each analysis chapter includes a discussion of the method used separately, as each chapter makes use of a different approach appropriate to address the research question at hand and building upon previous findings.

In *chapter 5*, logistic and multinomial logistic regressions are used to understand individual level correlates of insurance status among younger and older adults in Ghana using the four surveys assessed in *chapter* 4. This analysis provides a strong understanding of how robust the different survey results are. Furthermore, the analysis is used to identify those people who are not enrolled in a health insurance scheme. This information provides clues as to what can be done to increase insurance affiliation, as well as making clear whether the correlates of insurance coverage differ

between younger and older adults. Further literature regarding correlates of insurance enrolment are reviewed in detail in *chapter* 5 in anticipation of analysis which specifically adds to those studies.

Chapter 6 expands the analysis of *chapter* 5 by inspecting spatial and aspatial barriers of health insurance coverage using multilevel modelling and spatial analysis. A recurring critique in the literature on approaches to UHC bemoans the prioritisation of financial access to healthcare without giving equal priority to a concurrent improvement in the availability of services. The WHO (2015c) points out that: "UHC is not just health financing, it should cover all components of the health system to be successful". If healthcare services are not available, health insurance affiliation becomes futile, as desired or needed care cannot be attained. The analysis helps to demonstrate where insurance affiliation is high or low. Such information allows healthcare authorities and policymakers to create target-orientated policies on the path towards UHC.

Whether insurance affiliation does indeed increase the utilisation of healthcare is examined in *chapter 7* using propensity score matching. *Chapter* 7 attempts to analyse the healthcare utilisation of insurance holders compared to non-insurance holders, also described in the literature as "average treatment effect in the treated" (Lechner, 1999, p. 10). In doing so, it becomes possible to understand whether the insurance scheme implemented in Ghana really upgrades the route to UHC in the context of population ageing.

The final part of the thesis, *chapter 8*, summarises the findings of all chapters and provides an overall conclusion as well as options for action. In addition, recommendations for supplementary research and limitations are presented in the final part.

Chapter 2: Universal Health Coverage and Ageing Populations

More than 2 billion people live in low and middle-income countries where the health systems are often dominated by poor quality, unequal access to healthcare and insufficient funding (Escobar et al., 2010). Universal health coverage (UHC) aims to improve this situation by ensuring that people obtain needed healthcare. However, as the introduction to this thesis has already highlighted, population ageing presents considerable challenges for UHC due to increasing demand for healthcare related to greater prevalence of disabilities and morbidity in older age. This chapter reviews the literature on the two central aspects of this thesis: *UHC* and *population ageing*.

The first section focuses on UHC, including a definition of UHC because without fully understanding what UHC connotes, it is not possible to establish its boundaries in order to guide policy-makers or gauge progress towards UHC (O'Connell et al., 2013). Each term 'universal', 'health' and 'coverage' is discussed separately to highlight the dimensions of UHC. Following this discussion of key terms, theories and evidence of health insurance coverage as a strategy towards UHC are discussed.

The second section then looks at UHC in the context of population ageing. It describes global and African trends in population ageing and highlights challenges that occur with an ageing society. This information is vital in order to understand the motivation for focusing on older adults in this thesis. The term 'older adult' is defined with to clarify the terminology used in this thesis.

2.1 Universal Health Coverage

The goal of the Alma-Ata declaration conceived during the 1977 conference on primary healthcare was to achieve "health for all by the year 2000" (Baggott, 2000, p.165). The WHO believed that *health for all* should be the priority of governments in order to reach a health level that enables every citizen in a country to participate actively in the social life of the community where they are resident (WHO, 1998).

In 2005, the concept of UHC was formally constructed to enhance the idea of 'health for all' by focusing on health systems financing (WHO, 2010a). The WHO holds that 'health for all' cannot be achieved "without a well-functioning health financing system" (WHO, 2010a, p.4). This is because the structure of a healthcare system determines the affordability of required healthcare and the provision of healthcare services. The World Health Report of 2010 shaped the definition and discussion of UHC to a great extent and defined the aim of UHC as a situation whereby "all people

have access to services and do not suffer financial hardship paying for them" (WHO, 2010a, p.4). The avoidance of financial hardship is essential as without sufficient funding, people have to decide whether they can afford to seek care or not (WHO, 2010a). This can lead to a trade-off between paying for other essentials and healthcare (WHO, 2010a).

UHC is a key concern for the post-2015 development agenda as "disease and health-specific goals that may be included in the post-2015 development agenda cannot be met without a functioning health system that enables all people to access health services they need without incurring financial hardship" (United Nations Non-Governmental Liaison Service, 2014). UHC can been seen as a catalyst for progress resulting in greater access to healthcare, financial protection, and a healthier society (Save the Children, 2013). UHC pertains quite clearly to the MDGs 4 to 6 (reducing child mortality, improving maternal health, and combating HIV/AIDS, Malaria and other diseases). However, UHC will also have an effect on health goals that have been marginalised, like the reduction of premature death due to non-communicable diseases. Most directly, UHC falls under the umbrella of the third SDG (goal number 3.8) "ensuring healthy lives and promoting well-being for all at all ages" (United Nations, 2016), which implies that this objective should be inclusive of older adults.

A common understanding of the concept of UHC is needed in order to establish guidelines on how to move towards UHC. Defining the three terms 'universal', 'health' and 'coverage' ensures consistency.

Universal

From the perspective of UHC, the word 'universal' should ensure equity and refers to the provision of healthcare to all citizens in a state. O'Connell et al. (2013) define the term 'universal' more precisely as: "a legal obligation of the state to provide healthcare to all its citizens, with particular attention to ensure inclusion of all disadvantaged and excluded groups" (p.1). When using this definition it is important to note the difficulties in determining the connotation of 'all citizens'. No legal entitlement to healthcare might be afforded stateless people- including: refugees, people denied birth registration or undocumented migrants (O'Connell et al., 2013). Thus, it is important to be aware of variation among cases as to whether all citizens, all residents or other groups are covered. In Ghana, the NHIS is available to people resident in Ghana and people who are not resident but who are visiting the country (NHIA, 2015).

Health

The WHO defines the term 'health' as follows: "health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO, 1948). This definition

takes two factors into account that characterise health: self or mental well-being, and the well-being of the body (Callahan, 1973). This definition by the WHO has not been changed since 1948, a time where acute diseases accounted for the main cause of disabilities, and chronic illnesses were responsible for early deaths (Hubert et al., 2011). Nowadays, the patterns of disease have changed. Increasing improvements in heath technology, better nutrition, and better hygiene among individuals have led to more people surviving diseases (Hubert et al., 2011). In 1997, Rodolfo Saracci published an article in which he stated that the WHO definition needed to be reconsidered. In his opinion, a state of complete well-being is an idealistic view, associated with happiness rather than with health (Saracci, 1997). Other researchers argue that health cannot be defined as a fixed status diagnosed by a doctor (Lancet Editorial, 2009). Health varies among individuals and their environments. In other words, depending on their unique functional needs, each person defines health for him or herself (Lancet Editorial, 2009). What form of healthcare is needed varies among persons as each individual needs different treatments according to individual health conditions. The term "personalised medicine" (Lancet Editorial, 2009, p. 781) denotes that each person should receive unique treatment.

UHC can be considered as an ideal-type concept under which all people obtain needed healthcare. In reality however, politics requires a compromise between competing priorities in the context of resource constraints that influence which healthcare services are realistically available and accessible under a healthcare system.

Coverage

Coverage is classified as whether an individual who needs an intervention will actually receive this intervention (Murray and Evans, 2003). Coverage should not, it is argued, be evaluated by the pure existence of an infrastructure that provides healthcare, but by the actual *use* of healthcare services (Bump, 2010, O'Connell et al., 2013). This means that coverage is not the same as *access* but that coverage encompasses access. Specifically "coverage builds on access by ensuring actual receipt of services" (Evans et al., 2013, p. 546).

Overall, three dimensions of access have been identified to improve the path towards universal coverage, namely *availability* (also referred to as physical accessibility), *affordability* (financial access) and *acceptability* (cultural access) (Evans et al., 2013, Thiede et al., 2007):

- *Availability* refers to the accessibility of healthcare services within reasonable reach. Services need to be both available and physically accessible to improve healthcare usage. This includes factors like distance and travel time to a healthcare facility (including the availability of public transport) as well as opening hours or availability of the necessary

resources for specific diagnoses and treatments among providers (Evans et al., 2013, Thiede et al., 2007). The quality of services also needs to be taken into consideration as only health services of good quality can reduce the occurrence of preventable illnesses and death (O'Connell et al., 2013). However, there are no international standardised guidelines on how to measure the quality of services (O'Connell et al., 2013).

- *Financial affordability* relates to the ability to pay for needed healthcare services without fearing financial hardship. This dimension combines direct measures (like cost of healthcare service) and indirect measures (including costs of transportation and opportunity cost like missing time at work) (Evans et al., 2013, Thiede et al., 2007).

- *Acceptability* is categorised as the willingness of people to actually seek care. It has been found that "acceptability is low when patients perceive services to be ineffective or when social and cultural factors such as language or the age, sex, ethnicity, or religion of the health provider discourage them from seeking services" (Evans et al., 2013. p. 546).

Table 2.1 highlights the differences in the above-described terminologies.

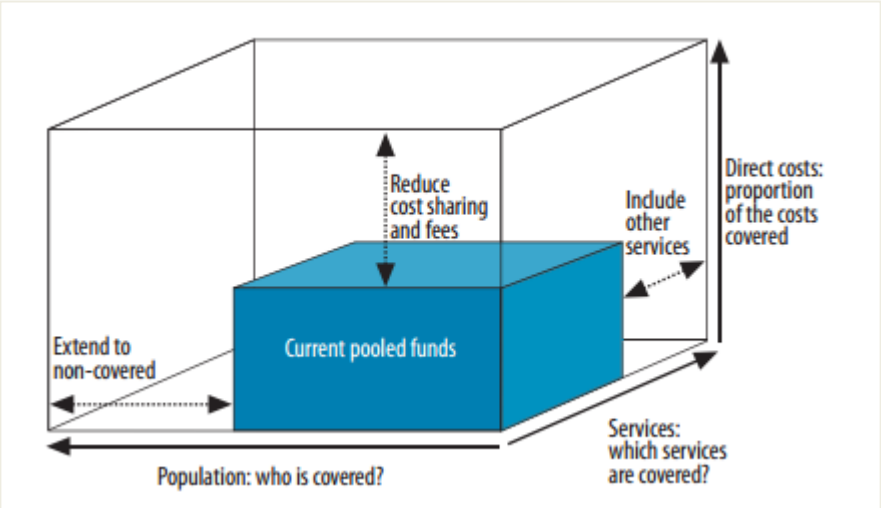
Table 2.1: Definition of universal health coverage, coverage of health interventions and access

Universal Health Coverage	*All people receive the health services they need without suffering financial hardship when paying for them.*
Coverage	*Whether an individual who needs an intervention will actually receive this intervention.*
Access	*Whether needed healthcare is available, affordable and acceptable.*

Source: Murray and Evans (2003), Evans et al. (2013), WHO (2015c)

Overall, there are three key dimensions of UHC: "who is covered, what services are covered, and what proportion of costs is covered " (Lagomarsino et al., 2012, p.934). These dimensions are presented in Figure 2.1.

Figure 2.1: Three dimensions of coverage



Source: WHO (2010a, p.15)

The aim of UHC is to fill out the cube outlined in Figure 2.1, implying that UHC is reached "when people actually obtain the health services they need and benefit from financial risk protection" (Evans et al., 2013, p. 546). Thus, UHC is a combination of *obtaining needed healthcare* and *financial protection,* leading to the ultimate goal of "maintaining and improving people's health" (Giedion et al., 2013, p. 5).

However, in reality it is acknowledged that filling the cube is problematic due to finite resources and budget constraints. The WHO recognised that "no country, no matter how rich, is able to provide its entire population with every technology or intervention that may improve health or prolong life" (WHO, 2010a, p. 21). Thus, the World Health Assembly (2005) encouraged its members states to plan strategies that focus on the transition towards UHC instead of focusing on realising UHC at once.

Many low and middle-income countries that are planning strategies towards UHC have placed a strong emphasis on improving the affordability of healthcare. This is based on the rationale that "when services become more affordable, patients will use them more often, will seek care with less delay, and will possibly be more likely to have a regular source of care, which contributes to the use of health services and to improving health" (Giedion et al., 2013, p. 6). It is, however, wrong to believe that improving the affordability of care alone will increase healthcare utilisation. Policymakers need to be aware that progress towards UHC cannot be achieved by concentrating on only one of the three outlined axes (WHO, 2013). Free healthcare usage will only be beneficial if healthcare is also available and acceptable.

In reality, progress towards UHC involves agreements and trade-offs on prioritising actions along all three axes. Thus, the next section outlines how pooling funds through insurance is used as a strategy to move towards UHC.

2.2 Health Insurance Coverage as a Strategy Towards Universal Health Coverage

All three dimensions of UHC are influenced by the way a health system is structured and the mechanisms used to pay for health services. The system of healthcare financing determines who has access to healthcare facilities, what services are covered, and what costs are covered.

In general, it has been recognised that "the mechanisms used to pay for health services can be broken down into two main classifications: voluntary and compulsory" (WHO, 2013, p. 24). Voluntary mechanisms include out of pocket payments, voluntary health savings accounts, or voluntary health insurance. In contrast to this, compulsory mechanisms are mandatory insurance schemes often subsidised centrally by governmental agencies or through individual mandatory health savings accounts (WHO, 2013).

Table 2.2: Mechanisms used to pay for health services

	Voluntary health financing mechanism	**Compulsory health financing mechanism**
No interpersonal pooling of funds	Direct out-of-pocket payment	
	Individual health savings accounts (voluntary)	Individual health savings accounts (mandatory)
Pooling of funds	Voluntary health insurance, managed by commercial for-profit companies, not-for-profit organizations, community groups, or governments	Government agencies including health ministries and local governments; public agencies with varying degrees of autonomy, such as compulsory/social health insurance agencies, or private (for-profit or non-profit) insurance funds that manage compulsory insurance

Source: Adapted from WHO (2013, p. 25)

It is estimated that out of pocket payments still form 32% of global health expenditure (WHO, 2015c). Out of pocket payments are defined as "any direct outlay by households, including gratuities and in-kind payments, to health practitioners and suppliers of pharmaceuticals, therapeutic appliances, and other goods and services whose primary intent is to enhance or restore health status" (Vian et al., 2014, p. 8). Out of pocket payments are the simplest form of health

financing as people pay directly for the services they use (WHO, 2013). Out of pocket payments can be formal and informal payments. Formal payments are defined as "user fees paid to private health-care providers; officially approved user fees charged in public facilities; and purchases of medicines" (Vian et al., 2014, p. 8) and informal payments are "a direct contribution, which is made in addition to any contribution determined by the terms of entitlement, in cash or in-kind, by patients or others acting on their behalf, to health care providers for services that the patients are entitled to" (Vian et al., 2014, p. 8). Out of pocket healthcare financing, however, can cause huge inequalities as health services are allocated to people based on their ability to pay for them. High out of pocket healthcare payments can push people into poverty or even further into poverty when already struggling (Moreno-Serra and Smith, 2012).

Savings accounts are one method that can serve to mitigate financial shocks in the case of sudden ill health. Individual health savings accounts are savings accounts that are set up to cover forthcoming healthcare expenditures (WHO, 2013). But again, these savings accounts do not account for income inequalities as "accounts held by the poor people do not pay for as much care as those held by the rich, thus failing to meet the equity criterion fundamental to attaining UHC" (WHO, 2013, p. 27). Poor people may not have any disposable income to save for future healthcare payments.

Equity in healthcare implies "that a major source of health funding needs to come from prepaid and pooled contributions rather than from fees or charges levied once a person falls ill and accesses services"(WHO, 2005, p. 2). UHC is characterised by moving away from formal out of pocket expenditure (or fees) to 'pooled' funding (Sengupta, 2013); meaning that the financial risks are shared amongst different people or the entire population of a country. It has been found that those countries which moved closest to UHC make effective use of risk-pooling and prepayment mechanisms (WHO, 2010a).

There are two main healthcare system models that are known for pooling risk and generating resources (Lagomarsino et al., 2012). On the one hand, there is the social (mandatory) health insurance model, which was implemented originally in Germany by Bismarck, and similar models are increasingly found in low and middle-income countries like in Ghana (Lagomarsino et al., 2012). On the other hand, there is the National Health Service (NHS) system, which exists in the UK. While the social insurance model relies on premiums which are paid by individuals as well as on payroll taxes, the second model is entirely financed by general tax revenues (Lagomarsino et al., 2012). Insurance schemes are seen as a good that helps households to pay regular but smaller fees rather than paying high out of pocket payments when healthcare is necessary. Households thereby "can

avoid a large shock to their wealth by greatly reducing financial vulnerability" (Pauly et al., 2006, p. 373).

It has been found that voluntary insurance schemes do not significantly improve the transition towards UHC as worldwide, the enrolment rate for voluntary insurance has been found to be low (Averill and Marriott, 2013). The alternative – social health insurance schemes, like the scheme in Germany— showed greater success as the enrolment is either obligatory or the government sponsors the programme to a great extent in order to ensure the sustainability of the system (Averill and Marriott, 2013).

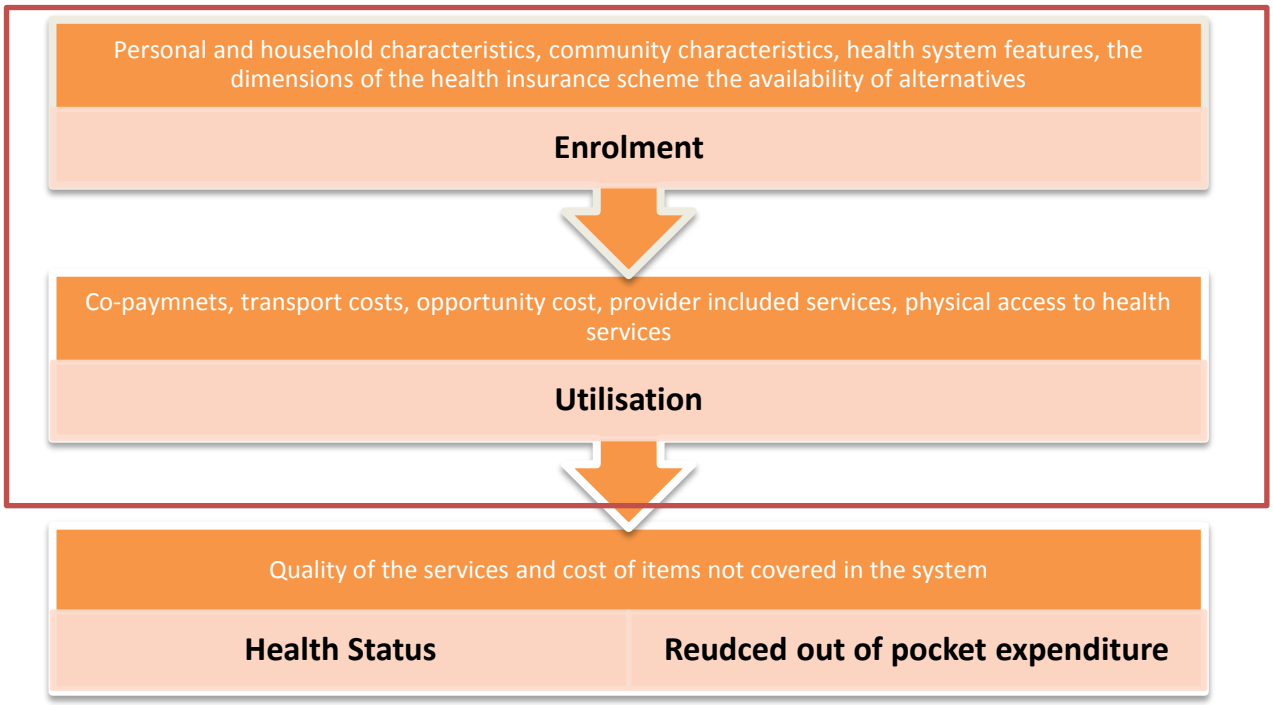
Social health insurance schemes, however, have their limitations too, as it is difficult to force individuals to join an insurance scheme (Averill and Marriott, 2013). Ghana forms a good example to illustrate these restrictions on social health insurance schemes. The enrolment in the Ghanaian social health insurance scheme is compulsory but the number of people actually enrolled is modest. If no penalties for non-enrolment apply, guaranteeing health insurance enrolment is difficult.

Although it has been argued that voluntary insurance does not improve UHC, many developing countries consider voluntary private insurance schemes an important driver in financing their healthcare systems (Pauly et al., 2006). Private insurance can fill the gap in services that public insurance schemes do not cover without increasing out-of-pocket expenditure when using healthcare services (Pauly et al., 2006). Although private health insurances have been critiqued for exacerbating inequalities and only providing coverage for those who can afford insurance payments, Sekhri and Savedoff (2004) argue that private insurance can help reaching the goals of UHC: "private coverage, when appropriately regulated, may be one way to move towards prepayment and risk pooling until publicly funded coverage can expand sufficiently. It also allows policy makers to target limited public resources towards the most vulnerable groups, while those who can afford it, can contribute to their medical costs" (p.3). In countries where no public insurance scheme exists, private insurance schemes often form the only financial protection available. There is no 'magic bullet' that determines how a health system should be structured to approach the goal of UHC (Rabovskaja, 2012). Healthcare systems are often very flexible and complex (Rabovskaja, 2012). Different countries will make different decisions on how to 'fill the box' outlined in Figure 2.1. However, although no uniform pattern has been discerned in the way UHC is delivered, successful strategies in the development of UHC in one country can be used as instructive lessons for another country (Bump, 2010).

2.3 Health Insurance Coverage and the Actual Use of Health Services

Ghana chose to reform its healthcare system and implemented a government sponsored health insurance scheme to improve equal access to healthcare (NHIA, 2015, WHO, 2014a)[2]. Figure 2.2 visualises a theory of change due to health insurance coverage. The aim of insurance enrolment is to increase the utilisation of healthcare through financial risk protection. Pooled funding through health insurance can be seen as a redistribution of income resulting in better access to services among the poorest groups by equalising the ability to pay for services and reducing out of pocket payments when seeking healthcare. The ultimate goal of insurance coverage is to improve people's health.

Figure 2.2: A theory of change due to health insurance



Source: Author's modified from Acharya et al. (2012, p. 4)

The elements of the theory within the red outline in Figure 2.2 are the focus of this thesis. It is important to keep in mind, however, the role of both health status and reduced out of pocket expenditure as qualitative outcomes of insurance-based health systems within the theory. Before focussing more narrowly on enrolment and utilisation, this section now highlights the theoretical context within which these elements contribute to a holistic theory of change in health insurance provision.

[2] The Ghanaian health insurance system is described in detail in chapter 3.

The uptake of health insurance depends on different aspects. Donfouet and Mahieu (2012) argue that the success of community based insurance schemes depend on the existence of social capital in a community. Social capital can be descripted as "social life-networks, norms, and trust that enables households to act together more effectively to pursue shared objectives" (Donfouet and Mahieu, 2012, p.2). In particular solidarity and trust between members are key determinates of a well-functioning social insurance scheme as "solidarity and trust stirs up members who are susceptible to risk to put together their resources for common use" (Donfouet and Mahieu, 2012, p. 4). Research by Fenenga (2015) supports this and demonstrates that in Ghana community trust is the key to success for the NHIS. Osei-Akoto and Adamba (2011) argue that in an African context in particular, ethnic and religious diversity determines enrolment in health insurance at community level. This argument is based on the hypothesis that ethnically diverse societies experience a lower level of trust and face less support for collective action (Osei-Akoto and Adamba, 2011).

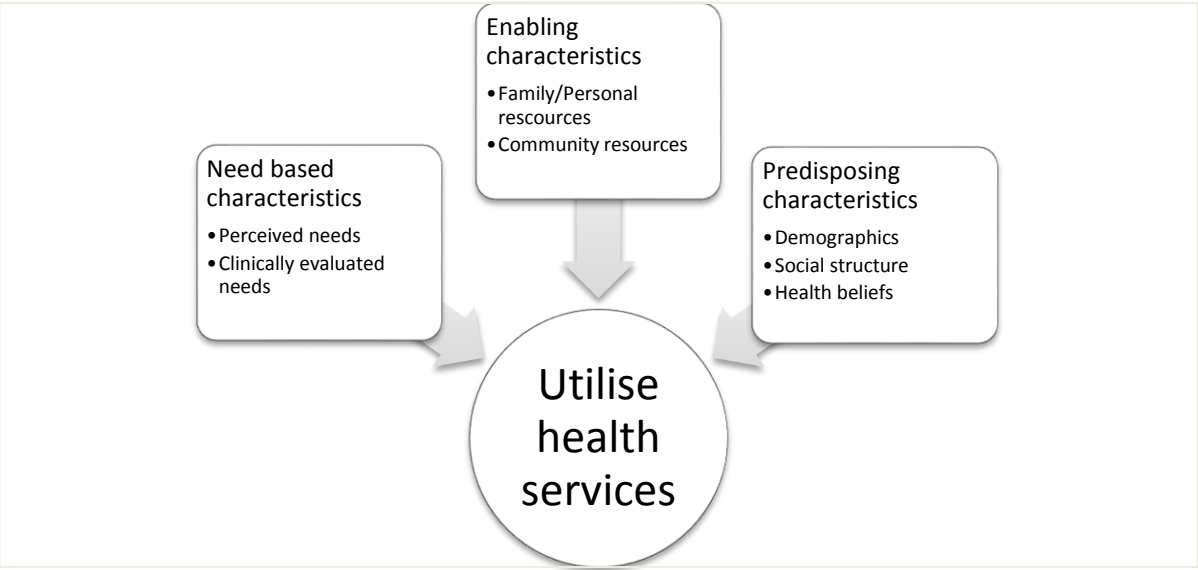
The literature identified several aspects that determine insurance enrolment, namely: *personal and household characteristics*, *community characteristics, health system features*, *the dimensions of the health insurance scheme* and *the availability of alternatives.* Those factors are not discussed in this chapter but in chapter 5 (section 5.1).

Once enrolled in an insurance scheme, insurance affiliation alone does not guarantee improved usage of healthcare. Healthcare utilisation may depend on several factors. In a popularly cited piece of literature from the 1960s, Andersen constructed a behaviour model to explain the utilisation of healthcare. Originally, this model was developed to understand why families use health services, however, this model has been reviewed and extended. An overview of the development of the behaviour model is provided by Andersen (1995). The original behaviour model distinguishes between three different dynamics that influence the actual use of health services (see Figure 2.3). The first set of factors, so-called *predisposing factors,* covers demographic, social, and structural features, as well as health beliefs (Andersen, 1995). The second factor grouping – *enabling factors* - encompasses everything that enables an individual person to actually use health services, for example money. *Need* represents the third factor which describes the need for services due to diseases or other disabilities (Andersen, 1995).

In explaining behaviour and recommending change, Andersen (1995) places a special emphasis on the existence of enabling factors and argued that in order to ensure usage, healthcare services must be available in the environment people live and work in. In addition, services will only be used if individuals have the know-how and means to use the services available to them. Andersen distinguishes the measurement of potential access to care (an enabling feature) with that of actual use of services, which he classifies as realised access. Furthermore, Andersen emphasized that

individual's judgements on health problems are shaped by their experience of pain and illness and will inform the decision of whether to seek healthcare or not.

Figure 2.3: Classical Andersen's Behavioural Model of health service utilisation



Source: Adapted from Andersen (1995)

The Andersen model was expanded in the 1970s. Andersen (1995) argues that apart from the traditional three population characteristics (predisposing, enabling and need) the healthcare system, including health policies, resources, and the organisation of a healthcare system all determine the usage of services. In particular, usage of healthcare is influenced by the organisation and resource allocation of services and the type of care available in districts and communities. During the 1980s and 1990s, health status outcomes were added to the model to understand whether utilisation of services improves health outcomes.

The literature that follows Anderson points strongly to how important it is to distinguish between the potential and realised access to healthcare. This is specifically important when studying older adults as the negative effect of distance to healthcare on healthcare utilisation is particularly strong for older adults who tend to be less mobile (Buor, 2003). Difficulties in hearing, seeing, as well as moving, are common disabilities among older adults (WHO, 2015d). Distances to healthcare providers need to be minimized and travel costs need to be made affordable to realise healthcare, especially for those with physical limitations or behavioural health issues (Amoah, 2014). Based on these arguments, Khan and Bhardwaj (1994) developed a similar model to the Andersen model to understand usage of healthcare. They argue that three main factors determine the utilisation of healthcare, namely: characteristics of a healthcare system, individual characteristics (the features of potential users), as well as the availability and accessibility of healthcare.

This thesis focuses on the first two aspects outlined in Figure 2.2 namely insurance *enrolment* and healthcare *utilisation*. The aim of this thesis is to analyse the determinants of health insurance enrolment in Ghana and to measure the impact of NHIS enrolment on utilisation of healthcare among older adults. The analysis of this thesis will contribute to the discussion whether the NHIS is an effective tool for improving healthcare usage.

This thesis hypothesises that with improved medical access, the health status of older adults will improve as well. Establishing causal links between insurance coverage and health status is challenging. Although the assumption that increased utilisation of care will improve health is plausible, the actual improvements in health status will largely depend on the quality of healthcare services and additional costs that are not covered under the insurance system (see Figure 2.2). Limited evidence by Lloyd-Sherlock et al. (2012b) demonstrates that NHIS enrolment increases awareness of hypertension among older adults.

The effect of insurance enrolment on out of pocket expenditure in Ghana has been researched by Aryeetey et al. (2016b). The study gives evidence that NHIS enrolment reduces household's out-of-pocket expenditure. However, the researchers acknowledge that even insured people are still making out-of-pocket payments that can be large enough to push households into poverty. Nguyen et al. (2011) confirm out of pocket payments by insured, however, the study shows that overall they pay significantly less compared to uninsured.

Programmes aiming to achieve UHC can improve access to healthcare, but it has been found that not all programmes do (Cotlear et al., 2015). The impact of health insurance is expected to differ across countries, healthcare systems, and populations (Escobar et al., 2010). Looking at evidence-based research from low and middle income countries, Mexico's healthcare reforms have been described as a positive example of improving access to services (Frenk et al., 2009). In 2003 Mexico introduced an innovative health insurance scheme to improve social security coverage. Bautista-Arredondo et al. (2014) give evidence that being insured increased the odds of healthcare usage significantly. Mexico's success can be ascribed to a number of comprehensive reforms that were established hand in hand with the implementation of the insurance scheme. Investments not only focused on the affordability of health services, but also on the availability and physical accessibility of services. Between 2001 and 2006 an increased health budget devoted to health infrastructure investment lead to the construction of not only basic care facilities, but also of highly-specialised hospitals even in the poorest states of Mexico (Frenk et al., 2009). In line with that, the availability of drugs was improved in public institutions which led to increased health service utilisation and coverage under the Mexican insurance system (Frenk et al., 2009).

Moreover, Thailand has been cited in the literature as a successful example of moving towards UHC. Currently 95% of the Thai population is insured under a social health insurance scheme. Gruber et al. (2012) demonstrated improved access to healthcare through insurance coverage in Thailand. However, achieving almost universal insurance coverage was linked to several healthcare reforms in the country. It took 27 years to move from the introduction of free medical care (which was restricted to the poor) in 1995 to nearly universal coverage in 2002 (Tangcharoensathien et al., 2010). High insurance coverage was accomplished by developments in the health services infrastructure. Thailand's government improved the country's health service infrastructure to ensure healthcare is accessible where people live. In Thailand all sub-districts have a primary healthcare centre and 90% of the districts have a hospital (Towse et al., 2004). Every year Thailand improves it's ratios of health care personnel to population with rising numbers of trained doctors, nurses and pharmacists in the country (Sakunphanit, 2006). In addition, Thailand implemented a capitation payment method (fixed fee for a bundle of services) instead of a fee-for-service payments to allow "the provider flexibility in choosing the proper course of treatment but not providing an incentive to over-treat" (Antos and Taylor Scholar 2007, p. 4).

In 1993, Colombia transformed its healthcare system and introduced a social health insurance which covers over 80% of the population (Giedion and Uribe, 2009). The programme is financed through mandatory taxes, central and local government funds, as well as subsidized aid programmes to increase coverage among the most vulnerable. The governments focus on enrolling the poor through subsidised regimes was found to be successful. Trujillo et al. (2005) provide evidence that Colombia's subsidised health insurance programme successfully improved access to care among the most vulnerable population groups (children, women and older adults). Increased utilisation through the insurance programme in Colombia was also confirmed by Miller et al. (2009).

Looking at Sub-Saharan Africa Rwanda introduced a mutual health insurance in 1999. Similar to Thailand, it nearly reached universal insurance coverage. The mutual health insurance in Rwanda is a community-based scheme and currently over 90% of the population in Rwanda has health insurance coverage (UNICEF, 2013). Makaka et al. (2012) provide evidence that the community-based health insurance programme has "reduced out-of-pocket spending for health from 28% to 12% of total health expenditure" (p.1). Like Thailand and Mexico, healthcare reforms in Rwanda addressed different dimensions of coverage to improve the access to healthcare. With the aim of enrolling the most vulnerable people into social protection programmes, Rwanda introduced a wealth categorisation programme (called Ubudehe) and employed 45 000 community health-care workers to improve enrolment in the system, particularly among the poorest (Makaka et al., 2012). In order to ensure respectable quality of healthcare, Rwanda introduced a performance based financing mechanism. The aim of this mechanism is to provide incentives to health facilities to

deliver high quality services and develop impact interventions to improve care (Sekabaraga et al., 2011).

In other countries, contrasting evidence of health insurance on healthcare usage is also prevalent. Robyn et al. (2012) found little impact in Burkina Faso's community-based health insurance on health seeking behaviour. A joint NGO paper written by Berkhoutm and Oostingh (2008) concludes that especially among the poor, health insurance coverage is not sufficient to improve access to quality care in low-income countries. Research in Uganda suggests that people aged 65 plus are less likely compared to those under 5 year olds to seek healthcare, even where user fees at health facilities owned by the government have been abolished (Xu et al., 2005). This likelihood may manifest because priority in terms of resource allocation is given to younger members within households and families over older adults (Aboderin, 2004).

Taken as a whole, the examples of Thailand, Mexico and Rwanda showed that healthcare investment needs to focus simultaneously on the affordability, availability and accessibility of services to improve insurance coverage and healthcare usage. Although evidence from Ghana showing a rise in use of healthcare when being insured under the NHIS does exist (Fenny et al., 2016), the insurance coverage in Ghana is as low as 38% (NHIA, 2013a). As the Andersen Model highlighted, insurance coverage alone will not improve utilisation of care. Fenny et al. (2016) point out that "affordability is not the only barrier for access to health services. Geographical, social, cultural, informational, political, and other barriers also come into play" (p.1). While specifically in Mexico and Thailand health investments focused on improving the availability and accessibility of services, Ghana has been criticized for the "low priority given to the need to build new and rehabilitate existing health infrastructure" (Apoya and Marriott, 2011, p. 39). A poor health infrastructure can contribute to the lower insurance coverage in Ghana. The quality and infrastructure of the Ghanaian healthcare system is discussed in the next chapter in more detail.

In general, strategies towards UHC can only be beneficial if a healthcare system is flexible and can adjust to developments over time, including shifts in disease burden and an ageing population (WHO, 2013). Thus, the next sections describes UHC in the context of population ageing and its challenges.

2.4 Universal Health Coverage in the Context of Population Ageing

Efforts to meet the aim of UHC will be influenced to a great extent by the global population ageing phenomenon, referred to as "the increasing share of older persons in the population" (United Nations, 2015a, p.23).

Globally, a demographic transition has occurred, characterised by a shift from a population structure with high fertility and high mortality to a population structure with low fertility and low mortality (Mba, 2010). This means that "older people making up an increasing share of the population as lower fertility results in fewer children feeding in the base of the population pyramid whilst improved longevity results in more people surviving to later life" (Falkingham et al., 2014, p. 3-4).

In nearly every country in the world, an increase in the percentage of older adults can be observed, leading to a substantial growth in the percentage of older people worldwide. It is estimated that by 2050 over 22% of the global population will be aged 60 and over (United Nations Population Fund and HelpAge International, 2012). Population ageing is an important social transformation which affects a whole variety of sectors including: "labour and financial markets, the demand for goods and services, such as housing, transportation and social protection, as well as family structures and intergenerational ties" (United Nations, 2015a, p.1).

Population ageing "demands a comprehensive public-health response" (WHO, 2015d, p. 6). Older adults in Sub-Saharan Africa are often left without any regular income due to lack of social pensions (Kidd and Whitehouse, 2009) and even where pension systems are in place they only benefit a minority of older adults. Most pension schemes in Sub-Saharan Africa only cover older adults who worked in the formal sector while older adults who worked in the informal sector (who are the majority) have no access to government provided pension schemes (Stewart and Yermo, 2009). The Social Security and National Insurance Trust (SSNIT) pension scheme in Ghana, for example, was found to only have a marginal impact on older adults' economic welfare in the county (Tawiah, 2011).

Lack of social security and increasing healthcare demands in older age suggest that the establishment of comprehensive universal health insurance systems may be particularly valuable in ensuring equal access to healthcare in low and middle-income countries.

2.4.1 Global Trends in Population Ageing

Globally, the life expectancy at birth has increased dramatically. Table 2.3 highlights global ageing trends by showing an increase in the median age over time (1950-2050).

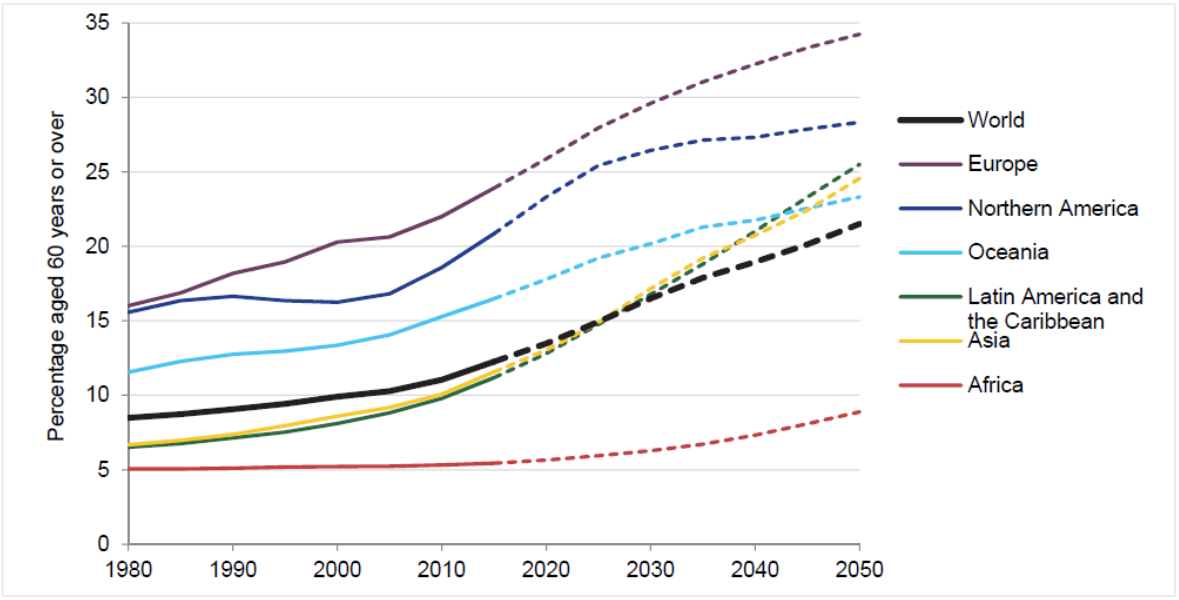
Table 2.3: Global ageing trends: median age by country income

	Median Age (years)			
	1950	**1975**	**2005**	**2050**
High-income countries	29.0	31.1	38.6	45.7
Middle- income countries	21.8	19.6	26.6	39.4
Low-income countries	19.5	17.6	19.9	27.9
World	23.9	22.4	28.0	38.1

Source: WHO (2011b)

Life expectancy has steadily increased since 1950 and the gap in life expectancy at birth between high and low-income countries is expected to narrow from 23 years in 1950 to only 8 years by 2050 (United Nations, 2013). In 2014, two-thirds of the 868 million global population aged 60 and over were living in low and middle-income countries and it is projected that by 2050, 80% of people aged 60 and over will live in countries that are classified as low or middle-income countries (WHO, 2015d). Even though the percentage of older adults is projected to remain at its highest in Europe (see Figure 2.4), population ageing in low and middle-income countries is taking place at a more rapid speed compared to already industrialised economies (Lloyd-Sherlock, 2004b).

Figure 2.4: Percentage of the population aged 60 years or over for regions



Dotted lines indicate future population estimates

Source: United Nations (2015a, p. 31)

Table 2.4 highlights the percentage change of the population aged 60 years and over between 2015 and 2030. This reveals that between 2015 and 2030, the number of older adults aged 60 and over in high-income countries will only increase by 32%, compared to 63% in low-income countries. In upper-middle-income countries and lower-middle-income countries, this percentage growth will be even greater (70% and 66% respectively).

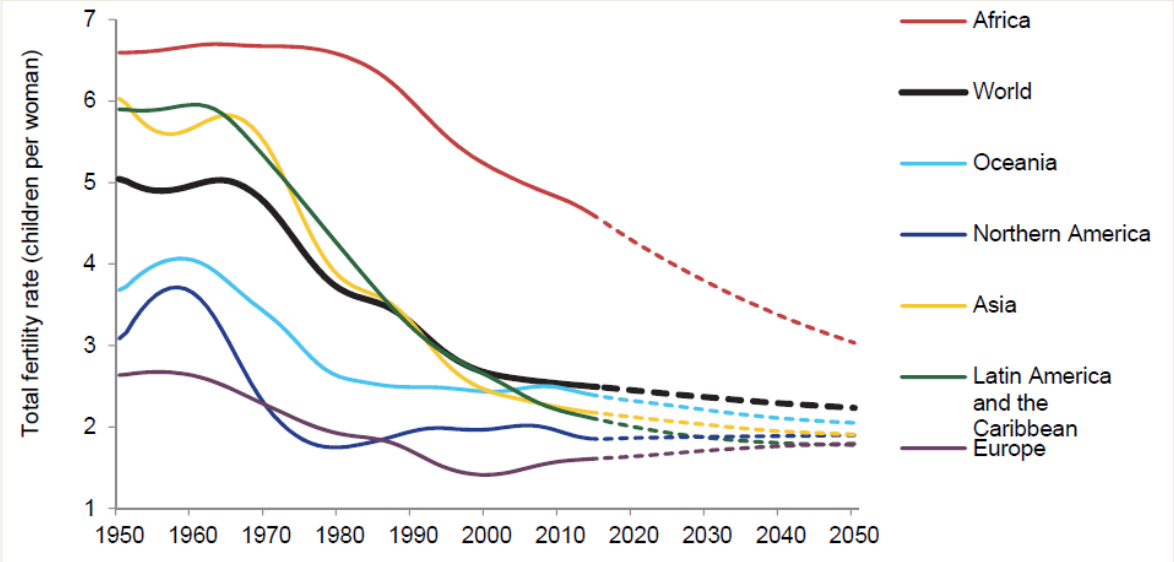
Table 2.4: Percentage change in the population aged 60 years or over between 2000 and 2015

	Percentage change	
	2000-2015	**2015-2030**
High-income countries	34.2	32.0
Upper-middle-income countries	64.0	70.2
Lower-middle-income countries	48.8	65.9
Low-income countries	56.2	63.0

Sources: Adapted from United Nations (2015a)

An increase in life expectancy alone, however, does not result in population ageing (United Nations, 2013). Population ageing is determined both *directly* and *indirectly* (Lloyd-Sherlock, 2010). The population structure is driven by mortality, fertility and migration (Mba, 2010). These determinants are classified as *direct* determinants of population ageing, with fertility seen as the main driver (Lloyd-Sherlock, 2010). Figure 2.5 shows that today, the global total fertility rate is 2.5 live births per woman, which is a substantial decline from 1950 when a women had on average 5 live births (United Nations, 2015a).

Figure 2.5: Total fertility rate for the world and regions



Source: United Nations (2015a, p. 46)

The impact of mortality decline on population ageing depends on whether mortality rates decline at younger or at older ages (Mirkin and Weinberger, 2001). Reduction of infant and child mortality lowers the population's mean age, but will not necessarily result in population ageing. However, as Mirkin and Weinberger (2001) point out "in countries where mortality rates at young ages are already low, further declines have tended to affect mainly the adult and older ages, and have contributed to population ageing"(p.47). This means that ultimately mortality decline accompanied by rising life expectancy will reinforce the effect of fertility decline on population ageing (United

Nations, 2013). The effect of migration on the age structure is less important on a national level but can have important effects on a regional or district level (Mba, 2010).

Indirect factors driving population ageing include "complex sets of socioeconomic and cultural transformations associated with development, and which underline demographic change" (Lloyd-Sherlock, 2010, p. 8). Examples of *indirect* factors are cultural influences, socioeconomic conditions, or policies like family planning programmes (Lloyd-Sherlock, 2010). Where social security systems are not in place for those of older age, this can be an important incentive for childbearing (Conde-Ruiz et al., 2003).

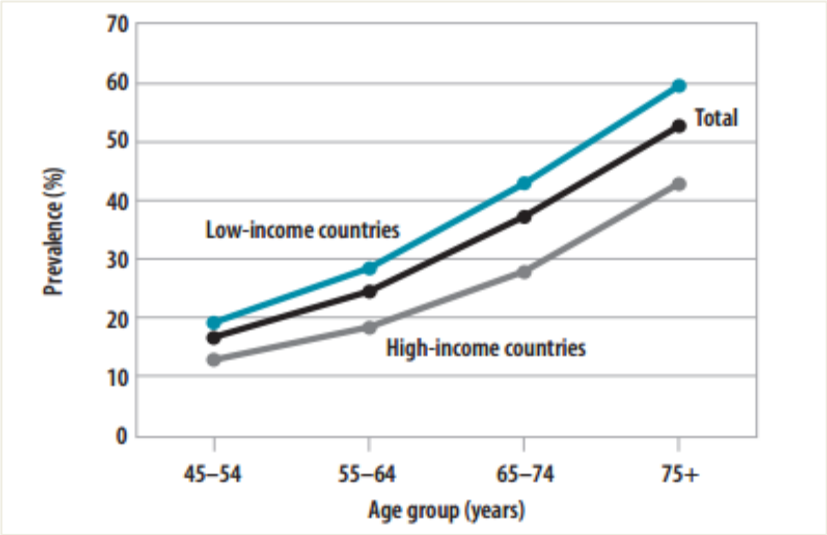
2.4.1 Challenges of Population Ageing

The increase in the number of older adults is seen as a success in global public health (United Nations, 2015b). However, with ageing populations new problems occur, especially in low and middle-income countries. The National Institute on Aging and Health (2007) states that: "societal aging may affect economic growth and many other issues, including the sustainability of families, the ability of states and communities to provide resources for older citizens" (p.1).

Population ageing is not only about the increases in numbers of older adults, but also about longevity and healthy ageing. (Lutz et al., 2008). By 2050, the number of people with a disability[3] requiring daily care is expected to rise by 257% in Sub-Saharan Africa (Harwood et al., 2004). Figure 2.6 indicates that, in low and middle-income countries, the prevalence of disabilities is greater than in higher income countries and that the rates of disabilities increase with age. In Ghana, the prevalence of disability was found to be five times higher among people aged 60 plus, compared to the rest of the population. This prevalence was reported to be higher in rural areas (13%) compared to urban dwellers (12%) (Ghana Statistical Service, 2013).

[3] WHO (2016c) defines disabilities as "an umbrella term, covering impairments, activity limitations, and participation restrictions".

Figure 2.6: Age-specific disability prevalence by country



Source: WHO (2011b, p. 35)

The fall in the number of children and an increase in the number of older adults will lead to shifting demands for healthcare services (Lloyd-Sherlock, 2004b). A worldwide shift in the loss of health and mortality caused by communicable (infectious and contagious diseases) to non-communicable diseases (such as arthritis, Alzheimers, cardiovascular disease, cancer, dementia and diabetes) is noticeable (National Institute on Aging and Health, 2007). Among people aged 60 plus globally, non-communicable diseases represent 87% of the burden of disease (National Institute on Aging and Health, 2007).

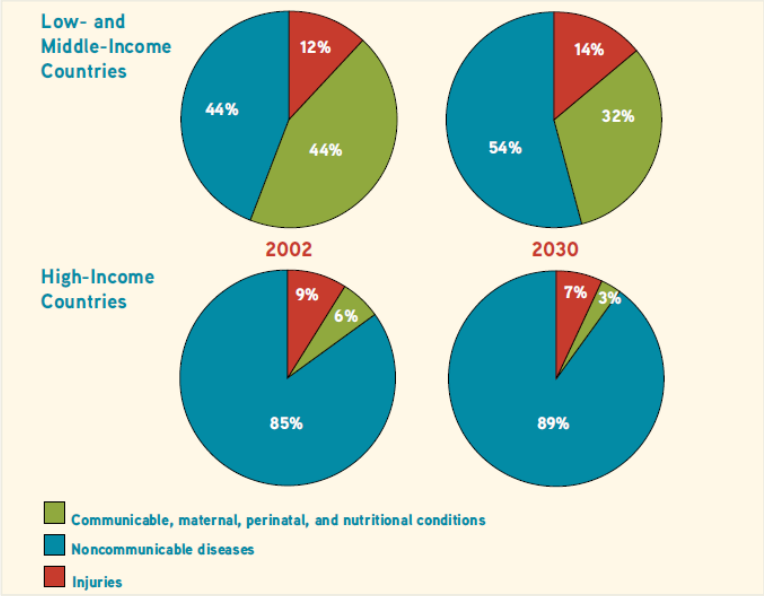
This phenomenon can be described by the epidemiological transition, which describes shifts over time in the prevalence of communicable to non-communicable diseases. The epidemiological transition theory, developed by Abdel Omran, focuses on "the complex change in patterns of health and disease and on the interactions between these patterns and their demographic, economic and sociologic determinants and consequences" (Omran, 2005, p. 732). The epidemiological transition was originally divided into three phases and was later expanded to five stages. The first stage is described as the 'Age of Pestilence and Famine' and is driven by high birth and death rates. The second stage; the 'Age of Receding Pandemics'; is marked by a reduction of death caused by infectious diseases (Agyei-Mensah and de-Graft Aikins, 2010, Omran, 2005). The third stage is characterized by social factors (including diet and lifestyle) and therefore is classified as the 'Age of Degenerative and Man-made Diseases' (Agyei-Mensah and de-Graft Aikins, 2010, Omran, 2005). The fourth stage is known as the 'Age of Delayed Degenerative Diseases' and the fifth stage the 'Age of Emergent and Re-emergent Infections'.

This model paints a general picture but is limited and has received criticism as the stages of the model fail to neatly describe epidemiological changes for every case (country). Health systems in

low and middle-income countries face the challenge of treating traditional infectious diseases and, at the same time, handling the growing burden of chronic diseases (Shetty, 2012). In Ghana, the coexistence of communicable and non-communicable diseases as well has the existence of a poor health system is classified as 'triple burden of disease' (Defo, 2014).

Estimates presented in Figure 2.7 indicate that by 2030, 54% of diseases in low and middle-income countries will be non-communicable. This represents an increase of 10% compared with 2002. In higher income countries, 89% of the burden of diseases will be attributed to non-communicable diseases by 2030. Worldwide, ischemic heart disease, stroke as well as chronic obstructive pulmonary disease have been identified as the greatest cause of years of life lost among older adults (Beard et al., 2016). Older adults also tend to be suffering from multiple chronic conditions (Beard et al., 2016). The co-occurrence of diseases or disorders with increasing age is nowadays a norm instead of an exception (WHO, 2015d).

Figure 2.7: The increase of non-communicable diseases in low, middle and high-income countries between 2002 and 2030



Source: National Institute on Aging and Health (2007, p. 13)

These changes in disease pattern will have a significant effect on healthcare systems. The WHO (2015d), reports that healthcare systems and health professionals in low and middle-income countries are often unprepared and not designed for the healthcare needs of older adults. Healthcare systems that were traditionally not required to deal with an ageing population need to shift their focus as "with the right health care, many chronic diseases can be managed, enabling the people living with them to maintain active lifestyles" (Lloyd-Sherlock, 2015, p.34). Traditionally in Sub-Saharan Africa, resources for education and health for younger adults have been prioritised. Older adults faced discrimination in the sense that they are categorised as less productive and

therefore entitled to less care (Lloyd-Sherlock, 2004a, Aboderin, 2007). Furthermore, a lack of interest in issues related to population ageing in Africa and cultural norms/beliefs shared by governments that older adults are looked after by their families, contributed to a lack of policy actions focusing on older adults (Aboderin, 2007).

Globally, due to the significant changes in the population structure worldwide, the agenda-focus on population ageing is gradually increasing. In 1982, when the first World Assembly on Ageing took place, Africa considered population ageing somewhat irrelevant as a political issue, with fertility reduction and reducing population growth seen as more pressing concerns requiring more immediate action (Apt, 2012). Nowadays, international health polices and documents more often raise awareness of the need to integrate older adults in the discussion of global health. Older adults are seldom mentioned in the 1993 World Bank development report 'Investing in Health' (The World Bank, 1993), while in 2013, the United Nations published a detailed report named 'World Population Ageing' which integrates the debate on global ageing (United Nations, 2013). This report was updated in 2015. In the same year, the first 'World Report on Ageing and Health' was published by the WHO (2015d). Furthermore, in 2012 the Wold Health day (7th April) was devoted to the topic 'Ageing and Health' (WHO, 2012).

2.4.2 Definition of an Older Adult

So far, the term 'older adult' has been used without defining when someone is classified as 'old'. This classification is far from straightforward. There are different factors determining the terminology 'old' and there is no universal definition of 'old'. However, in order to understand age-related effects on a healthcare system, it is necessary to define when a person is considered to be an older adult.

Ageing can be defined from an individual and demographic perspective. The demographic perspective refers to the earlier described process of population ageing "caused by declining fertility and mortality rates, which manifests itself in the growing number of older persons in society" (Huber, 2005, p. 2). Individual ageing is concerned with the distinctive process of ageing throughout the life course (Huber, 2005).

A conventional measure of ageing is to define 'older adults' by their chronological age (Lutz et al., 2008). Using chronological measures, demographic ageing has been defined as an "increase in the percentage of a population aged 65 years old or over" (Lloyd-Sherlock, 2000b, p. 888). Most high-income countries adopted this chronological definition of an older adult using 65 as a cut-off point to define an individual as an 'older adult' (WHO, 2000). This cut-off point is often associated with the acquirement of pension benefits (WHO, 2000). The United Nations, however, refers to an 'older

adult' as someone aged 60 plus. The National Population Council in Ghana defines someone as 'aged' when that person reaches the age of 65, however, the official retirement age for those working in the formal sector in Ghana is 60. This indicates that there is no official agreement on a numerical cut-off point when an individual is defined as an 'older adult' (WHO, 2000). This makes sense conceptually as there is no abrupt transition from 'young age' to 'old age' (Gatrell and Elliott, 2015). Relying on an arbitrary chronological age when classifying an older adult can only be a rough proxy which does not reflect a sudden increase in disabilities or diseases occurring when reaching this age (Gatrell and Elliott, 2015).

Another possible way to define someone as 'old' is by looking at how many years an induvial may have left to live, instead of looking at the number of years passed since birth (Ryder, 1975). However, this approach has its drawbacks as well as "at a given date, a cohort's life expectancy is unknown and its estimation using a period life table is imperfect" (d'Albis and Collard, 2013, p. 620).

Chronological age is not the only characteristic defining older adults. A different approach to defining the term 'older adult' is to use a functional assessment, as well as legislation or cultural considerations (Andrews et al., 2004). While it is not possible to draw a clear line between adulthood and later life, there are several events during the life cycle that are associated with the term 'older' - for example retirement, or social roles like becoming a grandparent.

The definition of 'old' can vary greatly depending on culture and differences in communities (WHO, 2000). While in higher income countries, chronological age is of high importance, in low and middle-income countries, the meaning of chronological age is of less significance (Heslop and Gorman, 2002, Gorman, 1999). Socially constructed connotations of age are important in an African context where the actual birthdates are difficult to obtain as official records are not always kept. The WHO acknowledges that when defining an older adult, it is "more appropriate in Africa to use a combination of chronological, functional and social definitions" (WHO, 2016a).

However, when using large-scale quantitative survey data it remains a challenge to combine multiple dimensions of definitions of an older adult suitably. In this thesis, old age is defined in chronological terms as there seems to be no widespread alternative definition that is suitable (Lloyd-Sherlock, 2000a).

Specifically, for the analysis in this thesis, people aged 50 and above are classified as older adults. Here, it is argued that the communally used, chronological definition of 65 is not appropriate when doing research in an African context. The WHO (2006) argues that in an African context, a chronological age of 50 or 55 serves as an appropriate cut-off point when defining an older adult. The average life expectancy in low-income countries for men is 60 years and for women 63 years,

which is considerably lower than high-income countries where men have on average a life expectancy of 76 years and women of 82 years (WHO, 2014c). Overall, life expectancy in Sub-Saharan Africa is still low; 57 years at birth (The World Bank, 2015). Therefore, to define people aged 50 plus as 'older adults' is more appropriate when looking at low and middle-income countries specifically (McIntyre, 2004). In Ghana, the life expectancy at birth is 62 years and the healthy life expectancy at birth 54 years (WHO, 2015a). Furthermore, the population aged 50 plus is under-represented in surveys in low and middle-income countries as health surveys commonly set their focus on adults under the age of 50 (WHO, 2000). Focusing on adults aged 50 plus will fill this gap in the literature and can widely inform policy makers who have begun to recognise the need to legislate for this age group.

2.5 Summary

UHC aims to improve access to healthcare without fearing financial hardship. Older adults are often overlooked in efforts to increase UHC in low and middle-income countries. This marginalisation cannot continue due to the challenges that increases in the number of older adults are bound to bring to the attainment of UHC. The global increase in the number of older adults is associated with an increasing demand for healthcare and a growing burden of non-communicable diseases. Population ageing in low and middle-income countries is occurring at a fast speed and healthcare systems need to respond to the healthcare needs of an ageing population. Health is a key driver determining whether those older adults can enjoy the opportunities of rising longevity (Beard et al., 2016).

The structure of a healthcare system determines to what extent the three dimensions of UHC (who is covered, what services are covered, and what proportion of costs are covered) are obtainable. In countries without social security systems, it is left to the individual to finance healthcare spending (United Nations, 2013) and the absence of this security can lead to catastrophic expenditures for individuals in times of unforeseen illness.

Transitions towards UHC are marked by a move away from out of pocket expenditure related to formal fees to 'pooled' funding. Health insurance can be viewed as an important component of financial protection as it aims to make healthcare affordable and accessible to all citizens through pooled funding. However, payments for health insurance amongst older adults can be problematic. Only 16.9% of older adults in Sub-Saharan Africa benefit from social security and receive a pension, while many older adults are left without a regular income (International Labour Organization, 2014). Thus, it is important to examine the merits of social health insurance coverage as an approach to achieving UHC specifically for older adults.

Evidenced-based research is urgently needed to inform the nascent policy dialogue on the challenges and opportunities of a globally ageing society (United Nations, 2013). Ghana presents a timely opportunity for a crucial case study to examine the effects of health insurance coverage aimed at achieving UHC. The next chapter highlights why Ghana has been chosen as a case study for this thesis and explains the healthcare reforms in the country.

Chapter 3: Study Context: Case Study Ghana

In this thesis, Ghana is chosen for a case study as a good example to learn lessons on whether national health insurance improves the access to healthcare among older adults. Ghana is an appropriate case study, as by 2050, Ghana is forecast to have the greatest share of older adults among all low and lower middle-income countries in Sub-Saharan Africa, at 9.7% of its population (United Nations, 2015a). In addition, Ghana has a relatively unique history of healthcare reform. The country has moved from a healthcare system based on out of pocket expenditure to a national health insurance scheme (NHIS) which explicitly aims to encourage progress towards UHC.

In this chapter, background information on Ghana is provided as a foundation for the research presented later in the thesis. This includes the geography of Ghana and trends in population ageing in Ghana, followed by the structure of the Ghanaian healthcare system and its reforms, past and present. Lastly, a detailed description of the provision of healthcare in Ghana is provided.

3.1 Background Information

Ghana is located on the west coast of Africa and covers 238,537 square kilometres of land (Ghana Statistical Service, 2008a). In 2007, Ghana celebrated 50 years of political independence from the United Kingdom (UK) (Makinen et al., 2011) and today the country is classified as a 'development darling' (Holder, 2012). Ghana's gross domestic product (GDP) nearly doubled between 2000 and 2010 as a result of the emerging oil industry and increased manufacturing. Since 2011, it is defined by World Bank criteria as a lower middle-income country instead of a low-income country (Holder, 2012). In the last two decades, Ghana not only experienced economic growth but also reduced poverty significantly (Makinen et al., 2011). In line with the MDG 1, Ghana successfully halved the proportion of people living in poverty and extreme poverty. The poverty rate declined from 37.8% in 1991 to 9.6% in 2013 (Molini and Paci, 2015). Ghana's progress in the past two decades also reflects improvements beyond poverty reduction. In 1995, 62 infants died for every 1000 live births. This rate has decreased to 37 per 1000 live births in 2015 (United States Census Bureau, 2015). Also, mortality under 5 years of age declined during the same period by more than half (Molini and Paci, 2015).

Recent data show that there has been a shift in the Ghanaian economy from dependence on agriculture to services. This shift is associated with the economic growth that Ghana recently experienced (Molini and Paci, 2015). In 2008, 34% of GDP was produced by agricultural activities which formed the main area of economic activity, followed by services and industry (Ghana

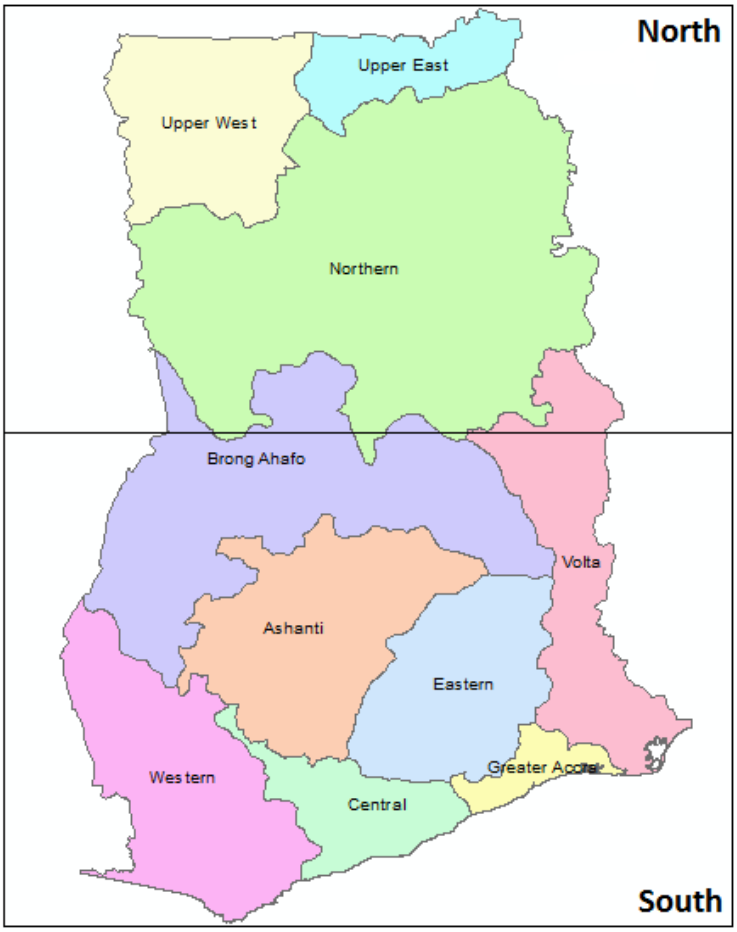
Statistical Service, 2008a). Today, the agriculture sector is not the major contributor to GDP but still forms the main sector of employment with 43.2% of those employed working in agriculture. As well as expansion in services, the industrial sector expanded in Ghana with gold and crude oil production becoming important contributors to the growth in GDP (Molini and Paci, 2015). Overall, since the 1990s Ghana's story has been one of social progress. The living standards of its citizens have been enhanced, educational attainment has increased, and the public health situation has improved (Molini and Paci, 2015).

Figure 3.1: Map of Africa

Source: South African History Online (2016)

Ghana consists of ten regions; namely Ashanti, Brong-Ahafo, Central, Eastern, Greater Accra, Northern, Upper East, Upper West, Volta and Western. There is a spatial north-south divide in Ghana. The northern part of Ghana encompasses the regions Upper West, Upper East and Northern while the remaining regions belong to the south (see Figure 3.2). The Republic of Ghana can be divided into three ecological zones: coastal, forest and savannah (Ghana Statistical Service, 2008a). The south of Ghana largely consists of sandy coastlines, the middle belt of the country is heavily forested, and the ecological zone in northern Ghana is classified as savannah.

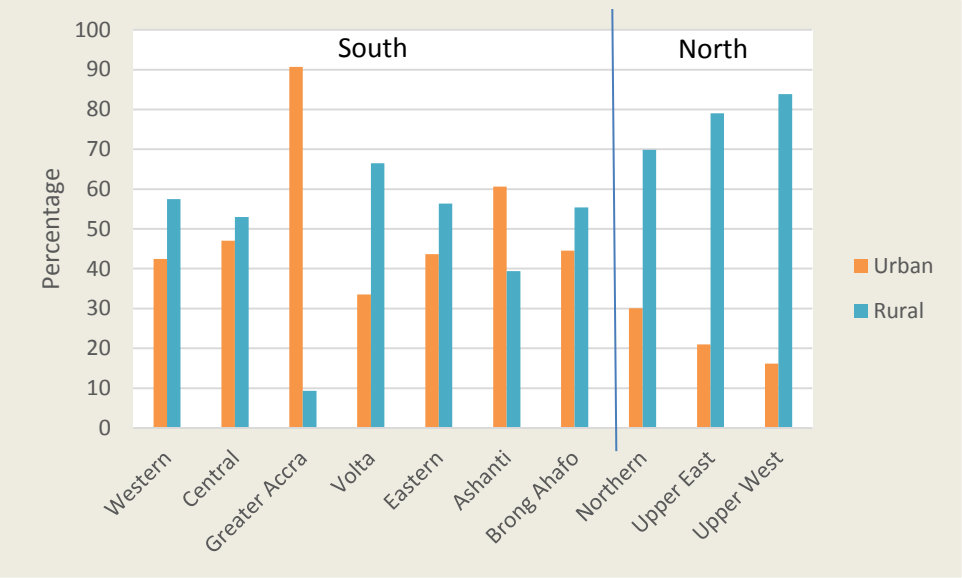
Figure 3.2: Regions of Ghana



Source: Author (2015)

Figure 3.3 highlights that the south is also more urbanised compared to the north of Ghana. Over 90% of people living in Greater Accra live in an urban environment, while 84% of inhabitants in the Upper West live in an area that is classified as rural. In the Greater Accra and Ashanti regions, this high level of urbanisation exists as the population concentrates around the main metropolises; Kumasi and Accra (the capital of Ghana). These geographical differences can affect use and access to healthcare services in different ways. While in the south of Ghana access to healthcare facilities is less challenging, in the north of the country, access remains difficult due to poorer infrastructure (Ghana Statistical Service, 2005).

Figure 3.3: Population by region and residence



Source: GLSS 2012/2013, author's calculations

Geographically, the Northern region is the largest region in Ghana. The smallest region of the country in terms of area is Greater Accra. However, after Ashanti, Greater Accra has the highest number of inhabitants, which results in a high population density (see Table 3.1). Overall, more than 80% of Ghanaians live in the southern part of Ghana and less than 20% of the Ghanaian population lives in the northern regions of Ghana. The spatial north-south divide of the country is underlined by north and south welfare disparities (Jatoe et al., 2012). The south of the country is classified as more developed than the north and the south tends to be wealthier. The poverty level in the north of Ghana is greater than in the south and the north has experienced a lower economic growth rate (Jatoe et al., 2012).

Table 3.1: Population distribution by region - 2010

Region	**Population**	**Population density per km²**
Total	24,658,823	103
Western	2,376,021	99
Central	2,201,863	224
Greater Accra	4,010,054	1,236
Volta	2,118,252	103
Eastern	2,633,154	136
Ashanti	4,780,380	196
Brong Ahafo	2,310,983	58
Northern	2,479,461	35
Upper East	1,046,545	118
Upper West	702,110	38

Source: Ghana Statistical Service (2012) and Ghana Health Service (2010)

3.2 Population Ageing in Ghana

The population in Ghana is still classified as youthful; however, changes in fertility and reduced mortality have increased the percentage of older adults in Ghana significantly. Compared to other countries in Sub-Saharan Africa Ghana has a high proportion of people aged 60 and older (Mba, 2010, United Nations, 2015a).

Table 3.2 illustrates the change in the Ghanaian population structure over the past half century. Between 1960 and 2010, the percentage of the Ghanaian population aged below 15 years decreased from 45% to 38%. At the same time, the share of the population aged 60 plus increased from 5% to 7%.

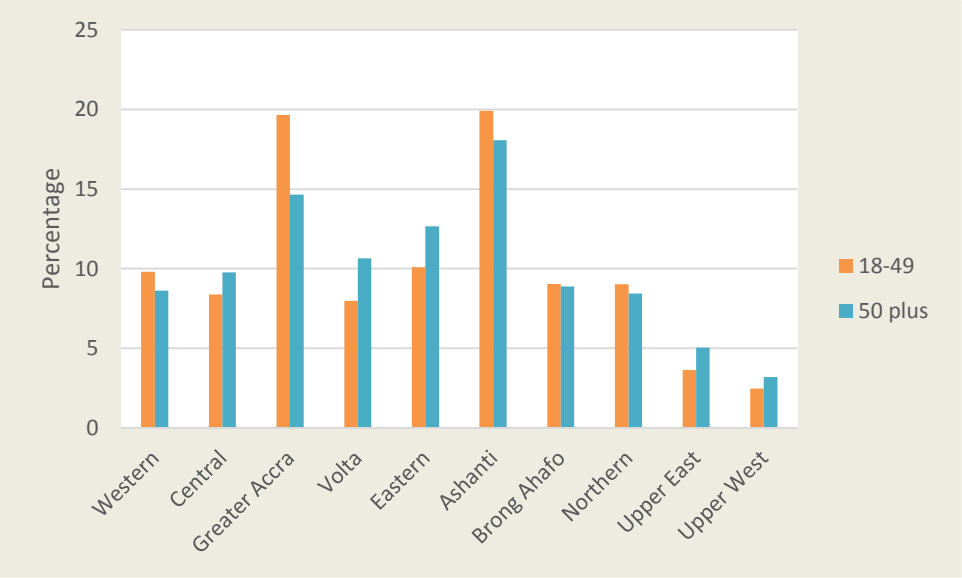
Table 3.2: Age structure of Ghana's population, 1960- 2010

Year	<15 years	15-59 years	60+ years
1960	44.5	51.0	4.5
1970	46.9	47.7	5.4
1984	45.0	49.1	5.9
2000	41.3	51.5	7.2
2010	38.3	55.0	6.7

Source Ghana Statistical Service (2013, p. 27)

According to the 1960 Ghanaian census, 213,477 people were aged 60 and over while this number rose to 1,643,381 in the latest 2010 census. The 2010 census further showed that 52% of older adults aged 50 and over live in rural areas compared to 44% of people aged between 18-49. Figure 3.4 reflects this regionally differentiated age profile. The figure shows that a greater share of younger/middle aged adults live in the two most urbanised regions in Ghana; Greater Accra and Ashanti; while a greater share of older adults live in the less developed Upper East and West.

Figure 3.4: Ghanaian population by age and region



Source: 10% sample of the 2010 Ghanaian Census, author's calculations

Chapter 2 already noted that population ageing is associated with a rise in non-communicable diseases as a leading cause of death. Table 3.3 highlights that in Ghana, death caused by non-communicable diseases are more common among older adults compared to younger adults. It can be seen that among adults aged 50 plus, stroke is the main cause of death. For older adults aged between 50 and 69, ischemic heart disease and malaria represent the second and third highest causes of death. For people aged 70 plus, lower respiratory infections and ischemic heart diseases are the second and third highest cause of death. For those aged 15-49, HIV/AIDS was found to be the main cause of death followed by maternal disorders.

Table 3.3: Main causes of death among people aged 70 plus in Ghana

Rank	Age 15-49	Age 50-69	Age 70 plus
1	HIV/AIDS	Stroke	Stroke
2	Maternal disorders	Ischemic heart diseases	Lower respiratory infections
3	Lower respiratory infection	Malaria	Ischemic heart diseases
4	Tuberculosis	Lower respiratory infections	Malaria
5	Malaria	Diabetes	Diabetes
6	Road Injury	Cirrhosis	Protein-energy malnutrition
7	Meningitis	HIV/AIDS	Hypertensive heart disease
8	Diarrheal diseases	Tuberculosis	Tuberculosis
9	Stroke	Road Injury	Chronic obstructive pulmonary disease
10	Epilepsy	Protein-energy malnutrition	Diarrheal diseases

Communicable diseases, Non-communicable diseases, Injuries

Source: Institute for Health Metrics and Evaluation (2013)

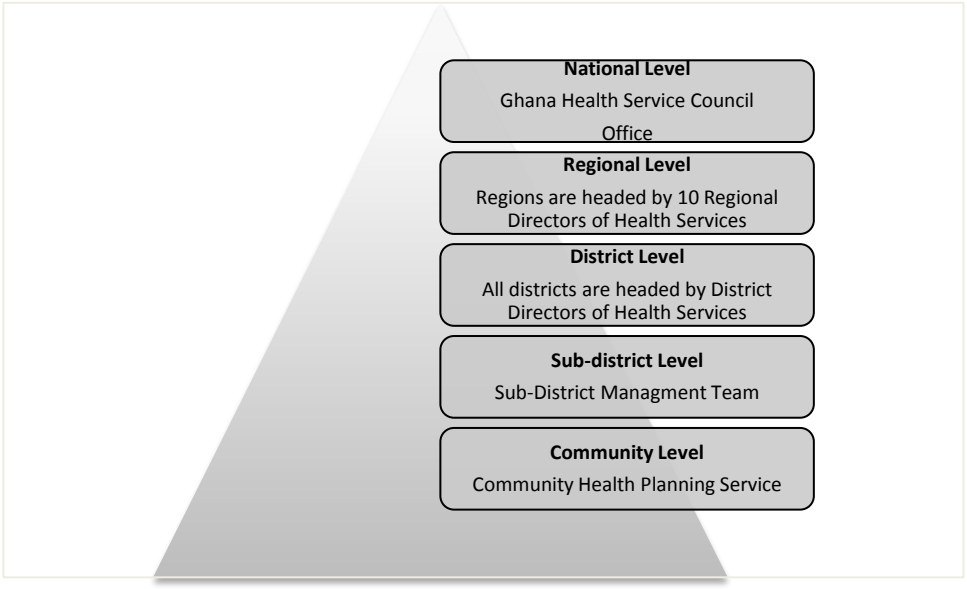
3.3 Ghana's Health Sector and Reforms

Understanding the Ghanaian health system and the nature of recent reforms is crucial when examining its nationwide health insurance scheme.

The health sector in Ghana can be divided into four delivery categories, namely; public, not-for-profit private, for-profit private and traditional (Arhinful, 2009). The organisational structure of the Ghanaian health system is summarised in Figure 3.5.

The public health sector is overseen by two governmental institutions - the Ministry of Health (MOH) which is the top policy decision-making body, and the Ghana Health Service (GHS) which steers service delivery (Makinen et al., 2011). Administratively, the system operates on a national, regional and district level. The GHS was reformed in 2001 to give the regional and district authorities more power. This decentralization of Ghana's Health System was seen as a way to meet health related development objectives more efficiently (Makinen et al., 2011). In 2003, the so-called Community-based Health Planning Services (CHPS) were introduced to improve basic preventive care as well as basic curative services at a community level. The introduction of these services aimed to respond to poor accessibility of services at other administrative levels (The World Bank, 2016). CHPS offer curative care services and are usually located in communities with a population ranging from 15,000 to 20,00 inhabitants (Alhassan et al., 2015).

Figure 3.5: Organisational Structure of the Health System



Source: Ghana Health Service (2015b)

After Ghana became independent in 1957, the then-incumbent government tried to implement nationwide health coverage and introduced a healthcare system that was financed through general

taxation. This system intended to provide affordable basic healthcare for the entire population (Blanchet et al., 2012, Mills et al., 2012b). The aim of this system was to achieve “free healthcare for all” (Chankova et al., 2009, p.1). In the 1960s and 1970s however, Ghana faced economic instabilities and a health system that was financed through general tax revenues became unsustainable. This put the government in the position of having to find alternative ways to finance the health system in the country (Lloyd-Sherlock, 2014b, Blanchet et al., 2012). From 1985, co-payments were introduced in order to head off the collapse of publicly funded services. In 1992, the so called ‘cash and carry system’ was fully instituted in the national health system of Ghana (Hsiao and Shaw, 2006). ‘Cash and Carry’ refers to the cash payments users had to make when they sought healthcare (Blanchet et al., 2012, Mills et al., 2012b). The fees increased inequalities in access to these services greatly, and were seen as a barrier for many people seeking healthcare services (Hsiao and Shaw, 2006). This system was hugely unpopular among Ghanaian citizens, as without the ability to pay out of pocket, many were unable to seek any healthcare, even in cases of emergency (Blanchet and Acheampong, 2013).

The NHIS was implemented in 2003 and fully established in 2005 in order to improve equality when seeking care by distributing/pooling the financial burden of healthcare (Mills et al., 2012a). The history of the NHIS is based in the Mutual Health Insurance Scheme movement in the 1990s. Between 1989 and 1992, the first community-level insurance scheme was implemented in the Sunyani district, a Catholic diocese (Blanchet and Acheampong, 2013). The system gained support and by 2000 30% of the citizens in the Sunyani district were enrolled (Blanchet and Acheampong, 2013). The Mutual Health Insurance Scheme was established district-wide by communities and was supported by the MOH (Hsiao and Shaw, 2006). This voluntary insurance system aimed to protect people with no social protection against financial hardship when seeking healthcare (Hsiao and Shaw, 2006). By 2001, 34 districts in Ghana had joined the scheme.

Although the community schemes were seen as a success compared to the cash and carry system, these schemes also had to face a lot of criticism as they offered limited healthcare coverage (Blanchet and Acheampong, 2013). Furthermore, the schemes were vulnerable to bankruptcy due to limited opportunities to pool funds (Blanchet and Acheampong, 2013). The NHIS resulted from promises made during the elections in 2000 to improve the health system situation in Ghana. Before explaining the NHIS in detail in the next section, Table 3.4 summarises healthcare reforms in Ghana.

Table 3.4: Health sector reforms in Ghana

Year	Incident	Rationale	Characteristics	Funding	Results
1957	Healthcare system based on the British healthcare scheme	Modelled after the British NHS	Universal access to health for the entire population	Funding though general tax revenue	With the decline in economic performance the scheme proved to be too expensive
1985	Introduction of co-payments	Avoid a collapse in publicly funded services	Gradual introduction of co-payments for healthcare services	From general revenues and user fees	Out-of-pocket user fees charged from partial to full cost recovery
1992	Introduction of Cash-and-Carry health system	Increase funds for providers, make fee recovery legal, restrict needless usage	Access to healthcare only through cash payments	From general revenues and user fees	Outpatient visits dropped significantly
1990s to 2000s	Mutual Health Insurance	Lack of social protection mechanisms	Social protection against the impoverishing costs of illness	Community	Financial protection and more equal access to care
2003	Introduction of the NHIS	Agenda of the current ruling government (re-election platform)	Abolish cash-and carry and expanded coverage through district wide MHOs	Funding though general tax revenue and membership premiums	95% coverage of all common diseases

Adapted from Hsiao and Shaw (2006, p. 74-75)

3.3.1 The National Health Insurance System

The NHIS is grounded in the 2003 National Health Insurance Act, specifically in the 'parliamentary bill ACT 650 and LI 1809' (Salisu and Prinz, 2009). This act aims to protect every citizen against financial hardship if they decide to seek basic healthcare (Ministry of Health Ghana, 2013). The NHIS operates under the vision of being "a model of a sustainable, progressive and equitable social health insurance scheme in Africa and beyond" (NHIA, 2015), and has the mission "to provide financial risk protection against the cost of quality basic healthcare for all residents in Ghana" (NHIA, 2015).

In total, three insurance schemes are available under the Health Insurance Act in Ghana:

- The District-Wide Mutual Health Insurance Scheme (DMHIS)
- The Private Mutual Health Insurance Scheme
- The Private Commercial Health Insurance Scheme.

The DMHIS, however, is the only system that receives governmental support from the National Health Insurance Fund and that is available in all 170 districts (Gobah and Liang, 2011). It is licensed and regulated by the NHIA. Gajate-Garrido and Ahiadeke (2015) summarises the task of the DMHIS:

> "Each DMHIS is responsible for establishing a district administration, enrolling and maintaining membership, collecting contributions from people who can pay, applying a means test to determine who is indigent and processing claims from accredited facilities"(p. 6).

Although it is mandatory to be part of an insurance scheme in Ghana, the literature often argues that in practice enrolment is voluntary. No penalties apply for not being a member of any insurance scheme and citizens are not enrolled by default (Blanchet et al., 2012). Only people working in the formal sector are authoritatively required to enrol in the NHIS, while in the informal sector no formal penalties apply for not being part of a health insurance scheme.

In order to become a member of the NHIS, individuals first need to register at the local district office and pay a registration fee and a premium. The health insurance membership ID card, which provides evidence of enrolment, will then be provided for participants after a waiting period which can take up to several months (Blanchet et al., 2012). A waiting period before receiving the ID card is seen as a tool for the reduction of enrolment only when ill (Osei-Akoto and Adamba, 2011). Immediate biometric registration at selected district offices has been launched only recently to optimise the enrolment process (NHIA, 2016c). NHIS membership expires after one year and thus each year the NHIS requires a renewal of insurance membership to remain eligible to the NHIS benefit system.

On reaching 70 years of age, individuals are exempt from the NHIS premium payment if they can provide a proof of age (Dixon et al., 2011). Other groups that are exempt from paying the premium include all children under 18 when both of their parents are enrolled in the NHIS, the core poor, and pregnant women. All people who cannot show a source of income and have no fixed residence are classified as the 'core poor' (Blanchet et al, 2012). Furthermore, all people enrolled in the livelihood empowerment against poverty (LEAP) programme, a cash transfer programme for extremely poor households, are able to enrol in the NHIS for free (Kusi et al., 2015). In addition, individuals who either contribute towards retirement benefits through the Social Security and National Insurance Trust (SSNIT) or receive a pension from the SSNIT are exempt from the NHIS premium (Agyepon and Adjei, 2008). The SSNIT is the national pension scheme in Ghana and contributions are mandatory for employees working in the formal sector (Parmar et al., 2014). Table 3.5 indicates that the percentage of NHIS subscribers who are SSNIT Pensioners is very small (0.2%). The table further shows that 4% of NHIS members are aged 70 and above and 12 % are indigents. The largest share are children under 18, forming nearly 47% of NHIS subscribers (NHIA, 2013a).

Table 3.5: NHIS Subscribers by Category as at December 2013

Category of membership	Percent of total registered
Informal sector	33.6
Indigents	12.1
70 Years and Above	3.8
Under 18 Years	46.5
SSNIT Pensioners	0.2
SSNIT Contributors	3.6
Other	0.2

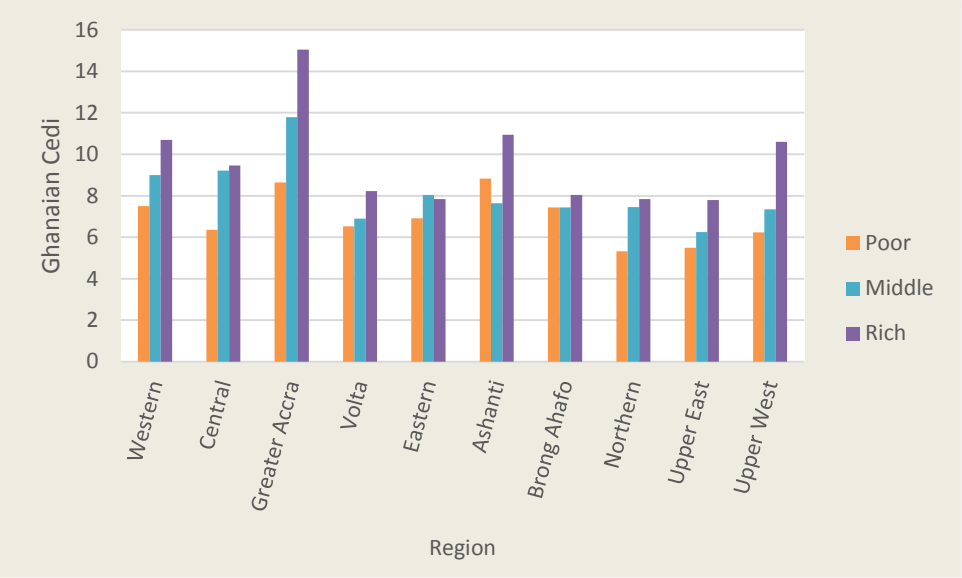
Source: NHIA (2013a)

Overall, the financing of the current healthcare system in Ghana is classified as progressive, meaning that "groups with a higher income contribute a higher percentage of their income than do groups with a lower income" (Mills et al., 2012b, p. 127). The NHIS premium is based proportionally on people's income with the poorest being exempt from any premium fees (McIntyre et al., 2008). The official minimum payment amounts to GH¢7.20 per annum and the upper limit is not allowed to exceed GH¢48.00 ($1.80 to $12.08[4]) (NHIA, 2015, Alfers, 2013). In reality this is difficult to achieve as it is problematic to define which are the poorest in a population, and it is challenging to determine the exact income of a household as household members do not necessarily state all of their income sources. To avoid these difficulties, in reality a permanent premium payment of GH¢ 7.20 per annum is charged at the local district office (McIntyre et al., 2008). To put this into perspective, the average annual per capita income is around GH¢ 1000 ($250.47) (Ghana Statistical Service, 2014).

Figure 3.6 shows slightly higher premium payments among the richest society members. Regional differences in the premium payment are also confirmed. The average premium payment was found to be highest in the Greater Accra region and lowest in the Upper East region. The NHIS offers the option to pay the premium in instalments over a period of 12 months (Alfers, 2013, Osei-Akoto and Adamba, 2011). However, the review of the literature found no studies providing evidence as to whether people are actually aware of this opportunity and whether in practice this rule is realised.

[4] Exchange rate November 2016: 1 Ghanaian Cedi = 0.25 US Dollar.

Figure 3.6: Average premium payments by region and expenditure tertile



Source: GLSS 2012/2013, author's calculations

Apart from the premium and registration fees, the NHIS is financed by a 2.5% value added tax (VAT), contributions to the SSNIT made by workers, the national insurance council, and government and donor funds (Owusu-Sekyere and Chiaraah, 2014).

Any public or private insurance scheme in Ghana has to offer a minimum benefit package recognised by the Minister of Health (Hsiao and Shaw, 2006). The NHIS package includes outpatient services, inpatient services, oral health, eye care, maternity care and emergencies as summarised in below (NHIA, 2016b).

Table 3.6: Overview of services covered by the National Health Insurance Scheme

NHIS Services
✓ Outpatient services (general as well as specialist care)
✓ Inpatient services
✓ Oral health
✓ Eye care services
✓ Maternity Care
✓ Emergencies
✓ Drugs (recorded on the NHIS drug list)

Source: NHIA (2016b)

Officially, the NHIS covers 95% of the common disease burden in its insurance package (Owusu-Sekyere and Chiaraah, 2014). By implication, this means not all healthcare services are covered. Services not covered by the NHIS include, for example, HIV retroviral drugs, organ transplantation, surgery for damage to the brain or heart not resulting from an accident (UHC Forward, 2013, Bosu, 2012).

Overall, healthcare providers reported that the NHIS increased healthcare usage, resulting in more prompt healthcare seeking behaviour. It reduced the numbers of clients who sought care too late with worsening conditions:

> "The NHIS has assisted in revenue mobilisation for health care delivery and the insured are also able to access health services promptly all the time without instant payment (In-depth interview, hospital accountant Bawku municipality in Akum (2014 p. 33))".

> "We have realized that with the uninsured, it is only when they are critically ill they do not report early to the facilities. Some of them just come to die (In-depth interview, medical doctor-Zebilla, p.35)".

There is evidence that the NHIS was also successful in improving access to specialised services. A health insurance manager stated:

> "Our region is the poorest and people who had hernias could not pay for the surgery fee, but now that the NHIS is in operation, many have gone for the hernia surgery and the problem has reduced drastically. All must embrace the NHIS and help in its sustainability" (In-depth interview, insurance manager-Zebilla in Akum (2014 p. 33)).

As mentioned in chapter 2, population ageing is associated with a rising burden of non-communicable diseases that healthcare systems need to account for by providing curative and preventive care (Dmytraczenko and Almeida, 2015). The NHIS benefit package does include treatment of chronic conditions like hypertension and diabetes, however, for other healthcare needs, older adults are not mentioned in the NHIS policy (Ayernor, 2012). Although the NHIS does provide cover for most non-communicable diseases Tagoe (2012) found that the "mean healthcare expenditure for households with respondents currently living with NCDs is 49% higher than households with healthier respondent" (p.54). This indicates that the NHIS does not entirely reduce financial burden in cases of illness. For example, while insulin for diabetes patients is covered under the NHIS, blood glucose testing devices, used to monitor sugar levels, are not (Kratzer, 2012). In addition, Kratzer (2012) found that the lack of availability of insulin supplies forms a vital barrier to treatment of diabetes.

Research in James Town and Ussher Town (urban poor communities in Accra) found that health workers lack fundamental knowledge of the risks of chronic conditions, as well as the prevention and treatment of cardiovascular diseases. Aikins et al. (2014) point out that health workers demonstrate a particularly poor knowledge in areas including: "the relationship between high red meat consumption and poor health, diabetes as a risk factors for heart disease, the relationship

between family history and individual risk of heart disease, and the need for individuals with hypertension to use blood pressure medicine for life" (p.7).

Furthermore, cancer treatment, with the exception of cervical and breast cancer treatment, is not covered under the NHIS even though according to the WHO (2011a) "more than two thirds of all cancer deaths occur in low- and middle-income countries" (p.1). Ageing is associated with increasing occurrence of mental health conditions, dementia, and a subsequent rising demand for institutional care services which have been less readily accounted for (The International Longevity Centre - UK, 2011, Awoyemi et al., 2011). The NHIS itself does not include psychiatric services in its benefit package but mental disorder treatment is freely available in the government psychiatric hospitals as well as through community psychiatric nurses. If, however, these services are not accessible, then alternatives have to be purchased out of pocket (Ofori-Atta and Ohene, 2014). Hearing aids and dentures are also excluded from the benefit package (Mensah et al., 2009). This indicates that the NHIS works differently for people with different aliments and health issues. The increasing number of older adults suffering from chronic conditions demands that more is to be done to ensure that people with chronic conditions benefit from the NHIS. Furthermore, bureaucratic requirements can restrict NHIS registration. The effectiveness of the premium exemption for people over the age of 70 has been questioned. NHIS agents request a proof of age to qualify for the exemption. Ghana introduced the registration of birth in 1912 (Ghana Health Service, 2015a) yet the possession of birth certificates among poorer individuals is rare. Therefore, the implementation of the old age exemption is undermined (Dixon, 2014). The Demographic and Health Surveys (DHS) 2014 shows that only 40% of the poorest under 5 year old children had a birth certificate compared to 80% of the richest under 5 year olds[5].

3.3.2 The Current Situation

The primary goal of the NHIS was to replace the cash and carry system in Ghana, improving affordability and usage of healthcare, especially among the most vulnerable. However, the success of the NHIS in attaining these objectives remains questionable. The NHIS suffers from administrative difficulties and inefficiencies. The processing of ID cards, which confirm NHIS enrolment, has been described as insufficient due to long waiting periods between formal NHIS registration and the actual receipt of ID cards (Gajate-Garrido and Owusua, 2013, Blanchet et al., 2012). According to Gajate-Garrido and Owusa's (2013) research, over 50% of districts reported that they have problems with the provision of ID cards. Delays in payment of claims have resulted

[5] The two surveys used in the thesis (*Ghanaian Living Standards Survey* and *Global Study on Ageing and Adult Health*), which include data on older adults, do not ask about having a birth certificate.

in a lack of trust in the system and a negative reputation for the system (Gajate-Garrido and Owusua, 2013).

Healthcare facilities are stretched by delays in processing the overwhelming volumes of claims resulting from the introduction of the NHIS. Increasing administrative burden led to concerning delays in reimbursements of claims of around 3 to 4 months (Owusu-Sekyere and Bagah, 2014). This in turn has led to deficits in facilities' budgets, including unpaid salaries, as reported by a medical officer of Kings Hospital in the Northern region:

> "For the past seven months (July, 2013-January, 2014) we have not received any payment from NHIA for the services rendered. I have therefore not been able to pay salaries for two months and my supplies and workers alike are on my neck. Can you imagine we have even run out of paracetamol? But for the benevolence of friends, this hospital would have been closed down" (Owusu-Sekyere and Bagah, 2014, p. 191).

Ashigbie et al. (2016) conducted interviews in private and public health facilities in three regions of Ghana (Eastern, Volta and Greater Accra) and found that delays in reimbursement were more common in private facilities particularly among private pharmacies and small hospitals. NHIS patients reported being denied treatment more frequently at private facilities (even when accredited under the NHIS) compared to at public facilities. Ashigbie et al. (2016) argue the delays in reimbursement, particularly among private providers, can explain the more common denial of treatment for NHIS patients at private facilities. Saeed et al. (2016) used the SAGE to examine the utilisation of care among older adults in Ghana and found that those with health insurance preferred the use of a public facility when seeking care, while those without insurance preferred to use pharmacies and or to seek traditional treatment.

Dissatisfaction arises in particular when insured members report that patients who are making cash payments receive a higher quality of care and face shorter waiting times when queuing for services (Bruce et al., 2008). Although there is evidence by Aryeetey et al. (2016b) that NHIS enrolment reduces household's out-of-pocket expenditure, it is estimated that 40% of insured members still make informal payments (WHO, 2010b). This was underlined through qualitative research by Dalinjong and Laar (2012) who found that insured clients complained about unofficial fees and that healthcare providers prefer out of pocket payment due to the delay in reimbursement by the NHIA.

Topical in-depth interviews carried out by Owusu-Sekyere and Bagah (2014) confirm that NHIS patients do not receive the same treatment compared to people who pay for their services in cash:

> "Some providers have introduced the out-of-pocket (OOP) payments for services to those with the NHIS cards. Some facilities in the districts have turned away people who are

> insured. It is true that some facilities and pharmacies would prefer people who will pay in cash to those with insurance, due to the delay in reimbursement" (A key informant at Yaala Health Center in the Upper West Region of Ghana in Owusu-Sekyere and Bagah (2014, p.192)).

Moreover, a 44-year-old malaria patient stated:

> "I came to the Hospital with my National Health Insurance card thinking that the insurance will take care of everything, but my brother even this paracetamol, I paid because according to them the new drug list does not cater for it" (Owusu-Sekyere and Bagah, 2014, p. 192).

Inequalities in the physical examination of insured and uninsured was found by Akum (2014) . The study reported that uninsured were meaningfully more likely to be physically examined compared to insured. One insured women stated:

> "..after my complaints, the doctor just wrote some drugs for me, he did not touch any part of my body" (p. 35 in Akum (2014)).

Regardless of insurance status, healthcare providers seemed to give priority to well educated and rich patients:

"The staffs have their own preferred clients who are well dressed, neat and good looking, but not poor people like us" (p. 36).As pointed out in chapter 2 this thesis does not examine the impact of NHIS coverage on household and individual's out-of-pocket health expenditure. However, when analysing the impact of NHIS enrolment on healthcare usage it is important to understand, that even when covered under the NHIS, informal healthcare payments are still common. The NHIS does not fully protect its members from out of pocket payments when seeking healthcare because of delays in reimbursement and perceptions of differences in quality and efficiency of care delivery. Particularly among the poor, unofficial payments can result in low usage of healthcare services even when covered under the NHIS. Chapter 7 investigates in more detail the equity in the value gain of insurance coverage with the aim of fully understanding the benefit of NHIS coverage among different expenditure groups.

Lately, the NHIS has received even more fervent critique when it emerged at the beginning of the year 2013 that the system was about to go bankrupt (Schieber et al., 2012). Increased population ageing is expected to lead to even greater demand for healthcare and the healthcare system in Ghana needs "to meet the increasing demands of its growing and structurally changing population" (Schieber et al., 2012, p. 2). Table 3.7 summarises the reasons for noninsurance. Reasons cited for

not being enrolled in the NHIS include a lack of money, lack of confidence, no need for coverage, or that the registration office is too far away. As highlighted before, the increasing prevalence of diseases and disabilities in older age makes health insurance coverage necessary when not having the financial means to pay out of pocket for health services. Even though older adults aged 70 plus are exempt from the premium payment, it can be seen that a slightly higher percentage of older adults reported that they have no money to enrol (55.6%) compared to people aged 18-49 (49.5%). Nearly 15% of people aged 18-49 reported that they do not need health insurance compared to 13% of people aged 50 plus. Further, 4.8% of older adults reported that the registration office is too far away as a reason for non-insurance. 3.7% of younger and middle-aged older adults reported the same.

Further analysis showed that residence is an important factor for never being registered. A higher percentage of participants living in rural areas reported that they could not afford the premium payment compared to their urban counterparts. Specifically, 65% of adults aged 18-49 and 70% of older adults living in rural areas reported they have no money to enrol. Further, among those older adults who reported that the registrations office is too far away, 90% were living in rural areas. Contrary, the confidence in the operators of the scheme was found to be higher in rural areas compared to urban areas. 71% of younger and middle aged adults and 65% of older adults who reported trust in the operators were rural dwellers.

Gender disparities were revealed as well when looking at reasons for non-enrolment. 61% of younger and 67% of older adults, who reported they do not need health insurance, were male. Bertakis et al. (2000) and Redondo-Sendino et al. (2006) showed that women have a poorer health status than men and a greater utilisation of healthcare, which could lead to self-selection into insurance schemes.

People who reported that they do not need health insurance also tend to be wealthier. 52% of younger and middle aged adults belonging to the richest wealth tertile reported that they do not need insurance coverage compared to only 19% of the poorest. Looking at older adults 34% of the richest reported that they do not need insurance coverage compared to 31% of the poorest. This could be attributed to a variety of different reasons: poorer people tend to have a poorer health status than richer people. In addition, richer people can afford out of pocket payments when ill or might even prefer to seek private care. For poor people, on the other hand, health insurance coverage might be the only way to avoid catastrophic healthcare expenditure when falling ill.

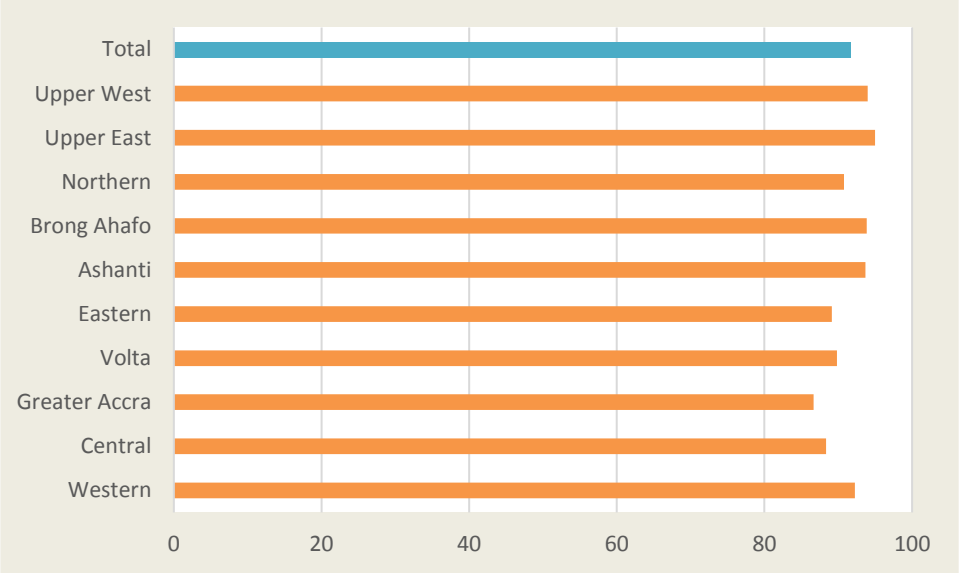
Table 3.7: Reasons (%) for never being registered or covered with National Health Insurance Scheme

Reasons	Age group	
	18-49	50 plus
Don't have confidence in operators of the scheme	12.0	8.9
Do not need health insurance	14.7	13.0
Registration officer too far	3.7	4.8
No money	49.5	55.6
Other	20.1	17.7

Source: GLSS 2012/2013, author's calculations

Nonetheless, based on the 2012/2013 Ghanaian Living Standards Survey (GLSS), once enrolled, over 90% of NHIS members reported that they benefitted from the scheme (see Figure 3.7). In 2005, only 16% of NHIS members reported that they benefitted from the insurance scheme in some form (Ghana Statistical Service, 2008b). In 2013, people living in the Upper East reported the greatest benefits from insurance coverage, while in Greater Accra the percentage of insured who reported benefits from coverage was slightly lower. The survey does not distinguish further in what way members benefitted, however these figures indicate that the NHIS insurance is beneficial for its members.

Figure 3.7: Percentage of NHIS member who benefited from the scheme by region



Source: GLSS 2012/2013, author's calculations

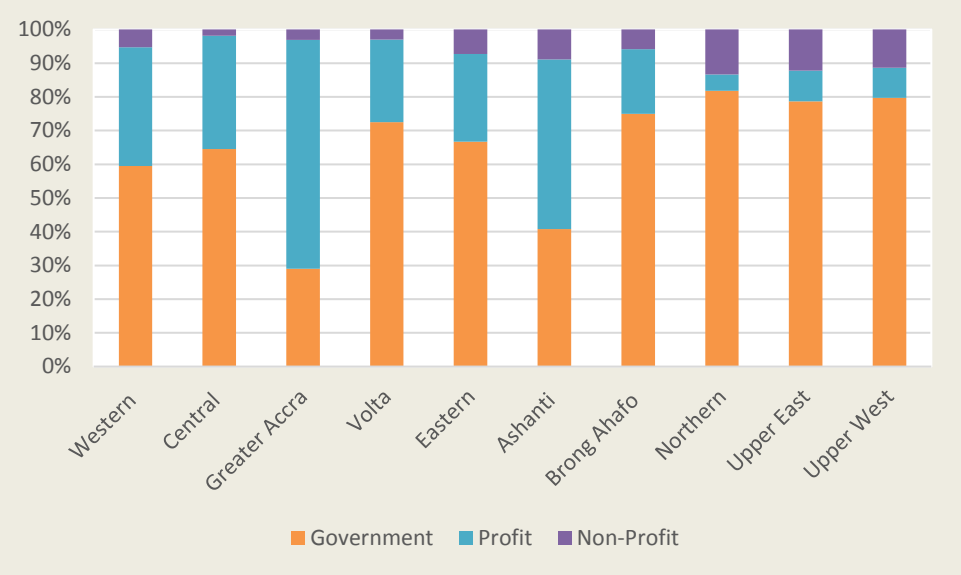
3.3.3 Health Service Provision in Ghana

Chapter 2 stressed the dimensions of access, which include the physical accessibility of healthcare. Reachability of services determines the utilisation of care to a great extent (WHO, 2008). The spatial

distribution of healthcare facilities and hospitals in Ghana are visualised in Figure 3.9. A clustering of hospitals is noticeable in the south of Ghana especially in the Greater Accra and Ashanti regions. This is to be expected as Greater Accra and Ashanti are the most populated regions. The fewest hospitals can be found in the Upper East and Upper West regions.

Healthcare facilities in Ghana are either government owned or split into private for profit or private non-profit facilities. Figure 3.8 highlights the distributes of health facility ownership by region. This reveals that the majority of government owned facilities are located in the three regions in northern Ghana. In Greater Accra, only 30% of facilities are government owned and 67% of services are offered by private providers.

Figure 3.8: Healthcare services by ownership and region



Source: CPC Healthcare Facilities Dataset 2012, author's calculations

Regional differences in the provision of healthcare are confirmed when looking at the doctor to population ratio (see Table 3.8). The Northern region has the highest doctor to population ratio of 1:50,751. A doctor in the Northern region has to look after nearly 10 times as many patients as a doctor in Greater Accra. The Upper East and Upper West regions, which are also located in the north of Ghana, also show a high doctor to patient ratio of 1:35,010 and 1:47,932 respectively.

Table 3.8: Doctor to population ratio by region – 2009

Region	Doctor to population ratio
Ashanti	8,288
Brong Ahafo	16,919
Central	22,877
Eastern	16,132
Greater Accra	5,103
Northern	50,751
Upper East	35,010
Upper West	47,932
Volta	26,538
Western	33,187

Source: Ghana Health Service (2010)

The NHIS benefits package is accessible for all NHIS cardholders at NHIA accredited facilities, which are predominantly government owned, but also private and mission based facilities have been accredited (NHIA, 2013a). Makinen et al. (2011) showed a higher use of public facilities among NHIS members compared to non-members. Overall, 40% of credentialed facilities are private facilities, 54% government owned, 1% are quasi-government owned and 5% are mission facilities (NHIA, 2013a). The greatest number of credentialed facilities are located in the Ashanti region (16%), followed by the Eastern and Western region (13% and 12% respectively). In Greater Accra, nearly 12% of facilities are accredited (NHIA, 2013a). According to the NHIA (2013a) "the spatial distribution of these credentialed healthcare providers across the country is a general representation of the regional membership base of the scheme" (p.16). It is important to note that the data used in this thesis do not distinguish between NHIS accredited and non-accredited facilities. This can under- or over- estimate the effect of insurance enrolment on healthcare utilisation. It is expected that in areas with a high coverage of registered facilities NHIS enrolment will be more beneficial compared to areas with low coverage. In order to measure the impact of insurance enrolment on healthcare usage accurately, matching techniques have been applied in chapter 7, to create a control group that is similar to the treatment group.

Between July 2009 and December 2010 a survey was undertaken by the NHIA to assess the nationwide performance of the accredited facilities (NHIA, 2013b). It measured the performance of accredited facilities by facility type, ownership, as well as region, based on a graded system ranging from A+ to E[6]. Although 95% of facilities passed the performance test, the overall performance was found to be poor. 77% of facilities were graded with either a C or D (NHIA, 2013b). While the Upper West and East regions preformed best in the assessment, quality was found to be mainly poor in

[6] According to the NHIA (2013) "a grade of E represents a score of less than 50% which represents failure by a facility" (p.38)

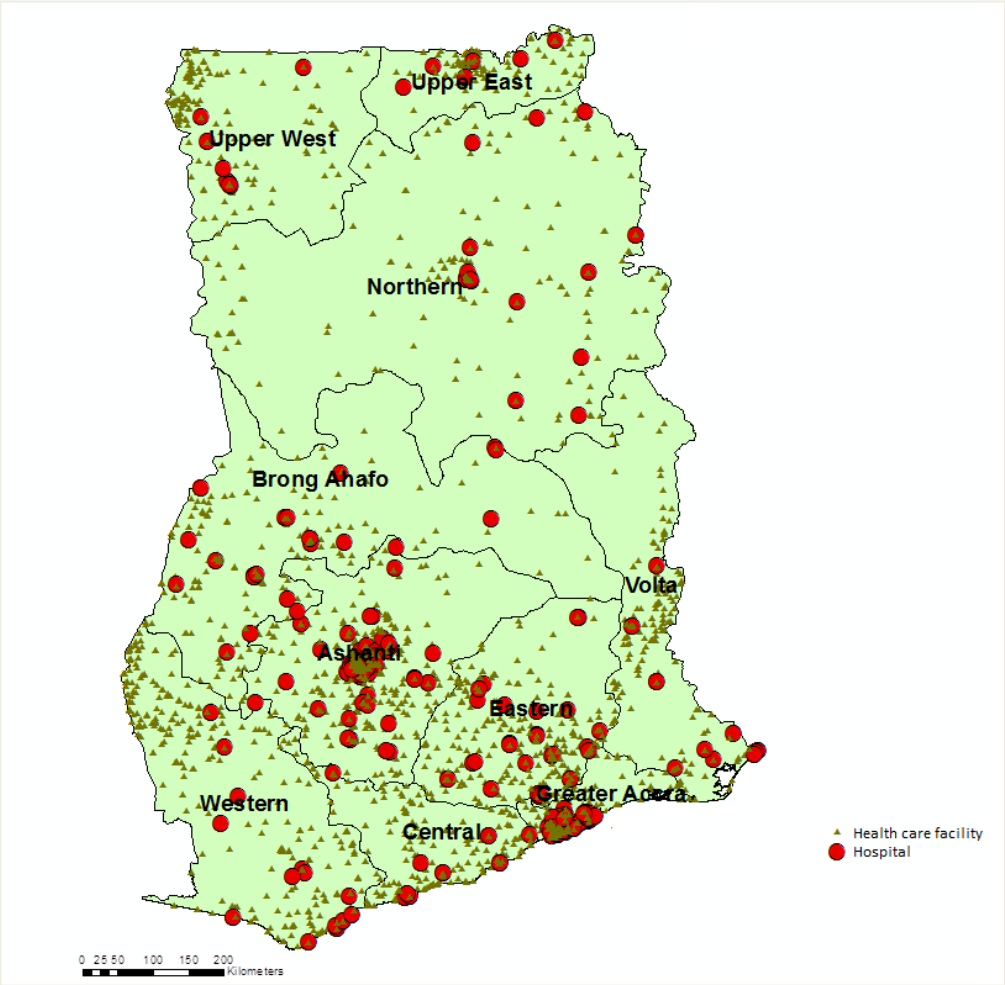
Greater Accra. That might be surprising as the regions in the north of Ghana (including Upper East and West) are the most rural parts of Ghana , while the south of Ghana and, in particular Greater Accra, is more developed. However, a study by Amo-Adjei et al. (2016) also reported better quality of care in deprived areas. They found that females living in urban areas reported lower healthcare service quality compared to rural dwellers.

Contrary, the provision of resources was found to be better in urban areas compared to poor areas. Alhassan and Nketiah-Amponsah (2016) reported that in rural accredited facilities 21% of health staff stated that they were unsatisfied with the drug and resource availability in their facility while only 7% of urban health staff expressed the same disappointment. Aryeetey et al. (2016a) found that under the NHIS the availably of drugs generally developed, but not in northern part of Ghana where the percentage of essential medicines for non-communicable diseases has not improved. Totally, 30% of qualified doctors and nurses in the country work in rural areas and 70% in urban areas Alhassan and Nketiah-Amponsah (2016).

In the entire country, the referral system has been identified to operate inadequately (WHO, 2010b). Particular for older adults, who tend to suffer from multimorbidity, coordination across care providers needs to be improved to address the multidimensional demands of care of older adults (Beard et al., 2016).

Makinen et al. (2011) highlighted that the use of public services declined between 1998 and 2006 while the use of private services increased across all regions. In Greater Accra and the Eastern region especially, private providers account for up to 70% of the total healthcare demand (Makinen et al., 2011). This change can attributed to increased credentialing of private facilities or to the current problems of the NHIS that influence provider choices among those who can afford to choose.

Figure 3.9: Location of healthcare facilities and hospitals in Ghana



Source: CPC Healthcare Facilities Dataset 2012, author's calculations

3.4 Summary

In 2003, Ghana introduced a nationwide health insurance scheme[7], the NHIS, to improve access to healthcare by making healthcare affordable. The scheme has been described as a vital driver towards UHC (Blanchet and Acheampong, 2013). It is overseen by the NHIA and operates under district-level authorities (Blanchet and Acheampong, 2013). Formally, it is a mandatory system, however, no penalties apply for not being a member of any insurance scheme, apart from those working in the formal labour sector who subsidise the NHIS through an automatic payroll deduction (Blanchet et al., 2012, Osei-Akoto and Adamba, 2011). The NHIS is mainly financed through tax revenues, and, to a lesser extent, through the premium payments of its members. On reaching 70 years of age, individuals are exempt from the NHIS premium payment.

[7] The NHIS was formally implemented in 2005.

The healthcare system in Ghana is from suffering poor administration which is in need of amelioration. Qualitative research by Owusu-Sekyere and Bagah (2014) showed that NHIS patients were turned away even with NHIS coverage, or charged out of pocket payments for services or drugs even when they were included in the NHIS benefit package. The administration of the NHIS also needs to be improved in order to handle the long waiting times and poor enrolment procedure. Recently introduced biometric registration allows people to receive their insurance card instantly when enrolling. So far however, biometric registration is only available in selected regions.

Furthermore, this chapter highlighted regional differences in the provision of healthcare. The provision of healthcare facilities in Ghana were found to be centred around the south of Ghana. This can limit the access to healthcare even with insurance coverage. Thus, chapter 6 will examine the provision of healthcare as a barrier to insurance enrolment in greater detail. Beforehand, chapter 4 (the next chapter) compares the quality of insurance coverage data in Ghana.

Chapter 4: Quality of Insurance Coverage Data in Ghana: Comparison of Data Sources

High quality data can inform both health authorities and policymakers by highlighting important trends in insurance affiliation on a regional and national level (Blewett and Davern, 2006). Reliable data may indicate where coverage needs to be improved, allows analysts to estimate the cost of health policy proposals, and can form evidence for target-orientated health policies (Kenney et al., 2006). The absence of accurate data on insurance coverage makes it difficult to advise policymakers on further healthcare reforms in Ghana. Only reliable data on insurance can lead to an evaluation of how insurance has aided the increase in healthcare and UHC, which makes it essential to inspect the quality of insurance coverage data in this thesis before any in-depth analysis is carried out.

Published data on the coverage of the NHIS raises concerns about the reliability of different datasets and brings into question whether it is possible to measure health insurance coverage in Ghana accurately. Apoya and Marriott (2011) estimated total NHIS coverage of only 18% in 2009, while the National Health Insurance Authority (NHIA) reported a coverage of 62% in the same year (NHIA, 2009).

In previous research, the insurance coverage in Ghana has been examined by different researchers using different surveys (see for example Dixon et al. (2013), Ayitey et al. (2013) or Blanchet et al. (2012)). However, there is no common consensus as to which survey is best suited measuring insurance coverage in the country. So far there is no reliable single source that estimates all valid members enrolled in the NHIS (Apoya and Marriott, 2011). Differences in survey and questionnaire design can influence comparability of different survey results. It is for these reasons that the WHO has been pushing for the development of global standards on indicators such as service coverage and financial protection to measure progress toward UHC accurately (WHO and The World Bank, 2015).

The aim of this chapter is to address the first research question of this thesis. Specifically, this chapter assesses the quality of three datasets that aim to be nationally representative and to focus on health insurance coverage in Ghana, including the USAID funded Demographic and Health Surveys (DHS), the World Bank funded Ghanaian Living Standards Survey (GLSS) and the WHO Study on Global Ageing and Adult Health (SAGE).

In order to be able to formulate polices aimed at older adults, appropriate data on older adults need to be both available and reliable (Randall and Coast, 2016). Up to now, there has been a lack of data focusing on older adults in low and middle-income countries, which makes it difficult to

inform policymakers on the healthcare needs of older adults. As an evolution of the World Health Survey (WHS), the WHO introduced the SAGE in several low and middle-income countries. Wave 1 of the Ghanaian SAGE was carried out between 2007 and 2008 and is currently the only nationwide survey in Ghana that specifically oversamples older adults. The survey includes not only information on insurance coverage in its questionnaire but also an extensive module on healthcare utilisation and health conditions.

The DHS and the GLSS are two of the largest household surveys carried out nationwide in Ghana. The DHS and the GLSS have been carried out regularly in Ghana since 1988 and 1987 respectively. After the implementation of the NHIS in 2005, both surveys introduced a section on NHIS coverage in their questionnaire. The DHS does not include data on older adults but its data on insurance coverage among younger and middle aged adults can be used to triangulate the findings of the SAGE and GLSS.

All surveys hold important information for studies focusing on health, health insurance and healthcare usage. However, depending on the explicit research objective, the utility of these surveys varies. During an extensive review of the literature, no paper has been found that analysed the quality of insurance coverage survey data in Ghana. The objective of the quality assessment provided here is to examine whether these surveys are suitable for measuring health insurance coverage in Ghana and whether researchers can rely on insurance coverage estimates using these survey data. This inspection is carried out in different stages. To begin with, descriptive statistics on health insurance coverage using the different surveys are shown. This is followed by a detailed overview of the surveys. Starting with SAGE, this overview provides a sense of the data collection procedures, implementation, and aim of the surveys. Without this background information, it is not possible to examine the quality of the different surveys holistically. This presentation of background information is followed by a discussion of the design, structure and content of the surveys. The chapter ends with a summary of which survey is best suited for research on insurance coverage and related fields.

4.1 Insurance Coverage Estimates

To begin with, insurance coverage by age groups among the different surveys was compared. This comparison highlights increasing enrolment over time (see Table 4.1).

Table 4.1: Health insurance coverage in percentage in different surveys

	SAGE 2007-2008	DHS 2008	GLSS 2012-2013	DHS 2014
	Voluntary**	NHIS*	NHIS*	NHIS*
18-49	24	30	48	50
50 plus	35	Na	58	Na

***** NHIS valid card holders*

*****Enrolled in the NHIS (no question on NHIS card ownership in the survey)*

Source: GLSS 2012/2013, SAGE 2007/2008, DHS 2008, DHS 2014, author's calculations

Both the SAGE and GLSS report a higher coverage among older adults compared to adults aged 18-49. The SAGE reported that 24% of younger and middle aged adults were enrolled in the NHIS, while 35% of older adults reported NHIS membership. The GLSS reported that 48% of 18-49 year olds have a valid NHIS card and 58% of older adults. The DHS 2014 was carried out a year after the GLSS and reported that 50% of people aged 18-49 have a valid NHIS card. Over time, the NHIS had the opportunity to develop and improve. Improvements include better advertising for the NHIS, helped by greater provision in 2011 of an internet network, computers and vehicles to most of the district operators by the NHIA (Gajate-Garrido and Owusua, 2013). In addition, Ghana experienced growth in per capita income and poverty reduction since the introduction of the NHIS, which can explain the changes in demand patterns (Makinen et al., 2011, Molini and Paci, 2015).

Ghana's NHIA, which administers NHIS, collects membership records as well. As seen in Table 4.2, in 2008 and 2009 the NHIS coverage was above 50% and dropped to just over 30% in 2010. This, however, does not mean that the real number of NHIS members dropped between 2009 and 2010. Ways to measure active members changed in this period (NHIA, 2011). Ghana's NHIA distinguished between cumulative NHIS membership – the accumulation of members who currently own or used to own a NHIS card - and active NHIS membership (Apoya and Marriott, 2011, NHIA, 2011). Until 2010, the NHIA calculated the number of active members by summing all the ID cards that have ever been given out or have been reviewed, and subtracting all expired cards from the sum. This approach is likely to overestimate the valid NHIS membership as these figures do not adjust for people who passed away, migrated out of the country, or for multiple registrations due to distribution problems of the NHIS ID cards (Apoya and Marriott, 2011).

Since 2010, the NHIA calculated the valid number of NHIS insured by adding together the number of new members and the number of renewed memberships for each given year (NHIA, 2011). The latest data on insurance coverage provided by the NHIA was from 2013, which reported that 38% of residents in Ghana were covered under the NHIS.

Table 4.2: Active members of Ghana's National Health Insurance Scheme as percent of population, 2008–2012

Year	Total active members	Percentage of population active
2008*	9,969,846	55
2009*	11,132,981	62
2010**	8,163,714	34
2011**	8,227,823	33
2012**	8,885,757	35
2013**	10,145,196	38

**old methodology **new methodology*

Source: Reconstructed form the National Health Authority Annual Report 2009, 2010, 2011 and 2013a

4.2 Overview of the Global Study on Ageing and Adult Health

The SAGE is a longitudinal study supported by the WHO with the purpose of collecting rich and detailed data on older adults. The survey oversampled individuals that are aged 50 and over in order to produce reliable data on older adults - a group that is widely missing from standard surveys that focus on men and women of reproductive ages. A smaller sample of individuals aged 18-49 years was collected as a control group (Biritwum et al., 2013a). The survey was carried out between 2007 and 2008 in six different countries, namely: Ghana, South Africa, China, Mexico, India and the Russian Federation.

The data were collected using a stratified multistage cluster design. All primary sampling units (PSU) were not only stratified by region but also by urban and rural locality (Biritwum et al., 2013a). Within each stratum an enumeration area (EA) was selected making a total of 300 EAs. 20 households, where at least one person aged 50 resided, were selected for interview in each EA using systematic sampling along with an additional four households representing the 18-49 age group (Biritwum et al., 2013a). The interviews were carried out face to face. In each household, the household informant was interviewed, along with all people aged 50 and over within this household. In total 5,579 individuals were surveyed during the first wave of the SAGE in Ghana. To ensure that the sample is representative of the Ghanaian population, the SAGE provided household and person-level analysis weights which incorporated a post-stratification factor and sample selection (Kowal et al., 2012a). For further information on the sampling weights see Kowal et al. (2012a).

At the time of analysis, only wave 1 of the SAGE was publically available for secondary data analysis; however, during the year 2016, wave 2 data is scheduled to become accessible as well. Some participants in the World Health Survey (WHS), which was carried out in the year 2003, were

followed up in wave 1 of the SAGE, which is why the WHS is referred to as wave 0 of the SAGE. This chapter, however, exclusively refers to data from wave 1 of the SAGE.

The household questionnaire in the SAGE included questions on housing, household composition, assets, household income and expenditure and was answered by the household head (Biritwum et al., 2013a). The question on insurance coverage is included in the household questionnaire as well. This means that the household informant was asked to report the insurance coverage status for the household members. The individual questionnaire collected information on socio-demographic characteristics, employment, health status, anthropometrics, health behaviours, chronic conditions, healthcare utilisation, social cohesion, well-being, and the impact of HIV/ADIS on caregiving (WHO, 2006). A proxy questionnaire was completed for those individuals who were found to be unable to complete the questionnaire themselves due to cognition or health reasons (Minicuci et al., 2014). In the SAGE wave 1, only 17 people were proxy respondents. The questionnaire was carried out in English and was translated into different local languages to ensure that all participants were able to understand the questions (Minicuci et al., 2014).

4.3 Overview of the Demographic and Health Surveys

The DHS advances the understanding of health research in over 90 low and middle-income countries. The aim of the DHS is to conduct national sample surveys in order to improve the comparative understanding of population and health (Institute for Resource Development, 1990). The survey is carried out on average every five years to enable comparable research within and between countries over time. The latest - at the time of the analysis - available DHS carried out in Ghana was conducted with the help of the Ghana Health Service as well as the Ghana Statistical Service in 2014, and the one before in 2008.

The Ghana DHS 2008 consisted of 412 clusters, grouping the households which were interviewed. Using a two-stage sampling design nearly 12,000 households were interviewed in the 412 clusters. The DHS 2014 had a sample size of 12,831 households (Ghana Statistical Service, 2015). Within half of the interviewed households an individual survey was carried out for men of age 15-59 and all women aged 15-49 living in the household were eligible to be interviewed (Ghana Statistical Service et al., 2009). For each gender group, a separate questionnaire was used which included similar but not identical questions (Ghana Statistical Service et al., 2009).

The purpose of the household questionnaire was to capture information on all household members and visitors and to detect eligible household members for the individual interview. The main reason for non-response in the individual survey was a lack of eligible individuals in a household due to the absence of eligible household members from the home, or a lack of individuals that were suitable

for the individual survey living in the home (Ghana Statistical Service et al., 2009). With the individual and household questionnaire, the DHS captures a wide range of individual and household level information. The specific purpose of the DHS is to collect information on: "fertility levels, marriage, sexual activity, fertility preferences, awareness and use of family planning methods, breastfeeding practices, nutritional status of women and young children, childhood mortality, maternal and child health, domestic violence, and awareness and behaviour regarding AIDS and other sexually transmitted infections" (Ghana Statistical Service et al., 2009, p.11). After the implementation of the NHIS in 2005, the Ghanaian DHS introduced a section on health insurance coverage in the individual questionnaire.

The DHS individual questionnaire only includes data for women aged 15-49 and men aged 15-49. Given that the purpose of this study is to examine health insurance coverage among older adults, the quality of the GLSS and SAGE are of primary interest. Nevertheless, the quality of the DHS was assessed as younger adults are used as a comparison group to older adults in this study. In addition, the DHS 2008 was conducted at a similar point in time to the SAGE, and the DHS 2014 was carried out just over a year after the GLSS. This allows for direct comparisons between the DHS and the other two surveys in terms of insurance coverage estimates.

4.4 Overview of the Ghana Living Standards Survey

The Living Standards Measurement Study survey is designed to detect linkages of household characteristics and government actions (Scott et al., 2005). The programme's goal is to improve statistical data at a household level in developing countries in order to better understand the effects of social and economic policies and to design new polices (Scott et al., 2005). The LSMS was introduced by the World Bank in 1980 and the first Living Standards Survey in Ghana was carried out in 1987 (Ghana Statistical Service, 2014).

Round 6, the latest (2012/1013) GLSS, sampled 18,000 households within 1,200 EAs. The PSUs were stratified by 10 different regions proportional to population size (Ghana Statistical Service, 2014). In round six, a response rate of over 93% led to 16,772 households being interviewed, which is the largest sample out of the three surveys studied (Ghana Statistical Service, 2014). In regions with smaller populations, the GLSS drew disproportionally greater samples meaning that each household did not have equal selection probability. Sampling weights were therefore computed based on the probabilities of selection. For further information on how the weights were calculated see Ghana Statistical Service (2014).

The GLSS collected data on socio-demographic characteristics, health, employment, household expenditure, and income and housing conditions. In addition, it covered information on household

agriculture, non-farm enterprises, and credit and assets. Apart from a household questionnaire, the GLSS included a community questionnaire. This community questionnaire provided information on a household's environment, including the access to markets, a price questionnaire that enables researchers to determine the cost of living in different areas of the country, and a facility questionnaire including information on the availability and accessibility of local services like healthcare providers (Scott et al., 2005). In addition, a questionnaire on governance, peace and security was introduced in the 6th round of the GLSS but this questionnaire is not relevant for investigating insurance estimates. A question on NHIS affiliation was added to the 5th round of the GLSS household questionnaire. However, at this point in time, the NHIS was not introduced nationwide. Therefore, the 6th round of the GLSS delivers a more precise picture of insurance affiliation.

Unlike the DHS and the SAGE, the GLSS does not include an individual questionnaire but collects individual level data through the household questionnaire. This means that the household informant reported health insurance coverage for each person in the household. In addition, the GLSS data can be linked to census data which reduces sample size problems and advances analysis possibilities (Scott et al., 2005).

4.5 Survey Quality

The discussion in the literature on how to measure health insurance coverage in surveys highlights important requirements that need to be considered when analysing the quality of insurance estimates. The literature points out that *correct identification of sources*, *sample size*, *reference period*, *source of coverage*, *unit of measurement*, *structure and placement of questions*, *type of survey*, *data release* and the *survey content* are vital factors that influence insurance estimates (Call, 2003, Kenney et al., 2006, Call et al., 2007, Blewett et al., 2004). Each of these points are discussed separately in the following sections.

4.5.1 Correct Identification of Sources

Insurance coverage estimates will differ between insurance types. To minimise errors when measuring insurance coverage, it has been found that stating specific names of insurance programmes is crucial (Call, 2003). Research on insurance coverage in the US found that the use of colloquial names of insurance schemes increased the number of insured significantly (Call et al., 2007).

Table 4.3 gives an overview of the questions on insurance coverage in each of the three surveys. It can be seen that the DHS and GLSS asked specifically about NHIS enrolment while the SAGE only distinguished between mandatory or voluntary insurance coverage.

During the data collection process of the SAGE, the interviewers were required to read out country specific examples of insurance types applicable to the country in which the survey is carried out. This approach is recommended by Call (2003) as a complete list of insurance sources in a specific country or region ensures that the participant understands what is classified as health insurance coverage. However, no show cards or checklists were used in the SAGE, which can lead to an underrepresentation of the extent of coverage. The list, defining the country specific classifications in the Ghanaian SAGE, was requested from the WHO. This highlighted what was classified as a mandatory and voluntary health insurance scheme in the questionnaire:

Voluntary Insurance: Universal social insurance for all citizens and legal residents in Ghana:

Example:

1. *National Health Insurance Scheme (Ghana) NHIS -Universal coverage by the National Health Insurance Authority by the Ghana Government through Ministry of Health*
2. *District Mutual Health Insurance Schemes DHIMS- Under the National Health Insurance Authority. These come together to form the NHIS*

Mandatory Insurance: Mandatory Insurance-due to one's occupation/ employment or membership of a social organization:

Example - Private / Voluntary Health Insurance Schemes operated by private health insurers:

3. *First Fidelity Health Insurance Home, Acacia Health Insurance, MedX, Liberty Mutual Health, Apex Mutual Health Insurance, Vitality Mutual Health, Premier Health Insurance, Momentum Health Insurance Ghana*

This classification of mandatory and voluntary could have been unclear for the interviewed person as NHIS enrolment is legally classified as mandatory (Seddoh et al., 2011) but in the survey referred to as voluntary. This could lead to a decrease in the proportion stating NHIS coverage.

In order to examine the long-term effects of NHIS coverage with the SAGE, a clearer definition of mandatory and voluntary insurance coverage could lead to more precise information on the type of coverage. Inaccurate conclusions can be drawn if those interviewed are not clear about their type of insurance coverage, as services offered by the NHIS and private insurance schemes do not necessarily overlap. Not all private healthcare facilities accept NHIS payments (Dixon et al., 2013).

Dixon et al. (2013) points out that "media reports of better services via private insurance or at privately run clinics means that the NHIS faces competition on many fronts" (p.9). Dalinjong and Laar (2012) found that people without NHIS membership received treatment faster than NHIS members.

Table 4.3: Questions on insurance coverage in different surveys

GLSS 2012- 2013	**SAGE 2007-2008**	**DHS 2008**	**DHS 2014**

Has (NAME) ever been registered or covered with a health insurance scheme?
 	
If (NAME) has never been registered why?
 	
Is (NAME) still registered, or covered?
 	
If (NAME) is no longer registered or covered why?
 	
If (NAME) is registered or covered, what type of health insurance scheme is he/she registered with?
• National/District Health Insurance (NHIS)
• Private Health Insurance
• Both
 	
Does (NAME) hold a valid Health Insurance Scheme (NHIS) card?
	Does (NAME) have health insurance coverage?
	• Yes, mandatory
	• Yes, voluntary
	• Yes, both mandatory and voluntary insurance
	• No
	• Don't know
		Do you have any health insurance or are you a member of a mutual health organization?
		
		What type of health insurance are you covered by?
		• National/District Health Insurance (NHIS)
		• Health insurance through employer
		• Mutual health organisation/ community based insurance
		• Privately purchased commercial insurance
		• Other
		
		Why have you not registered with the National Health Insurance Scheme (NHIS)?
		
		Did you pay your NHIS membership yourself?
		
		Do you hold a valid National Health Insurance Scheme (NHIS) card?
			Are you covered by any health insurance?
			
			Are you registered with the National Health Insurance Scheme (NHIS)?
			
			What type of health insurance are you (covered/registered) by?
			• National/District Health Insurance (NHIS)
			• Health insurance through employer
			• Mutual health organisation/ community based insurance
			• Privately purchased commercial insurance
			• Other
			
			Does your insurance cover any of the following maternity benefits?
			
			Why have you not registered with the National Health Insurance Scheme (NHIS)?
			
			Who paid for your NHIS membership?
			
			Do you hold a valid National Health Insurance Scheme (NHIS) card?

Source: GLSS 2012/2013, SAGE 2007/2008, DHS 2008, DHS 2014

The table above further reveals that the GLSS and DHS included a more comprehensive section on insurance coverage in their questionnaire compared with the SAGE. Lessons from previous studies recommend starting the section on insurance coverage in a questionnaire with a general question

on whether the participant is insured or not (Call, 2003). This is justified by the finding that participants usually can identify their insurance status but not necessarily the type of insurance coverage (Call, 2003). Both the GLSS and DHS opened their unit on insurance coverage in their questionnaire with a generic question on insurance coverage. The DHS asked whether the respondent has any insurance coverage and the GLSS asked whether the interviewee has ever been insured, followed by whether the interviewee is still registered with or covered by a health insurance scheme. All respondents who replied negatively to the question on insurance coverage were asked follow up questions regarding reasons for non-insurance. The DHS asked specifically why the interviewee is not registered with the NHIS. This verification question is essential as other studies highlighted that a specific question asking about non-enrolment increased the correct reporting of numbers of non-insured and insured (Davern et al., 2009, Kenney et al., 2006).

Researchers found that after adding a verification question to the U.S current population survey that asked directly whether a respondent who reported no insurance coverage is in fact uninsured, decreased the number of incorrect estimates (Davern et al., 2003). The verification question increased the number of insured who would, without a verification question, have been classified incorrectly as uninsured (Call, 2003, Kenney et al., 2006). In addition, correct information on those uninsured is important as Davern et al. (2009) found that reasons for not holding insurance in the past influence present insurance status. The SAGE included only one question on insurance affiliation, which asked whether the participant has a mandatory, voluntary, or no health insurance. The SAGE also built-in the answer option ‘do not know’ to avoid assumptions of non-insurance, but no specific verification question on insurance status was part of the questionnaire.

Furthermore, both the DHS and the GLSS had a question on whether the participant holds a NHIS card. The DHS expanded the section on insurance coverage by also asking whether there are any services that are needed from a health provider that are not covered by NHIS, and whether in the participant’s opinion NHIS card holders get a better/same/worse healthcare service than others. The SAGE only requested information regarding whether someone received healthcare the last time they needed healthcare.

4.5.2 Sample Size

A sufficient sample size is needed in order to create national level estimates. A sample should be large enough to create worthwhile results, as a small sample size can lead to non-representative findings (Blewett et al., 2004). Cluster sampling can ensure that the survey is representative for different geographic units, including urban and rural. Further representative samples for each region are essential to produce valid estimates on a regional level (Kenney et al., 2006).

Evaluations of the household and individual sample size by survey and region are reported in Table 4.4. All surveys drew their sample out of all ten regions in Ghana and stratified by urban and rural location. As seen in the table, the first wave of SAGE had the smallest sample size out of the different surveys. A major strength of the GLSS was that with 16,772 interviewed households, it had a very large sample size.

Table 4.4: Number of household and individual interviewed by region

	SAGE		**DHS 2008**	**GLSS**	**DHS 2014**
	2007-2008			**2012-2013**	
Region	HH	Ind.	Ind.*	HH	Ind.*
Ashanti	851	847	1,495	1,981	1,659
Brong Ahafo	522	528	763	1,621	1,460
Central	549	549	622	1,602	1,349
Eastern	611	693	935	1,804	1,447
Greater Accra	604	636	1,292	1,924	1,603
North	467	497	1,021	1,702	1,510
Upper East	310	402	729	1,447	1,267
Upper West	175	197	897	1,399	1,292
Volta	526	561	849	1,574	1,404
Western	654	644	881	1,718	1,459
Total	**5,269**	**5,571**	**9,484**	**16,772**	**14,389**

** Based on the male and female questionnaire combined*

Source: GLSS 2012/2013, SAGE 2007/2008, DHS 2008, DHS 2014 author's calculations

4.5.3 Reference Period

Sample size is an important factor for determining the representativeness of a sample; however, there are additional factors that need to be considered when looking at health insurance coverage. Kenney et al. (2006) point out that data on insurance coverage can be amassed for different timeframes. Data on insurance coverage can, for example, be collected over a lifetime, a year, or at the current point in time. The literature labels the timeframe over which the data are collected as the reference period (Call, 2003).

There is no gold standard on which reference period to use (Call, 2003). It mainly depends on the investigator's interests for the reference period during which data are collected. Different information is delivered using different reference periods. Often, researchers are not only interested in one reference period but several. If a researcher is interested in whether a recent change in health policies changed insurance affiliation patterns, the researcher would be interested not only in the current insurance status but also in past insurance affiliation.

The most accurate estimates are produced by commonly used point-in-time measurements (Call, 2003). Measurement errors were found to be reduced when participants only have to remember their current insurance status instead of recalling their insurance status in the past, especially when they have to recall their insurance affiliation over an extensive period of time (Kenney et al., 2006).

When information at a household level is required, the literature advises avoiding the use of retrospective questions as it is unlikely that the interviewee will be able to recall the insurance status of all household members accurately (Call, 2003). Asking only about current insurance status is, however, not enough to deliver a comprehensive picture of the duration of insurance affiliation. This leads to a trade-off between complexity and accuracy (Kenney et al., 2006).

All surveys presented here asked about insurance coverage at the point in time that the survey was conducted. The GLSS also included a question on past insurance enrolment. This enables researchers to distinguish between current and former insurance enrolment (see chapter 5). However, in order to measure trends over time, it is essential that a survey is carried out repeatedly instead of just once (Blewett et al., 2004). The GLSS and DHS are repeated cross-sectional surveys, allowing analysts to determine changes over time, while SAGE is a longitudinal survey following up a number of respondents in each wave, which allows identification of individual-level reasons for being insured or not over time (Call, 2003). The second wave of the SAGE is estimated to be available at the end of 2016, which will enable researchers to carry out longitudinal analysis.

4.5.4 Data Release

Another consideration is that survey data should be available in a timely fashion after data collection. The data release does not directly affect the quality of a survey but time lags in data releasing can limit the prompt analysis of health reforms (Blewett et al., 2004). Although it is acknowledged that there is a trade-off between timely data release and the complexity of a survey, only timely-released data can inform policymakers and health authorities on how to improve contemporary health reforms (Kenney et al., 2006). It has been found that the shortest period between data collection and data publication is around six months for nationwide complex surveys (Kenney et al., 2006).

The data entry phase of the 2008 DHS was completed in February 2009, meaning that the data were available less than half a year after the data collection process, which started in September 2008 (Ghana Statistical Service et al., 2009). The DHS 2014 was carried out between September and December 2014 and data processing was completed in February 2015 (Ghana Statistical Service, 2015).

Although the data collection process of SAGE finished in 2008, the micro data were not accessible until February 2012 and the first official reports based on the SAGE data were not published until July 2013 (Biritwum et al., 2013a). This is a significant time lag between the data release and data collection process. Therefore, it was not possible to carry out prompt analysis using SAGE to measure changes in health insurance schemes, including the introduction of the NHIS in 2005. It remains to be seen whether the data for wave 2 will be available in a more timely fashion.

The GLSS data, in comparison, was released nine months after the data collection process finished, which still enabled researchers to carry out up to date analysis of recent healthcare reforms (Gajate-Garrido and Owusua, 2013).

4.5.5 The Unit of Measurement

The unit of measurement defines from whom the data are collected, or in other words it defines the level of analysis for which data are collected (Call, 2003). This can refer to selected individuals, selected households or selected family members depending on whether the investigators want to measure insurance coverage across households or at an individual level (Call, 2003). Household and family member data are mainly of interest for politicians if they try to expand insurance coverage within a household - for example, by encouraging parents to enrol their children. The NHIS offers free insurance coverage to children when both of their parents are enrolled in the system. Information on the insurance status of all household members and household composition can deliver an accurate picture of whether parents are likely to enrol their children under the NHIS.

Assessing characteristics through person-level questions, also known as person-level looping, means that the household informant acts as a proxy and repeats and answers each question sequence for each person in the household (Call, 2003, Hess et al., 2001). After completing the question sequence for one household member, the interviewer returns to the beginning of the sequence and repeats the questions for the next household member until all information for all household members are reported (Hess et al., 2001). These kind of questions do normally start with: “Does [Name] have…” or “Is [Name]…”.

Although this is a quick method to collect a lot of information, this method has its drawbacks, especially when the household is large. Estimates are found to be inaccurate when the insurance status and the type of coverage varies to a great extent among the different household members in large household units (Call, 2003). In addition, if the household size is big, the interviews can take a long time, resulting in a lack of concentration towards the end of an interview (Call, 2003).

The response on health insurance affiliation in SAGE and the GLSS was collected through person-level looping and was answered by the household head. The GLSS collected insurance coverage information on all individuals in the same household. SAGE asked questions on insurance coverage to a sub-sample of mainly older adults within a household.

The DHS, however, addressed its questions on health insurance coverage to the interviewed person directly. In addition, the DHS included a question in the household questionnaire on how many people in a household are covered by health insurance. This is called household screening, meaning that a household screener, normally the household informant, reports information for the entire household instead of referring to one specific household member (Hess et al., 2001). This approach is less popular, as researchers found that addressing questions through a household-level approach leads to under-reporting of events (Hess et al., 2001).

It has been found in previous studies that asking for health insurance coverage at a person-level instead of household-level leads to more accurate results as each person in the household is addressed separately (Davern et al., 2009). Hess et al. (2001) carried out research with the Census Bureau's Questionnaire Design Experimental Research Survey (QDERS) and found a significant difference in health insurance reporting using household and person-level approaches which supports the risk of under-reporting when using household-level approaches. However, Hess et al. (2001) also argue that overall non-response is reduced using the household-level approach. Missing data on the question of insurance coverage was lower than 5% in all surveys. This shows a low level of missing data regardless of whether the survey asked for health insurance coverage at a person-level (like in the DHS) or at a household-level (like in the GLSS and SAGE).

4.5.6 Structure and Placement of Questions

The structure of a questionnaire and the placement of questions are other aspects to be aware of when trying to explain differences in insurance coverage estimates (Call, 2003). Call (2003) emphasises the inclusion of critical questions and questions of primary interest at the beginning of an interview. Participants tend to be more focused at the opening of an interview, especially when the interview is long. Research carried out in America found that missing data on insurance coverage varies between 1% and 15% depending on the position of the questions within a questionnaire. Surveys that placed the section on insurance coverage at the beginning reported the lowest level of missing data (Call, 2003).

The SAGE placed the question on insurance coverage in the first section of the household questionnaire. The overall interview duration, however, was on average 2.5 hours which is classified as long and demanding (Kowal et al., 2012a). This can have a negative effect on the accuracy of

responses for questions placed at the end of the questionnaire. The GLSS and DHS 2014 placed their questions related to insurance affiliation in the middle of the interview. The individual questionnaire of the DHS 2008 closes its questionnaire with a section on insurance coverage.

Non-response leading to missing data is a general problem in surveys if the data are not missing at random. However, as mentioned before, even when taking item non-response into account, there is no reason to suspect non-response bias could be causing unsound estimates across all surveys discussed in this thesis.

Before moving on to a discussion of the survey content in the next section, the placement of the questions on insurance coverage and all of the aspects discussed up to now are summarised in Table 4.5. This table gives an easy overview of the data collection on insurance coverage in all surveys.

Table 4.5: Overview of data collection process by survey

	GLSS 2012/2013	**SAGE 2007/2008**	**DHS 2008**	**DHS 2014**
Response rate by regions	81.9-97.8%	97.1-99.7%	97-99.7%	99%
Date of data collection	October 2012 to October 2013	May 2007 and June 2008	September to November 2008	September to mid-December 2014
Mode of data collection	Face to face	Face to face	Face to face	Face to face
Type of survey	Repeated cross-sectional	Longitudinal survey	Repeated cross-sectional	Repeated cross-sectional
Unit of measurement	All household members	Sub-sample of the household	Sub-sample of the household	Sub-sample of the household
Data collection	Person-level though household respondent	Person-level	Person-level	Person-level
Reference period	Point in time	Point in time	Point in time	Point in time
Placement of insurance question	Beginning of the questionnaire	Middle of the questionnaire	End of the questionnaire	Middle of the questionnaire
Data release	August 2014	February 2012	February 2009	February 2015

Source: GLSS 2012/2013, SAGE 2007/2008, DHS 2008, DHS 2014

4.5.7 Content Details

This section focuses on what else, beyond aspects of the survey design and structure, a good survey requires to be useful for studies related to insurance coverage.

An ideal survey aiming to produce estimates on insurance coverage and its causes would need to encompass, apart from a complex section on insurance coverage, a detailed section on individual socioeconomic and demographic characteristics, plus accurate information on income, expenditure and consumption at the household level (Kenney et al., 2006). Indigents can join the NHIS without paying the premium, which is why it is important that a survey collects data on income to determine who is exempt from premium payments. In addition, such information will inform whether enrolment is equal across socioeconomic groups.

On top of this, extensive details on well-being, health status, chronic conditions and disabilities are important to analyse the effect of insurance coverage on the treatment of diseases and disabilities. This information is also essential to examine the effect of ill health on insurance enrolment, as it was found that ill people are more likely to enrol in a health insurance scheme (Waters, 1999). Data on the health status of individuals are therefore important to control for selection bias in insurance affiliation. Data on health status are also important to examine the long run effects of insurance coverage and health improvements.

Further data on the access and utilisation of inpatient and outpatient healthcare, as well as out of pocket expenditure, are vital to examine the impact of insurance affiliation (Kenney et al., 2006). Information on insurance premium payments, payments for healthcare visits and transport costs to healthcare facilities can be used to measure the affordability of healthcare and whether access to healthcare is realised (Kenney et al., 2006). This information is particularly relevant for measuring the progress towards universal health coverage within a country.

Moreover, Blewett et al. (2004) claim that geographical identifiers in a survey advance its analytic capabilities. Including geographic information in a survey enables researchers to carry out micro-level analysis and measure the effects of distance and travel time to healthcare on insurance enrolment. It also allows researchers to determine where enrolment is particularly high or low.

Survey providers need to modify and adopt these dimensions to latest policy changes in order to produce up to date estimates (Kenney et al., 2006). Good examples are the GLSS and DHS as they introduced a question on NHIS coverage after the introduction of the NHIS, showing awareness of health policy reforms.

Table 4.6 gives an overview of the most important survey features that are needed for research on insurance coverage. It reveals that significant differences can be found in the health characteristics provided in each survey. SAGE offered complex information not only on healthcare utilisation but also on self-reported health status, chronic conditions and perceptions of well-being and disabilities (Biritwum et al., 2013a). The DHS mainly focused on self-reported prevalence of sexually transmitted infections instead of the overall health status of individuals. In the GLSS, health conditions are only measured in the two weeks preceding the interview. The same holds for healthcare use. While the GLSS only included information on outpatient healthcare use in the two weeks preceding the point in time the survey was carried out, the DHS included a question on healthcare use in the women's questionnaire, and no information on healthcare utilisation among men. Looking at inpatient care, the GLSS asked about utilisation in the last 12 month. The SAGE covered information on inpatient as well as outpatient healthcare usage in the last 12 months allowing comprehensive analysis of healthcare utilisation.

Several papers that examined health insurance affiliation found that income is one of the most important variables that affect insurance participation even when the enrolment fees are adjusted to income differences (Davern et al., 2009, Dixon et al., 2011, Ayitey et al., 2013). Having accurate information on income is important in order to understand why people choose to be insured or not (Kenney et al., 2006). Surveys are advised to include multiple questions on this topic as previous studies found that a single question on income is not adequate enough and can lead to measurement errors (Kenney et al., 2006). Kenney et al. (2006) argue that by asking several questions listing different sources of income, measurement errors are reduced and the exact income is best determined. SAGE adopted this strategy and included a detailed section on assets and household income. This section included multiple questions on income sources as well as assets to determine the prosperity of a household. The GLSS collects information on household income, consumption and expenditure. The DHS contains information on wealth, based on household assets (Ghana Statistical Service et al., 2009, Ghana Statistical Service, 2015).

In addition, all surveys covered aspects of payments related to healthcare, although to a different extent. Both the GLSS and SAGE included records on insurance premium payments, which enable researchers to analyse whether premium payments differ among region, gender or wealth quintile. Both surveys also collated data on out of pocket payments for hospitalisation, which is crucial to determining whether insurance affiliation reduced financial access to healthcare. The DHS only asked about general out of pocket payments for drugs and services but not about the exact amount. This makes it more difficult to study the effect of NHIS enrolment on healthcare utilisation and out of pocket expenditure.

Table 4.6 further indicates that for all surveys, GIS information was available. This information is important for creation of control variables like distance to healthcare facilities, which can have an important effect on insurance affiliation. People living closer to a healthcare facilities are found to be more likely to be enrolled in a health insurance scheme as they are more likely to access care when needed (Gething et al., 2012). It is important to note when analysing spatial effects that for confidentiality reasons, the GPS data in the DHS were randomly displaced by a maximum of 5 kilometres (DHS Spatial Interpolation Working Group, 2014). Control variables like distance to healthcare facilities need to be precise as a displacement of up to 5 kilometres can make a substantive difference, especially where emergency care is concerned.

The GLSS also included a community questionnaire for rural areas allowing determination of district-level effects on insurance affiliation. Researchers argue that people living in rural areas face geographical difficulties in contacting healthcare facilities due to limited public transport, poor infrastructure and long travel times (Arcury et al., 2005). The GLSS is the only survey out of the three that has information on travel time to healthcare facilities. This information is valuable to determine how accessible heath care facilities are and may help to inform requirements for road networks and public transport improvements to ensure quick access to care when needed.

Table 4.6: Survey features of the Ghanaian Living Standards Survey (round 6), the Ghana Study on Global Ageing and Adults (wave 1) and the Ghana Demographic and Health Survey (2008/2014)

Survey features	GLSS 2012/2013	SAGE 2007/2008	DHS 2008/2014
Demographics	Sex; age; marital status; education; ethnicity; religion; area of residence; employment	Sex; age; marital status; education; ethnicity; religion; area of residence; employment	Sex; age; marital status; education; ethnicity; religion; area of residence; employment
Assets and income	Information on household income expenditure and consumption and assets	Information on household income expenditure and consumption and assets	Information on household assets
Health states	Health condition in the two weeks preceding the interview	Overall self-rated health; eight self-rated health domains; Disability Assessment Schedule (WHODAS) ; activities of daily living (ADLs); instrumental activities of daily living (IADLs); vignettes on health state descriptions	Self-reported prevalence of sexually transmitted infections (STIs) and STIs symptoms
Healthcare utilisation	Inpatient in the last 12 month preceding the interview Outpatient healthcare in the two weeks preceding the interview	Past need for healthcare; reasons for healthcare or for not receiving healthcare; inpatient and outpatient healthcare	Maternal care; healthcare facility visit in the last 12 month preceding the interview (only for women)
Chronic conditions	No	Self-reported and symptomatic reporting of arthritis; stroke; angina; Self-reporting of diabetes; chronic lung disease; hypertension; cataracts; oral health; injuries; cervical and breast cancer screening	No
Payments related to healthcare	How much did (NAME) pay for this registration/ card/folder at the health facility? How much did (NAME) or will (NAME) pay for staying in a hospital/health facility during the last 2 weeks? Who pays for the largest portions of (NAME) health expenses incl. Consultations and hospital stays (if any)?	In the last 12 months, how much did your household spend on: - Healthcare costs - Insurance premiums Who paid for this hospitalisation? About how much in total did you or a family/household member pay out of pocket for this hospitalisation?	Paid out of pocket for drugs and services Out-of-pocket payment for medicines and services by respondents covered by NHIS
Travel time	How much time did (NAME) take to travel to and from the facility?		
GPS information	Yes	Yes	Yes

Source: GLSS 2012/2013, SAGE 2007/2008, DHS 2008

4.5.8 Age Misreporting

In order to understand population ageing, correct data on *age* are essential. However, age misreporting is a common error in surveys as well as censuses (West et al., 2005). It has been found that misstatement of age is most common among population subgroups with a low level of education (Siegel and Swanson, 2007) and a particular problem when carrying out research in an African context where many older adults are illiterate (Randall and Coast, 2016). Age reporting in surveys is often subject to recall errors and researchers argue that in Sub-Saharan Africa, "high levels of illiteracy and low levels of development have been combined with a widespread social irrelevance of knowing absolute age" (Randall and Coast, 2016, p. 144).

Typically, age misreporting occurs in two different forms: *heaping* or *shifting/inflation* (INDEPTH Network, 2002, Randall and Coast, 2016). Age inflation describes the tendency for reporting an older age than the actual age. Age heaping refers to digit preference as "when the true age is unknown or misstated, there is a tendency to quote ages in round numbers, such as the nearest even number, or one that ends in 0 or 5" (West et al., 2005, p. 3658).

There is a lack of studies that examine age misreporting among older adults in Africa (Randall and Coast, 2016). Age heaping in the SAGE has been analysed by Biritwum et al. (2013b) who reported no concerning problems with age heaping in the survey. Biritwum et al. (2013b), however, calculated age heaping across younger and older adults at the same time. Randall and Coast (2016) argue that this can cause biased results as age reporting among younger adults is more accurate.

Age is a central focus of this thesis and therefore it is crucial to evaluate the truthfulness of the age data collected particularly in the SAGE and GLSS[8]. The Whipple's index was applied to measure the accuracy of age reporting. This index is used to identify any preference for ages ending in a particular digit (here 0, 5, or both). In this thesis, only digit preference among older adults was taken into consideration and thus the Whipple's index was constructed from the age of 50. The persons who reported age ending in 0 or 5 were summed and divided by the sum of the total population reporting being aged 50 and older.

The Whipple's index rages from 100 (no digit preference) to 500 (only digit '0' or '5' were reported) and the index for a 5-year range was found to be similar in both surveys. For the GLSS, it was 182.3 and in the SAGE 181.4. This means that, based on the Whipple's index, the population at these ages (in the SAGE and GLSS) overstate the corresponding unbiased population by around 18%.

[8] Given that the focus of this thesis are older adults and age reporting among younger and middle aged adults is considered as more accurate, heaping in the DHS was not examined.

Age misreporting could potentially influence the results of this thesis. Older adults need a proof of age before being eligible to the NHIS premium exemption. This means that the effect of the NHIS premium exemption, with the age of 70, on insurance enrolment, can only be measured accurately when age is reported correctly in surveys. Robustness tests, by changing the age boundary to 67, have been applied in this thesis in order to understand whether age heaping is likely to influence the findings of this study.

4.6 Discussion

High quality survey data are essential to measure improvements towards UHC. Data on insurance affiliation however, were found to differ by sources. These differences question the accuracy of survey data when measuring health insurance coverage.

The review of the literature found that there are different aspects like *correct identification of source of coverage*, *sample size, reference period*, *unit of measurement*, *structure and placement of questions,* and the *survey content* which influence the quality of insurance estimates in a survey. In order to be able to carry out research on insurance coverage, it was essential to compare the data quality of different surveys based on those aspects.

All of the above named aspects were assessed in Table 4.7. A three-star ranking has been carried out in order to give an overview as to which measurement is likely to be most accurate in which survey. The ranking ranged from one to three stars. Three stars were the upper limit of the scale, meaning that in this category the survey produces the best estimates.

Table 4.7: Quality of insurance estimates by survey

Measurement	**GLSS**	**SAGE**	**DHS**
Correct identification of insurance sources	***	*	***
Sample size	***	*	*
Reference period	***	**	**
Unit of measurement	**	**	***
Structure and placement of questions	**	***	**
Survey content	**	***	**

Source: Author (2015)

In general, the GLSS and DHS were better suited than the SAGE to estimate coverage of health insurance in Ghana. The meaning of the classifications of a mandatory and voluntary insurance scheme in the SAGE was not obvious, while the GLSS and DHS asked specifically about NHIS and private health insurance enrolment. Furthermore, the SAGE included only a single question on insurance coverage, while the DHS and GLSS covered a whole section on insurance coverage in their questionnaires.

In terms of *sample size,* the GLSS had the largest sample followed by the DHS. The DHS, however, did not sample older adults, which resulted in a lower ranking in the *sample size* category. The SAGE oversampled older adults; however, its sample of adults aged between 18 and 49 years was very small. This makes comparisons between younger and older adults difficult.

All surveys asked about health insurance enrolment at the point in time the survey was carried out. This is seen as the most accurate way of receiving information on coverage (Kenney et al., 2006). The GLSS additionally included a question on past insurance enrolment, which is why the GLSS received a higher ranking.

In terms of *unit of measurement,* the DHS directed the question on health insurance coverage directly to the respondents, while the GLSS and SAGE obtained information on insurance coverage through the household head. The latter method can lead to inaccurate estimates especially when the household is large. Thus, the DHS has the highest ranking in this specific section.

Furthermore, the literature argues that the inclusion of critical questions and questions of primary interest should be placed at the beginning of a questionnaire to ensure that the participant is fully focused. The SAGE received the highest ranking in the *placement of questions* category. Unlike the other surveys, the SAGE asked about insurance coverage in the first section of its interview.

When looking at the *survey content,* the SAGE included several questions on health status and chronic conditions, which can act as important control variables when examining motivations for insurance enrolment. This information is also vital when measuring the success of insurance enrolment on health status. The survey also included a section on healthcare usage. The GLSS only requested data on outpatient care in a time interval of two weeks, and the DHS mainly focuses on maternal care (which is why they got a lower ranking in this section). Accurate data on healthcare utilisation are essential when measuring the impact of health insurance enrolment. Please note that each of the survey sections on health status and healthcare usage have to be examined individually to ensure that the data quality in each section is high. The ranking here is only based on the questions included in the interview.

All surveys presented add real value to healthcare research. However, each of the surveys contained drawbacks. It is not easy to make a common statement as to which survey can be classified as the most reliable or accurate. Depending on the researchers' interests, different survey features are useful. Table 4.8 illustrates which measurement is likely to be most accurate in which survey extending the quality measurements in the previous table.

Table 4.8: Suitability of surveys by dimension measurements

Dimension	GLSS	SAGE	DHS
Insurance coverage	***	*	***
Effects of healthcare polices over time	***	*	***
Regional level analysis and healthcare access	***	**	**
Healthcare utilisation	**	***	*
Health status	**	***	*
Overall	***	**	**

Source: Author (2015)

Each of the dimensions in Table 4.8 are discussed further below.

Health insurance coverage

The GLSS and DHS are most suitable for producing reliable insurance coverage estimates. Both surveys reacted to recent changes in the healthcare system in Ghana and included a module on insurance coverage in their questionnaire after the implementation of the NHIS in 2005. There is a general argument that insurance schemes' own administrative data report a higher insurance coverage than survey data, which is why strong recommendations are made that surveys should mention specific names of state insurance schemes in questionnaires to ensure accurate estimates (Kenney et al., 2006). The DHS and GLSS covered a wide range of questions on the topic of health insurance and both surveys used the name of the specific state insurance programme, 'NHIS'. Other studies also indicated that when adding the name of a specific insurance programme, reporting errors fall to a great extent (Davern et al., 2009). Adding the term "Medical Assistance" (a Medicaid programme) to a survey carried out in Maryland in the US, alone increased the proportion of people reporting insurance enrolment by nearly 30% (Davern et al., 2009, Call et al., 2007).

Researchers found that participants in a survey generally can identify whether they are insured or not but are not necessarily able to state the type of insurance scheme (Call, 2003). To ensure correct estimates of coverage, the DHS and GLSS both included a general question on insurance coverage which can be answered with yes (covered) and no (not covered) and afterwards asked about the type of system. The SAGE, however, asked people directly to identify whether they are covered by a mandatory insurance scheme, a voluntary insurance scheme or have no insurance. This question requires participants to know whether they are enrolled in a voluntary or mandatory scheme in the case of insurance membership. This could have wide-ranging effects as the misreporting of insurance coverage can artificially increase the estimates for people with no health insurance (Davern et al., 2009).

The literature highlights that an explicit question asking about non-enrolment increased the correctly reported number of non-insured (Davern et al., 2009, Kenney et al., 2006). In order to

create an accurate estimate of people who are classified as uninsured, the GLSS asked about reasons as to why an individual was not insured in any scheme and the DHS included a question on reasons for non-NHIS enrolment.

Contrary to advice in the literature which argued for the inclusion of multiple questions on insurance coverage, the SAGE only includes a single question on insurance affiliation. This primarily explains why the SAGE is a weaker source when carrying out studies on insurance affiliation.

Comparison over time

It speaks in favour of the DHS and GLSS that these surveys have been carried out regularly over a number of years leading to greater understanding of the survey's limitations. In contrast, the SAGE is a new survey and its weaknesses have not been analysed and well understood yet. As Blewett et al. (2004) pointed out, a survey that is valid over time is more likely to produce high quality results.

In the long run, all surveys will allow a cross sectional comparison of insurance coverage over time, however, only the SAGE follows up the same respondents allowing tracking of personal changes in health insurance coverage. Kenny et al. (2006) argue that longitudinal surveys are able to measure the duration of coverage best. Further, they can determine patterns and changes of individual health insurance coverage. Comparing different surveys in the US, Kenny et al. (2006) found that longitudinal surveys produce a higher estimate of people who are not insured in a health insurance scheme compared to cross-sectional surveys. Although it is known that huge drawbacks of longitudinal data include higher dropout rates and more problems in data linkage between surveys, longitudinal analysis can be very valuable to determine personal events that influence health insurance coverage. Upcoming waves of the SAGE will reveal how well the wave 2 data can be matched to wave 1 and how many participants were actually followed up in order to judge fully if it will be possible to measure the effect of healthcare policies over time using this survey data.

Regional level analysis and healthcare access

All three surveys included regional information allowing detailed regional analysis on insurance coverage to be undertaken.

On top of this, GLSS carried out a separate community questionnaire for some selected rural communities. This survey included specific questions on the availability and accessibility of healthcare facilities, which are all important factors that can influence health insurance enrolment. Unfortunately not in all communities, where a household was interviewed, the community questionnaire as administered. However, the EAs of the GLSS can be matched to census data, allowing precise district-level analysis.

In addition, the GPS information provided by the DHS, GLSS and SAGE make it possible to determine specific locations where the insurance coverage is particularly low in order to create target-orientated polices that can increase the NHIS enrolment. The drawback of the DHS is that the GIS information is randomly displaced. This can have a significant influence when measuring the distance or time to get to emergency centres, as in cases of emergency, precise location information is necessary. The geographic information of SAGE needs to be more accessible. At the moment, no guidelines on how to apply for access to these sensitive data can be found on the WHO website.

Healthcare utilisation

Data on insurance coverage is very important but policymakers and health authorities are not just interested in the level of coverage; they want to understand whether the implementation of the NHIS was successful in increasing the usage of healthcare.

While the SAGE included separate questions covering outpatient and inpatient healthcare utilisation over the past 12 months, the DHS only included a question on healthcare utilisation in the female questionnaire and none in the survey for males. The GLSS also falls short in this area when looking at outpatient care. The GLSS only included information on healthcare utilisation in the last two weeks for outpatient care, but for the last 12 months for inpatient care. In order to measure the impact of insurance coverage on the utilisation of healthcare, longitudinal data is the preferred choice. A point in time measure does not capture the relationship between healthcare utilisation and insurance coverage as well as longitudinal data does (Kenney et al., 2006). Utilisation of healthcare needs to be recorded over an extensive period of time in order to capture whether health insurance affiliation has a positive effect on healthcare use (Kenney et al., 2006). More research is needed on whether retrospective questions on insurance coverage can capture this relationship as accurately as longitudinal surveys (Kenney et al., 2006). Once the second wave of the SAGE is available, the SAGE would seem to be suitable for carrying out research on healthcare utilisation.

Health status

Although the DHS has an extensive section on health insurance affiliation, the survey lacks detail in other sections. The main drawback of the DHS is that it did not include information on the health status of individuals apart from sexual and reproductive health. In contrast, the SAGE contained questions on functional limitation, well-being, chronic conditions and self-reported health status, allowing a comprehensive examination of a person's level of health. The GLSS included a question on personal health status (suffering from illness or injuries in the last two weeks) and a question on disabilities (having any serious disability that limits full participation), which allows controls for the

health status at the time of the survey interview but provides a less comprehensive picture of the individual's health status compared to the SAGE. Health status is an important control variable when examining the factors that influence health insurance affiliation. In addition, information on health status is important to evaluate the effect of insurance coverage on health. It helps to understand whether insurance coverage improves the health status of insured. Population ageing is associated with an increasing burden of chronic non-communicable diseases. Thus, information on chronic diseases is particularly important when studying the health status of older adults.

4.7 Conclusion

There are a number of different nationwide surveys that include questions on health insurance coverage in Ghana, however, only two of them focus on older adults: the SAGE and the GLSS. The quality of both surveys was examined here. It was found that both surveys have their strengths and drawbacks and Table 4.8 highlighted that each survey is suitable for a different research question.

Chapter 2 outlined that this thesis focuses on the determinants of health insurance enrolment and healthcare utilisation. The SAGE contains a detailed questionnaire on health status, chronic conditions, well-being, and disabilities, all of which are important control variables when trying to determine individual-level factors that influence insurance affiliation. It also has been hypothesised that people with health conditions are more likely to self-select themselves into purchasing insurance (referred to as adverse selection). To control for adverse selection, detailed information regarding the health status of an individual is essential.

A drawback of the SAGE is, however, that it only asked a single question on insurance coverage and is therefore a weaker survey when it comes to insurance coverage estimates. The GLSS and DHS provided detailed estimates of insurance coverage on a national and regional level in Ghana as both surveys included a complex section on insurance coverage in their questionnaire. They used control questions to determine the uninsured, list different sources of insurance coverage, and used the specific state-insurance scheme names. Utilising the community questionnaire of the GLSS and the ability to match the GLSS with latest census data, it is possible to determine where there is under-coverage of insurance enrolment. This information is important for policymakers to increase insurance coverage among household members and regions and to create target-orientated policies.

GLSS seems to be a better-suited survey than the SAGE to examine insurance coverage among older adults. However, as highlighted in this chapter, the GLSS included limited information on health status and disabilities. It specifically provides a less comprehensive picture on health status than the SAGE. This constrained the scope of the analysis in this thesis. The effect of health on insurance

enrolment could only be explored with limitations. Ideally, the GLSS would have included a more compressive module on chronic conditions, wellbeing and health status to fully understand the effect of multiple dimensions of health on insurance enrolment.

In order to support precise estimates of insurance coverage using the SAGE, for further waves of the SAGE are advised to expand its question on insurance coverage in the questionnaire. Expanding the content on insurance coverage in further waves would lead to more accurate information for policymakers and health authorities on insurance coverage among an under-researched group in older adults.

Furthermore, all surveys lack on questions focusing on the quality of healthcare services. A positive association between the quality of service and healthcare utilisation is expected. Detailed evidence of service quality would have supplemented the analysis in this thesis to fully unpack the impact of health insurance on healthcare utilisation. Also, data on the quality of different NHIS district offices is not available. It is expected that a district office that engages closely with the district and promotes enrolment has a higher level of enrolment. Poor administrative management is seen as one of the main threats for the sustainability of the NHIS (Makinen et al., 2011). Another factor that cannot be controlled for, with the here available survey data, is the availability of drugs. Gobah and Liang (2011) argue that low coverage of drugs in the NHIS reduces the likelihood of joining the system. Moreover, people are expected to travel longer distances to obtain specialist and higher quality treatment (Buor, 2003); an expected effect this thesis could not control for as data on the type of care were not available. Preferably, the SAGE and the GLSS would have included more information on type of care and quality of care to improve analysis around insurance coverage and its impact.

Generally, there is still a low availability of comparable datasets which focus on older adults in Sub-Saharan Africa. This makes it difficult to compare strategies towards UHC between different countries especially when focusing on older adults. Without data concentrating on the elderly, it will not be possible to inform policymakers about this population group, and will encourage further marginalization of older adults. So far, in the entire Sub-Saharan African region, the SAGE has only been carried out in Ghana and South Africa. Recent versions of the LSMS are available in Ethiopia, Malawi, Niger and Nigeria. The LSMS questionnaires, however, are not standardised and each survey includes different information on healthcare.

Chapter 5: Determinants of Health Insurance Enrolment: A Comparison between Surveys

The Ghanaian health system was organised as a 'cash and carry system' until 2005, which meant that healthcare was only obtained after payment. This was seen as highly inequitable and acted as a barrier to individuals getting timely and necessary treatment (Blanchet et al., 2012). In response, the NHIS (National Health Insurance Scheme) was set up with the intention of ensuring equal access to healthcare in Ghana. The architects of the NHIS imagined that it would work to reduce or eradicate poverty as a barrier to healthcare (Adamba, 2010). Initially the establishment of the NHIS received "loud applause" (Adamba, 2010, p.1). However, as highlighted in chapter 4, the enrolment rate in the NHIS in Ghana was as low as 38%, according to the Ghanaian government's official 2013 National Health Insurance Authority (NHIA) report[9]. Chapter 3 described the NHIS and highlighted that the programme is partly financed by the premium and registration fees paid by its members, and partly by tax revenues and donations. Future justifications for sponsoring the NHIS will largely depend on the demand for this programme (Schieber et al., 2012). An accurate assessment of the nature of that demand is therefore necessary.

Previous research has been critical of the lack of evidence as to what influences uptake of the NHIS (Brugiavini and Pace, 2010, Ayitey et al., 2013). The NHIA points out that knowing who is enrolled and why the decision was made to enrol will help to improve the system (NHIA, 2013b). The objective of this chapter is to investigate the correlates of enrolment for the NHIS among adults aged 18-49 and among older adults aged 50 plus. Furthermore, this chapter analyses health insurance renewals and drop outs. So far, studies have mainly focused on young and middle-aged adults, but have neglected to consider the extent to which these results can be generalized to older adults.

Reviewing the literature uncovers a substantial lack in studies that examined the correlates of insurance coverage specifically among older adults in low and middle-income countries. For example, each of Blanchet et al. (2012), Ayitey et al. (2013) and Osei-Akoto and Adamba (2011) examined demographic and socio economic factors that influence NHIS membership among adults without differentiating older adults from their corresponding younger generations. Following the arguments outlined in earlier chapters, this thesis seeks to pay more careful attention to older adults while explaining the determinants of health insurance enrolment. The thesis argues that it is

[9] More up to date administrative data is not available at time of writing.

important to consider younger and older adults separately due to their differences in demographic and socio-economic characteristics as well as differences in health and disability status. The 2010 Ghanaian Census showed that over 9% of older adults (aged 50 plus) suffer from at least one disability as compared to less than 3% of adults aged 18-49 years. Communicable diseases like HIV and malaria are the main cause of disability-adjusted life-years (DALYs) until the age of 50, and for people aged 50 plus non-communicable diseases are the main cause of DALYs (Institute for Health Metrics and Evaluation, 2010). Even more, older adults and younger adults have very different socio-economic characteristics. Older adults are found to predominantly live in rural areas while younger adults have the tendency to move into urban areas. Compared with younger adults, the education status among older adults is relatively low (Ghana Statistical Service, 2013). These differences in user characteristics can influence the uptake of health insurance significantly, which is why it is important to explore whether the correlates of NHIS enrolment differ between younger and older adults.

This chapter determines whether the socio-economic and demographic characteristics that influence insurance affiliation differ between younger and older adults in Ghana (addressing objective two of the thesis). By understanding who is enrolled in the NHIS and why others are not, progress towards UHC can be made. In times of ageing populations, health policies can be reconsidered to benefit all, inclusive of both younger as well as older adults (Lloyd-Sherlock et al., 2012a). Demand patterns of insurance enrolment will reveal what factors influence the decision to be part of the NHIS. Such information should help to create a healthcare system that meets the needs of all Ghanaians (Dixon et al., 2013). The findings can be used by policymakers to implement target-orientated policy measures that can increase enrolment in the NHIS.

The previous chapter indicated quality differences between the Ghanaian Living Standard Survey (GLSS), Demographic and Health Survey (DHS) and Study on Global Ageing and Adult Health (SAGE). Differences were seen in particular in terms of questionnaire design, question placement and wording of questions when researching insurance coverage. It is essential to determine whether these differences affect outcome measurements. Thus, another purpose of this analysis is to understand the reliability of different surveys better when measuring correlates of insurance affiliation. In particular, it is interesting to examine whether the correlates of insurance affiliation differ depending on which survey is used. Thus, the correlates of NHIS coverage among younger and middle aged adults were assessed using the GLSS round 6, SAGE wave 1, DHS 2008 and 2014. Given that the DHS does not focus on older adults, the stage of the analysis focusing on enrolment among older adults uses the GLSS and SAGE only. Comparing the findings of the GLSS and SAGE to the DHS among people aged 18-49 gives reassurance as to whether the findings of the SAGE and GLSS can be classified as reliable. Agreement as to which factors determine enrolment in the NHIS

provides a robustness-check such that the information can be more confidently relied upon to shape policies.

Previous studies either used the DHS or GLSS round 5 (Brugiavini and Pace, 2010, Dixon et al., 2011, Ayitey et al., 2013) to assess health insurance enrolment. Yawson et al. (2014) used the SAGE, taking insurance membership as a control variable when measuring health outcomes.

The analysis in this chapter replicates previous analyses of individual-level correlates on NHIS enrolment, but contributes novelty in the form of a special emphasis on the comparison between younger and older adults and between different surveys. The next chapter will expand this analysis by further taking into consideration contextual factors and further access barriers. The analysis in this chapter also adds to the literature by determining whether the use of different surveys leads to similar conclusions on what determines health insurance enrolment. Such information is important for future researchers analysing insurance coverage in Ghana as it will allow researchers to choose appropriate surveys for their work.

5.1 Determinants of Health Insurance Enrolment: A Review of Existing Research

To evaluate the impact of any insurance system, it is first necessary to understand the determinants of enrolment, particularly in low and middle-income countries. This section considers questions as to who is covered and importantly, who is not. Such a discussion can enable researchers to see whether opportunities to enrol are equal or whether the enrolment patterns vary depending on socioeconomic status, sex or residence. The literature discussed in this section explains the rationale for choosing which key variables were considered in the analysis provided in this and following chapters.

Mathauer et al. (2008) summarised the literature on determinants affecting the demands for health insurance and identified five main features: *personal and household characteristics*, *community characteristics, health system features*, *the dimensions of the health insurance scheme,* and finally *the availability of alternatives*. These categories fall under the umbrella of demand and supply factors, which can hinder or encourage the use of services (Ensor and Cooper, 2004). All of the characteristics are discussed below by reviewing the wider literature on health insurance enrolment.

Personal and household characteristics

The literature on health insurance affiliation presents diverse findings on what determines the uptake of health insurance.

Income is argued to be the main correlate of insurance enrolment in low and middle-income countries (Ayitey et al., 2013, Dixon et al., 2011, Escobar et al., 2010). Looking at studies that focus specifically on the West African context, work by Juetting (2001) includes a comprehensive analysis of community-based health insurance enrolment in Senegal. The study concluded that household-, area-, as well as individual-level characteristics determine the decision of a household to join in the community insurance scheme. The author showed that an increase in wealth is associated with a higher probability of being insured, despite the theory that insurance should offer financial risk protection especially to the poor.

The finding that rising wealth increases the likelihood of insurance coverage can be explained by the 'consumer theory'. This theory assumes that, if the consumer is perfectly informed, changes in income and prices determine the purchase of insurance (Schneider, 2004). Health insurance is classified in the literature as a normal good, implying that the income elasticity of demand is positive (Schneider, 2004). This means a decrease in insurance payment (registration fee, premium) will increase the demand for insurance purchase. In this stylised relationship, poor people are less likely to enrol in an insurance scheme than wealthier people if they have to pay a premium or registration fee.

The 'expected utility theory' assumes that it is the level of risk aversion that determines the purchase of insurance. A risk averse person is likely to become a member of an insurance programme in order to reduce the level of uncertainty and reduce the risk of high expenses in case of illness (Schneider, 2004). The 'expected utility theory', however, does not take the motivation for access to coverage into consideration. It can be argued that perhaps the main motivation to enrol for poorer people is to gain a greater access to healthcare when insured. Insurance coverage will enable poor people to access healthcare, which would be prohibitive without coverage. The poverty-focused literature further found that insurance enrolment among the poor depends on whether they place a greater value on future protection over current consumption. If a greater value is placed on future protection, insurance will be purchased. This will protect poor people from being pushed into extreme poverty due to unanticipated healthcare payments (Schneider, 2004).

The finding that wealth determines insurance coverage is supported explicitly in the Ghanaian context. Brugiavini and Pace (2010) examined the correlates of NHIS membership using the 2008 DHS. The study found that education and wealth are the key determinants for NHIS enrolment

among men and women when controlling for other demographic differences. This was underlined by the findings of Dixon et al. (2011) who, also using the DHS 2008, found that the poorest are least likely to be enrolled in the NHIS. Ayitey et al. (2013) examined NHIS insurance affiliation using the 5th round of the GLSS. The researchers used a binary logistic regression model to measure NHIS enrolment. In line with the findings of Brugiavini and Pace (2010) and Dixon et al. (2011), the work by Ayitey et al. (2013) confirmed that wealth is one of the key determinants of NHIS membership despite the fact that the system was designed to ensure equal access to healthcare across income groups.

A further relevant theory that tries to explain this finding is the 'inverse equity hypothesis'. This hypothesis suggests that "new health interventions will initially benefit higher socioeconomic groups and widen health inequities, but if coverage increases overtime, the poor can eventually catch up and health inequities can be narrowed" (Lee et al., 2014, p. 1). Richer people also might be more likely to have insurance coverage as the benefits are clearer to them and their knowledge of the availability of healthcare services is better (Yawson et al., 2014). Nevertheless, the anticipation of such a long-term correction is less comforting when considering older populations. Ensuring insurance enrolment among the poor is essential in the context of population ageing as "households with elderly, handicapped, or chronically ill members are more likely to be confronted with catastrophic health spending due to their greater need for health services and their lack of financial resource" (Kawabata et al., 2002, p. 612).

Compared to other population groups, older adults are more vulnerable to disabilities and diseases (WHO, 2016d). There are competing theories that try to explain the relationship between health status and insurance enrolment. Waters (1999) argues that ill health can lead to insurance enrolment in the first place. For people of ill health, insurance affiliation is more appealing as they expect a benefit from being insured, leading to the problem of adverse selection. Adverse selection is described as "the situation where consumers have differential health risk but are not charged a premium equal to the expected marginal cost of their insurance" (Osei-Akoto and Adamba, 2011, p.2). Consumers that are classified as being in high risk are more likely to purchase insurance as it appears more attractive to them (Osei-Akoto and Adamba, 2011). Older adults are classified as a high-risk population, which makes the purchase of insurance more attractive for them. The 'prospect theory' argues that before enrolment, people asses their health status and base the decision of enrolment on their current health level. They then evaluate whether the insurance premium payments outweigh the risk of getting ill given their health situation (Schneider, 2004).

Apart from adverse selection, moral hazard influences the relationship between insured and insurer (Pauly et al., 2006). Low insurance enrolment rates could be explained by a lack of trust in the

insurer (Kumi-Kyereme and Amo-Adjei, 2013). Individuals do not necessarily trust the insurer to compensate the cost of healthcare utilisation. Overall trust in the insurer and the healthcare providers determines the decision to enrol in an insurance scheme (Schneider, 2004). In return, insurers face the problem that individuals abuse the insurance offers by misreporting utilisation of services (Pauly et al., 2006). The 'regret and disappointment theory' states that people fear disappointment greatly, which is why if they do not see clear benefits of insurance enrolment they will not insure themselves to avoid such disappointment. After an insurance premium is paid, a person can regret enrolment in the case of good health (Schneider, 2004). Perversely, this can lead to the use of healthcare services even without actually needing care.

Despite income and health status, the literature agrees that education positively influences the likelihood of being a member of an insurance scheme (Asenso-Okyere et al., 1997, Ayitey et al., 2013). Education increases the awareness and understanding of the healthcare system and its advantages (Asenso-Okyere et al., 1997). Research conducted in India found that the awareness of available cataract treatment was higher among literate older adults compared to illiterate elderly (Brilliant et al., 1991). In line with that, Addo and Gyamfuah (2014) found a higher usage of healthcare among older adults having tertiary level of education. A high illiteracy specifically among older adults in Africa is associated with a limited access to public resources (Parmar et al., 2014). Using the GLSS round five, Ayitey et al. (2013) showed that the odds of being insured by the NHIS in Ghana increased with education.

Looking at age specifically as a correlate, although there are limited studies that examined health insurance affiliation specifically among older adults, general studies focusing on insurance enrolment agree that insurance membership is positively affected by age (Ayitey et al., 2013, Bhat and Jain, 2006, Juetting, 2001, Kumi-Kyereme and Amo-Adjei, 2013). Blanchet et al. (2012) illustrated that age seemed to be a strong predictor which determines enrolment in the NHIS. Their study used individual-level data to investigate the effects of NHIS enrolment on healthcare use. The researchers found with the help of the Women's Health Study of Accra Wave II, which was carried out between 2008 and 2009, that insurance afflation increased with age. In the 65 plus age group, over 45% of participants were enrolled in the NHIS, which was higher than in any other age group. This could be driven by the NHIS premium release at the attainment of 70 years of age. Blanchet et al. (2012), however, did not look at this age group separately to see whether there is a sharp enrolment increase for people turning 70 years of age.

Ayitey et al. (2013) and Kumi-Kyereme and Amo-Adjei (2013) supported the findings of Blanchet et al. (2012) that an increase in age raises health insurance affiliation. Ayitey et al. (2013) explain this relationship by arguing that older adults are more likely to experience a health shock due to greater

occurrence of disabilities and diseases with age. Kumi-Kyereme and Amo-Adjei (2013) add that the risk perception of older adults changes, leading to greater healthcare investments with increasing age. This highlights an age-related dimension to the aforementioned 'prospect theory', suggesting that changing perceptions of health risk associated with age affect decisions to enrol. An ageing global population is associated with a shift in disease burden. Rising prevalence of non-communicable diseases (WHO, 2011a) and the rise of older adults suffering from multiple conditions (multi-morbidity) (Beard et al., 2016), puts a greater pressure on healthcare systems. Therefore, systems need to plan for the above incentives to enrolment across the entire population, with a view to managing an expected increase in demand for insurance services from older adults.

Moreover, in reviewing the literature on healthcare utilisation, it was found that gender plays a role in healthcare use (Ayitey et al., 2013, Bertakis et al., 2000, Redondo-Sendino et al., 2006) leading as a consequence to different incentives for insurance enrolment. Bertakis et al. (2000) found that women were significantly more likely than men to use outpatient healthcare. Redondo-Sendino et al. (2006) examined the healthcare use of older adults in Spain and confirmed the findings of Bertakis et al. (2000) showing that women have a higher utilisation of outpatient care. When controlling for chronic diseases, however, they showed that the odds of women using inpatient care were lower compared to men. Saeed et al. (2015) showed that older women were more likely than men to be self-employed and have a higher level of illiteracy compared to their male counterparts, which are both factors that reduce the likelihood of NHIS enrolment. Further evidence is needed as to whether gender differences among older adults also influence insurance membership in low and middle-income countries. Peltzer et al. (2014) examined healthcare utilisation among older adults in China Ghana, India, Mexico, Russia and South Africa. They research showed that compared with older men, older women were more likely to use outpatient care but less likely to use inpatient care.

Conflicting findings on household size and insurance enrolment are presented in the literature. An empirical study by Bhat and Jain (2006) showed a positive association between insurance purchase and the number of children in a household. Contrary to this, a study from Australia showed that family size did not affect health insurance enrolment significantly (Cameron and Trivedi, 1991). Recent evidence from Ghana, however, presented a positive association between NHIS enrolment and family size, which is most likely explained by increased feelings of responsibility (Ayitey et al., 2013) and free enrolment for children when both parents are a member of the NHIS. However, health insurance can be also beneficial for older adults living alone who do not have great family support. Yawson et al. (2014) found that older adults living alone have difficulties in accessing cataracts treatment services and argues that enrolment in a social protection programme (such as the NHIS) among older adults needs to be increased.

Married people in low and middle-income countries were found to be more likely to hold health insurance. This could be due to increased responsibility to mitigate effects of their potential ill-health on their partner (Asenso-Okyere et al., 1997, Cameron and McCallum, 1995). In addition, married couples have the opportunity to pool financial resources, making it easier to afford insurance membership (Dixon et al., 2011).

Community characteristics

The social context people live in can further help inform their decision about whether to join an insurance scheme. Positive or negative experience with a system by one person can influence the decision of another person to be part of the scheme or not. It has been found that in low and middle-income countries, community factors like internet, radio or newspaper coverage in the area can increase the awareness of insurance schemes through mass media campaigns (Brugiavini and Pace, 2016).

Another characteristic that was found to influence the likelihood of having health insurance was considerations as to the insurability of health and the understanding that illness is not destiny (Mathauer et al., 2008). Reliance on 'faith in God' to protect the family leads to lower use of preventative healthcare. Thiede and Koltermann (2013) reported that tradtional beliefs in Ghana lead to a smaller likelihood of joining a health insurance scheme compared to other religious beliefs. In addition, a lower uptake of maternal health services is witnessed among those with traditional beliefs in Ghana. Christian women, however, were found to have the greatest liklelihood to give birth in a healthcare facitlity (Addai, 2000). This could be attributed to the greater provision of healthcare services by the Catholic Church in Ghana (Addai, 2000), or that Christians are more likely to live in the southern part of Ghana (Abdul-Hamid, 2011) were the provision of healthcare services is greater (see chapter 3). Further as outlined in chapter 2 Osei-Akoto and Adamba (2011) argue that ethnic and religious diversity determines enrolment in health insurance in Ghana. Solidarity and trust across communities has been identified as a driver of health insurance enrolment as well as familiarity with formal institutions (Mathauer et al., 2008). Johnson et al. (2015b) found that community and district predictors influence women's uptake of skilled birth care significantly.

Health system features

Chapter 2 already highlighted that reducing financial access to healthcare through insurance enrolment is not a sufficient condition for increasing the utilisation of care. Health system characteristics like geographical access to care, the quality of care or the costs of services can hold back or promote insurance enrolment (Mathauer et al., 2008).

Adamba (2010) argues that health insurance purchasers will only benefit if health services are close to them. If healthcare services are not accessible, health insurance membership is of little worth as the desired care cannot be attained. Existing studies have found that, especially in Africa, residential remoteness regulates insurance affiliation (Ayitey et al., 2013). Removing barriers to enrolment is necessary to ensure that every resident can be part of the NHIS and benefit from the system (Arhin, 2013). Osei-Akoto (2003) discovered that spatial barriers and regional differences like poor road networks, poor quality of services as well as the distance to healthcare facilities not only influences the utilisation of healthcare services, but also affiliation to health insurance in Ghana. Road access in rural areas of Ghana are limited, excluding certain groups from easy access to healthcare (Agyepon and Adjei, 2008). This was supported by Nketiah-Amponsah (2009) who carried out a binary logit model to examine the demand for health insurance among women. The study indicated that the number of nurses per head of population, as well as the distance to healthcare facilities affect insurance membership significantly. The importance of controlling for regional differences when undertaking research on health in Ghana is also highlighted by Brugiavini and Pace (2010). They paint a vivid picture of inequalities by examining doctor-patient and nurse-patient ratio between regions. Chapter 3 also highlighted the regional disparities among doctor-patient ratios in Ghana.

The cost of travelling to a healthcare facility has been identified worldwide as an important factor that influences the use of services. The relationship between healthcare utilisation and distance from care facilities can be described as 'distance decay' (Gatrell and Elliott, 2015). In Britain, for example, it has been found that, controlling for demographic differences, the utilisation of healthcare is significantly higher when people live within a 2 kilometre radius of healthcare facilities compared to people living outside this 2 kilometre radius (Gatrell and Elliott, 2015). This relationship is especially true for older adults. In the US state of Vermont, it has been found that there is a significant reduction in healthcare utilisation when older adults live further than 16 kilometres away from a healthcare facility (Gatrell and Elliott, 2015). A study focusing on rural areas in North Carolina found that people living in rural areas face geographical difficulties in contacting healthcare facilities due to limited public transport, poor infrastructure and long travel times (Arcury et al., 2005).

There are different reasons that account for this 'distance decay' relationship. Patients tend to make a trade-off between the cost of travelling to a healthcare centre and the expected benefits of visiting a facility (Gatrell and Elliott, 2015). This calculation is based on both mobility and accessibility. Mobility includes the availability of public transport or a car to reach a healthcare centre while accessibility refers to the actual travel time to a healthcare facility (Gatrell and Elliott, 2015).

Looking at the Ghanaian context, the 2003 Core Welfare Indicators Questionnaire Survey reports that in Accra, the geographical access to healthcare facilities is at a relatively high level, but is poorest in the northern and western part of the country (Ghana Statistical Service, 2005). While 78.6% of the population that resides in urban areas has quick access to a healthcare facility, less than half of the population living in rural areas has access to healthcare services within 30 minutes (Ghana Statistical Service, 2005). In Greater Accra, the percentage of healthcare facilities that can be reached within half an hour is 81.2%, the highest in the country. The lowest is found in the Upper East administrative area where only 26.6% of the population lives within 30 minutes travelling distance of a healthcare facility (Ghana Statistical Service, 2005).

Gething et al. (2012) published a study on geographical access to healthcare services in Ghana, which found that geographical access determines the use of maternity care services to a great extent. The proportion of women that have no skilled midwife attendance during birth rises with the distance from cities, meaning the likelihood of giving birth in a hospital increases when a woman lives in an urban area (Gething et al., 2012). The most extensive access to birth-care facilities was found in Accra, the capital of Ghana. Poor geographical access to healthcare facilities were found in rural areas especially in northern and western parts of the country (Gething et al., 2012).

Further studies confirm and expand on these findings. Owoo and Lambon-Quayefio (2013) examined the regional variation in the intensity of antenatal visits. The researchers found that the use of antenatal visits is the greatest in the south of Ghana while it remains low in northern regions. Sarpong et al. (2009) looked at 99 rural villages in Ghana in the Ashanti region and found a negative relationship between distance to healthcare and insurance enrolment. The researchers calculated the distance to healthcare facilities by measuring travel time to the nearest healthcare facility by public transport. They found that the shorter the travel time, the greater the NHIS coverage. Here, it is important to bear in mind that distance to healthcare facilities influences urgent health need to a lesser extent than non-urgent needs. For less urgent services, distance can form a barrier when seeking care as the travel cost may exceed the benefits of the treatment while in cases of emergency, people are more willing to travel further distances to get care (Gatrell, 2002, Buor, 2003).

Mobility decline in old age makes it particularly important to focus on physical accessibility of healthcare to ensure improved healthcare usage, which is why chapter 6 puts analysis of spatial barriers of NHIS enrolment among older adults under focus.

Health insurance scheme design

The design of a health insurance scheme can positively or negatively influence insurance enrolment. Particular features like the attractiveness of the benefit package, enrolment procedures, enrolment fees and the level of co-payments will determine enrolment. For example, the premium exemption for people aged 70 plus or for indigents in Ghana forms an incentive to enrol in the system.

The benefit package of an insurance scheme needs to be target-orientated as different people need different healthcare. This is particularly important in the context of population ageing. Healthcare authorities must identify the special needs of older adults to ensure they can receive care when needed. Although the NHIS covers 95% of common diseases, it lacks coverage of needs largely specific to older adults, like home care. In Africa, further complications are caused by insufficient knowledge among healthcare providers about the specific needs of older adults: particularly the lack of knowledge on how to treat chronic conditions (Lloyd-Sherlock, 2004b, De-Graft Aikins et al., 2010).

This shows the importance of distinguishing between the intended targets of the NHIS and its practical implementation (Arhin, 2013). Qualitative work by Dalinjong and Laar (2012) indicates unequal treatment among insured and non-insured. This is highlighted by the response of an insured man in Bulisa:

> "Some of the staff are too discriminatory. When you come without insurance, very quickly they will attend to you" (p.10)

Due to the absence of upfront payments by the insured, non-insured tend to get better examination and tend to wait less time to see a health professional. Insured clients complain about the long queues when seeking care and insufficient physical examinations. Dalinjong and Laar (2012) reported the testimony of an insurance manager in Bogatanga who said in interview:

> "We've received numerous complaints of delays by our clients at the facilities. Some insured clients spend a whole day seeking health care in the facilities" (p.10).

Since the introduction of the NHIS, the charges for healthcare services have increased. Providers justify the increase in charges as being due to the insufficient reimbursement of the NHIS. The postponement of NHIS reimbursement payments also results in healthcare facilities refusing to see insured patient unless they offer to make cash payments (Dalinjong and Laar, 2012). Due to the increase in co-payments when seeking care, the NHIS is no longer considered free (Arhin, 2013). This can encourage individuals to seek alternative care and indicates that it is a challenging task to

examine the actual benefit of NHIS coverage. Chapter 7 aims to measure the effect of NHIS coverage on healthcare utilisation by matching insured and non-insured survey respondents.

The availability of alternatives

The availability of alternatives will further influence insurance enrolment. The GLSS 2012-2013 shows that less than 1% of those holding health insurance in Ghana have private health insurance. However, the above described problems with the NHIS can lead to the decision not to enrol in the NHIS but to pay out of pocket for better services. The uninsured report that that they prefer the usage of private care as the quality of care is better. Rich people, in particular, are able to choose the service they prefer regardless of insurance coverage (Makinen et al., 2011).

Other alternatives to health insurance coverage are family or community support networks. In many lower and middle-income countries, older adults rely on traditional institutions like their family as care givers due to a lack of institutional frameworks that successfully manage and define healthcare needs of older adults (Saeed et al., 2015). However, due to changes in family structure and migration, the support system for older adults is shifting. Falling family size, decreases in extended family support, rising employment of women, as well as increasing rural to urban migration by younger adults results in older adults being left behind without the support which is specifically needed in older age (Falkingham, 2015, Apt, 2012, Bloom et al., 2015).

Research by Bloom et al. (2015) confirmed higher health expenditure rates in households with older adults. In cases of illness without financial support of the family, older adults are often left without means to access healthcare (Mba, 2006) which makes health insurance coverage essential.

5.2 Definition of Variables Used

The variables used in this thesis to determine health insurance enrolment build on the above literature review.

Ideally, in order to have directly comparable results, the questionnaire for the DHS, GLSS and SAGE would have been worded in the exact same way. However, as highlighted in the previous chapter, the questionnaires were not identical. Therefore, the analysis was restricted to only those control variables that were available and identical within the DHS 2008 / 2014, GLSS and SAGE[10]. The coding of all variables is summarized below and the incentive for these classifications is discussed in the following paragraphs.

[10] A more comprehensive model which aims to understand the determinants of health insurance enrolment was built the next chapter (chapter 6). It focuses on older adults only.

Table 5.1: Description and coding of control variables

Variable	Coding
Age	Treated as a categorical variable: *Younger adults:* (18-24,25-29,30-34,35-39,40-44,45-19) with 18-24 used as reference category *Older adults:* (50-59, 60-69, 70+) with 50-59 used as reference category
Sex	Coded dichotomously using the category male as reference
Marital status	Grouped into 3 categories: married/cohabiting, never married, separated/divorced and widowed. Reference category: married/cohabiting
Education	Converted into 4 categories from none to tertiary education with primary education as reference category
Standard of living	Wealth tertile. Reference category: Poorest (1st quantile)
Region	10 regions of Ghana. Reference: Greater Accra
Place of residence	Coded dichotomously. Reference: Urban
Formal sector employment	Converted into 2 categories with not currently employed in the informal sector as reference category
Disability	Coded dichotomously into yes -suffering from disabilities- and no – not suffering from disabilities. Latter was used as the reference category

Source: Author (2016)

The variable *age* has been transformed from a continuous into a categorical variable in order to control for changes in the demand for healthcare insurance among different age groups.

Ten year intervals (50-59, 60-69, 70 plus) were chosen to compare different groups of older adults. These categories make theoretical sense as operationalisations of groups that are differentially related to the scheme through regulations governing exemptions from payments. Age 60 is the official retirement age in Ghana, and, as mentioned in chapter 3, all pensioners under the Ghanaian SSNIT Pension Scheme are exempt from premium payments. Those aged 60-69 years who do not receive pensions and work in the informal sector would still be liable for premium payments on the NHIS. It is expected that due to the exemptions on premiums for people aged 70 plus, insurance membership rises sharply among those older adults.

While ten year intervals make theoretical sense when looking at older adults, five year intervals were used for younger adults. Five year intervals were chosen to measure changes in insurance coverage, particularly during reproductive age, more accurately. The premium exemption for pregnant women is expected to increase insurance enrolment among younger women and interactions between sex and age were tested.

The variable *marital status* distinguishes between married/cohabiting, never married, separated/divorced and widowed. Being widowed was included as an extra category as older adults often face being left without their partner due to death.

The variable *education* was recoded in a way that is sensitive to key milestones in the Ghanaian education system (see US Embassy (2015)). The variable was adjusted for changes in the school system to ensure that the school system, in place when an older adult went to school, was taken into account. In order to create a comparable measure between surveys, the level of education was grouped into four categories ranging from none to tertiary. In the SAGE, the primary education category included all individuals with primary school education. A secondary education refers to the completion of secondary school or high school while tertiary education was defined as the completion of a college, university or post-graduate degree. Based on the official classifications of primary, secondary and higher education in Ghana (US Embassy, 2015), the variables in the GLSS were recoded. In the GLSS, a report of no education, kindergarten attendance, primary school education and junior high school completion was classified as primary education. Completion of senior high school, secondary school or a vocational, technical, or commercial training was coded as secondary education. The achievement of a teacher training or nursing course, post-secondary diploma, bachelor degree or postgraduate degree formed the tertiary education category. The DHS already grouped education into the categories none to tertiary. It should be noted that the problem of using education as an indicator of socioeconomic status for older adults is that the level of education of older adults usually reflects educational achievements early in life which can differ from current education standards (Grundy and Holt, 2001).

Living standards are most commonly measured based on income, expenditure or consumption (O'Connell et al., 2013) and it is important to be aware of the strength and drawbacks of each measure when analysing the standard of living.

Table 5.2: Definitions of measures of living standards

Income	The amount of money received during a period of time in exchange for labour or services, from sale of goods or property, or as a profit from financial investments.
Expenditure	Money payments of the incurrence of a liability to obtain goods or services.
Consumption	Final use of goods and services, excluding the intermediate use of some goods and services in the production of others.

Source: O'Donnell et al. (2008, p. 70)

The most straightforward approach to measure living standards is to use income. Income is defined as “the earnings from productive activities and current transfers” (O'Donnell et al., 2008, p. 69). Income–based measures generally refer to *current income* (O'Donnell et al., 2008, Fergusson et al., 2001). However, it has been argued that income is not the most suitable measure when working

with older adults. Older adults tend to understate their standard of living, and current income does not take assets acquired by older adults in the past into consideration (Fergusson et al., 2001). There are several other limitations to using income as a measure of living standard, particularly in low and middle-income countries. Many people living in low and middle-income countries work in the informal sector and often have various and constantly changing sources of income, making it difficult to determine their actual income (O'Donnell et al., 2008). Falkingham and Namazie (2002) note that another problem arises "in imputing the value of wage or transfer income when people are paid in-kind" (p. 24). Particularly in rural areas, people are paid in kind, which makes measuring income in rural areas difficult. Further, 80% of people in Ghana work in the informal sector and suffer from high-income insecurity (Ampratwum and Osei-Boateng, 2011). Income derived from the informal sectors tends to be under-reported. Under-reporting of income or a high number of non-response tends to occur if the survey participants fear that the information of the survey will be passed on to other officials (e.g. tax office) (Falkingham and Namazie, 2002).

Another measure of living standards, *expenditure,* refers to "the purchase of a particular good or service" (O'Donnell et al., 2008, p. 69). The drawback of using expenditure as a measure of living standard is that expenditure measures do not take into account whether goods are immediately consumed and expenditure can be very irregular. Expenditure data in surveys are often collected on the basis of recall (e.g. expenditure in the week prior the survey interview) which can lead to measurement errors (especially when the recall period is long) (Falkingham and Namazie, 2002). Another limitation is that especially in low and middle-income countries, home production is very common which makes it difficult to use expenditure as an accurate measure of living standard (O'Donnell et al., 2008). The consumption of goods is an appropriate alternative which measures resources actually exhausted (O'Connell et al., 2013). This measure is particularly popular in low and middle-income countries due to the limitations of income and expenditure measures (O'Donnell et al., 2008).

There is no gold standard for which measurement is best (O'Donnell et al., 2008). For this thesis, expenditure and income-based measurements were most suitable as it is hypothesised that insurance coverage depends strongly on the disposable income that makes the NHIS premium affordable. Despite the arguments for the use of consumption measures above, income/expenditure based measures have the advantage of taking into account the effect of cash-flow necessary for the ongoing purchase of insurance premiums.

While consumption, expenditure and income are classified as *direct* measures of living standards there are also respected proxy measures of living standards. Household assets can be used as a proxy measure of prosperity (O'Donnell et al., 2008). Assets as a proxy measure of wealth has been

classified as a “convenient way to summarize the living standards of a household” (O'Donnell et al., 2008. p. 71). These proxies, however, often fail to reflect theoretical foundations, as it is unclear as to whether the relative importance of each component (or asset) with regard to the concept they purport to measure is the same for each individual in the sample. Therefore, any sums of assets may not reflect the underlying concept accurately.

Although there is a strong argument for using expenditure or income as a living standard measurement in this thesis, this was not always possible. Problems of misreporting and non-response of income components in surveys (Group, 2011), as well as the lack of expenditure and income data in the DHS, make the use of indirect living standard measures sensible. Thus, for the purposes of comparison this chapter uses assets to measure wealth. All four surveys collected information on household assets. In order to take into account urban and rural differences in the distribution of assets, a wealth index was created over urban and rural residence using principal component analysis. The wealth indices constructed in this thesis were based on assets and consumer items (such as bicycle, television, and car) and dwelling characteristics (such as drinking water, type of flooring material, and sanitation facilities). Due to sample size issues (in particular among younger and middle aged people in the SAGE) wealth tertiles were created.

Moreover, area characteristics are hypothesised to affect the demand for healthcare. *Place of residence* and *region* were included to capture regional differences. Here, it is hypothesised that living in an urban area increases the likelihood of health insurance enrolment due to the greater availablity of services.

Other control variables were not directly comparable between the surveys. However, this chapter does not only compare insurance coverage between surveys. Section 5.5 of this chapter also analyses health insurance renewals and drop outs. NHIS membership needs to be renewed yearly and only limited research up to now has examined the factors that influence the decision to renew this membership (Boateng and Awunyor-Vitor, 2013, Jehu-Appiah et al., 2011). Out of the DHS, GLSS and SAGE, only the GLSS asked about *former* insurance enrolment, hence only that survey was used for the analysis in section 5.5. Two additional variables (formal sector employment and disability status) were added to the model as they were expected to influence insurance drop out. These are not comparable to the SAGE and DHS due to substantial differences in the questionnaire.

Current formal sector and current non-formal sector employment was added to the analysis to account for premium exemption for people who are contributing to the SSNIT. Again, it has to be noted that using occupation as an indicator is problematic when focusing on older adults as older adults tend to be retired (Grundy and Holt, 2001). However, in Ghana a high percentage of older

adults are still economically active. Only 0.96% of survey respondents in the GLSS reported that they are pensioners.

Following Juetting (2001), in order that sample selection bias is avoided (in the sense that people of ill health are more likely to self-select into insurance membership), healthy and non-healthy individuals were included in the analysis. Measuring health is a challenging task and it requires distinguishing between *objective* and *subjective* measures of health (Johnston et al., 2007) which can be defined as followed:

> "Subjective health measurements reflect the individuals' opinions about their health, while objective health measurements are derived from medical examinations" (Romaniuk, 2013, p.88).

Previous research showed that self-reported health is subject to biases as "survey respondents may report their health differently depending on their socially driven conceptions of what 'health' means, their expectations of their own health, their use of healthcare, and their comprehension of the actual survey questions asked" (Johnston et al., 2007, p. 3). Self-reported health bias is a particular problem when studying older adults. Older adults tend to inflate their health status in surveys as they have lower expectations for good health (Lloyd-Sherlock, 2010). Objective health measures should be independent of participant's personal opinions but Baker et al. (2004) showed that objective health measures are subject to reporting error as survey respondents might not be aware of their medical conditions. In this thesis, health status was measured through the presence of any severe disabilities that limit full participation in life activities. Measuring health in terms of disabilities tries to minimise biases resulting from older adults' tendency to overstate their health status.

5.3 Methodology

The NHIS distinguishes between different types of memberships, namely: *registrants* and *cardholders*.

Registrants refers to those people who have registered at a local district office but have not paid the full premium, or have paid the premium in full but are still waiting for the card to be processed. *Card holders* have already received their membership card and are eligible for the NHIS benefit services (Ghana Statistical Service, 2015).

The DHS 2014 and GLSS distinguish in their questionnaire between these types, while the SAGE only asked about insurance enrolment and not explicitly about holding a NHIS card. The DHS 2008 has no question on insurance *registration*. In order to minimize errors due to different understandings

of registrants and card holders in the different surveys, the initial analysis in this chapter distinguishes between being currently insured (having a valid NHIS card) and not currently insured (not having a valid NHIS card). In the SAGE, everyone who reported voluntary insurance coverage (which includes NHIS coverage as described in chapter 4) was classified as being enrolled in the NHIS.

Exploratory analysis provides a preliminary analysis of the association between the above mentioned explanatory variables and NHIS insurance. The purpose of this analysis is to explore associations between the independent variables and the outcome of interest (currently insured) as well as showing trends in NHIS uptake. Cross tabulations between the outcome and explanatory variables highlight patterns of NHIS enrolment. In addition, Pearson's Chi-squared test was used to assess whether there is a significant association between the categorical explanatory variables and NHIS enrolment in the population, using a 5% significance level.

Owing to the dichotomous nature of the outcome variable (NHIS cardholder vs non-cardholders), binary logistic regression, the most common form of analysing binary data, was applied. Logistic regression allows for robust analysis and explanation of the categorical dependent variable, which is not possible using simple linear regression. Logistic regression was chosen in response to previous work done by Dixon et al. (2011) and Ayitey et al. (2013) which also used logistic regression[11].

Logarithmic transformation of the data by using the so-called *logit* function is used in order to predict the probability of success (=1) or failure (=0). For an individual, *i,* enrolment in the NHIS is equal to 1 and not being enrolled is equal to 0*.*

The specification of the model is as follows:

(5.1)

$$logit(\pi_i) = log\,[\frac{\pi_i}{1-\pi_i}]$$

(5.2)

$$logit(\pi_i) = \alpha + \beta_1 x_{1i} + \beta_2 x_{2i} + \ldots + \beta_k x_{ki}.$$

The vectors x_{1i} to x_{ki} stand for the independent variables and β indicates their net effect on the likelihood of being enrolled in the NHIS. Thus, logistic regression estimates the log-odds of younger or older adult's enrolment in the NHIS while controlling for socioeconomic and other characteristics by holding them constant. Using the logistic regression output, it is possible to work out the predicted probability for different groups of falling into the outcome category. Predicted

[11] Chapter 6 expands this analysis using multilevel modelling.

probabilities enable researchers to understand the effect of a specific variable while holding all other explanatory variables constant:

(5.3)

$$\pi_i = \frac{\exp(\alpha + \beta_1 x_{1i} + \beta_2 x_{2i} + \ldots + \beta_k x_{ki})}{1 + \exp(\alpha + \beta_1 x_{1i} + \beta_2 x_{2i} + \ldots + \beta_k x_{ki})}$$

Building upon this, supplementary analysis in section 5.5 distinguishes between three outcomes of insurance status: *never enrolled in an insurance scheme*, *currently insured* and *previously insured*. As mentioned before, out of the four surveys (DHS 2008 / 2014, GLSS and SAGE), the GLSS asked about *previous* insurance enrolment which makes this supplementary analysis possible.

Multinomial logistic regression was used in order to distinguish between the three types of insurance status (none, previous and current enrolment). Multinomial logistic regression is a suitable method when the outcome variable is nominal and has more than two categories which cannot be numerically ordered. Multinomial logistic regression works under the same principal as logistic regression by breaking the response variable into a series of comparisons to predict the membership of each response categories (Field, 2009).

It extents binary logistic regression by using a separate logit model for each pair of outcome categories. It models the log-odds (or odds) of being in one response category compared to the log-odds of the baseline (also known as reference) category:

(5.4)

$$\log\left(\frac{\pi_1}{\pi_3}\right) = a_1 + \beta_1 X \qquad \log\left(\frac{\pi_2}{\pi_3}\right) = a_2 + \beta_2 X$$

Where:

π_3 = baseline category

In the above equation, β_1 and β_2 measure the effect of X on the log-odds of being in one response category instead of the reference category. The reference (baseline) category used in this analysis is 'currently insured'. Again, the results were transformed into predicted probabilities to allow for an easier interpretation of the result:

Probability of never being insured (category 1):

(5.5)

$$\pi_1 = \frac{\exp(\alpha_1 + \beta_1 X)}{1 + \exp(\alpha_1 + \beta_1 X) + \exp(\alpha_2 + \beta_2 X)}$$

Probability of former insurance enrolment (category 2):

$$\pi_2 = \frac{\exp(\alpha_2 + \beta_2 X)}{1 + \exp(\alpha_1 + \beta_1 X) + \exp(\alpha_2 + \beta_2 X)} \quad (5.6)$$

Probability of being currently insured (baseline category 3):

$$\pi_3 = \frac{1}{1 + \exp(\alpha_1 + \beta_1 X) + \exp(\alpha_2 + \beta_2 X)} \quad (5.7)$$

Further tests were hindered by deficits in the data. A multinomial analysis distinguishing between the different types of insurance schemes (private vs. public) could not be carried out due to the low number of respondents reporting a mandatory insurance coverage in the SAGE or a private insurance coverage in the DHS and GLSS. An explanatory analysis examining the choice of insurance providers resulted in omitted variable bias due to the small size of samples remaining for independent variables.

All analysis was carried out in STATA version 14 and unless otherwise indicated sample weights were applied throughout to adjust for unequal probability of selection (see chapter 4).

5.4 Results: Determinants of Current Enrolment

5.4.1 Descriptive Results

This section discusses the descriptive results with regard to NHIS coverage patterns first among young /middle aged adults (using two waves of the DHS, the GLSS[12] and the SAGE), and after NHIS coverage is compared between both young /middle aged adults and older adults. This chapter looks first at people aged 18-49 as chapter 6 analyses enrolment patterns among older adults in more detail.

As discussed earlier, the comparison between the different surveys (DHS, GLSS and SAGE) allows a check on the strength of the data by estimating whether correlates of health insurance status are consistent across surveys. Agreement as to which factors determine enrolment in the NHIS provides a robustness-check.

Enrolment patterns of young and middle aged adults

[12] Only the 6th round of the GLSS was used (2012-2013) as during the 5th round of the GLSS the NHIS was not implemented nationwide.

Comparing NHIS coverage of 18-49 year olds by sex, both waves of the DHS and the GLSS indicate a higher enrolment rate among females compared to males (see Figure 5.1).However, contrary to this, the SAGE reported a greater coverage among males. These differences can be attributed to policy changes and fieldwork timing. Since July 2008, all pregnant women who attend antenatal care in one of the NHIA accredited facilities are exempt from the NHIS premium payment as they are automatically registered in the scheme upon arrival. They and their new born are entitled to the NHIS benefits until 3 months after the delivery (NHIA, 2016a). The data collection of the 2008 DHS took place between September and November (Ghana Statistical Service et al., 2009) and the fieldwork for the SAGE took place between May 2007 and June 2008. This means that during the SAGE data collection period the premium exemption for pregnant women was not in place, which could account for the lower coverage among women particularly in reproductive age.

All the four surveys confirm the findings in the literature review that richer individuals are more likely to enrol in the NHIS ($p<0.01$). However, the results suggest that the gap between the richest and poorest is decreasing. While the SAGE (carried out between 2007 and 2008) reports a difference in NHIS coverage between those belonging to the poorest and richest wealth quintile of 21%, in the DHS 2014 this difference decreased to 3% (this difference found to be significant at a 5% level).

Moving on to regional and residential differences, all four surveys demonstrate a greater coverage in urban areas compared to rural areas. This can be explained by the better health service coverage in urban areas which will be discussed in detail in chapter 6. The NHIA underlines this by reporting that rich and urban dwellers have the highest NHIS coverage (NHIA, 2013b). Again, the gap between rural and urban residence seems to be decreasing over time which could be attributed to facility accreditation (see chapter 3) introduced by the NHIA in 2009 (which has been expanded since) to improve the quality of care and the access to care (Alhassan et al., 2015).

Regardless of which survey was used, a significant association between region and NHIS coverage was found ($p<0.001$). The regional coverage varies by survey. Both the SAGE and the GLSS report the highest enrolment rate in the Upper West region (53% and 76% respectively), while the DHS 2008 reports a coverage of 38% and the DHS 2014 of 61% in the Upper West. The DHS 2014 shows the highest coverage in Brong Ahafo, with 67% of respondents having a valid NHIS card. In the DHS 2008, the highest enrolment (rate 42%) was found in the Upper East, followed by Brong Ahafo.

Figure 5.1: NHIS coverage among 18-49 year olds by sex, wealth, residence and region

Source: GLSS 2012/2013, SAGE 2007/2008, DHS 2008, DHS 2014, author's calculations

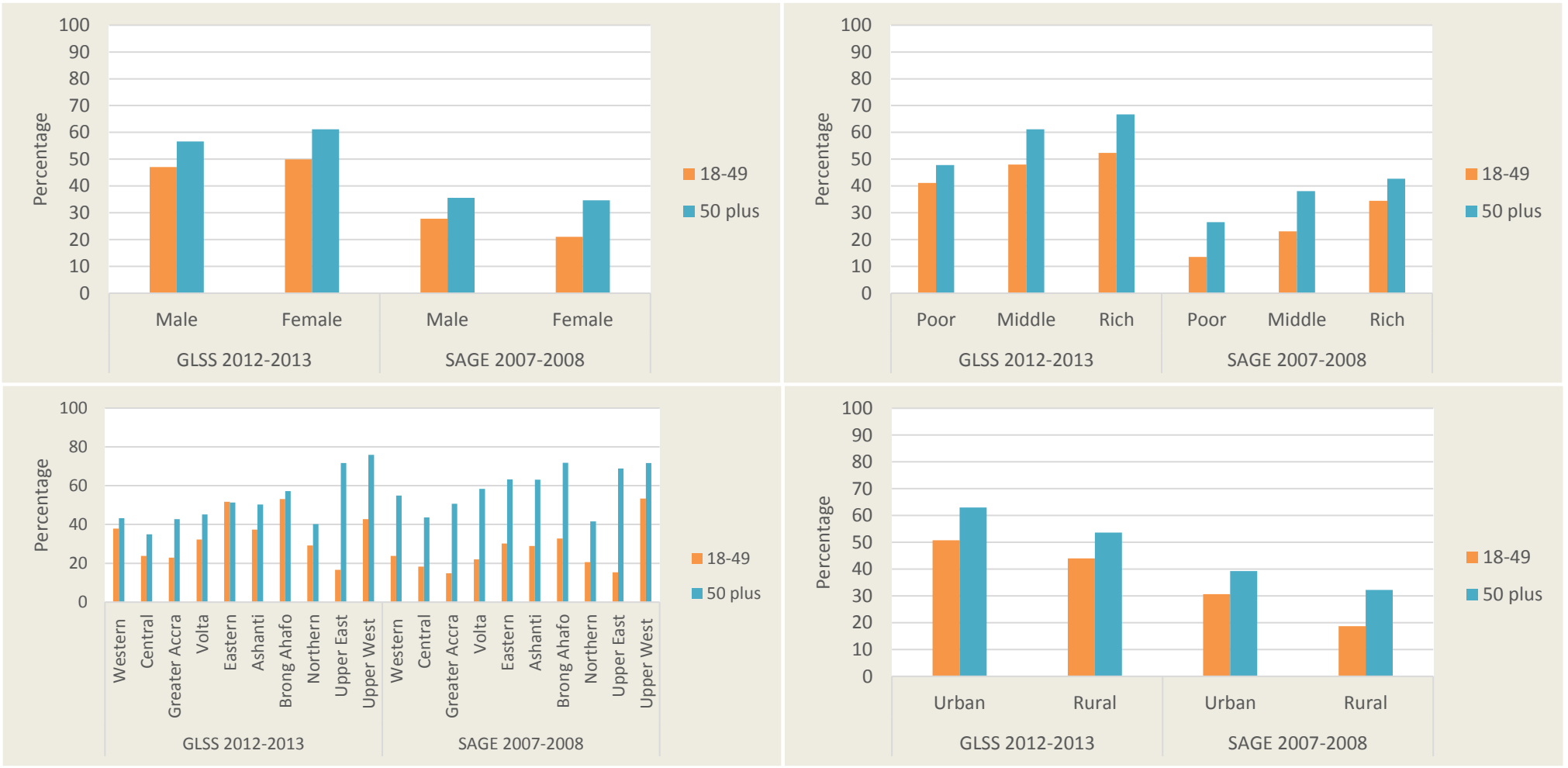
Comparison in enrolment patterns among young / middle aged and older adults

In order to understand differences between younger / middle aged and older adults, Figure 5.2 compares NHIS coverage between both groups and selected variables of interest. When comparing enrolment between 18-49 year olds and adults aged 50 plus, a higher enrolment rate among older adults can be found ($p<0.001$). While descriptive statistics above showed a greater enrolment rate among males compared to females for people aged 18-49 in the SAGE, this difference disappears when looking at older adults. Older males only had a slightly higher enrolment rate (36%) compared to older females (35%). In contrast, the GLSS showed that more females enrolled in the NHIS compared to males regardless of age group ($p<0.01$). Ayitey et al. (2013) also found that the NHIS uptake in Ghana is greater among women compared to men. The higher use of healthcare among younger women could be due to a higher need for care during reproductive years. However, there is not conclusive evidence as to whether gender differences in healthcare use and insurance participation remain among older adults.

Looking at equity in insurance enrolment, Figure 5.2 reveals that even though adults aged 70 plus are exempt from the premium, coverage increases with wealth among older adults ($p<0.001$). 48% of people aged 50 plus who belong to the poorest wealth tertile reported NHIS coverage in the GLSS, while 67% in the richest quintile were covered under the NHIS. The SAGE shows the same trend. 26% of poorer older adults were covered under the NHIS compared to 43% of rich older adults.

The results further underline the regional differences in NHIS enrolment. Figure 5.2 illustrates a greater enrolment rate in urban areas not only among younger adults but also among older adults ($p<0.001$). In the GLSS and SAGE respectively, 63% and 40% of older adults were insured with the NHIS in urban areas compared to 54% and just over 30% of those in rural dwellings. As mentioned in the review of the literature, it is particularly important for older adults that healthcare services are easily accessible as they tend to be less mobile than other population groups.

Figure 5.2: Comparison of NHIS coverage among 18-49 year olds and 50 plus year olds



Source: GLSS 2012/2013, SAGE 2007/2008, DHS 2008, DHS 2014, author's calculations

5.4.2 Regression Results

A logistic regression analysis was conducted for each survey to determine the correlates of health insurance membership. Explanatory variables discussed in section 5.1 as potential factors to determine insurance enrolment were chosen to predict NHIS affiliation with comparison between surveys taken into account. Those include demographic and socioeconomic variables (sex, marital status, age, education, asset wealth) and geographical variables (region and residence). Two models were fitted; one for adults aged 18-49, and one for older adults aged 50 plus. Results of the logistic regression are summarized in Table 5.3 and Table 5.4. The results for younger/middle aged and older adults are debated separately. Due to the different survey sample sizes, the discussion of the results focuses on the effect sizes rather than on significance only.

5.4.2.1 Results for Adults Aged 18 to 49

The results shown in Table 5.3 indicate similarities but also disagreement on the number of variables that significantly predict health insurance affiliation in Ghana. In addition, the direction of effects of variables related to the odds of insurance affiliation varied between surveys. The effect of each explanatory variable on health insurance affiliation among adults aged 18-49 is discussed below in detail.

Looking at the effect of demographic factors on insurance enrolment, a discrepancy in the regression results regarding the effect of gender is shown in Table 5.3. The GLSS and the two waves of the DHS highlight that females were significantly more likely to enrol in the NHIS. This reflects the findings of the descriptive statistics. Using the SAGE, a significant association between gender and insurance coverage was not confirmed, however, when considering the direction effect only, women were less likely to enrol in the NHIS compared to men. As highlighted before, this could be attributed to the changes in laws regarding the premium exemption for pregnant women. A higher insurance coverage among females in reproductive age can be explained by the greater need of healthcare and the premium exemption when being pregnant. An interaction effect between age and sex (see Appendix A) was found to be significant when using the GLSS or the DHS (2008 and 2014). In the SAGE, an interaction between age and sex was found not to be significant.

Table 5.3: Adjusted odds ratio of NHIS coverage among adults aged 18-49

		SAGE				DHS 2008				GLSS				DHS 2014			
Variable	**Characteristics**	**Odds Ratio**		**95% Conf. Interval**		**Odds Ratio**		**95% Conf. Interval**		**Odds Ratio**		**95% Conf. Interval**		**Odds Ratio**		**95% Conf. Interval**	
Sex	Male	**1.000**				**1.000**				**1.000**				**1.000**			
	Female	0.733		0.467	1.150	1.885	***	1.673	2.124	1.945	***	1.814	2.085	2.199	***	1.972	2.451
Marital Status	Married	**1.000**				**1.000**				**1.000**				**1.000**			
	Separated/Divorced	1.325		0.574	3.061	0.654	**	0.512	0.836	0.807	**	0.692	0.940	0.578	***	0.479	0.698
	Widowed	1.616		0.574	4.554	0.620		0.381	1.007	1.057		0.806	1.386	0.776		0.579	1.041
	Never married	0.522		0.193	1.412	0.719	***	0.606	0.853	0.932		0.845	1.026	0.653	***	0.566	0.754
Education	None	**1.000**				**1.000**				**1.000**				**1.000**			
	Primary	2.117		1.135	3.947	1.241	**	1.012	1.523	1.464	***	1.336	1.606	1.000		0.853	1.174
	Secondary	1.682		0.943	3.002	2.196	***	1.826	2.641	2.543	***	2.236	2.892	1.441	***	1.247	1.665
	Tertiary	11.688		3.785	36.087	4.935	***	3.715	6.555	3.392	***	2.863	4.020	2.794	***	2.194	3.558
Age	18-25	**1.000**				**1.000**				**1.000**				**1.000**			
	25-29	0.488		0.135	1.757	1.079		0.898	1.296	0.894	*	0.804	0.995	1.020		0.875	1.190
	30-34	0.828		0.251	2.731	1.481	***	1.207	1.818	0.918		0.814	1.036	0.989		0.832	1.175
	35-39	0.672		0.192	2.359	1.481	***	1.204	1.822	1.044		0.922	1.183	1.177		0.984	1.408
	40-44	0.859		0.254	2.903	1.566	***	1.246	1.968	1.127		0.987	1.288	1.177		0.805	1.183
	45-49	0.582		0.172	1.969	1.246		0.985	1.576	1.244	*	1.077	1.435	1.084		0.889	1.321
Wealth assets	Poor	**1.000**				**1.000**				**1.000**				**1.000**			
	Middle	2.868	**	1.454	5.656	1.480	***	1.253	1.749	1.482	***	1.363	1.612	1.272	***	1.122	1.442
	Rich	5.102	***	2.386	10.910	2.233	***	1.842	2.708	1.771	***	1.596	1.964	1.726	***	1.470	2.025
Region	Greater Accra	**1.000**				**1.000**				**1.000**				**1.000**			
	Western	4.063	***	1.643	10.045	2.887	***	2.244	3.713	1.461	***	1.266	1.685	2.895	***	2.411	3.477
	Central	3.171	*	1.187	8.468	1.636	**	1.224	2.186	1.023		0.885	1.181	1.538	***	1.246	1.898
	Volta	2.353		0.866	6.392	2.563	***	1.957	3.357	1.818	***	1.582	2.088	4.499	***	3.683	5.496

		SAGE				DHS 2008				GLSS				DHS 2014			
Variable	**Characteristics**	**Odds Ratio**		**95% Conf. Interval**		**Odds Ratio**		**95% Conf. Interval**		**Odds Ratio**		**95% Conf. Interval**		**Odds Ratio**		**95% Conf. Interval**	
	Eastern	5.473	***	2.122	14.116	4.798	***	3.767	6.110	2.033	***	1.772	2.332	2.804	***	2.324	3.384
	Ashanti	3.568	**	1.593	7.994	2.372	***	1.911	2.945	1.852	***	1.622	2.114	2.201	***	1.838	2.637
	Brong Ahafo	6.569	***	2.603	16.581	5.934	***	4.540	7.755	3.097	***	2.685	3.571	6.004	***	4.942	7.294
	Northern	11.439	***	3.441	38.030	5.733	***	4.390	7.488	1.927	***	1.668	2.227	3.206	***	2.581	3.982
	Upper East	8.468	**	1.795	39.941	9.572	***	7.202	12.723	7.374	***	6.288	8.648	6.637	***	5.335	8.257
	Upper West	54.682	***	13.436	222.544	7.754	***	5.961	10.086	10.000	***	8.576	11.660	5.207	***	4.126	6.570
Residence	Rural	**1.000**				**1.000**				**1.000**				**1.000**			
	Urban	1.440				1.108		0.959	1.279	1.135	*			1.120	*	1.002	1.251
N		789				7,735				28,316				11,610			

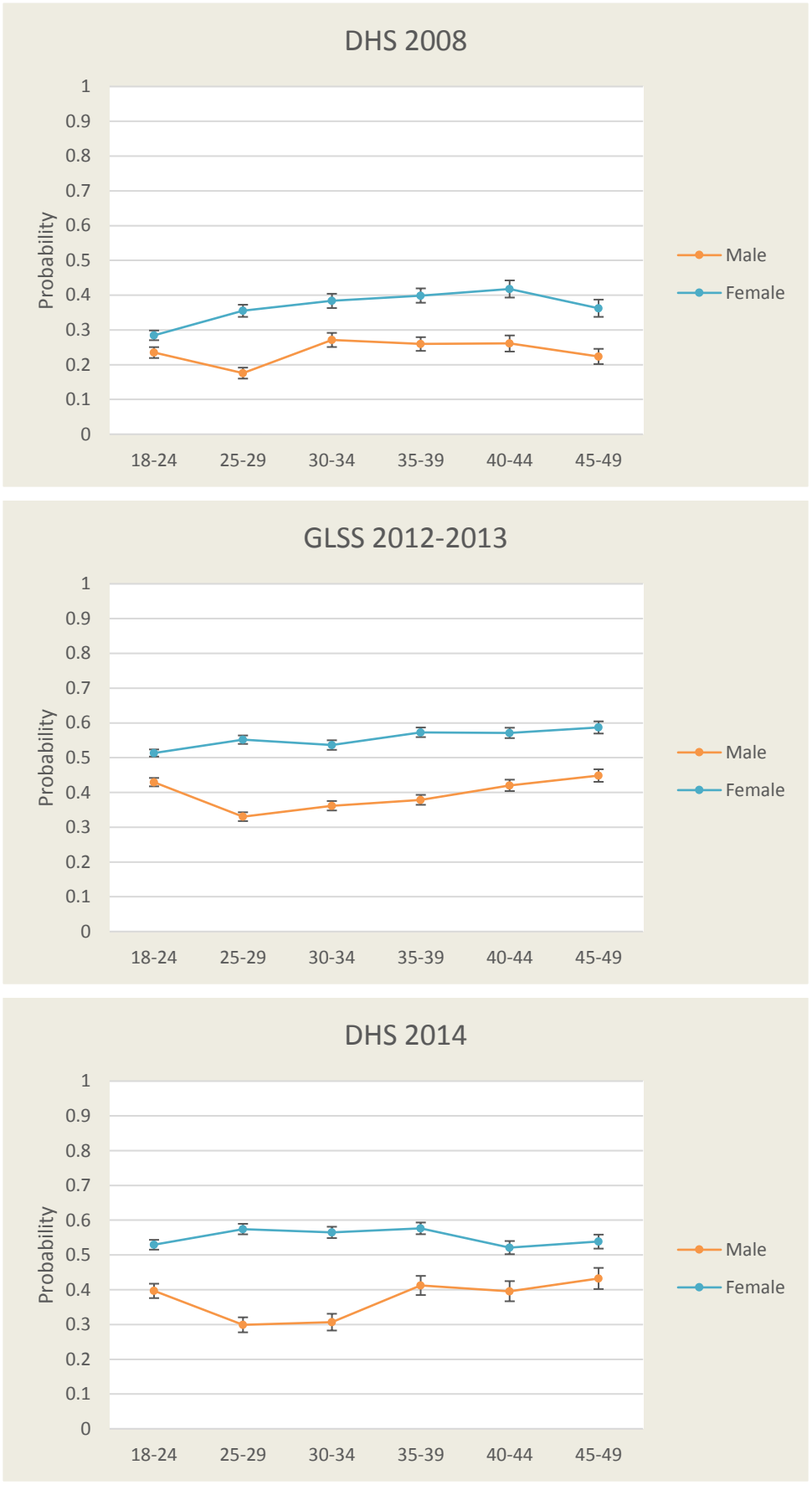
Source: GLSS 2012/2013, SAGE 2007/2008, DHS 2008, DHS 2014, author's calculations; *** p<0.001, ** p<00.1 * p<0.05

The interaction results for the different surveys are pictured in Figure 5.3 using predicted probabilities. They show similar results across surveys, highlighting that for all ages, women have a higher probability of enrolling in the NHIS compared to men. However, the difference between men and women in their probability of joining the NHIS is smaller for the 18-24 age group and much greater for the 25-29 age group (before narrowing again afterwards). While for women, the probability of being covered under the NHIS increased when moving between the 18-24 to 25-29 age groups, the probability for men making the same move decreases.

This could be attributed to different healthcare service needs for men and women. The GLSS asked about reasons for non-insurance, revealing that 16% of men aged 18-24 reported that health insurance does not cover the services they need (see Appendix B.1). This figure increased to 25% for men aged 25-29. For women, the opposite was shown. Women who reported that health insurance does not cover appropriate services fell from 31% for women aged 18-24 to 13% for those aged 25-29. The NHIS benefit package covers services such as antenatal care and delivery, thus "women looking to have children may be highly motivated to enrol in the NHIS programs" (Dixon et al., 2011, p. 1111). Over 30% of women in the age group 18-24 reported that they do not need health insurance, while only 16% of women aged 25-29 reported the same (see Appendix B.2). According to the DHS (2014), 72% of women aged 25-49 had given birth before reaching the age of 25.

What is more, 38% of men aged 25-29 reported that they do not know about any insurance scheme, while only 13% of women in the same age group reported the same (see Appendix B.3). This again could be attributed to the family-orientated healthcare programmes covered under the NHIS which are especially attractive for women (Dixon et al., 2011). Positive experiences with the NHIS (including the premium exemption but also experience of good treatment) are likely to be passed from woman to woman.

Figure 5.3: Probability of NHIS coverage by age and sex



Source: GLSS 2012/2013, DHS 2008, DHS 2014, author's calculations

Further results show that all four surveys were consistent in the finding that people who never married were less likely to enrol in the NHIS compared to people that are married or cohabit (although the finding did not reach significance in the SAGE). Such a finding was also confirmed by Dixon et al. (2011). The literature claims that married people tend to have a higher coverage due to an increasing sense of responsibility and care for their partner. In addition, NHIS coverage is free for children if both parents are enrolled in the NHIS. This gives an incentive for couples with children to enrol in the NHIS.

When looking at expenditure a pro-rich bias was observed. An increase in wealth was significantly and positively associated with insurance coverage, thereby underlining the findings of Ayitey et al. (2013) and Blanchet et al. (2012). The steady decline in the probability of insurance coverage as wealth decreases indicates that the NHIS fails to successfully enrol indigents (Dixon et al., 2011). The system has been criticized for not covering poor people adequately and for not having appropriate measures for classifying someone as indigent (Jehu-Appiah et al., 2010).

In addition, the findings that better education leads to a greater likelihood of being enrolled in an insurance scheme, which was prominent in the literature (Ayitey et al., 2013, Dixon et al., 2013), were confirmed. An increasing likelihood of insurance coverage with education is highlighted. It is hypothesised that people with better education and higher income have a greater knowledge of the benefits of a healthcare system and how benefits can be accessed. Appendix A also illustrates a significant interaction between education and wealth when using the GLSS or DHS. Again, no significant interaction effect was found when using the SAGE[13]. Figure 5.4 depicts this interaction graphically again using predicted probabilities. It can be seen that a low level of education when belonging to the richest wealth tertile significantly increases the likelihood of NHIS enrolment compared to the poorest tertile. However, when having a high level of education, the differences in wealth on the likelihood of enrolment become non-significant. This means that, particularly among the lowest educated, wealth is an important determinant of the decision to enrol in the NHIS. More educated people seem to be more aware of the benefits of insurance coverage. In addition, the higher-educated tend to be wealthier than the lower-educated (see Appendix C).

[13] Due to the small sample size, no interaction in the SAGE was found to be significant. Thus, non-significant interactions do not necessarily reflect the absence of a significant relationship.

Figure 5.4: Probability of NHIS coverage by wealth and education

Source: GLSS 2012/2013, DHS 2008, DHS 2014, author's calculations

Looking at regional effects, the descriptive statistics in section 5.4.1 showed different coverage rates by region. Nevertheless, all four surveys were consistent in the finding that residents of any other region were more likely to enrol in the NHIS than those living in Greater Accra. This finding is true for younger/middle aged adults as well as older adults. At first glance, this is a surprising finding as Greater Accra has the greatest health service provision in Ghana. Ayitey et al. (2013) and Dixon et al. (2011) confirm that adults living in the northern areas of Ghana have a greater likelihood of joining the NHIS compared to those living in the south. Dixon (2014) recognised this paradox and tried to answer the question why the poorest regions in Ghana have higher rates of enrolment compared to more developed parts of the country (like Greater Accra). Dixon (2014) argues that "access to health care cannot be understood solely at the individual level, as individuals exist within broader social-structural processes, which shape every element of daily life". People in the northern regions of Ghana were found to have closer social networks which are in favour of the NHIS and "that in Ghana place and community can have very important influences on health knowledge, such as etiology and disease prevention measures. This knowledge passes through informal social networks in the community in locations such as the marketplace" (Dixon et al., 2011, p. 1112). Social networks can play an important role in the willingness to participate in the NHIS which can support enrolment specifically in the North. Further, although the service coverage in the northern parts of Ghana is poorer, the quality of services particularly in the Upper East and West region was found to be better compared to the services offered in Greater Accra (NHIA, 2013b). Discussions of the effects of regional differences will be taken up in the next chapter (chapter 6) and will be explored in further detail. For this chapter, it is important to highlight that region has a similar effect on NHIS enrolment among younger and middle aged as for older adults.

In terms of residence, expectations drawn from previous literature and the descriptive statistics were not entirely confirmatory. Although the descriptive statistics showed a greater insurance coverage in urban areas compared to rural areas, the DHS 2008 and SAGE found that the effect of urban residence on insurance enrolment is not significant. The GLSS and DHS 2014 both showed a greater likelihood of enrolment when living in an urban environment. Looking at the direction effect only, all four surveys confirm a greater likelihood of enrolment when living in urban areas.

5.4.2.2 Results for Older Adults Aged 50 plus

Moving now to people aged 50 plus, Table 5.4 highlights the odds ratio of insurance affiliation among older adults. It shows an increasing likelihood of NHIS membership with age and wealth. The review of the literature suggested that older adults are more likely to invest in their health to avoid financial shocks due to increasing healthcare utilisation. Wealthier older adults tend to have

more financial means to invest in their health. Thus, an interaction between age and wealth was tested. Using the GLSS, such an interaction was found to be significant (see Appendix D)[14].

Table 5.4: Odds ratio of NHIS coverage among older adults aged 50 plus

		SAGE				GLSS			
Variable	**Characteristics**	**Odds Ratio**		**95% Conf. Interval**		**Odds Ratio**		**95% Conf. Interval**	
Region	Greater Accra	**1.000**				**1.000**			
	Western	3.355	***	2.360	4.769	2.170	***	1.650	2.871
	Central	1.864	**	1.294	2.685	1.330	*	1.039	1.740
	Volta	2.703	***	1.884	3.879	2.676	***	2.065	3.435
	Eastern	6.095	***	4.341	8.560	3.074	***	2.365	3.884
	Ashanti	2.724	***	1.953	3.801	3.038	***	2.365	3.964
	Brong Ahafo	6.697	***	4.658	9.627	5.306	***	4.034	6.986
	Northern	3.415	***	2.275	5.126	1.942	***	1.472	2.548
	Upper East	2.088	***	1.275	3.420	6.270	***	4.745	8.436
	Upper West	6.480	***	3.861	10.875	8.594	***	6.354	11.170
Residence	Rural	**1.000**				**1.000**			
	Urban	1.147	NS	0.946	1.391	1.235	**	1.084	1.429
Sex	Male	**1.000**				**1.000**			
	Female	1.108	NS	0.918	1.337	1.481	***	1.648	1.648
Age	50-59	1.000				1.000			
	60-69	1.507	***	1.241	1.830	1.388	***	1.258	1.657
	70plus	2.736	***	2.237	3.346	2.124	***	2.059	2.781
Marital Status	Married	**1.000**				**1.000**			
	Separated/Divorced	0.865	NS	0.670	1.118	0.628	***	0.521	0.774
	Widowed	0.850	NS	0.685	1.054	0.801	*	0.637	0.875
	Never married	0.513	NS	0.242	1.090	0.307	***	0.205	0.602
Education	None	**1.000**				**1.000**			
	Primary	1.349	*	1.042	1.746	1.226	**	1.214	1.608
	Secondary	1.387	*	1.106	1.740	1.451	**	1.346	2.379
	Tertiary	3.626	***	2.294	5.733	2.434	***	2.235	4.037
Expenditure	Poorest	1.000				1.000			
	Poor	1.702	***	1.385	2.091	1.899	***	1.632	2.157
	Middle	2.543	***	1.961	3.297	2.219	***	2.391	3.469
N		4,216				9,504			

Source: GLSS 2012/2013, SAGE 2007/2008, author's calculations; *** p<0.001, ** p<00.1 * p<0.05

The predicted probabilities of current NHIS enrolment among older adults by age and wealth are displayed in Figure 5.5. It shows that the likelihood of NHIS enrolment rises with age as well as with wealth, despite the premium exemption at the age of 70. Richer older adults were still more likely to be part of the NHIS even when reaching the age of 70. Poorer older adults may be less likely to

[14] No significant interaction was found using the SAGE.

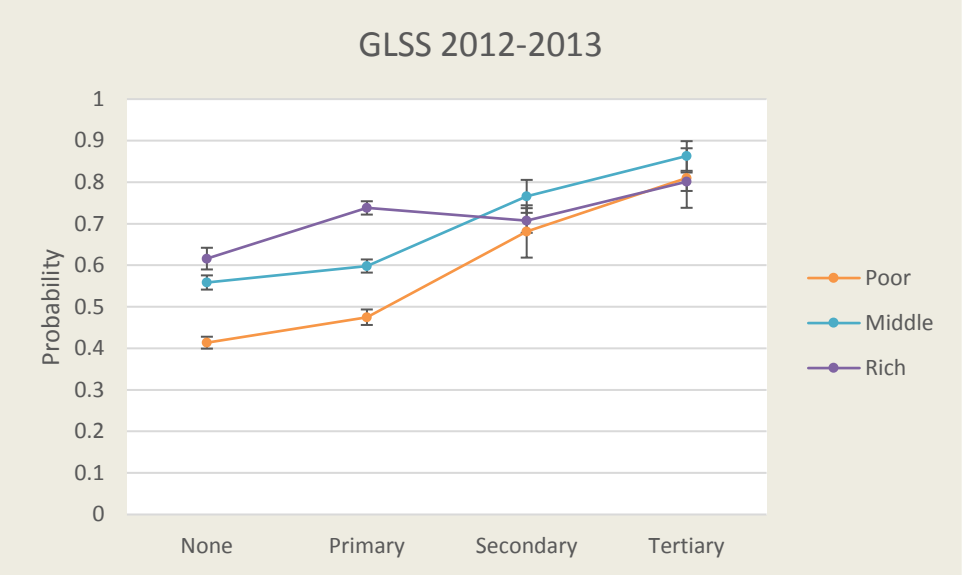
have a birth certificate or other documents proving their age compared to wealthier older adults, which could explain the difference. This means that they would not be eligible for the premium exemption even when they are aged 70 or older. Moreover, registration fees (which still apply for all ages) can form an enrolment barrier, specifically among the poorest.

Figure 5.5: Probability of current NHIS enrolment among older adults by age and wealth tertile

Source: GLSS 2012/2013, author's calculations

A significant interaction between wealth and education was confirmed not only for adults aged 18-49 but also for older adults (see Figure 5.6). For those with no, or primary education, being rich increased the likelihood of insurance enrolment significantly. However, for better educated older adults, again this interaction was found to be insignificant.

Figure 5.6: Probability of current NHIS enrolment among older adults by education and wealth tertile



Source: GLSS 2012/2013, author's calculations

When considering older adults, both the GLSS and SAGE exhibited that women had a greater likelihood of enrolling compared to men, although this association was not significant in the SAGE (see Table 5.4). In addition, a greater likelihood of insurance enrolment in urban areas was confirmed when looking at older adults. However, again this effect was only significant in the GLSS.

Finally, comparing younger/middle aged adults and older adults Figure 5.7 highlights two things. First of all, it shows that older adults have a greater probability of being part of the NHIS. Secondly, it highlights that among both population groups, the probability of being insured increased over time. The differences in the probability of NHIS coverage among people aged 18-49 ranges from 0.2 in the SAGE, which was carried out in 2007-2008, to 0.5 in the 2014 DHS. For older adults, the probability of coverage ranged from 0.3 in the SAGE to 0.6 in the GLSS.

Figure 5.7: Probability of current NHIS coverage by age group and survey

Source: GLSS 2012/2013, SAGE 2007/2008, DHS 2008, DHS 2014, author's calculations

Comparing the two models further, overall similar results for people aged 18-49 and people aged 50 plus were revealed. The findings, however, have to be treated with caution as they could change when adding further control variables to the model. Due to survey comparison limitations, only a small set of variables (which were comparable between surveys) were added to the model. Further correlates of insurance status are explored in the next section and in chapter 6. Another purpose of this analysis was to understand the reliability of different surveys better when measuring insurance affiliation and trends in coverage. The findings of the DHS, GLSS and SAGE were used to ascertain whether all surveys show similar results to validate the findings on insurance coverage.

All four surveys confirmed that education and wealth increase the likelihood of NHIS affiliation. Further, regional and residential differences in insurance coverage were highlighted with greater NHIS coverage in urban areas. The large odds ratio, particularly when looking at regional effects in the SAGE, can be attributed to the small sample size of the survey (see Appendix E). When examining older adults, the SAGE largely confirmed the findings of the GLSS when considering the direction of effect only. The GLSS, however, showed more significant associations between NHIS affiliation and selected control variables. This, however, could be mainly due to sample size differences. While both surveys indicate that region, education, age, and wealth drive insurance coverage among older adults significantly, the GLSS also found that marital status and residence significantly affect the decision to be a NHIS member. The direction effect of both variables, however, was pointing in the same direction for both surveys with urban dwellers and married older adults being more likely to be enrolled.

5.5 Results: Determinants of Previous Enrolment

The previous section explored the determinants of NHIS enrolment but did not consider insurance membership renewal. Understanding the determents of NHIS renewals is essential in order to ensure that the system is sustainable and is responsive to its member's needs.

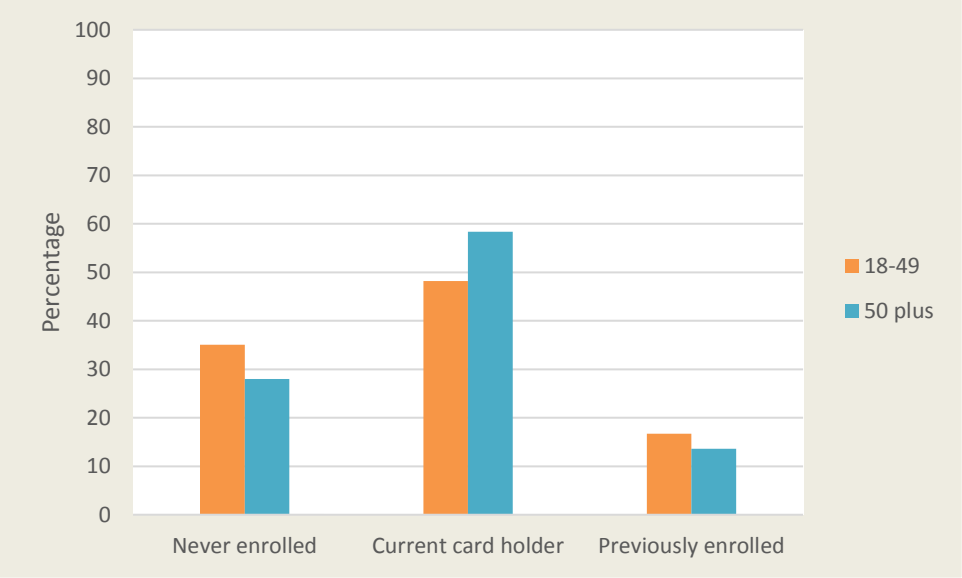
The GLSS asks about former insurance enrolment which enables researchers to distinguish between three possible insurance status outcomes, namely: never been enrolled, currently enrolled or previously enrolled.

This thesis classifies a respondent as *previous insured* when the respondent stated that he or she used to be enrolled under a health insurance scheme but currently does not hold a valid insurance card. Current NHIS cardholders fall under the category *currently insured*. *Never insured* are respondents who reported no current and no previous insurance enrolment. The GLSS does not distinguish between the types of former insurance enrolment. This means that former enrolment could refer to NHIS enrolment, private insurance enrolment or enrolment in an insurance system prior the NHIS establishment. The low number of privately insured (less than 1%), however, led to the assumption that former enrolment refers to NHIS enrolment. A limitation is that there are no comparable data available on whether private insurance coverage was higher prior the establishment of the NHIS.

5.5.1 Explanatory analysis

Figure 5.8 visualises the insurance status of people aged 18-49 and older adults aged 50 plus. It highlights that a higher proportion of people aged 18-49 were never enrolled or dropped out of insurance enrolment compared to those aged 50 plus. Nearly 14% of older adults reported previous enrolment, while nearly 17% of adults aged 18-49 dropped out of insurance coverage.

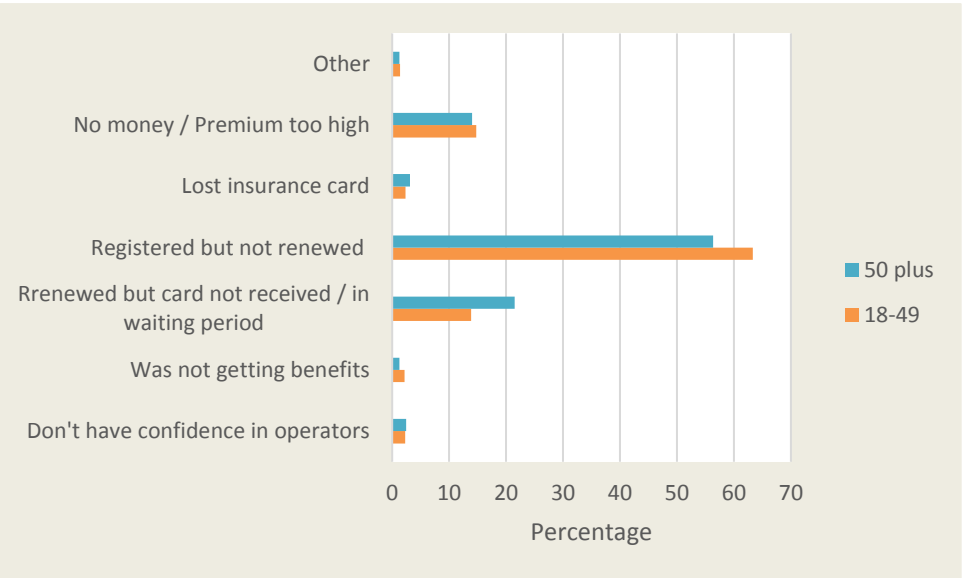
Figure 5.8: Insurance status by age group



Source: GLSS 2012/2013, author's calculations

The reasons for dropping out of insurance membership were explored in Figure 5.9. The figure indicates that for both age groups, the main reason for not having an insurance card anymore was non-renewal of membership, followed by no money. Nearly 48% of people aged 18-49 and over 21% of older adults stated that they are still waiting for their insurance card to arrive, meaning that they already renewed their membership but are not currently eligible for any insurance coverage benefits. Biometric registration, introduced after the survey was conducted, aims to reduce this waiting period between signing up for the NHIS and receiving the insurance card.

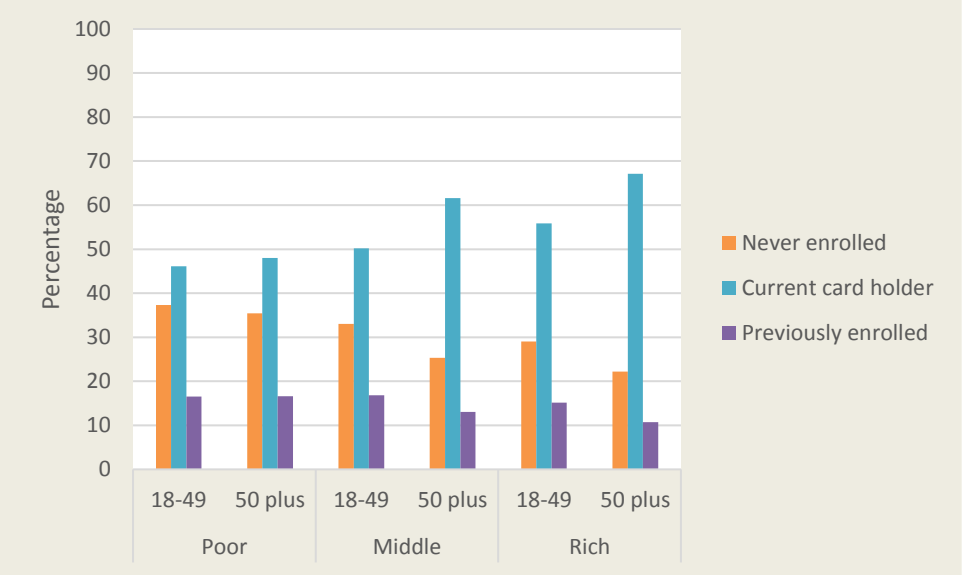
Figure 5.9: Reasons for non-insurance by age group



Source: GLSS 2012/2013, author's calculations

Based on the previous analysis, wealth is expected to have a strong relationship with insurance enrolment. This is confirmed again in Figure 5.10. Looking at those previous enrolled shows that former insurance enrolment decreased slightly with wealth but only among older adults.

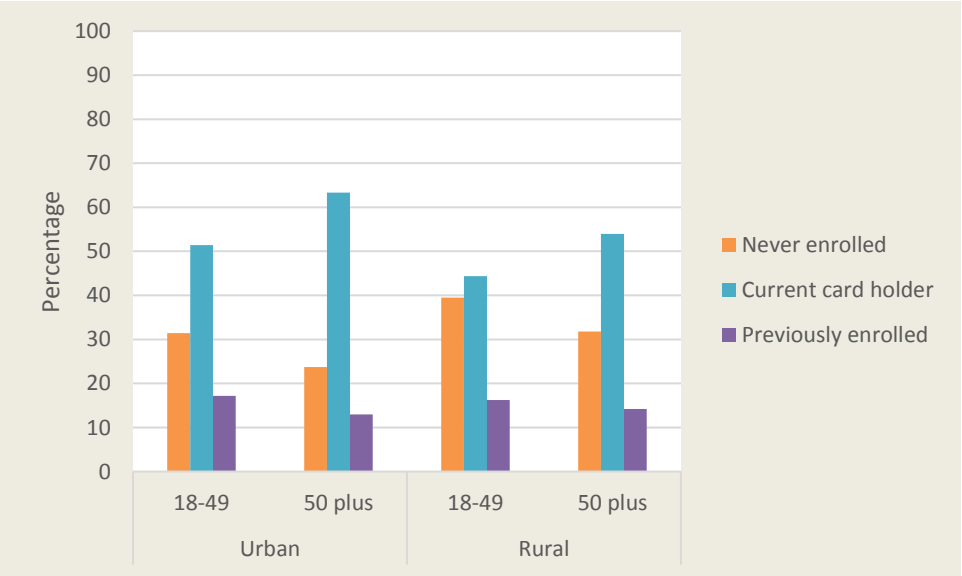
Figure 5.10: Insurance status by wealth and age group



Source: GLSS 2012/2013, author's calculations

The previous section also highlighted a greater likelihood of insurance enrolment in urban areas compared to rural dwellers. For older adults, the percentage of insurance drop out was slightly higher in rural areas (14%) compared to urban areas (13%) (see Figure 5.11). Looking at adults aged 18-49, 17% of urban dwellers reported former insurance enrolment compared to 16% of rural dwellers.

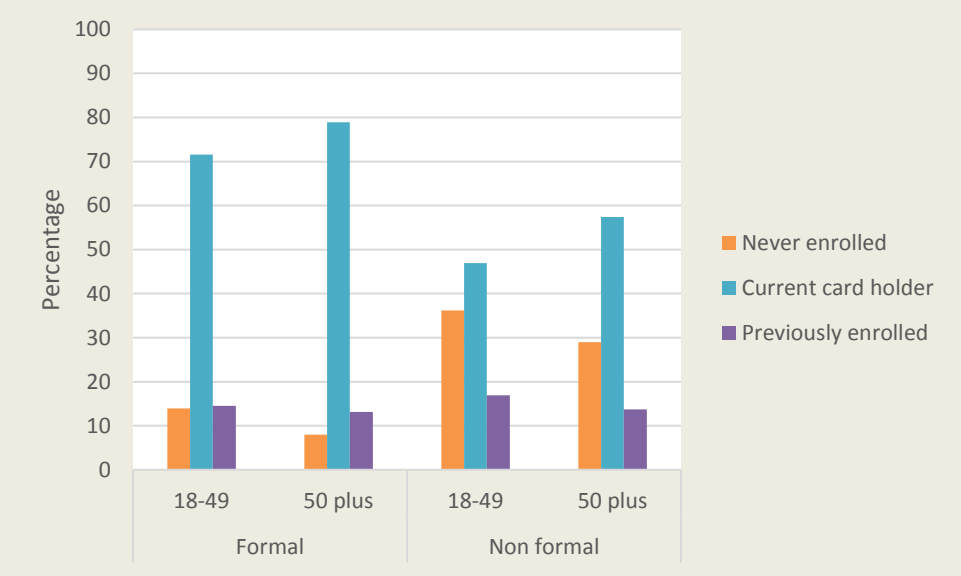
Figure 5.11: Insurance status by residence and age group



Source: GLSS 2012/2013, author's calculations

One of the most anticipated reasons for dropping out of NHIS enrolment is a change from the formal to the non-formal employment sector. Only in the formal sector is NHIS enrolment authoritatively required, while in the informal sector no authorised penalties apply for non-insurance enrolment.

Figure 5.12: Insurance status by employment status and age group



Source: GLSS 2012/2013, author's calculations

Figure 5.12 highlights that those working in the formal sector have the highest proportion of currently insured. Looking at the non-formal sector, 36% of adults aged 18-49 never had insurance coverage compared to 14% in the formal sector. The same holds for older adults where 29% of older adults who do not currently work in the formal sector have never been insured, compared to 8% who are currently working in the formal sector. Also, the proportion of previous enrolled is slightly higher for those not working in the formal sector, but not by much.

Another reason for insurance renewal is health status. As mentioned earlier, before enrolment, people tend to assess their health status and base their decision of enrolment on their health. A relationship between insurance status and disability, however, was not found to be significant ($p=0.173$ for people aged 18-49, $p=0.410$ for people aged 50 plus).

5.5.2 Multinomial Logistic Analysis

A multinomial logit model distinguishes between the possible outcomes never enrolled, currently enrolled, former enrolment.

Table 5.5 and Table 5.6 present the odds ratio comparing the multiple factors that determine current, none and previous insurance enrolment. Those who are currently enrolled were treated as the baseline group. Thus, the models gives the odds ratio of either having never been enrolled or dropped out, in comparison with being currently enrolled. Again, one model was built for younger/middle aged adults and one for older adults. This time, the results for both models are discussed together.

Table 5.5: Odds ratio of insurance status among people aged 18-49

		Never enrolled				Prev. enrolled			
		Odds Ratio		95% Conf. Interval		Odds Ratio		95% Conf. Interval	
Region	Greater Accra	**1.000**				**1.000**			
	Western	0.497	***	0.424	0.583	1.440	***	1.175	1.764
	Central	0.958		0.819	1.120	0.905		0.723	1.134
	Volta	0.397	***	0.340	0.464	1.211		0.994	1.475
	Eastern	0.357	***	0.307	0.417	1.071		0.881	1.302
	Ashanti	0.319	***	0.274	0.371	1.546	***	1.285	1.860
	Brong Ahafo	0.167	***	0.141	0.197	1.129		0.930	1.370
	Northern	0.333	***	0.283	0.392	1.467	***	1.201	1.792
	Upper East	0.098	***	0.082	0.117	0.289	***	0.226	0.370
	Upper West	0.056	***	0.047	0.067	0.339	***	0.272	0.422
Residence	Rural	**1.000**				**1.000**			
	Urban	0.763	***	0.698	0.835	1.120	*	1.010	1.242
Sex	Male	**1.000**				**1.000**			
	Female	0.389	***	0.359	0.421	0.807	***	0.735	0.887
Marital Status	Married	1.000				1.000			
	Separated/Divorced	1.326	**	1.111	1.581	1.190		0.983	1.442
	Widowed	1.080		0.804	1.452	0.748		0.497	1.124
	Never married	1.080		0.937	1.173	1.097		0.963	1.250
Education	None	**1.000**				**1.000**			
	Primary	0.606	***	0.547	0.671	0.875	*	0.770	0.994
	Secondary	0.325	***	0.279	0.377	0.606	***	0.509	0.720
	Tertiary	0.240	***	0.191	0.300	0.638	**	0.493	0.825
Expenditure	Poorest	1.000				1.000			
	Poor	0.634	***	0.577	0.697	0.750	***	0.670	0.839
	Middle	0.509	***	0.452	0.574	0.688	***	0.599	0.789
Age	18-24	**1.000**				**1.000**			
	25-29	1.243	**	1.100	1.405	0.961		0.835	1.106

		Never enrolled				Prev. enrolled			
		Odds Ratio		**95% Conf. Interval**		**Odds Ratio**		**95% Conf. Interval**	
	30-34	1.162	*	1.013	1.334	0.998		0.848	1.175
	35-39	1.000		0.867	1.154	0.925		0.782	1.094
	40-44	0.906		0.776	1.057	0.931		0.782	1.108
	45-49	0.812	*	0.690	0.956	0.900		0.740	1.095
Disability	No	**1.000**				**1.000**			
	Yes	0.836		0.622	1.122	0.999		0.690	1.445
Employed in formal sector	No	**1.000**				**1.000**			
	Yes	0.375	***	0.295	0.295	0.722	**	0.564	0.924
N					28,116				

Source: GLSS 2012/2013, author's calculations; *** p<0.001, ** p<00.1 * p<0.05

Table 5.6: Odds ratio of insurance status among people aged 50 plus

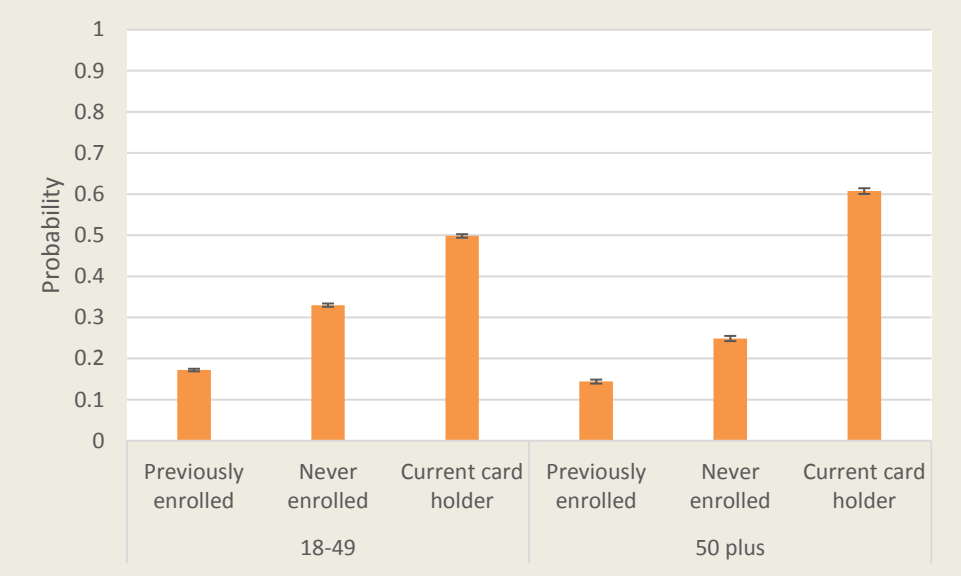
		Never enrolled				Prev. enrolled			
		Odds Ratio		**95% Conf. Interval**		**Odds Ratio**		**95% Conf. Interval**	
Region	Greater Accra	**1.000**				**1.000**			
	Western	0.331	***	0.243	0.453	0.916		0.619	1.357
	Central	0.715	*	0.537	0.951	0.778		0.523	1.158
	Volta	0.249	***	0.185	0.335	0.858		0.598	1.232
	Eastern	0.230	***	0.173	0.306	0.657	*	0.461	0.937
	Ashanti	0.209	***	0.155	0.281	0.792		0.547	1.147
	Brong Ahafo	0.089	***	0.063	0.124	0.618	*	0.424	0.901
	Northern	0.351	***	0.257	0.479	1.114		0.758	1.638
	Upper East	0.105	***	0.076	0.146	0.350	***	0.228	0.537
	Upper West	0.068	***	0.049	0.093	0.342	***	0.227	0.517
Residence	Rural	**1.000**				**1.000**			
	Urban	0.696	***	0.593	0.817	1.033		0.849	1.257
Sex	Male	**1.000**				**1.000**			
	Female	0.432	***	0.370	0.505	0.719	**	0.597	0.866
Marital Status	Married	**1.000**				**1.000**			
	Separated/Divorced	1.708	***	1.361	2.144	1.241		0.940	1.638
	Widowed	1.436	***	1.195	1.726	1.169		0.934	1.463
	Never married	2.633	**	1.499	4.627	2.141	*	1.017	4.505
Education	None	**1.000**				**1.000**			
	Primary	0.634	***	0.539	0.745	0.915		0.754	1.110
	Secondary	0.520	***	0.370	0.731	0.617	**	0.414	0.921
	Tertiary	0.362	***	0.243	0.538	0.491	**	0.310	0.778
Expenditure	Poor	**1.000**				**1.000**			
	Middle	0.506	***	0.432	0.594	0.561	***	0.460	0.685

		Never enrolled				Prev. enrolled			
		Odds Ratio		**95% Conf. Interval**		**Odds Ratio**		**95% Conf. Interval**	
	Rich	0.315	***	0.254	0.392	0.412	***	0.317	0.536
Age	50-59	**1.000**				**1.000**			
	60-69	0.627	***	0.535	0.735	0.797	*	0.655	0.970
	70 plus	0.335	***	0.281	0.400	0.573	***	0.463	0.709
Disability	No	**1.000**				**1.000**			
	Yes	0.908		0.689	1.197	0.923		0.647	1.317
Employed in formal sector	No	**1.000**				**1.000**			
	Yes	0.240	***	2.534	6.825	0.954		0.637	1.724
N		9438							

Source: GLSS 2012/2013, author's calculations; *** p<0.001, ** p<00.1 * p<0.05

Figure 5.13 shows the predicted probability of insurance status by age group. It shows that older adults have a slightly lower probability of dropping out of insurance coverage (14%) compared to younger/middle aged adults (17%).

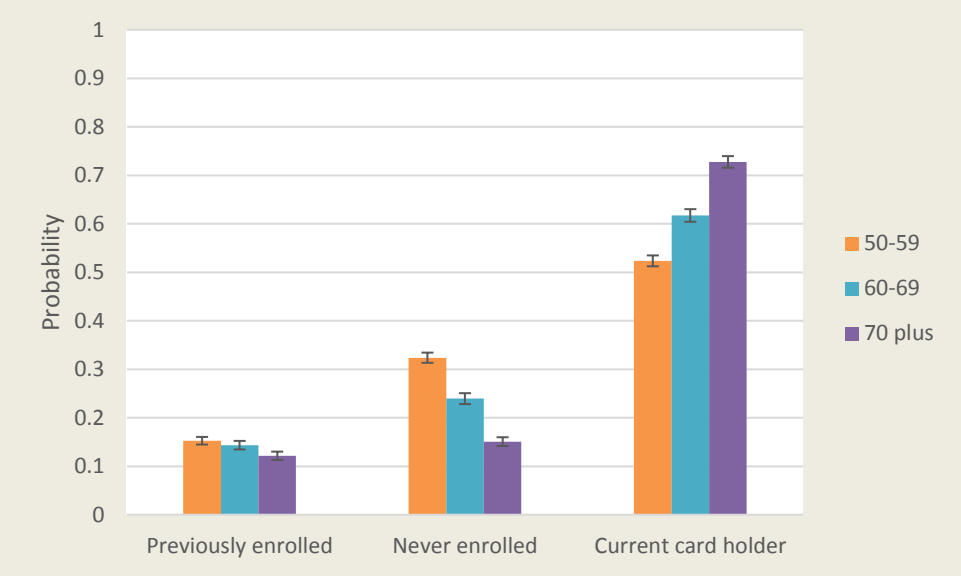
Figure 5.13: Predicted probability of insurance status by age group



Source: GLSS 2012/2013, author's calculations

Further unpacking previous enrolment by age, Figure 5.14 shows that older adults aged 70 plus had a significant, smaller likelihood of dropping out of insurance coverage and were more likely to be currently enrolled compared to other older adults aged between 50 and 69. There are two good explanations: first, the premium exemption may show some kind of success in improving insurance enrolment and retention; and/or secondly, people aged 70 plus are even more likely than other older adults to need healthcare and thus invest in their health through insurance enrolment.

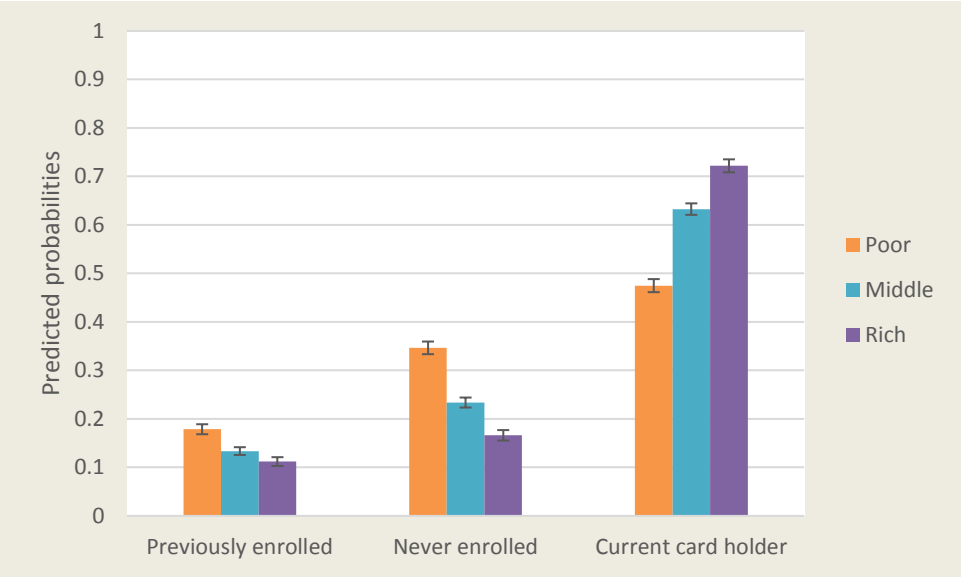
Figure 5.14: Predicted probabilities of insurance status among older adults



Source: GLSS 2012/2013, author's calculations

Further results once more confirm that insurance status is strongly related with wealth (Figure 5.15). The probability of dropping out of insurance enrolment was significantly higher for the poorest older adults compared to older adults belonging to the other two wealth tertiles. For younger/middle aged adults, no significant difference between previous enrolment by wealth was found.

Figure 5.15: Predicted probabilities of insurance status among older adults and wealth

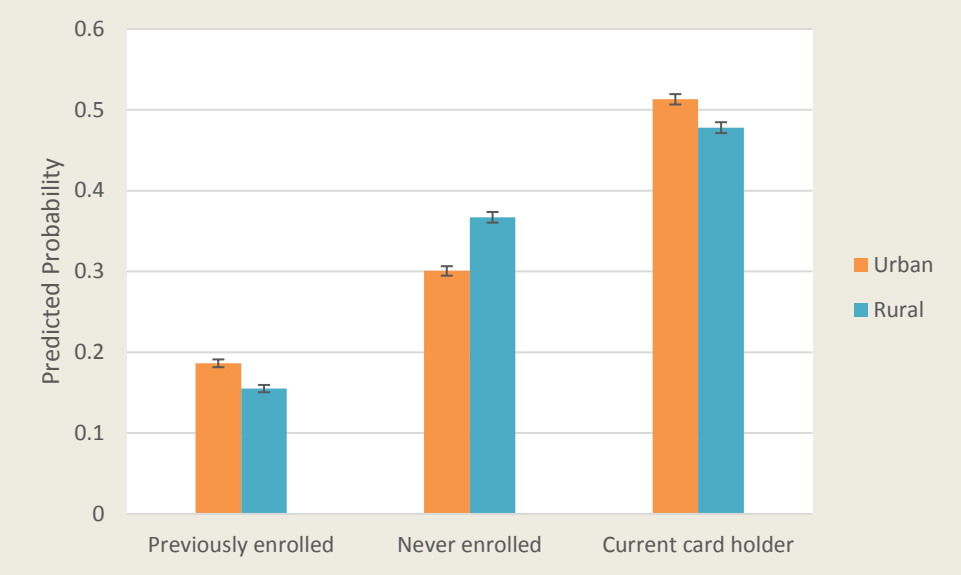


Source: GLSS 2012/2013, author's calculations

For younger/middle aged adults, a strong effect of residence on the likelihood of dropping out of insurance enrolment is shown in Figure 5.16. Although the previous chapter highlighted a greater

probability of NHIS membership when living in urban areas, the likelihood of dropping out of insurance coverage for adults aged 18-49 was also higher in urban areas (for older adults this was not confirmed).

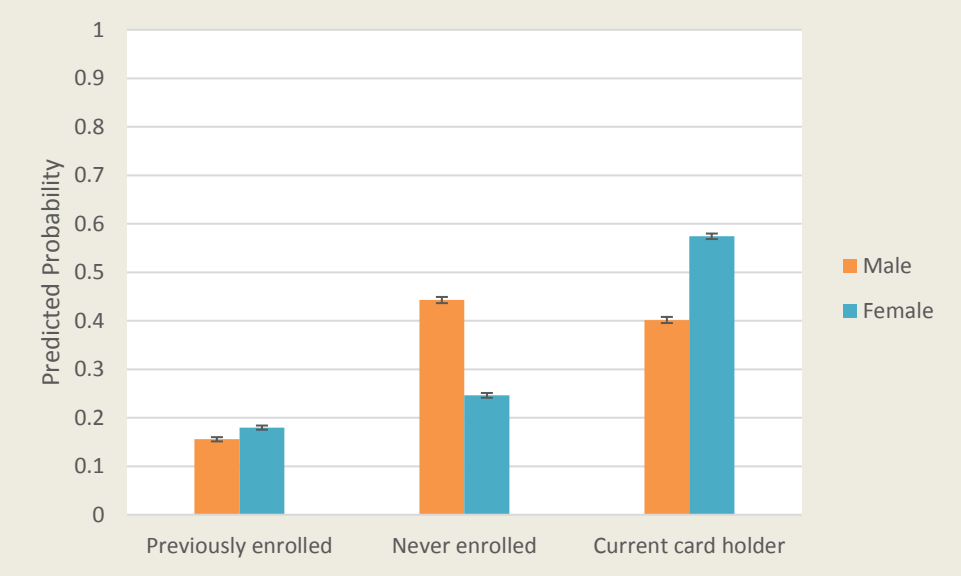
Figure 5.16: Predicted probabilities of insurance status among adults aged 18-49 and residence



Source: GLSS 2012/2013, author's calculations

The likelihood of younger/middle aged adults dropping out of insurance enrolment further increased significantly with being female Figure 5.17. This could be due to women enrolling during pregnancy, while they are exempt from the premium, and not renewing membership after childbearing (when the premium exemption does not apply anymore). However, neither an interaction between sex and age, nor sex and marital status was found to be significant.

Figure 5.17: Predicted probabilities of insurance status among adults aged 18-49 and sex



Source: GLSS 2012/2013, author's calculations

Overall, the findings in this section show similar results to section 5.4. This gives confidence that the models in section 5.4, which do not treat previous insurance as a separate category, provide an accurate picture of the determinants of enrolment versus non-enrolment.

5.6 Discussion

The study carried out here advances the literature on insurance enrolment by analysing factors associated with insurance enrolment among older adults in Ghana as a separate population group. It indicates that correlates of insurance membership overlap between younger and older adults with only minor exceptions. This suggests that healthcare reforms to increase insurance affiliation can be beneficial across both population groups. Such a finding appears especially clear when it comes to promoting higher coverage among the poor. Despite scaled-to-income fees that in theory should mitigate skewed enrolment according to wealth, the findings imply that insurance enrolment increases with wealth. This finding confirms that of other research, including Ayitey et al. (2013), Kotoh and Van der Geest (2016) and Dixon et al. (2011). Despite the theoretical argument that health insurance will improve access to healthcare, low enrolments among the poorest indicate failure to reach the objective of equal access. More research is needed on whether the core poor and people over 70 plus are aware of the premium exemption. Awareness of social protection schemes seems to be a problem in Ghana. Other social protection programmes, including the Livelihood Empowerment Against Poverty (LEAP), show low awareness and a low uptake (NHIA, 2013b). In addition, very little research has been done on whether registration fees reduce NHIS enrolment, as the majority of studies focus on the premium exemption. Kusi et al.

(2015) showed that the registration fee put a burden on very poor households wishing to enrol children, even though they are exempt from the premium payment.

The review of the literature already presented the 'inverse equity hypothesis' which suggests that health interventions initially benefit wealthier people most. However, it is hypothesised that as coverage increases, those inequalities between rich and poor will narrow over time (Lee et al., 2014). Victora et al. (2000) tested the hypothesis that health inequalities between rich and poor will narrow over time by examining child health inequalities in Brazil. They illustrate the complexity involved in testing this hypothesis as new health interventions are constantly produced which makes it difficult to determine whether inequalities in coverage of a new intervention narrow over time. However, the authors conclude that "investment in public-health interventions is a priority in order to prevent inequities becoming worse among poor people in the developing world" (Victora et al., 2000, p. 1098).

There is evidence that poorer people are increasingly benefitting from the NHIS in form of increasing enrolment, which was highlighted in the descriptive statistics of this chapter. Also, the gap in enrolment between the poorest and the richest was found to decrease over time. Additional analysis of the GLSS showed that 42% of older adults that benefitted from the scheme were classified as poor and 26% as rich. This could be due to the greater need for healthcare amongst the poorest. 48% of older adults who reported disabilities belong to the lowest wealth tertile while only 20% belong to the richest tertile. Poorer people often do not have the financial means to seek healthcare, which is why the NHIS might be their only access to healthcare and thus they benefit more from coverage. In comparison, richer individuals often have the means to afford cash payments when care is needed. Unfortunately, the GLSS does not distinguish further in what ways members benefitted.

An increase in education was found to significantly increase insurance affiliation for younger and older adults. This finding underlines that of Ayitey et al. (2013) who showed that with rising education, NHIS enrolment increases. Ayitey et al. (2013) explain this finding by arguing that with increasing education, the awareness of the programme and its benefits increases, which ensures further enrolment. That study was based on data conducted in 2005 when the general knowledge of the NHIS was low, due to its recent (and not even nationwide) implementation. More up to date research indicates a high general awareness of the system. In the GLSS round 6 (2012/2013) less than 1% of respondents reported that they did not know about the system. A recent randomised control trial by Schultz et al. (2013) examined whether health education increases NHIS enrolment or re-enrolment by delivering health education sessions. Their results suggests that education was

not a barrier. No significant differences between the clients that received education and those who did not were found.

Moreover, it is doubtful that higher education alone could be seen to increase NHIS awareness among older adults. As previously mentioned, formal education of older adults generally occurred in the earlier part of their lives and therefore those people would not have been exposed to direct mention of the health insurance system during their schooling. It is likely that the education variable serves as a proxy for a set of capacities, confidences and behavioural norms that allow individuals to overcome psychological and social barriers to exploit the opportunities provided by the state.

When looking at gender using the GLSS and DHS, the logistic regression results show that both younger and older females were more likely than males to be enrolled in the NHIS. Compared to the SAGE (which did not find a significant relationship between gender and NHIS enrolment), the results of the GLSS and DHS are in line with the findings of Dixon et al. (2011) and Ayitey et al. (2013). Both studies also found that females are more likely to enrol in the NHIS than males. An explanation of why women are more likely to enrol could attribute the effect to cultural gender roles. Dixon et al. (2013) argue that women in Ghana tend to take responsibility for the health and wellbeing of the family and thus are more likely to be aware of the benefits provided by health insurance coverage when seeking care. Other researchers discuss whether the opportunity for women to enrol in the NHIS contributed to a broader debate about women's empowerment in Ghana (Dixon et al., 2011). NHIS enrolment can act as a tool to narrow gender-related discrimination in access to healthcare. Women in low and middle-income countries tend to have a lower level of education and experience lower levels of employment in the formal sector, which limits their chances of being entitled for the premium exemption under the SSNIT. In Ghana, the decision-making power for seeking healthcare for household members often lies with the male household head, who tends to control access to and allocation of household resources (Tolhurst et al., 2008). If required services are covered be the insurance system, the NHIS enables women to seek healthcare when needed after the regular premium is paid, without asking to use household recourses more irregularly. This augments women’s decision making power in seeking healthcare.

Using the GLSS round 5, Ayitey et al. (2013), indicated that marital status increases healthcare enrolment among all adults. Although the effect of marriage on insurance affiliation was only significant when using the GLSS and DHS, the direction effect in all four surveys was the same. Younger, middle aged, as well as older adults who are married were all more likely to be enrolled in the NHIS compared to those never married. Dixon et al. (2011) pointed out that married women who are planning to have children have a great incentive to join the NHIS as antenatal care is covered under the NHIS. Moreover, as mentioned before, pregnant women are excluded from the

premium fees. But, even older adults are more likely to enrol when they are married. The latter finding could be attributed to increasing care from a partner and opportunities to pool funds where households benefit from joint income.

With regards to age, it has been found that an increase in age among older adults is associated with a greater probability of being insured in a health insurance scheme. This could be attributed to the premium exemptions for those aged 70 plus. However, an interaction between wealth and age showed that regardless of wealth, NHIS coverage increases with age. This refers back to the hypothesis of Kumi-Kyereme and Amo-Adjei (2013) that people assess their health status before insurance enrolment and that older adults are more likely to invest in their health due to increasing usage of healthcare with age. Further analyses showed that only 3% of older adults aged 50 to 59 in the GLSS reported that they have a serious disability, compared to 12% of people aged 70 plus.

Further analysis in this chapter showed that older adults had a slightly lower probability of dropping out of insurance coverage compared to younger/middle aged adults. This could be due to the above-described greater need of health insurance coverage with increasing age. In addition, older adults might have had more time to re-enrol after dropping out. The opportunity cost of going to the district office to enrol tends to be lower for older adults as they are less likely to have to take a day off work. Following this argument, older adults may too have had more opportunities to enrol in the first instance. Younger adults may have dropped out but not yet re-enrolled as they need less healthcare than older adults. As mentioned in chapter 3, nearly 15% of people aged 18-49 reported that they do not need health insurance compared to 13% of people aged 50 plus. Women especially might not feel the need for insurance coverage after childbirth. Younger adults also tend to have less time to enrol and have greater opportunity costs like missing time at work.

Finally, the previous chapter highlighted the differences in survey quality when measuring insurance affiliation using the DHS, GLSS or SAGE. These differences raised questions as to whether the determinants of insurance affiliation differ depending on the survey choice. Because of the fact that the true population correlates of insurance coverage are unknown, it is difficult to estimate which of the surveys delivers more accurate results. Comparing survey results can, though, give reassurance to analyses of the determinants of NHIS coverage.

The findings among older adults gave assurance that both datasets (GLSS and SAGE) are suitable for research on insurance affiliation. Despite recommendations for using the GLSS when measuring insurance coverage that emerged in the previous chapter, the analysis showed that the direction of effect was found to be in line for most independent variables when using the SAGE or GLSS to look at older adults. Further, the findings of the DHS largely confirm the findings of the SAGE and GLSS when analysing enrolment patterns among young and middle aged adults. When treating the

surveys as four cross-sectional surveys, they indicate an increasing trend in NHIS enrolment. Trends in enrolment can be attributed to changes in health polices and economic circumstances in Ghana including NHIS facility accreditation in 2009 to improve quality and access to care, free enrolment for pregnant women in 2008, economic growth and increasing per capita income, and more general improvements of the NHIS over time. In 2007/2008, when the SAGE was conducted, the NHIS was still a new system. Over 10 years on from its implementation, it has now been allowed some time to learn from experience and improve its services.

In terms of a comparison of correlates of insurance status among younger and older adults, most variables show a similar effect between the two groups. This shows that specific actions to increase insurance enrolment can be applicable for younger as well as older adults at the same time, especially considering wealth effects. In order to overcome the gap in insurance enrolment between rich and poor, external financial support needs to be increased and premiums need to decrease. Government subsidies or donor funding are seen as one way to stabilize the health finance system in the long run. Efforts need to be undertaken to ensure that all people that fall below the poverty line are aware of the premium exemption in the NHIS to increase enrolment among the poor. More research is needed on whether registration fee hinders enrolment as, even for those exempt from the premium, a registration fee applies.

Results here replicate and support what researchers like Ayitey et al. (2013), or Dixon et al. (2011) amongst others have shown, in particular when it comes to the effects of wealth and education. Nevertheless, it was important to provide robust evidence that younger and older adults do not differ significantly in their choice to join the NHIS as the different demographic and health profile of those two groups led to the hypothesis that they would. In addition, using both timely and also less recent surveys indicate that although the gap in coverage among rich and poor and urban and rural residents appears to have decreased, these factors still determine NHIS coverage. The same holds for education and sex. Increasing efforts are needed to ensure equal access to care in moving towards UHC.

Further analysis in this thesis uses the GLSS only. As shown in chapter 4, due to its comprehensive questionnaire on health insurance enrolment, the GLSS allows detailed analysis on insurance coverage when analysing insurance coverage among older adults in Ghana. In addition, it is possible to link the GLSS data to the census data which allowed controlling for further barriers of NHIS enrolment in the analysis presented in subsequent chapter.

Chapter 6: Spatial and Aspatial Barriers of Health Insurance Enrolment

The previous chapter examined individual user level characteristics that are associated with NHIS coverage. The analysis, however, did not consider how spatial factors impact insurance enrolment. Health authorities and policy makers often focus on the reduction of financial access to healthcare. However, as seen in the review of the literature, the availability and accessibility of healthcare services cannot be neglected when analysing insurance demand. The geographical access to healthcare services in Sub-Saharan Africa is of high importance. If healthcare services are not available or physically accessible, health insurance affiliation becomes devoid of value for the individual as desired care cannot be attained. Aspatial barriers also need to be considered, as the social context people live in may inform the decision to join the NHIS. UHC can only be achieved by moving beyond a narrowly conceived financial aspect and taking demand and supply side factors of coverage into account (Neal et al., 2015).

This chapter aims to assess the reach of the Ghanaian NHIS policy to older adults, accounting for spatial and aspatial barriers to accessing care. This is the third objective of the thesis. The chapter builds upon the previous one by advancing the model of insurance enrolment to include not only individual level factors but also take into account the availability and accessibility of services, focusing on adults aged 50 plus.

Previous research has found that older adults are disadvantaged in their access to healthcare as they predominately live in rural areas where the provision of healthcare services is limited (McIntyre, 2004, Ghana Statistical Service, 2013). In addition, older adults are less mobile than younger age groups, and are more likely to be bed-ridden, which can make it more difficult for them to reach healthcare facilities. So far, little attention has been given to how distances to healthcare facilities impact insurance affiliation.

Modelling environmental conditions when analysing health insurance enrolment can improve understandings not only of who uses the NHIS but where. Policy recommendations aimed at improvements to NHIS coverage can only be devised with confidence that policymakers are maximizing the use of scarce resources when the effect of individual level and contextual factors on insurance affiliation are understood (Ko and Bindman, 2014). This understanding will ensure that targeted health interventions can be designed in particular for older adults.

This chapter shows a micro-level understanding of NHIS affiliation and identifies those districts in which NHIS enrolment is particularly high or low by expanding the simple classification of urban

and rural. Given the focus of this thesis on older adults, from this chapter onwards, younger adults will not be used as a comparison. Comparing both population groups is a complex process as different conditions of enrolment and service coverage apply for women, children and older adults. A comparison between both groups is recommended for future work.

6.1 Barriers to Enrolment in Health Insurance

Chapter 2 previously highlighted that spatial barriers to healthcare include both the availability and accessibility of healthcare services. The pure availability of services does not necessarily mean that these services are physically accessible. It is expected that health insurance uptake can be improved only when healthcare services are available and accessible. In Ghana, previous research showed that long distances as well as increasing travel time to healthcare facilities reduces healthcare utilisation and NHIS enrolment (Osei-Akoto and Fenny, 2013, Osei-Akoto and Adamba, 2011). These studies, however, are not nationally representative as they use the Ghanaian Living Standards Survey 5+, which only covers six out of the ten regions in Ghana. Among other regions, the Upper West and Upper East are not included in the GLSS 5+, which could lead to biased results regarding NHIS coverage and distance to healthcare facilities, particularly as in the Upper West and Upper East health service provision is still relatively poor.

The most common measures of service availability are provider to population ratios (such as the doctor to patient ratio), also known as supply ratios (Guagliardo, 2004). These are suitable for the comparison of supply across regions, but do not account for border crossing of patients, or for accessibility limitations (Guagliardo, 2004). In addition, the average distance to facilities can increase depending on the location and clustering of the facilities (Guagliardo, 2004). To account for these limitations, both travel time and distance to facilities provide a more accurate measurement of the concept. There are different methods to measure travel time and distance, including straight line distance, travel distance or actual travel time. The Ghana Health Service policy framework defines easy access to healthcare as being located within 8 kilometres reach of a healthcare facility (Johnson et al., 2015a, Apoya and Marriott, 2011, Luginaah and Kerr, 2015). However, travel distance and straight line distance indicators do not provide any information on the actual time it takes to get to a healthcare facility (Møller-Jensen and Kofie, 2001). Thus, average travel time to a healthcare provider is sometimes preferred as a more accurate measurement (Guagliardo, 2004).

Aspatial dimensions of healthcare are also known as social access (Khan and Bhardwaj, 1994) or cultural acceptability (see chapter 2). These are barriers to healthcare that are of non-geographic character, and may include political, economic and cultural factors (Khan and Bhardwaj, 1994,

Mobley et al., 2006). The social context people live in can help inform their decision about whether to join the NHIS, with social interactions expected to pass on information about the NHIS. This can contribute to a spatial and social diffusion pattern in uptake. As mentioned before, one person's positive or negative experience with the NHIS can influence the decision of another person to be part of the scheme or not. Behaviour patterns among more proximate neighbourhoods are expected to be similar which is also described as 'peer-effect' (Mobley et al., 2006), leading to clustering of enrolment.

6.2 Data and Methods

The data for the analysis carried out in chapter 6 is taken from the GLSS round 6 (2012-2013) and was restricted to respondents aged 50 plus.

Data for the construction of district level control variables were taken from a 10% sample of the Ghanaian 2010 census, provided by the Integrated Public Use Microdata Series (IPUMS). IPUMS "is a project dedicated to collecting and distributing census data from around the world" (IPUMS International, 2016).

For descriptive purposes, the straight-line distance to healthcare facilities was created using data made available through the ESRC Centre for Population Change (CPC) in Southampton which was collected for a study by Gething et al. (2012). Gething et al. (2012) created a detailed list of healthcare facilities in Ghana based on data from the Ghanaian Ministry of Health (MOH), the Centre for Remote Sensing and Geographic Information Service, and the University of Ghana. They also geo-referenced the healthcare facilities.

For this thesis, the attribute data and shape files were exported to the statistical programme R and a Ghanaian district polygon map was linked to the above described geo-referenced healthcare facility dataset, the GLSS dataset and the census data.

6.2.1 Definition of Variables Used

The definition of the variables included in this chapter's analysis are summarised in Table 6.1. They can be grouped into spatial and aspatial factors. This section dicusses both factors; starting with spatial factors.

Table 6.1: Coding of variables used in chapter six

Variable	**Coding**
Travel time	Treated as a categorical variable (up to 15 minutes, 16-30 minutes, 31-45, 46-60 minutes, over and hour) , with ≥ 15 used as reference category
Region	Included the 10 regions in Ghana with Greater Accra used as reference
Place of residence	Coded dichotomously. Reference: Rural
Hospital in district	Coded dichotomously. Reference: None
Sex	Coded dichotomously using the male category as reference
Age	Was treated as a categorical variable (50-59, 60-69, 70+) with 50-59 used as reference category
Disability	Coded dichotomously into yes -suffering from disabilities- and no – not suffering from disabilities. Latter was used as the reference category
Marital status	Grouped into 3 categories: married/cohabiting, never married, separated/divorced and widowed. Reference category: married/cohabiting
Internet usage	Coded dichotomously using the no usage category as reference
Formal sector employment	Converted into 2 categories with not currently employed in the informal sector as reference category
Education	Converted into 4 categories from none to tertiary education with no education as reference category
Standard of living	Expenditure tertile. Reference category: Poorest (1st tertile)

Source: Author (2016)

Spatial factors

Place of residence and region were included in the anlysis to capture geographical differences. As described above, the straight-line distance between a household and a healthcare facility was calculated using the geo-references provided in the GLSS and the healthcare facility dataset. Those distance information were used for descriptive statistics in order to obtain an understanding of the geographical provision of services. The average district travel time to a healthcare facility was calculated from the GLSS, based on the reported individual travel time to and from a healthcare facility last visited. The GLSS distinguishes between private and public sector facilities as well as medical alternatives like traditional healers. Here, only travel time to public and private facilities was included as medical alternatives are not freely accessible with NHIS membership.

Physical access to healthcare is usually defined as “a measure of distance to care, with 30 minutes generally being viewed as the accepted maximum time to access healthcare” (Janke, 2009, p. 437).

Although this time limit is a common measurement of physical accessibility in high-income countries (Bosanac et al., 1976, Luo and Wang, 2003, Health and Places Initiative, 2014), there is evidence that in low and middle-income countries, this 30-minute standard is also appropriate in certain areas (Schoeps et al., 2011, Campbell and Abu Sham, 1995). However, the Health and Places Initiative (2014) argues that in rural areas, this standard does not hold. This is seen in Ghana, where although 78.6% of the population resident in urban areas have under 30 minute access to a healthcare facility, less than half of the population living in rural areas have access to healthcare services within 30 minutes (Ghana Statistical Service, 2005). Therefore, for this analysis, the travel time to a health facility has been categorised into five bands: up to 15 minutes, 16-30 minutes, 31-45, 46-60 minutes, an hour or more.

To measure the availability of healthcare, the existence of a hospital in the district was included. The correlation between travel time and hospital availability was assessed for multicollinearity. Only a weak correlation was observed.

Demographic and other aspatial factors

Demographic factors like sex, marital status and age were coded as in the previous chapter. The analysis in this chapter further controls for formal and non-formal sector employment and suffering from disability (like in chapter 5).

Given that this chapter only uses the GLSS, living standards were captured by per capita household expenditure instead of using household assets. This has the advantage of measuring disposable financial means that make the NHIS premium affordable (as highlighted in chapter 5). The other alternative would have been to use income as a direct measure of living standards. However, income is heavily related to employment and can be problematic when looking at older adults (Grundy and Holt, 2001). Even though 58.5% of people aged 60 plus in Ghana were found to still be economically active (Ghana Statistical Service, 2013), using expenditure as a measure reduces bias resulting from common misreporting of income in survey questions (Group, 2011). To avoid recall measurement errors, the GLSS makes use of expenditure diaries where survey participants record their expenditure over a set period of time. The Ghana Statistical Service (2013) decribes this approach in the GLSS as followed:

> "A diary of daily consumption and expenditure was used to support the interviews. During the first visit, a literate person already identified in each household was trained to record all subsequent expenditures made by the household and submit the diary to the interviewer on his next visit for entry into the appropriate sections. Where a household

had no literate member, the interviewer made daily visits to the household and recorded all expenditures in the diary meant for the household" (p. 202).

Expenditure in the GLSS was based on the average expenditure on food, beverages, tobacco, expenditure on non-food items (including transportation) and expenditure on housing. The data collection was spread over a 12-month period. This ensured a continuous recording of expenditures and seasonal changes occurring thereof. The diary method captured each household's daily expenditure. Other expenditures on water, electricity or gas were annualized.

Finally, all expenditure data were converted to daily measures, which were then summed and divided by the household size to obtain the per capita expenditure. Afterwards, the sample was divided into tertiles by this per capita expenditure amount. To account for differences in regional prices, per capita household expenditure was adjusted to the regional costs of living in the year 2012. Food items, for example, were found to be most expensive in Greater Accra (Ghana Statistical Service, 2014)[15]. It ought to be noted that per capita expenditure simplifies the resource allocation in a household and assumes equal access to resourses among all household members. The interpretation of the per capita expenditure therefore needs to be treated with caution. The different needs of household members are not captured using this approach and no economies of size are controlled for (Falkingham et al., 2009, Barrientos et al., 2003). The level of material poverty among older adults could be underestimated using a simple per capita approach (Falkingham et al., 2009, Barrientos et al., 2003). A separate analysis using household assets was provided in the appendix, which showed similar findings to the results shown here when using per capita expenditure, which gives confidence in the results.

A growing body of the literature debates whether higher internet coverage in an area increases the overall awareness of the NHIS. Opoku et al. (2012) argue that mass media is used much more in Ghana to provide and receive information on healthcare advice than in other countries like the UK. Areas with a high share of internet usage were expected to have a greater knowledge of the NHIS and therefore internet usage is expected to influence insurance membership positively. The internet usage varies significantly among regions within Ghana. The 2010 census data highlight that the internet usage in Greater Accra is the highest among all regions (42%). In all other regions the internet usage is still very low. The coverage was particularly low (under 3%) in the three regions located in the north of Ghana (Northern, Upper East and Upper West).

[15] For further information on expenditure measures the GLSS see Ghana Statistical Service (2014).

For the analysis, household internet usage data were taken from the GLSS (survey question: *does the household use internet?*). This includes all kinds of internet usage including at home, internet usage through a mobile phone or in an internet café. Although the household internet usage can be unevenly distributed among household members (with older adults being less likely to use the internet), it is a good indicator for general access to mass media within the household.

The social context people live in can help inform the decision of individuals about joining the NHIS. A recent study by Fenenga (2015) gives evidence that community trust is the key to success for the NHIS. Osei-Akoto and Adamba (2011) argue that in an African context, ethnic and religious diversity determines enrolment in health insurance. This chapter controls for ethnic and religious diversity by using a fractionalization index as described in Alesina et al. (1999). It measures the probablity that two randomly selected people from the same district will be ethnically or religiously different, meaning that they belong to different ethnic groups or religious domains (Osei-Akoto and Adamba, 2011, Alesina et al., 1999). A higher index indicates a higher diversity in a defined area. The fractionalization index F was calculated as (Fearon, 2003):

(6.1)

$$F = 1 - (\sum_{i=N}^{n} p_i^2)$$

Where:

$p_1, \dots, p_n$= share of religious / ethnic group as a proportion of the total propulation of a defined area

Census data were used to calculate share of religious or ethnic group as a proportion of the total propulation of a defined area. The fractionalization index was matched, based on unique district identifiers, to the GLSS data. A link between ethnicity and religion was found not to be significant in Ghana (U.S. State Department, 2006) which is why the effect of religious as well as ethnic diversity was tested here.

6.2.2 Methodology

Two analysis techniques were applied in this chapter, namely: multilevel modelling, and spatial analysis. Both techniques are discussed below.

Multilevel modelling

To examine the correlates of NHIS enrolment, binary logistic multilevel modelling was used. Multilevel modelling is a popular method in the field of health research where hierarchical

structures are examined. It enables researchers to distinguish between individual and contextual effects on health insurance enrolment. It allows controlling for variances in the structure of the data (Johnson et al., 2015a). The NHIS operates on a district level, which makes the use of a multilevel model appropriate. A conventional regression model would underestimate the standard errors, as it fails to take the clustered structure into account, thereby increasing the risk of incorrectly assuming that a result is significant (Park and Lake, 2005).

The previous chapter used logistic regression over multilevel logistic regression as it was reacting to previous work done by Dixon et al. (2011) and Ayitey et al. (2013) which also used logistic regression. Further logistic regression enabled comparison between surveys as the district codes in the SAGE and GLSS do not match. The GLSS district level information can be matched to the 2010 census, which will be used in this chapter to control for NHIS operation on a district level.

Instead of NHIS card holders, this chapter looks at all NHIS registrants (see Appendix F). In chapter 5, it was revealed that people registered under the NHIS have to wait up to three months before their insurance card is issued, and, in order to avoid misunderstanding of insurance status between surveys, only cardholders were assessed. The analysis in chapter 6 seeks to capture all NHIS registrants in order to fully understand the barriers of being part of the NHIS. The binary outcome variable y_{ij} in chapter 6 equals 0 if a individual was registered in the NHIS and 1 if the older adult was not registered.

The binary response variable was analysed on different explanatory variables x_{ij}. The model consists of two levels. The multilevel model here assumes that 9,513 individuals *i* (level 1) are nested within 170 districts *j* (level 2). The two level random intercept model where y_{ij} =1 looks as follows

(6.2)

$$Logit(\pi_{ij}) = \beta_{0j} + \beta_{1j}x_{ij} + \cdots + \beta_{kj}x_{ij}$$

Where:

$\beta_{0j} = \beta_0 + u_{0j}$

$u_j \sim N(0, \sigma_u^2)$

$\Pi_{ij} = \Pr(Y_{ij} = 1)$

The intercept consists of the fixed term β_0 and a random effect u_{0j} based on the assumption that u_{0j} follows a normal distribution with a variance σ^2_u and a mean of zero. The random effect is specific to district *j.* On the contrary, β_0 is shared by all districts (Leckie, 2010).

Cluster specific predictions were obtained by computing the median probabilities by substituting the mean level of the level 2 residuals ($u_j = 0$):

(6.3)

$$\pi_i = \frac{\exp(\beta_{0j} + \beta_{1j}x_{ij} + u_j)}{1 + \exp(\beta_{0j} + \beta_{1j}x_{ij} + u_j)}$$

A sequential model-building process was applied to understand the extent to which user characteristics, aspatial, and spatial access barriers influence participation in the NHIS.

Spatial analysis

District level analysis of NHIS coverage and mapping of the coverage clusters was conducted using the GLSS as well. A local Moran's test for the residuals was carried out to detect clusters of insurance coverage rates of different districts. Specifically, a local Moran's test was used to examine whether there is evidence for spatial autocorrelation or whether the insurance enrolment rates are distributed randomly. This test derives from the assumption that "alternatives (locations) that are closer to one another…[are]… more correlated with one another in unobserved factors than those that are farther apart" (Sener et al., 2011, p. 295).

As a consequence of social interaction, it is expected that neighbourhoods demonstrate similar behaviour patterns potentially resulting in spatial clustering in NHIS enrolment. This clustering can affect the outcome of interest significantly when not controlled for and can result in misleading estimates (Mobley et al., 2006). The risk of social spill-overs is particularly high when studying healthcare utilisation and health insurance enrolment due to the structure of healthcare systems (Mobley et al., 2006). Community-based resource allocation can result in unequal investment in health infrastructure between communities (Mobley et al., 2006). As the NHIS operates on a district level, it is expected that a good healthcare infrastructure in one district can have a positive influence on healthcare access in surrounding districts. It is difficult to capture these social spill-overs with predictor variables, but omission of social clustering across areas can lead to spatial autocorrelation in other explanatory variables (Mobley et al., 2006). Further, failing to account for spatial correlation can lead to unreliable standard errors and misleading estimates (Mobley et al., 2006). The Moran's test detects "clusters of either similar or dissimilar disease frequency values around observations" (Wangdi et al., 2011, p. 3). Neighbourhoods for this test were defined as districts that share borders or corners.

The complete analysis has been carried out with the data software STATA, R Studio and GeoDa. For the descriptive statistics, sample weights were applied to adjust for unequal probability of selection.

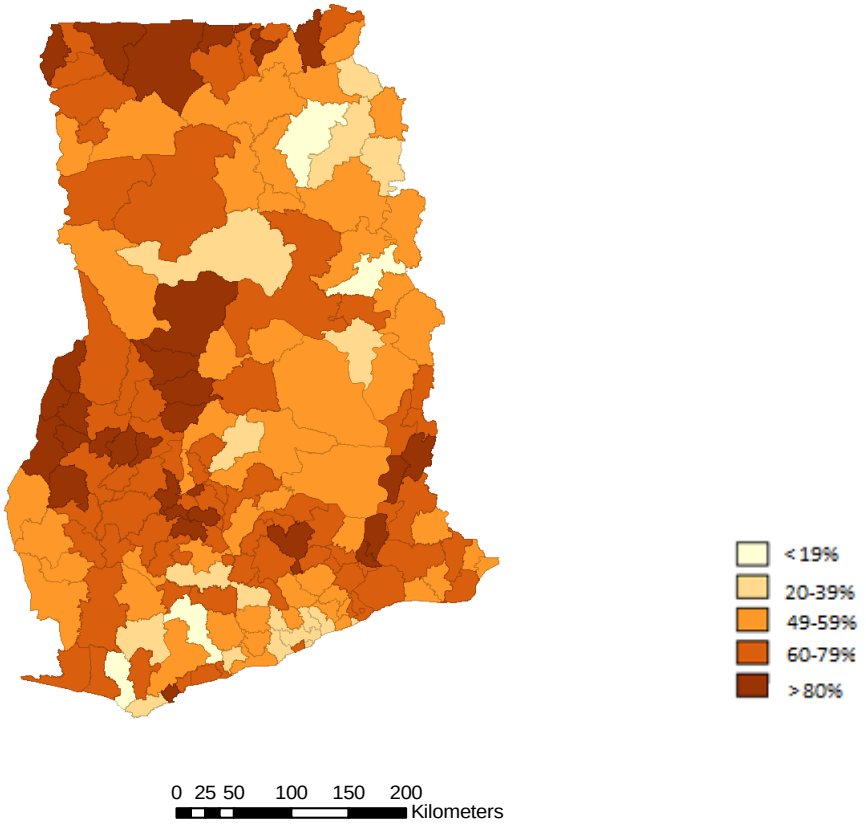
6.3 Results

6.3.1 Descriptive Results

The NHIS registration rates among older adults are visualised in Figure 6.1. The figure shows that there is substantial geographical variation in NHIS registration among older adults between districts. The NHIS coverage among all adults is present in the appendix (see Appendix G.1) which shows a similar picture. The lighter colours highlight a low insurance registration coverage while the bolder colours illustrate a higher registration coverage.

The map visualises the finding that in most of the districts the insurance registration among older adults ranged between 40% and 60%. In the Upper West and Upper East region, the insurance coverage was particularly high, exceeding over 80% in some districts. Lower coverage was found in the Central region and in Greater Accra.

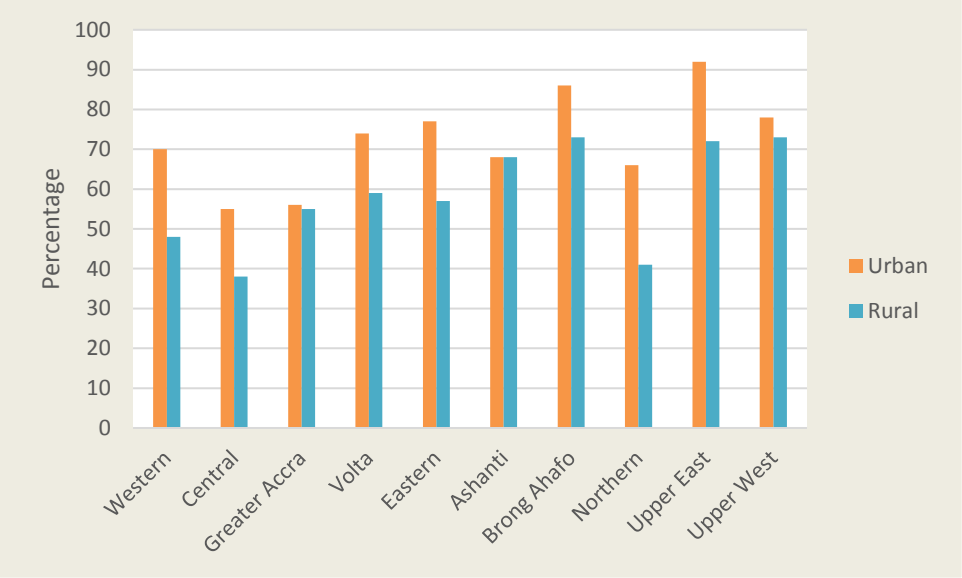
Figure 6.1: NHIS registration rate among older adults by district 2013



Source: GLSS 2012/2013, author's calculations

Figure 6.2 highlights that in most regions, the coverage in urban areas was higher compared to rural areas indicating significantly unequal NHIS uptake across place of residence and region ($p<0.001$). Ashanti and Greater Accra are the most urbanised regions in Ghana which resulted in minor (or no) differences in the distribution of NHIS registration by residence.

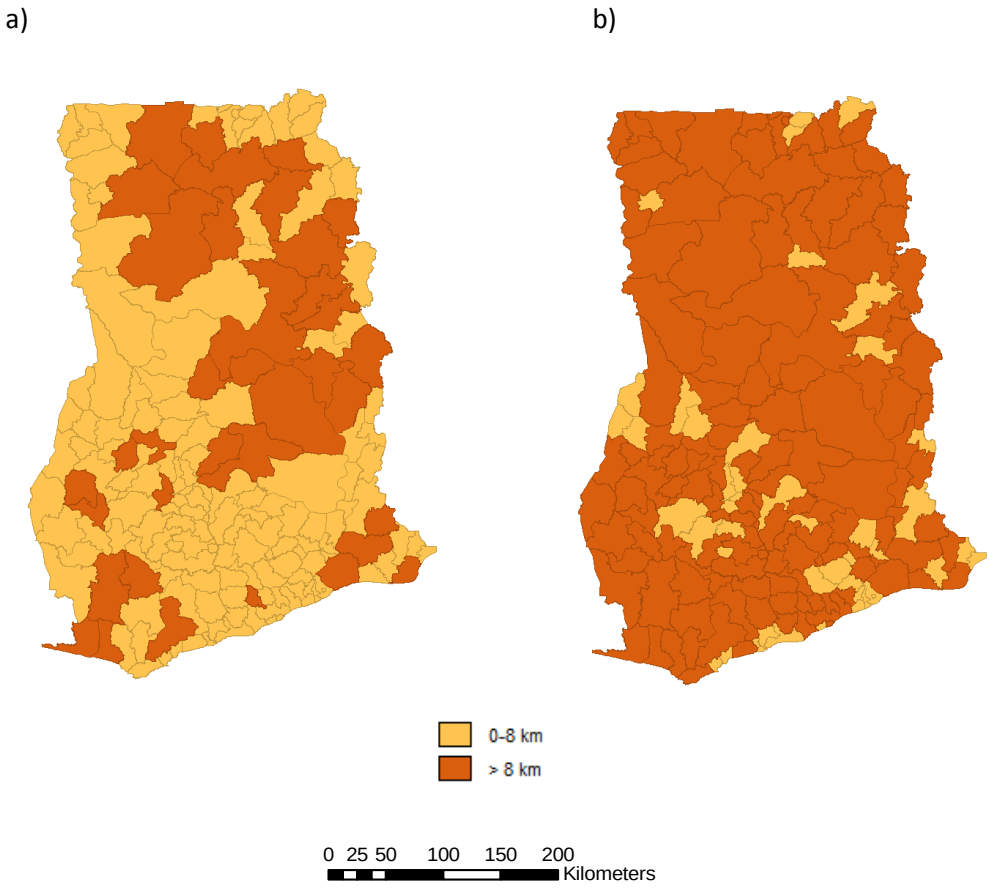
Figure 6.2: Distribution of NHIS registration among older adults by residence and region



Source: GLSS 2012/2013, author's calculations

Figure 6.3, visualises the distance to healthcare facilities and hospitals, respectively, within the 8 kilometre radius recommended by Ghanaian Health Service policy framework. The healthcare facility availability and hospital coverage tends to be greater in the south compared to the north of Ghana. The majority of Ghanaians live within an 8 kilometre distance of a healthcare facility but nearly 73% of the Ghanaian population do not live within an 8 kilometre radius of a hospital. Appendix G.2 shows the average distance to a healthcare facility and hospital, highlighting that in large parts of the country, people live over 30 kilometres away from the closest hospital.

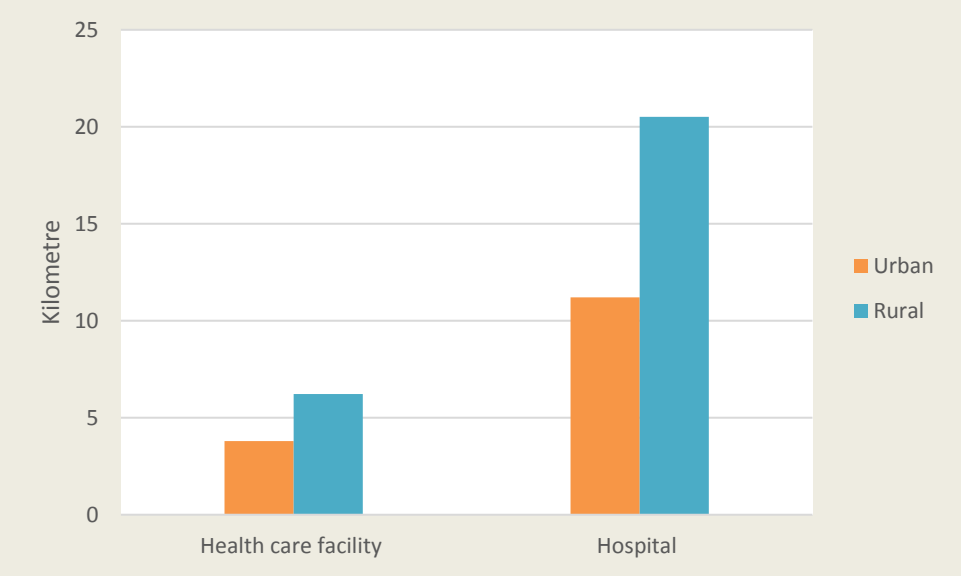
Figure 6.3: Distance to a) healthcare facilities and b) hospitals



Source: CPC Healthcare Facilities Dataset 2012, author's calculations

Geographical differences in distance to healthcare are also underlined in Figure 6.4. In rural areas, the average distance to healthcare facilities was significantly greater than in urban areas. The average distance to a healthcare facility and hospital respectively was nearly 4 kilometres and 11 kilometres in urban areas, and 6 kilometres and 21 kilometres in rural areas. Traffic, road quality or quality and availability of public transport networks can influence the actual travel time to a healthcare facility. Based on the GLSS, the average reported travel time to a healthcare facility in an urban area was 27 minutes and in a rural area 41 minutes.

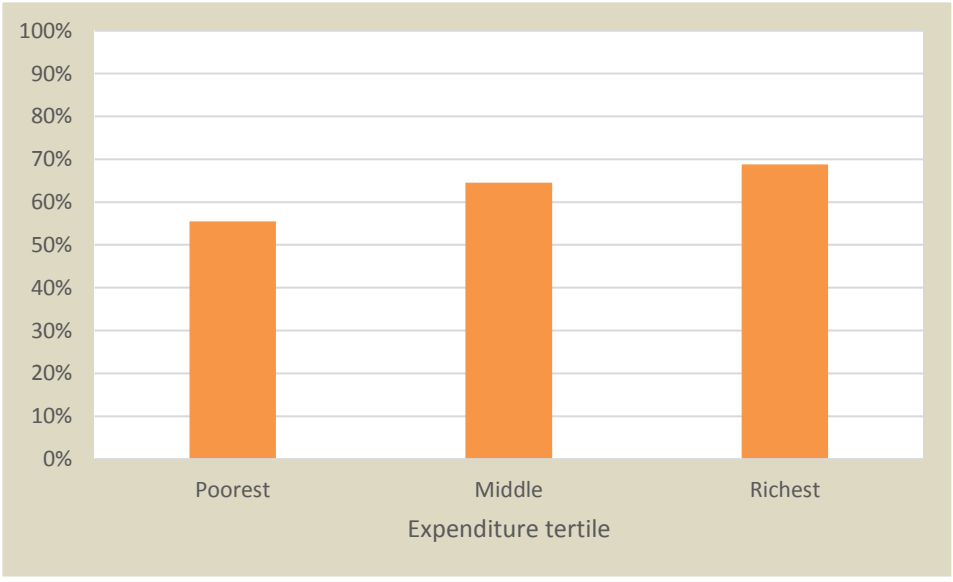
Figure 6.4: Average distance to healthcare facilities and hospitals by residence



Source: GLSS 2012/2013, author's calculations

In Figure 6.5, the distribution of NHIS uptake by household expenditure per capita is shown. A similar trend as in chapter 5 is witnessed. Results indicate that expenditure significantly influences NHIS enrolment ($p<0.05$). An increase in financial well-being was associated with a higher NHIS uptake, with registration rates ranging from 54% among the poorest to 69% among the richest. Appendix H compares the distribution of NHIS registration among older adults by expenditure and asset tertile. The distributions are very similar, confirming that measuring living standard based on expenditure and assets produces comparable results.

Figure 6.5: Distribution of NHIS registration among older adults by expenditure tertile

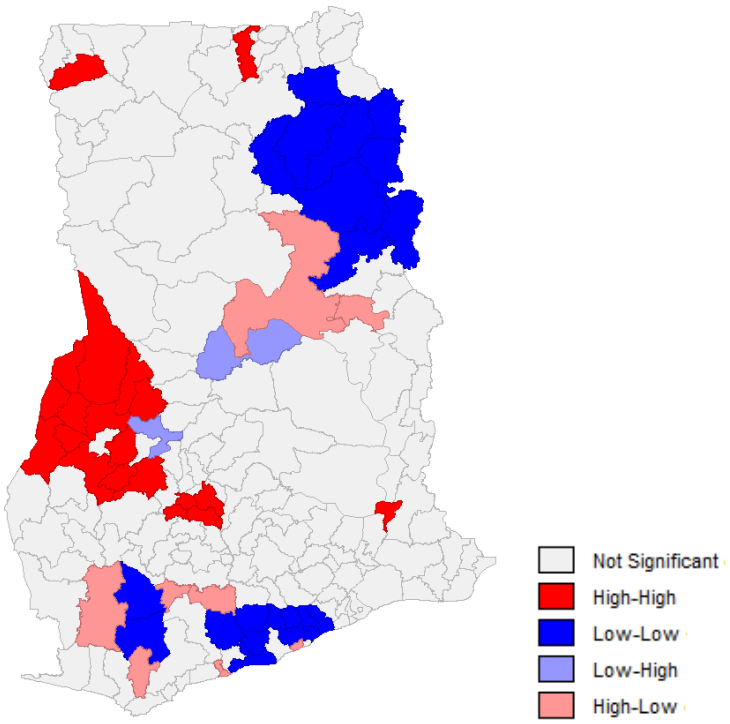


Source: GLSS 2012/2013, author's calculations

6.3.2 Moran's I Test

Figure 6.6 highlights that there is significant regionalisation in NHIS enrolment among older adults, with the Moran's I test indicating the rejection of the hypothesis that the residuals are randomly distributed (Moran I statistic = 0.36, p-value <0.01). This means that NHIS coverage among adjacent districts is spatially correlated[16]. Strong positive autocorrelation is shown by the darker shaded red and blue colours. The locations with positive spatial autocorrelation are clusters that have a high local and a high neighbourhood rate, or low neighbourhood and low local rate. Non-significant clusters are presented in grey. Depending on place of residence, a model that does not account for spatial autocorrelation is liable to either under-predict or over-predict the likelihood of NHIS registration.

Figure 6.6: Spatial clustering in the NHIS registration among older adults



Source: GLSS 2012/2013, author's calculations

6.3.3 Multilevel Regression Results

The odds ratios from the multilevel regression analysis, which examines the correlates of NHIS registration for older adults, are illustrated in Table 6.2.

[16] The GLSS is not representative at the district level; therefore it has to be acknowledged that the sample used might not be representative.

Table 6.2: Odds ratio of NHIS registration among older adults – sequential model

Variable	Characteristics	Model 1			Model 2			Model 3			
		Odds Ratio		95% Conf. Interval	Odds Ratio		95% Conf. Interval	Odds Ratio		95% Conf. Interval	
Travel time	≥ 15 min	1.000			1.000			1.000			
	16 -30 min	0.760		0.431 1.340	0.725			0.713		0.434	1.172
	31 – 45 min	0.579		0.328 1.022	0.663			0.682		0.413	1.128
	46 – 60 min	0.563		0.300 1.058	0.920			0.997		0.575	1.729
	> 1 hour	0.467	*	0.241 0.905	0.713			0.763		0.434	1.340
Region	Greater Accra				1.000			1.000			
	Western				1.464			1.643		0.948	2.847
	Central				0.908			1.028		0.584	1.807
	Volta				2.394	**		2.772	**	1.542	4.985
	Eastern				2.140	**		2.558	***	1.554	4.213
	Ashanti				2.510	***		2.994	***	1.753	5.114
	Brong Ahafo				5.722	***		7.460	***	4.316	12.893
	Northern				1.478			2.406	**	1.347	4.300
	Upper East				6.004	***		9.707	***	4.620	20.397
	Upper West				5.054	***		8.905	***	4.423	17.929
Residence	Rural				1.000			1.000			
	Urban				2.120	***		1.628	***	1.428	1.857
Diversity	Religious				0.188	**		0.213	**	0.075	0.604
	Ethnic				0.696			0.729		0.383	1.390
Hospital in district	No				1.000			1.000			
	Yes				1.238			1.160		0.847	1.588
Sex	Male							1.000			
	Female							1.709	***	1.535	1.902
Age	50-59							1.000			
	60-69							1.404	***	1.252	1.574
	70plus							2.353	***	2.068	2.676
Disability	No							1.000			

Variable	Characteristics	Model 1		Model 2		Model 3			
		Odds Ratio	95% Conf. Interval	Odds Ratio	95% Conf. Interval	Odds Ratio		95% Conf. Interval	
	Yes					1.032		0.845	1.259
Marital Status	Married					1.000			
	Separated/Divorced					0.627	***	0.529	0.743
	Widowed					0.781	*	0.685	0.891
	Never married					0.414	***	0.262	0.653
Household size	Log					1.067	**	0.988	1.152
Internet usage	No					1.000			
	Yes					1.199		0.976	1.472
Employed in formal sector	No					1.000			
	Yes					2.425	***	1.754	3.351
Education	None					1.000			
	Low					1.312	**	1.162	1.482
	Medium					1.652	**	1.286	2.122
	High					2.152	***	1.605	2.885
Expenditure	Poorest					1.000			
	Middle					1.944	***	1.716	2.204
	Richest					2.383	***	2.026	2.803
N		9438		9438		9438			

Source: GLSS 2012/2013, author's calculations; *** p<0.001, ** p<00.1 * p<0.05

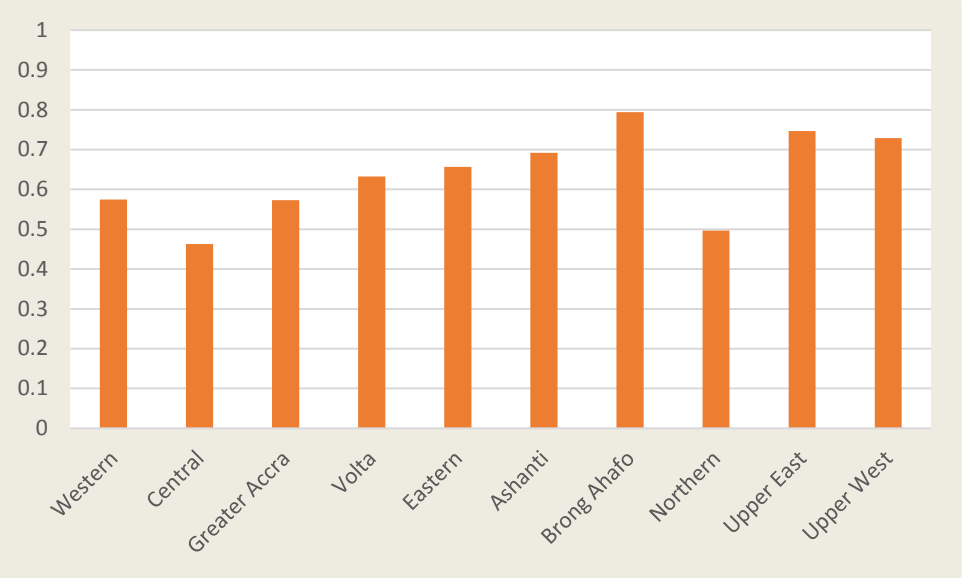
Three models were estimated. The first model controls for the physical accessibility of services in terms of travel time to healthcare facilities. The second model expands the first model and adds contextual factors. Other demographic characteristics were controlled for in model three.

Model 1 supports the findings of the descriptive statistics and indicates that travel time to the nearest healthcare facility influences insurance enrolment negatively. A travel time of over an hour to a healthcare facility was significantly associated with a smaller likelihood of enrolment in the NHIS.

In model 2, it is seen that place of residence and region significantly influence the decision to enrol in the NHIS. After controlling for these important geographical variables, travel time to healthcare facility was no longer found to be significant. This indicates that regional and residential differences predominately determine NHIS enrolment. Also, an interaction effect between travel time and residence or region was found not to be significant. A limitation here is that it was not possible to distinguish between NHIS accredited and non-accredited facilities in the analysis. This could drive the weak association between proximity and insurance enrolment in the model. It is expected that proximity is could be significant predictor of enrolment, particularly in areas with low coverage of accredited facilities.

Older adults living in urban areas were found to be twice as likely to join the NHIS compared to rural residents. The finding that living in a rural area decreases the likelihood of being enrolled in the NHIS is important, as the proportion of older adults in Ghana living in rural areas is higher than in urban areas. The predicted probabilities in Figure 6.7 show that the likelihood of registering in the NHIS varies by region.

Figure 6.7: Predicted probability of NHIS registration among older adults by region



Source: GLSS 2012/2013, author's calculations

There are several potential explanations for these regional differences. Ayitey et al. (2013) and Dixon et al. (2011) found that adults living in the northern areas of Ghana (Upper East, Upper West and Northern Region) have a greater likelihood of joining the NHIS. Dixon et al. (2011) argue that this could be due to earlier implantation of community-based insurance schemes in the north compared to the regions located in the south[17]. The three northern regions therefore had more time to institutionalise the concept of risk pooling and to build trust in a community-based insurance scheme (Dixon et al., 2011). Appendix I highlights that in Greater Accra, 21% of older adults reported that they do not have confidence in the operators of the insurance scheme, while only 1% of older adults in the Upper West reported the same.

Dixon et al. (2011), however, only distinguished between north and south without controlling for further regional differences. The findings above highlight that this can lead to erroneous conclusions. While, in the Upper West and Upper East enrolment is particular high, in the Northern region, enrolment was found to be very low. This indicates regional differences in enrolment patterns within the north of Ghana.

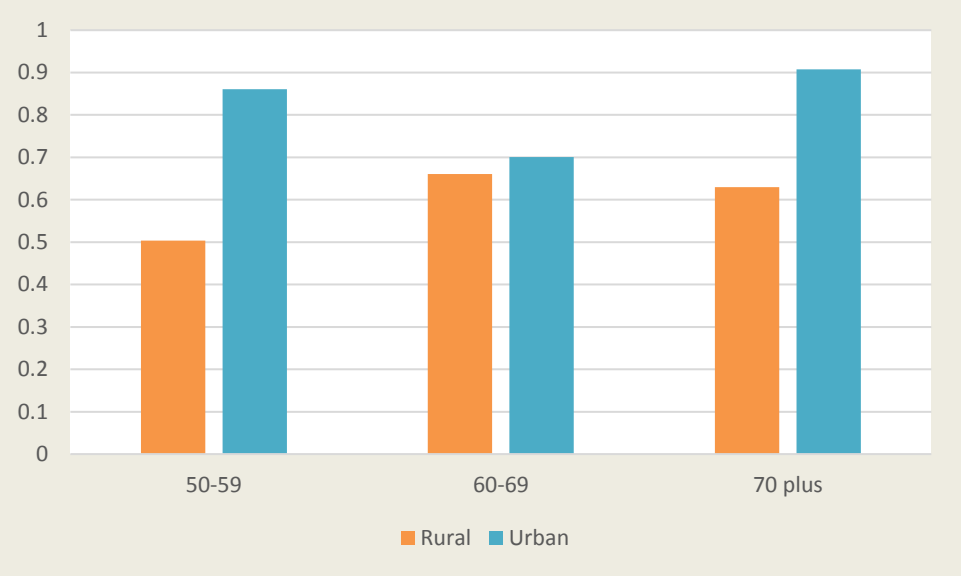
This could be attributed to differences in service quality. In the Upper East and Upper West, accredited NHIS facilities were found to preform best in terms of service quality (NHIA, 2013b). In addition, the Northern region is more underdeveloped compared to other parts of the country. Molini and Paci (2015) used two waves of the GLSS (from 1991 and 2012/2013) and found that the

[17] The regions located in the South of Ghana are: Western, Central, Greater Accra, Volta, Easter, Ashanti and Brong Ahafo.

Northern region has the highest number of poor individuals in Ghana and the region's poverty rate has increased since 1991. In contrast, in the Brong Ahafo and Ashanti regions (where NHIS enrolment is high) the poverty rate has fallen by 20% between 1991 and 2012/2013 (Molini and Paci, 2015).

The final model estimated, model 3, added the characteristics of the individual. This model shows that NHIS insurance coverage increases with age, confirming the results of chapter 5. Interacting age and residence (see Table 6.3) shows that the likelihood of insurance registration was higher for all age groups when living in urban areas. However, the difference in the predicted probability of registering between urban and rural residents was smaller for people aged 50-59 and greater for adults aged 70 plus (see Figure 6.8). Increasing mobility difficulties with rising age form a vital barrier to healthcare and insurance enrolment, especially in rural areas where public transportation networks are limited and the density of healthcare is lower.

Figure 6.8: Predicted probability of NHIS registration among older adults by age and residence



Source: GLSS 2012/2013, author's calculations

Further results highlight that the likelihood of being insured increased when employed in the formal sector. Those with any education were also more likely to be enrolled compared to those without any education. Religious diversity was found to be significant. When looking at the direction of the effect of both religious diversity and ethnic diversity (although the latter does not reach significance), both variables indicated decreasing NHIS enrolment with increasing diversity. Other findings in terms of sex and marital status confirmed the results of the previous chapter. Married older adults were more likely to be enrolled in the NHIS compared to those never married, separated, or widowed. Females were more likely to enrol compared to males. An increasing

enrolment with expenditure was also confirmed. As a robustness check, appendix J uses assets (as in chapter 5) instead of expenditure tertiles, which underlines the findings of this chapter.

Internet usage and suffering disability were not found to significantly influence NHIS registration. That disability status did not significantly influence NHIS registration could be attributed to the disincentive provided by the waiting time before the NHIS card arrives after registration, which is seen as a way to reduce adverse selection.

As mentioned in chapter 4, age heaping is a problem in the GLSS. A sensitivity analysis using different cut-off points for the *age* variable (50-53, 54-57, 58-63, 64-67, 68-73, 73 plus) demonstrates comparable results (see Appendix K). This gives confidence that digit preference in age reporting does not affect the conclusions drawn in this thesis.

Overall, travel time to healthcare facilities explained 5.6% of the between-district variance compared to an intercept-only model. When controlling for spatial and aspatial barriers (model 3), the between district variation in NHIS enrolment was reduced by 49%, although it remains significant. This indicates that the model was unable to explain all the between district differences in NHIS enrolment. However, when applying the local Moran's I test to model 3, it was seen that the model successfully controls for spatial clustering (Moran I statistic = -0.09, p-value = 0.963).

Table 6.3: Odds ratio of NHIS registration among older adults

Variable	Characteristics	Odds Ratio		95% Conf. Interval	
Travel time	≤ 15 min	1.000			
	16 -30 min	0.713		0.434	1.170
	31 – 45 min	0.683		0.414	1.128
	46 – 60 min	0.997		0.575	1.727
	> 1 hour	0.760		0.432	1.333
Region	Greater Accra	1.000			
	Western	1.643		0.946	2.837
	Central	1.024		0.583	1.800
	Volta	2.778	**	1.546	4.992
	Eastern	2.541	***	1.544	4.182
	Ashanti	2.983	***	1.748	5.092
	Brong Ahafo	7.432	***	4.303	12.838
	Northern	2.404	**	1.346	4.293
	Upper East	9.726	***	4.634	20.413
	Upper West	8.884	***	4.417	17.866
Residence	Rural	1.000			
	Urban	1.379	***	1.169	1.628
Diversity	Religious	0.211	**	0.074	5.994
	Ethnic	0.731		0.384	1.391
Hospital in district	No	1.000			
	Yes	1.161		0.848	1.588
Sex	Male	1.000			
	Female	1.708	***	1.535	1.902
Age	50-59	1.000			
	60-69	1.279	**	1.112	1.471
	70plus	2.098	***	1.811	2.431
Disability	No	1.000			
	Yes	1.039		0.851	1.269
Marital Status	Married	1.000			
	Separated/Divorced	0.626	***	0.528	0.742
	Widowed	0.777	*	0.681	0.887
	Never married	0.414	***	0.262	0.653
Household size	Log	1.067	**	0.988	1.152
Internet usage	No	1.000			
	Yes	1.209		0.984	1.486
Employed in formal sector	No	1.000			
	Yes	2.526	***	1.825	3.495
Education	None	1.000			
	Low	1.316	***	1.165	1.486
	Medium	1.674	***	1.302	2.152
	High	2.121	***	1.580	2.848
Expenditure	Poorest	1.000			
	Middle	1.938	***	1.710	2.196
	Richest	2.399	***	2.039	2.822
Residence*Age	Urban*60-69	1.309	**	1.034	1.656
	Urban*70plus	1.480	**	1.146	1.912
N				9,438	

Source: GLSS 2012/2013, author's calculations; *** p<0.001, ** p<00.1 * p<0.05

6.4 Discussion

The aim of the social insurance system in Ghana is to improve access to and utilisation of healthcare by providing affordable healthcare for Ghanaian citizens. While other studies have evaluated demand for the NHIS and its benefits for healthcare usage among adults, the implications of the NHIS for older adults have remained under-researched. There is limited evidence analysing whether the NHIS has been successful in enrolling older adults (Parmar et al., 2014) and this chapter and the previous chapter have begun to fill this gap in the literature.

The analysis presented in this chapter examines spatial and aspatial factors to shed light on key barriers to insurance enrolment among older adults in Ghana. The results of this analysis have both research and political relevance. The analysis combined demographic and geographical methods to examine NHIS coverage in Ghana. The use of geographic information systems provided insight into the geographical distribution of NHIS enrolment. The multilevel model allowed the determination of which individual-level and area-level characteristics influence participation in the NHIS.

The findings of the previous chapter were confirmed in chapter 6. It was found that wealth influences NHIS enrolment positively. This will hinder improvements towards meaningful UHC in Ghana as socioeconomic disparities form a major barrier to healthcare access. Without interventions to ensure that the poorest people can access the NHIS, they will continue face a trade-off between financing needed healthcare and the allocation of recourses for other essentials like food (Blanchet and Acheampong, 2013). To ensure equal access to healthcare among older adults, a lowering of the premium exemption of older adults to an age of 60, the authorised retirement age, is proposed by other researchers (Mba, 2006). As mentioned before, it is unclear whether older adults are aware of the premium exemption at 70 years of age as no studies seemed to have examined this issue (Parmar et al., 2014). Further research on this aspect is needed. Awareness of the NHIS premium exemptions could be improved through increased publicising of the system, potentially at markets or community hubs. Further community trust in the system can lead to the encouragement of community members to join the NHIS.

Social and regional differences presented in this study indicate that NHIS affiliation is influenced by factors that go beyond wealth. The likelihood of being insured increased among older adults when being employed in the formal sector. Although the National Health Insurance Bill made NHIS enrolment mandatory for the formal and informal sector, the large informal sector in Ghana in which average income is often too low to significantly contribute to the NHIS makes sustainable funding of the scheme problematic (Owusu-Sekyere and Bagah, 2014). It is challenging to increase NHIS membership in the informal sector. While employers in public sectors are obligated to ensure NHIS enrolment among their employees, there are no formal operators that verify insurance status

among the self-employed. There is a gap in the literature looking specifically at non-poor people working in the informal sector (Joint Learning Network, 2015). While the NHIS offers incentives for the core poor to enrol (through premium exemption) and for people employed in the formal sector, not much work has been done on improving enrolment for the better off workers in the informal sector (Alfers, 2013, Joint Learning Network, 2015). These groups mainly complain about the 'chaotic' registration process and long waiting times as a main barrier to enrolment (Alfers, 2013). Innovative ways of providing social protection are needed in order to protect informal workers from shocks (Molini and Paci, 2015).

Furthermore, it is well known that religion and culture have a significant impact on beliefs and health practices (Dwumoh et al., 2014). Religion influences the choice of provider and the decision to seek formal care and people tend to be more likely to learn from people of their own religious beliefs than from individuals that are socially more distant. This study indicated that religious diversity negatively influences the decision to enrol in the NHIS. Parmar et al. (2014) showed that a greater social community network increases the likelihood of NHIS enrolment. Osei-Akoto and Adamba (2011) gave evidence that ethnic diversity reduces the uptake of the NHIS. In this thesis ethnic diversity, however, was found to have a non-significant effect. Also Dwumoh et al. (2014) showed that ethnicity does not influence NHIS enrolment but religion does. Religious diversity was expected to have a great influence on the uptake of NHIS in particular among older adults as studies found that religious activities influence the well-being of older adults (Lawler-Row and Elliott, 2009). For the promotion of public health, faith-based institutions in Africa were found to carry an important role at community level (De-Graft Aikins et al., 2010). Hence, great religious diversity makes the promotion of the NHIS in communities through churches more difficult.

For older adults especially, health services need to be physically accessible, as older adults tend to be less mobile than younger adults and are more likely to be bed-ridden making it impossible to travel long distances to seek care. Policymakers need to become more attuned to these risks. Vice President of Help Age Ghana, Edward Ameyibor, has urged the NHIS to react better to the needs of older adults by proving home treatment (Ghana News Agency, 2013). Differences in the provision of services in geographic regions of Ghana were also established. It was found that urban dwellers were more likely to join the NHIS compared to rural dwellers, even when controlling for travel time to healthcare facilities. This could be due to poorer medication stocks, poorer quality of care, and long waiting periods in rural areas (McLaren et al., 2014). Also the poverty rate in rural areas was found to be significantly higher than in urban parts of Ghana (Duku et al., 2013). This again is a particular problem for older adults as they tend to live in rural areas. These barriers need to be removed in order to make further progress in the direction of UHC.

The findings of this chapter call for greater advertising of the scheme and information on how it could benefit these in remote areas. Residential differences in NHIS coverage require a targeted policy response and consideration of innovative insurance devices within schemes, including reimbursed transport for those who live in remote areas. In many lower and middle-income countries, older adults rely on traditional institutions like their family as caregivers, due to a lack of institutional frameworks that successfully manage and define healthcare needs of older adults (Saeed et al., 2015). However, due to the rural-urban migration of younger adults in Ghana, many older adults are left behind in rural areas. In urban areas, the restrictions on physical space provide challenges to living in households with different generations (Beales, 2000).

Overall, this chapter highlights that spatial as well as aspatial characteristics influence NHIS enrolment and that NHIS coverage can only improve when healthcare is available and accessible.

Chapter 7: The Effect of Health Insurance on Healthcare Utilisation

The NHIS aimed to improve the affordability, and most importantly, increase the utilisation of services for those who need care. While the previous chapters analysed correlates of health insurance uptake, whether the NHIS achieved the objective of increasing the use of healthcare services to respond in particular to the needs of older adults remains in question. Inefficient monetary and human resource allocation has been popularly identified as an explanation for reduced potential gains from subsidised insurance coverage in Ghana (Alhassan et al., 2015). Moreover, frequent reports of superior treatment for patients who make instant payments suggest that the effectiveness of the NHIS needs to be examined carefully. It has been found that NHIS patients receive poorer physical examination and report longer waiting times compared to patients who offer cash payments (Dalinjong and Laar, 2012). Policymakers looking to improve the NHIS will be interested in understanding whether the NHIS has indeed witnessed increased use of services as a result of reduced financial barriers.

Evaluating whether the introduction of the NHIS influences outcomes such as healthcare utilisation will help in understanding whether health insurance is an effective tool for the task of improving the equal access to healthcare. Furthermore, such an analysis will aid in understanding whether current strategies to achieve UHC are specifically applicable to older adults. This knowledge is essential for advocates of subsequent policy reform in Ghana, but can act as guidance for developing countries implementing similar insurance schemes to in order to increase access to health services for all.

Since the implementation of the NHIS, mixed interpretations of its success can be found with regard to both its financial sustainability and utilisation of care. According to the NHIA (2013b), the NHIS increased the utilisation of healthcare services. However, the NHIA acknowledge that challenges remain, including equal access to healthcare, poor quality of care and poor availability of services. Determining the impact of the NHIS on older adults is of great importance here. The significant increase in number of older adults in Ghana is associated with a greater need for healthcare and, in turn, the effect of population ageing can have a significant impact on the sustainability of the NHIS.

This chapter looks at the final objective (number four) of this thesis and analyses the value of NHIS coverage with a focus on older adults. In particular, the chapter aims to estimate the impact effect of NHIS membership on healthcare utilisation by analysing the usage of out- and in-patient care

among NHIS members and non-members, focusing on older adults. Previous studies that have analysed the effects of the NHIS, controlling for potential sources of selection bias, have mainly focused on maternal healthcare and restricted their analysis to specified regions (Mensah et al., 2009, Blanchet et al., 2012). Brugiavini and Pace (2016) used the national representative Ghanaian DHS but also focused on evaluating the effects of the NHIS on maternity care.

However, what remains uncertain is whether their findings can be extended to older adults as the healthcare needs of older adults are known to differ from those of younger adults. The NHIS has been popularly criticised in the news for not being responsive enough to the needs of older adults (Ghana News Agency, 2013). Chapter 3 highlighted that homecare, cancer treatment (apart from cervical and breast cancer), hearing aids and psychiatric treatment are not included in the NHIS benefit package. Also, long distances to healthcare facilities (as shown in chapter 6) can be a barrier for less mobile older adults to actually use their desired care. Further, the review of the literature highlighted the current complaints about long queues and waiting times under the NHIS. Older adults are often physically not able to queue for a long time while waiting for care (HelpAge International, 2008). The above mentioned limitations of the Ghanaian health system lead to questioning whether NHIS membership actually improves the usage of healthcare among older adults. Limited research analysing the effect of NHIS coverage in healthcare usage among older adults indicates that older adults with insurance coverage in Ghana have a greater awareness of hypertension compared to uninsured, reflecting a greater usage of services among insured (Lloyd-Sherlock et al., 2012b), however, more evidence is needed to prove the success of the NHIS

Measuring the effect of NHIS coverage on healthcare usage is not straightforward. Bias in measuring the value of NHIS membership can occur when not accounting for differences in characteristics between members and non-members. Thus, in order to examine the value of NHIS coverage methodically, this chapter is organised as followed: to begin with, the methodological approach for this chapter is explained including a definition of the fundamental problem of causal inference and a discussion of methods used to overcome this problem. The following analysis and results section presents findings detailing the effectiveness of NHIS coverage on healthcare utilisation using a propensity score matching (PSM) approach. The final section discusses the results.

7.1 Theoretical Background and Methodical Approach

Measuring the success of the NHIS and understanding the casual treatment effect of NHIS membership on healthcare usage is not straightforward due to self-selection problems. Although under Act 650 it is compulsory in Ghana to be enrolled in a health insurance scheme, in practice the

enrolment is voluntary (Blanchet et al., 2012) meaning it is the individual's own choice to become a member of the NHIS. Thus, differences found in the utilisation of healthcare among NHIS members and non-members could be biased due to differences in personal characteristics that affect enrolment (Mensah et al., 2009). Previous chapters have showed that NHIS members tend to be wealthier, married, more educated and older. It is therefore necessary to control for differences in personal characteristics between insurance and non- insurance holders in order to understand the impact of the NHIS on utilisation. This section discusses methodologies on how to overcome the problem of selection bias.

7.1.1 The Fundamental Problem of Causal Inference

When evaluating any treatment or intervention, the greatest challenge is to determine what would have happened without receiving the intervention (Heinrich et al., 2010), i.e. the counterfactual. Determining what would have happened without receiving the intervention is essential as otherwise it is not possible to evaluate whether the intervention changed participants' behaviour or whether the change would have occurred regardless of the intervention (Heinrich et al., 2010).

Overall, the individual NHIS treatment effect τ_i can be measured as the differences between the potential outcomes in healthcare utilisation $Y_i(D_i)$ in case of NHIS membership $(D = 1)$ and in case of non-membership $(D = 0)$ (Caliendo and Kopeinig, 2008):

(7.1)

$$\tau_i = Y_{1i} - Y_{0i}$$

Where:

$i = 1, \dots, N$

$N = total\ population\ of\ older\ adults$

Please note that it is only possible to observe either Y_{0i} or Y_{1i} but it is not possible to observe them simultaneously as an individual cannot be both enrolled and not enrolled in the NHIS at the same time. Here the 'fundamental problem of causal inference' arises. The 'fundamental problem of causal inference' describes that it is impossible to "observe the outcomes of the same unit in both treatment conditions at the same time" (Heinrich et al., 2010, p. 9). The outcome that it is not possible to observe is referred to as counterfactual outcome.

A suggested solution to overcoming this problem is to use a control group consisting of participants who did not receive the intervention and to compare the mean difference in the outcome between both groups. To obtain non-biased results by comparing the mean between these groups, both groups need to be statistically equivalent, meaning that both groups need to be identical in all characteristics apart from the treatment itself (Heinrich et al. 2010).

In order to find comparable groups, randomisation is key. Random allocation of participants into treatment and control group ensures that the effect of the intervention is not confounded with any other observed or non-observed characteristics (Austin, 2011). Thus, the average difference in the outcome between treatment and control group can be explained by the intervention itself (Heinrich et al., 2010).

Unfortunately, randomisation through an experiment is often not possible, feasible or ethical and raises the question regarding whether it is possible to control for potential selection bias without carrying out a randomised control trial. There is a wide variety of literature available on how to measure the effect of an intervention when using nonrandomised studies (Austin, 2011, Caliendo and Kopeinig, 2008, Heinrich et al., 2010).

Common methods that address the fundamental problem of causal inference are double-difference method and regression discontinuity (Khandker et al., 2009). To determine the treatment effect, the double-difference method takes the differences in outcome before and after the intervention is implemented and compares this difference between the treatment and comparison group (Khandker et al., 2009). Regression discontinuity is used when examining social intervention programmes involving numeric rating that selects candidates for an intervention. A cut-off point is created and everyone falling either below or above this cut-off points receives the treatment (Jacob and Zhu, 2012). Thus, regression discontinuity forms a treatment and control group by comparing those individuals lying closely above or closely below this threshold line (Khandker et al., 2009). Due to the nature of this study, double-difference method and regression discontinuity are not appropriate methods for examining the effect of NHIS coverage. The NHIS was introduced nationwide, giving every citizen the opportunity to enrol in the system which is why it is not possible to apply regression discontinuity. In addition, there is no cut-off point that enables or hinders an individual to be part of the NHIS. The absence of data on healthcare utilisation of individuals before the NHIS was introduced makes it impossible to apply the double-difference method.

Another popular approach is to mimic randomisation through matching methods when randomisation it not actually possible (Khandker et al., 2009). Matching allows one to mimic the features of a randomised control trial by creating a treatment and control group (Austin, 2011) and is seen as an effective method if experimental study designs are not realistic (Peikes et al., 2008).

The idea of matching is to create a control group that is in its observable characteristics as similar as possible to the group that received the intervention (Khandker et al., 2009). This assumes that no unobservable characteristics cause selection bias. When the differences between the intervention and control group are purely based on observable differences, matching allows

determination of the effect of an intervention when actual randomisation is not possible (Khandker et al., 2009).

The literature distinguishes most commonly between two parameters when evaluating the mean impact of an intervention: the population average treatment effect (ATE) and the treatment effect on the treated (ATT) (Caliendo and Kopeinig, 2008, Heinrich et al., 2010).

The ATE is used when estimating the mean effect of an intervention and is defined as "the difference of the expected outcomes after participation and nonparticipation" (Caliendo and Kopeinig, 2008, p. 34) and can be specified as followed (Caliendo and Kopeinig, 2008):

(7.2)

$$\tau_{ATE} = E\,(\tau) = E\,[Y_1 - Y_0]$$

The ATT, in contrast, estimates the specific effect of a treatment on those who received the treatment (Caliendo and Kopeinig, 2008):

(7.3)

$$\tau_{ATT} = E\,(\tau \mid D = 1) = E\,[Y_1 \mid D = 1] - E\,[Y_0 \mid D = 1]$$

As mentioned before, a challenge that arises with the use of non-experimental data is the problem of selection bias. This problem needs to be afforded careful consideration (Caliendo and Kopeinig, 2008). Selection bias occurs when systematic differences between participants and non-participants exist (DiPrete and Gangl, 2004). If characteristics of participants differ systematically from non-participants, bias occurs if those characteristics affect the outcome. In such a case, comparing the mean outcome between both groups would not generate accurate results (Caliendo and Kopeinig, 2008). Selection bias can be created by the intervention programme itself as the programme is often designed for a specific target group. In Ghana for example, the premium exemption for people aged 70 plus leads to a higher self-enrolment among people aged 70 plus compared to other population groups, all other things being equal. In the paper of Caliendo and Kopeinig (2008) the problem of selection bias (marked in red) is indicated as follows:

(7.4)

$$E\,(Y_1 \mid D = 1) - E\,(Y_0 \mid D = 0) = \tau_{ATT} + E\,(Y_0 \mid D = 1) - E\,[Y_0 \mid D = 0]$$

The application of matching approaches has increased significantly in the literature, as, compared to simple regression analysis, matching is a more accurate method for generating causal estimates if the assumptions of conditional independence and common support are fulfilled (DiPrete and Gangl, 2004). Both assumptions are explained in the next section. Matching approaches can correct for self-selection by matching individuals of the treatment and control group on similar characteristics (Caliendo and Kopeinig, 2008) and it allows researchers to reduce the risk of confounding factors affecting the study results (Austin, 2011).

7.1.2 Matching Assumptions

Although the idea of matching might sound straightforward, this approach is based on two assumptions which cannot be neglected (Heinrich et al, 2010). The validity of matching is firstly based on the assumption of conditional independence, meaning that all factors that determine the participation in a programme and the outcome are observed, ruling out the effect of potential unobserved factors (Caliendo and Kopeinig, 2008, Heinrich et al., 2010). This assumption can be noted as followed (Caliendo and Kopeinig, 2008):

(7.5)

$$Y_{0,}\, Y_1 \perp D \mid X$$

where $\perp$ symbolises independence and X a set of covariates which are observable. Thus, when it can be assumed that only observable characteristics influence the decision to participate in a programme, matching is an appropriate method to examine the effects of a programme. However, the assumption of conditional independence is a strong assumption. Bias caused by the effects of unobservable characteristics is also known as 'hidden' bias. There are usually a whole range of covariates that can affect an outcome but a rich dataset reduces the likelihood of hidden bias, adding plausibility to matching approaches. In order to control for different characteristics, a dataset with enough number of cases including the variables that are suspected to have an influence on the outcome must be used. Small datasets would lead to the problem of not having enough units to match (Heinrich et al. 2010, Trujillo et al. 2005).

Secondly, the common support condition must be fulfilled (Caliendo and Kopeinig, 2008):

(7.6)

$$0 < \mathrm{P}\,(\mathrm{D} = 1 \mid X) < 1$$

In the case of this study, the common support condition infers that the probability of being enrolled in the NHIS cannot lie outside the stated interval (zero to one) and that the chance of obtaining the treatment is nonzero for every individual (Austin, 2011). Furthermore, the common support condition requires that there is enough overlap in the characteristics of those who are enrolled in the NHIS and those who are not as otherwise appropriate matches cannot be identified (Heinrich et al., 2010). In the case of PSM, this implies that for the treatment observations there are enough comparison observations that are close to the distribution of the propensity score (Khandker et al., 2009). This raises questions surrounding trade-offs in the dropping of variables if weak or no common support exists, which will be dealt with in more detail in subsequent sections.

Only when both of the above stated assumptions are fulfilled is it possible to make causal inferences on the effect NHIS enrolment on healthcare utilisation.

7.1.3 Propensity Score Matching

The main difficulty of matching is to match on all possible relevant characteristics that exist. This is also known as the problem of dimensionality (Heinrich et al., 2010, Khandker et al., 2009). In order to overcome this problem, Rosenbaum and Rubin (1983) recommend using balancing scores like the propensity score. Balancing scores enables researchers to reduce dimensionality by matching on a single score (Peikes et al., 2008). Using balancing scores goes beyond matching at the mean. Balancing scores are used to balance the distribution of observed characteristics across the treated and untreated. PSM is based on the assumption that "when it is valid to match units based on the covariates *X*, it is equally valid to match on the propensity score" (Heinrich et al., 2010, p.21). This implies that participants who received and did not receive the treatment are comparable when sharing a similar propensity score (Guo and Fraser, 2010).

Thus, the PSM approach reduces the matching process to the propensity score. The propensity score was first introduced by Rosenbaum and Rubin (1983) and is defined as the probability of receiving a treatment based on characteristics X, which all must be observable (Caliendo and Kopeinig, 2005):

(7.7)

$$\mathrm{P}\,(\mathrm{D} = 1\,|X) = P(X)$$

Using PSM enables researchers to estimate the ATT by comparing the mean outcome between those who received the treatment and their matched (non-treated) pairs. Caliendo and Kopeinig (2008) show that by implying that the above-described assumptions (conditional independence and common support) hold, the ATT can be estimated using the propensity score to make causal interfaces (Caliendo and Kopeinig, 2008). The PSM estimator for the ATT (τ_{ATT}^{PSM}) can be defined as "the mean difference in outcomes over the common support, appropriately weighted by the propensity score distribution of participants" (Caliendo and Kopeinig, 2008, p. 36):

(7.8)

$$\tau_{ATT}^{PSM} = E_{P(X)|D=1}\{E[Y_1|D = 1, P(X)] - E[Y_0|D = 0, P(X)]\}$$

Matching has been used in particular to analyse the effect of labour market polices (Lechner, 2002, Heckman et al., 1997, Lechner, 1999) but can be found in many different fields. Ye and Kaskutas (2009) made use of PSM to measure the effectiveness of Alcoholics Anonymous in observational studies and Wyse et al. (2008) examined the effects of small school size on mathematics achievement using PSM. Trujillo et al. (2005) used PSM to evaluate the effects of a subsidized health insurance programme on healthcare usage in Colombia and Gnawali et al. (2009) did similar research for the insurance programme in Burkina Faso.

Looking at the Ghanaian context, Blanchet et al. (2012) evaluated the effect of NHIS coverage on the utilisation of healthcare among women living in Accra using PSM. Mensah et al. (2009) also focused on healthcare usage among children and women in the Upper East and Brong Ahafo region by evaluating the effect of the NHIS in the context of MDG 4 and 5. The work of this thesis goes beyond these two studies and tries to understand the value gain of NHIS coverage for the whole country and sets a particular focus on older adults.

Although PSM has been identified as a popular alternative method to experimental studies, Peikes et al. (2008) showed that PSM did not replicate findings based on experimental designs. Peikes et al. (2008) found that PSM overestimated the effect of an intervention and was even able to show that PSM showed positive intervention effects where results from experimentally derived estimates showed that the intervention indeed had a negative effect. PSM fails if the assumption of conditional independence is invalid and unobservable characteristics determine participation. It is important to note that PSM is used to balance observable characteristics between participants and non-participants; however, the unobservable variables cannot be balanced (Trujillo et al. 2005). If it is suspected that unobservable characteristics influence selection, then the use of instrumental variables is the more appropriate method for producing accurate estimates (Trujillo et al., 2005, Blundell and Dias, 2008).

7.1.3.1 Instrumental Variables

Instrumental variables are used to control 'hidden biases'. The purpose of instrumental variable regression is to correct for *unobserved* heterogeneity. Trujillo et al. (2005), for example, used instrumental variables to predict the effect of health insurance enrolment on healthcare utilisation. The drawback of using instrumental variables is that it is difficult to find appropriate instrumental variables. An instrumental variable is only allowed to correlate with the variable that is estimated to be endogenous, which requires that strong assumptions are made. A poorly chosen instrumental variable again leads to biased results. Furthermore, the correlation between the instrumental variables and the endogenous variables needs to be strong, yet instruments that are classified as random often do not fulfil this condition, resulting in potential small-sample bias (Dunning, 2011). In the example of NHIS coverage on healthcare usage, an instrumental variable must be associated with NHIS enrolment but is not allowed to have a direct effect on healthcare usage. Although it is not possible to rule out that unobservable characteristics influence healthcare utilisation among insurance vis-a-vis non-insurance holders, the use of instrumental variables was not possible. This study failed to find appropriate instrument variables that fulfil the above described conditions and PSM as chosen as the analysis method for this chapter.

According to Heinrich et al. (2010) and Caliendo and Kopeinig (2008), there are four different steps that need to be followed when using PSM: estimating the propensity score, choosing an appropriate matching algorithm, checking for common support and examining the matching quality. All of these steps are discussed below in detail.

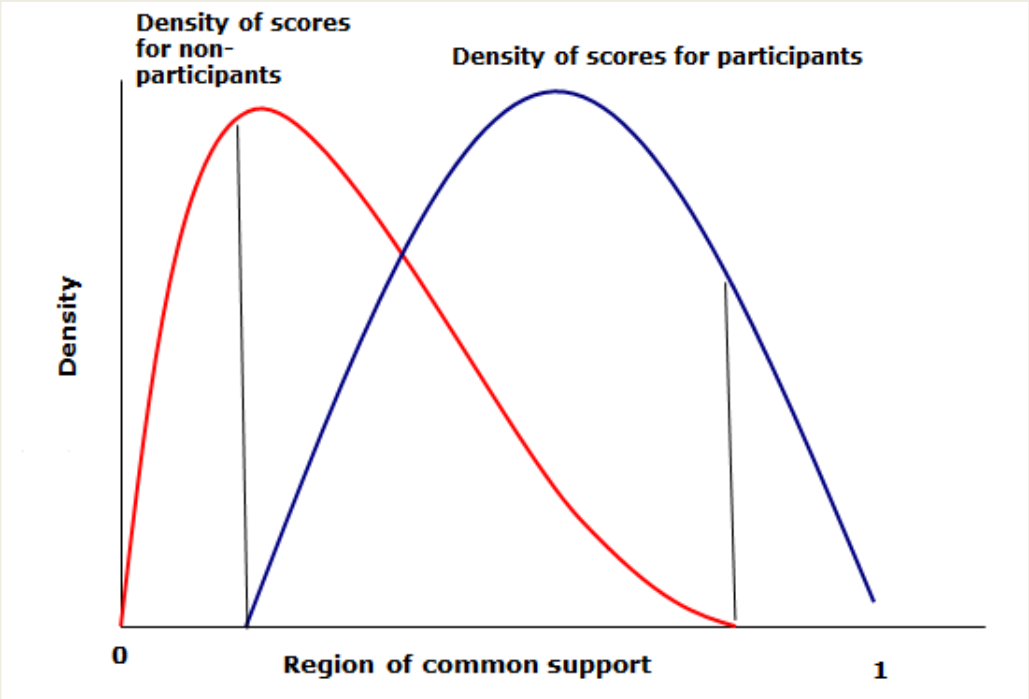
7.1.3.2 Estimating the Propensity Score

To begin with, the propensity score needs to be estimated (Austin, 2011). The propensity score $P\ (X)$ is commonly estimated through logistic regression and is defined as the predicted probability of receiving the treatment (Austin, 2011). Given that the treatment status, here NHIS enrolment, is dichotomous, the use of a logit or probit function was appropriate to estimate the propensity score (Heinrich et al., 2010). There is no preference for one method, as using a logit or a probit function to estimate the propensity score was found to produce similar results (Caliendo and Kopeinig, 2008).

A comprehensive understanding of the research topic is essential to predict the likelihood of participating in an intervention (Caliendo and Kopeinig, 2008). Heinrich et al. (2010) point out that a key issue for PSM is that of identifying those variables that determine participation in a treatment. This is an essential feature of PSM, given the assumptions of conditional independence and, as discussed above, the possibilities for omitted variable bias (Caliendo and Kopeinig, 2008). To fulfil the assumption of conditional independence, it is assumed that all characteristics that influence the NHIS uptake are observable. This assumption and its limitations will be discussed later in more detail.

Given that the true propensity score is unknown, it is important to choose appropriate covariates to estimate the score carefully. Identifying those variables that can cause an imbalance between those who received and intervention and those who did not is the first step when applying PSM (Guo and Fraser, 2010). Failing to balance in covariates would mean that the average healthcare usage of NHIS enrolled and non-enrolled could not be reliably attributed to insurance coverage. The figure below compares the optimal density distribution of the propensity score in a treatment and control group graphically:

Figure 7.1: Demonstration of common support



Source: Adapted from Khandker et al. (2009, p. 57)

The previous chapters provide the baseline for this chapter's analysis as they discussed NHIS enrolment in great detail. The previous chapters identified a great number of control variables associated with NHIS enrolment. However, the previous chapters also illustrate that not all variation in NHIS enrolment can be explained by the fitted models. It cannot be completely ruled out that unobserved individual differences invalidate the assumption of conditional independence. However, tests were applied to check whether the findings of this chapter are still robust even if unobserved individual differences invalidate the assumption of conditional independence.

7.1.3.3 Matching Algorithm

After the propensity score is estimated, the treatment and comparison group need to be matched. The concept of PSM is similar to covariate matching with the only difference being that instead of matching on a set of covariates it is possible to match on only one score (Angrist and Pischke, 2009). As described above, matching on the propensity score allows estimates for the effect of treatment to be obtained (Angrist and Pischke, 2009). The interpretation of the results is the same as that employed in randomised control trials.

Different matching algorithms can be applied to match the treatment group to the non-treatment group using the estimated propensity score (Heinrich et al., 2010). Caliendo and Kopeinig (2008)

provide a summary of the different matching algorithms. The nearest neighbour- radius- as well as Kernel matching are the most commonly used algorithms in the literature (Heinrich et al., 2010) and will be also applied and discussed in this chapter.

Nearest Neighbour Matching

Nearest neighbour (NN) matching is described in the literature as the most straightforward matching approach (Caliendo and Kopeinig, 2008, Heinrich et al., 2010, Austin, 2011). In the light of this study NN matching refers to matching an individual with no NHIS membership to an individual with NHIS membership based on equal propensity score values. When an untreated individual can be used more than once as a match NN matching is carried out 'with replacement', while NN matching 'without replacement' is applied if the untreated individual can only be considered once as a match (Heinrich et al., 2010).

Radius Matching

Radius matching, also referred to as NN matching within a defined caliper distance, is a good alternative to NN matching when failing to find neighbours with the same propensity score (Caliendo and Kopeinig, 2008). Especially when having continuous variables as matching criteria finding exact matches is implausible (Bryson et al., 2002). Radius matching refers to defining a maximum score distance, also known as 'caliper' to match on (Caliendo and Kopeinig, 2008, Heinrich et al., 2010). Specifically, this means that within the defined propensity range the NN is used as a matching partner. The drawback of this method is that it implies a priori knowledge on what tolerance level is appropriate (Caliendo and Kopeinig, 2008).

An extension of caliper matching is the many-to-one radius matching approach. This approach uses not only one but all comparison members within a set radius.

Kernel and Local Linear Matching

Unlike the above matching approaches which only use selected observations of the control group, kernel and local-linear matching uses all (or nearly all) of the individuals in the comparison group to construct the counterfactual outcome (Caliendo and Kopeinig, 2008). Kernel and local-linear matching are defined as "nonparametric matching estimators that compare the outcome of each treated person to a weighted average of the outcomes of all the untreated persons, with the highest weight being placed on those with scores closest to the treated individual" (Heinrich et al., 2010, p. 27). Due to the increased information used, these approaches result in lower variance, however, also in potential poor matches (Caliendo and Kopeinig, 2008).

There is no common agreement on which of the described matching algorithms is the best to use. All of the matching algorithms have their strengths and drawbacks. Thus, Caliendo and Kopeinig (2008) advise the use of different matching algorithms and to compare their outcome to see whether they deliver similar results. This was done in this thesis, with consistency of results providing evidence that any effect observed is an actual effect rather than a statistical artefact.

7.2 Analysis and Results

In order to be eligible for the NHIS benefits package, possession of a valid NHIS card is required. The card enables members to receive the treatment covered under the NHIS free of charge. Therefore, NHIS enrolment was classified (as in chapter 5) by possession of a valid insurance card, and those holders form the treatment group in the analysis. The control group consists of other older adults having no valid NHIS card. The effect of NHIS enrolment was measured using two outcome variables capturing outpatient and inpatient utilisation of healthcare: 1) consultation with a licensed health practitioner in the private or public sector during the last two weeks, and 2) hospitalization in the last 12 months. Both outcome variables are dichotomous and indicate whether or not the respondent received healthcare.

Healthcare utilisation in the sample is summarized in Table 7.1.

Table 7.1: Healthcare utilisation among older adults

	Proportion*	**N**
Consulted a health practitioner	17	1,506
Hospitalised	10	937

**sample weights were applied*

Source: GLSS 2012/2013, author's calculations

It shows that 17% of older adults reported that they consulted a health practitioner in the two weeks prior the survey interview, and 10% spent at least one night in a hospital or a long-term health facility during the preceding 12 months. Table 7.2 differentiates NHIS members and non-members. Here, it can be seen that the mean value of the two outcome variables is significantly higher for NHIS members compared to those without NHIS membership. 20% of members consulted a health practitioner compared to 10% of non-members. The percentage of older adults reporting being hospitalized overnight was also higher among members (13%) compared to non-members (6%).

Table 7.2: Healthcare utilisation by insurance status

	Covered		Not covered		Difference	p-value*
	N	%	N	%		
Consulted a health practitioner	1,114	20	392	10	10	0.000
Hospitalised	692	13	245	6	7	0.000

**p-values based on a simple two-sided t-test*

Source: GLSS 2012/2013, author's calculations

It is important to understand whether the differences described here are biased or not by respondent's characteristics or reflect the true effect of NHIS enrolment. Thus, the results of PSM analysis deliver a more accurate picture of the causal effect of NHIS enrolment on the utilisation of healthcare.

7.2.1 Choosing the Propensity Score

The method section above describes three vital steps when applying propensity score analysis - estimating the propensity score; balancing the sample using different matching approaches; and finally, estimating the effect of NHIS coverage on healthcare usage.

The primary step - the estimation of the propensity score - has to be done with great care. This involves exploring the differences between older adults enrolled and non-enrolled in the NHIS in a wide range of observed characteristics. To estimate the propensity score, the assumption of conditional independence needs to be fulfilled. As described in the previous section, omitting variables that influence both health insurance enrolment and healthcare utilisation can lead to biased results.

It is not always clear what variables should be included when applying matching techniques (Bryson et al., 2002). In order to predict the propensity score accurately, Heinrich et al. (2010) hold that it is essential to include those variables in the analysis that determine programme participation. Further, no variables should be included which lead by default to participation or non-participation. If P(X)=0 or P(X)=1 for values of X, matching would not be possible given that some individuals would always receive a treatment and others would never be eligible for it (Caliendo and Kopeinig, 2008). This scenario constitutes a failure in the assumption of common support, which is an essential condition for PSM.

The literature on estimating the propensity score in cases of uncertainty divides among those who caution against including too many variables and those who are wary of ending up with not enough predictors (Caliendo and Kopeinig, 2008). Bryson et al. (2002) provide strong justifications for the avoidance of over-parameterised propensity score estimation. They argue that including

extraneous variables can exacerbate the support problem. Including non-significant variables in the estimation will not create bias when estimating the score, but it will increase variance. The latter argument is supported by Augurzky and Schmidt (2001). They recommend including only those variables that are highly significant. Rubin and Thomas (1996), however, hold that "unless a variable can be excluded because there is consensus that it is unrelated to the outcome variables or not a proper covariate, it is advisable to include it in the propensity score model even if it is not statistically significant" (p.253).

Previous chapters analysed the determinants of health insurance empirically and theoretically. Understanding those determinants is fundamental to estimating the propensity score correctly. The approach to estimation chosen here is based on the statistical significance uncovered in previous chapters. A variable is kept in the analysis when it is statistically significant at the conventional level. This approach is taken to avoid the problems of increasing variance and aggravation of the support problem through the inclusion of extraneous variables.

In the Ghanaian context, *age* is one criterion that determines eligibility for participation in the NHIS with respect to premium exemptions. The previous chapter showed an increasing likelihood in NHIS enrolment among those aged 70 and over who are exempted from the premium payment. Furthermore, it is important to consider institutional factors when estimating the propensity score. The previous chapter showed how the availability and accessibility of healthcare services influence insurance affiliation. These variables are expected to also influence the utilisation of healthcare. Therefore, travel time to a healthcare facility as well as place of residence and region was included in the model when estimating the propensity score. Only those variables that are expected to significantly influence healthcare utilisation and health insurance enrolment simultaneously are suitable for inclusion in the model when estimating the propensity score.

In addition, the review of the literature showed that *health status* can lead to self-selection into insurance schemes due to greater expected benefits. However, when estimating the propensity score, no variables should be included that can be influenced by the intervention itself (Caliendo and Kopeinig, 2008). Variables that are fixed over time or those measured prior to the intervention taking place can be deemed appropriate for inclusion when estimating the propensity score (Caliendo and Kopeinig, 2008). The GLSS included two questions on the health status of the interviewee. The survey participants were asked if they suffered from any illnesses or injuries in the two weeks prior to the interview and whether they have any serious disabilities which limit their participation in life activities. It can be argued that health insurance enrolment leads to better health and treatment of disabilities due to the greater utilisation of services. To avoid this problem, neither of the two variables were included in the model estimating the propensity score. However,

results including the variable disability[18] (like in the previous chapter) were included in the appendix, which support the findings of this chapter indicating that the findings are robust.

Furthermore, the previous two chapters presented other factors determining health insurance enrolment among older adults. Sex, education, marital status, occupation and expenditure[19] were found to determine uptake of the NHIS significantly. Based on previous research, (Blanchet et al., 2012, Mensah and Oppong, 2007) these factors were also expected to influence the utilisation of healthcare and were therefore included in the estimation of the propensity score.

The means of the characteristics of NHIS members and non-members are presented in Table 7.3. A t-test was applied to test whether there are significant differences between NHIS members and non-members. Overall, the test showed considerable differences in characteristics between those who are enrolled in the NHIS and non-members. Members of the NHIS tend to live closer to a healthcare facility, and in an urban environment. Furthermore, NHIS-members tend to be older, married, better educated, employed in the public sector and wealthier than those without insurance membership. These differences in characteristics show the importance of balancing vital covariates, as the average difference in healthcare utilisation between insurance holders and non-holders cannot otherwise be purely ascribed to NHIS coverage (Mensah et al., 2009).

[18] Like in the previous chapters, health status was measured through the presence of any severe disabilities that limit full participation in life activities.

[19] Expenditure based measurements to measure living standards were most suitable as it is hypothesised that insurance coverage depends strongly on the disposable income that makes the NHIS premium affordable.

Table 7.3: Differences in observed characteristics between NHIS members and non-members

Variable	Characteristics	Enrolled	Unenrolled	Difference	
Travel time	≤ 15 min	4	2	1	***
	16 -30 min	42	38	5	***
	31 – 45 min	38	40	-2	NS
	46 – 60 min	10	12	-3	***
	> 1 hour	6	8	-2	***
Region	Greater Accra	7	10	-3	***
	Western	8	8	-1	NS
	Central	7	12	-5	***
	Volta	11	10	0	NS
	Eastern	13	11	2	*
	Ashanti	11	9	2	**
	Brong Ahafo	11	6	4	***
	Northern	7	15	-8	***
	Upper East	12	9	4	***
	Upper West	14	9	5	***
Residence	Rural	60	70	-10	***
	Urban	40	30	10	***
Sex	Male	50	42	8	***
	Female	58	50	8	***
Age	50-59	42	51	-9	***
	60-69	27	27	0	NS
	70plus	31	23	9	***
Marital Status	Married	65	65	1	NS
	Separated/Divorced	8	11	-3	***
	Widowed	26	23	3	***
	Never married	1	2	-1	***
Employed in formal sector	No	94	98	-4	***
	Yes	6	2	4	***
Education	None	52	57	-5	***
	Low	36	37	0	NS
	Medium	5	4	1	**
	High	7	3	4	***
Expenditure	Poorest	38	51	-13	***
	Middle	35	30	5	***
	Richest	35	30	5	***
N		5,977	3,512		

P-values based on a simple two-sided t-test

Source: GLSS 2012/2013, author's calculations

The aim of creating the propensity score is to create a balanced sample between NHIS members and non-members. The propensity score was estimated using a logit function. The predictor variables entered into the model are based on the considerations discussed in the previous chapter, which identified correlates of NHIS enrolment and are expected to increase utilisation of care. The output is summarised in Table 7.4. The results support the findings of the descriptive results above and the results of chapter 5 and 6 that found older adults who live closer to a healthcare facility,

live in an urban environment, are wealthier, older, married, employed in the formal sector, and are more educated are more likely to participate in the NHIS.

Table 7.4: Logit model of NHIS enrolment among older adults for estimating the propensity score

Variable	Characteristic	Coefficient		95% Conf. Interval	
Travel time	≥ 15 min	1.000			
	16 -30 min	0.620	**	0.445	0.865
	31 – 45 min	0.653	*	0.467	0.914
	46 – 60 min	0.822	NS	0.570	1.185
	> 1 hour	0.633	*	0.434	0.925
Region	Greater Accra	1.000			
	Western	1.915	***	1.452	2.526
	Central	1.200	NS	0.925	1.559
	Volta	2.419	***	1.872	3.126
	Eastern	2.763	***	2.148	3.554
	Ashanti	2.453	***	1.891	3.183
	Brong Ahafo	4.386	***	3.330	5.778
	Northern	1.701	***	1.297	2.231
	Upper East	5.908	***	4.424	7.891
	Upper West	7.809	***	5.834	10.453
Residence	Rural	1.000			
	Urban	1.427	***	1.245	1.637
Sex	Male	1.000			
	Female	1.891	***	1.658	2.158
Age	50-59	1.000			
	60-69	1.495	***	1.301	1.718
	70plus	2.543	***	2.186	2.961
Marital Status	Married	1.000			
	Separated/Divorced	0.621	***	0.510	0.757
	Widowed	0.749	***	0.641	0.876
	Never married	0.401	**	0.237	0.680
Employed in formal sector	No	1.000			
	Yes	0.456	**	0.315	0.662
Education	None	1.000			
	Low	1.408	***	1.223	1.621
	Medium	1.812	**	1.364	2.407
	High	2.537	***	1.852	3.475
Expenditure	Poorest	1.000			
	Middle	1.855	***	1.607	2.142
	Richest	2.297	***	1.924	2.742

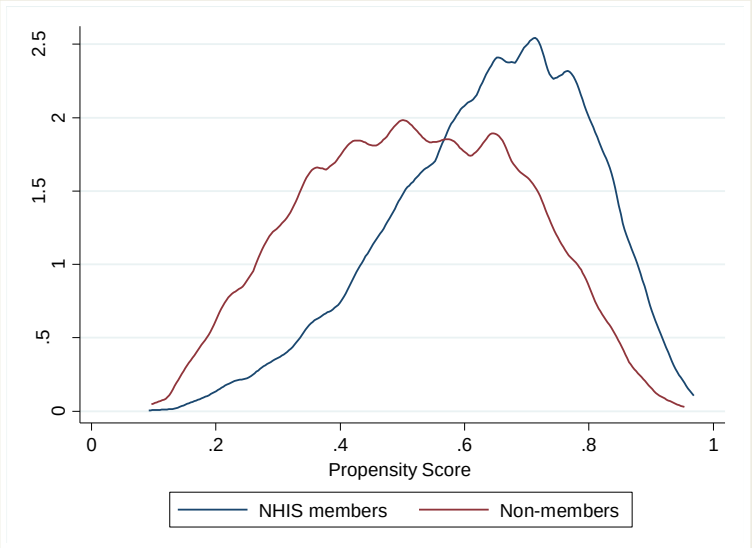
Source: GLSS 2012/2013, author's calculations*** p<0.001, ** p<00.1 * p<0.05

The common support condition needs to be verified in order to check the validity of the PSM (Heinrich et al., 2010) to avoid the fallacy of comparing units on incomparable grounds (Caliendo

and Kopeinig, 2008). If the control and treatment group are very different from one another, finding common support can be a challenging task.

Figure 7.2 visualises the common support for NHIS members and non-members based on the logit model estimated in Table 7.4. It shows a strong common support which provides assurance that applying PSM will create reliable estimates.

Figure 7.2: Test of common support for the logit propensity score estimation



Source: GLSS 2012/2013, author's calculations

7.2.2 Matching Results: Does Insurance Coverage Increase Healthcare Utilisation?

The discussion above indicated that different matching techniques have their strengths and weaknesses. Robustness checks are therefore used to increase the reliability of the results (Heinrich et al., 2010). Using different matching algorithms to estimate coefficients is one way of checking the robustness of the results. Four different matching approaches were therefore applied - namely: NN with replacement, NN without replacement, radius matching and Gaussian kernel matching. In order to choose an appropriate radius, Rosenbaum and Rubin (1985) propose that an appropriate calliper width is a quarter of the standard deviation of the estimated propensity score. The use of different matching approaches ensures a comprehensive understanding of the effect of NHIS coverage on healthcare utilisation. Before applying any of these techniques the data were randomly sorted to remove potential bias in the matching caused by the sorting of the data.

In addition, the significance of the intervention effect was tested. Testing statistical significance and calculating the standard errors can be problematic when applying PSM. As Caliendo and Kopeinig (2008) explain: "the estimated variance of the treatment effect should also include the variance

due to the estimation of the propensity score, the imputation of the common support and in the case of matching without replacement, also the order in which the treated individuals are matched" (p. 51). Thus, the problem lies in additional variation added when different estimation steps are undertaken using PSM (Bryson et al., 2002). Methods used to estimate variance and standard errors when assuming normal sampling variation cannot be applied and alternatives are required. A widely applied method for estimating the standard errors is bootstrapping (Caliendo and Kopeinig, 2008). The bootstrap sample is drawn repeatedly from the original sample with replacement sampling techniques (Austin and Dylan, 2014). Imbens (2004) provides evidence that bootstrapping is expected to create valid confidence intervals as well as valid standard errors for PSM, as the estimators are asymptotically linear. The Stata command *psmatch2* was applied here for the matching and to estimate the effect of NHIS enrolment on healthcare utilisation. Depending on the matching approach, this command allows determination of the nearest available match. Bootstrapping can be applied using the *psmtach2* command. Bootstrapping is a time consuming approach and the error estimates are asymmetrically unbiased which means that there is no guarantee that the estimates are unbiased when using a small (finite) sample (Heinrich et al., 2010). However, given that the GLSS contains a large sample of older adults, the use of bootstrapping seemed appropriate here. 1000 replications were run for each of the different matching approaches.

The propensity score matching results are presented in Table 7.5. Generally, the findings support the hypothesis that NHIS membership increases the utilisation of healthcare. The findings in Table 7.5 support the unconditional differences reported in Table 7.2. When conditioning on observable characteristics for all matching approaches, a positive effect of NHIS enrolment on the utilisation of care was found. In all instances, significant differences were found in inpatient and outpatient care between insured and non-insured.

Table 7.5: Propensity score matching results

		Covered (%)	Not covered (%)	Difference	SE*	p-value
Consulted a practitioner	NN	20.181	11.355	8.827	1.500	0.000
	NN without replacement	19.674	9.999	9.675	0.800	0.000
	Radius**	20.182	11.018	9.164	1.400	0.000
	Kernel	20.182	11.336	8.846	0.900	0.000
Hospitalised	NN	12.580	7.482	5.097	1.200	0.000
	NN without replacement	11.463	6.255	5.208	0.600	0.000
	Radius**	12.580	7.100	5.480	1.200	0.000
	Kernel	12.580	7.839	4.740	0.700	0.000

**Bootstrapped **Imposed calliper width: 0.044*

Source: GLSS 2012/2013, author's calculations

Insured older adults display a greater use of health practitioner consultations and tend to be more likely to be hospitalized than the non-insured. Even when examining the different matching estimates in greater detail, it can be seen that ATT does not vary substantially across the different methods applied. Depending on the matching method, the difference in outpatient care use between NHIS members and non-members ranged from nearly 9% to nearly 10%. NHIS members also tend to use more inpatient care compared to non-members. The difference ranged from nearly 5% to nearly 6%. These findings are in line with the results presented in appendix L, which included the variable disability when estimating the propensity score.

Overall, the use of PSM led to finding a slightly lower impact of the programme than illustrated by the unconditional differences. This impact is considered as more accurate as observable differences in the treated and non-treated were taken into account. A sensitivity analysis of these results is presented below.

7.2.2.1 Balancing of covariates

PSM can only deliver viable estimates and determine causal effects if the balancing of covariates is successfully achieved. Using balancing scores involves conditioning only on a single score instead of conditioning on all covariates. Therefore, it is essential to check the quality of the matching. The matching quality is assessed by evaluating whether it was possible to balance the distribution of observed characteristics across the treated and untreated, using matching procedures (Caliendo and Kopeinig, 2008). This is done by comparing the situation before and after the matching and looking for remaining differences (Caliendo and Kopeinig, 2008). If after conditioning on the propensity score, no differences remain, it can be said that the PSM was fully successful (Caliendo and Kopeinig, 2008). One way to test whether there are significant differences after matching is to use a two-sample t-test. After matching, no significant differences between the control and comparison group should exist (Caliendo and Kopeinig, 2008). Another approach is to compare, before and after the matching, the pseudo-R^2s. After the matching, the pseudo-R^2 is expected to be low, and a high value would indicate poor matching quality (Caliendo and Kopeinig, 2008).

Table 7.6 illustrates good overall matching performance for all four matching approaches. The mean standardized bias should fall under 5% after the matching in order to justify a claim of good balance variables (Grilli and Rampichini, 2011), which is the case in all models. This means that comparable respondents were compared, which is essential to attribute increases in healthcare usage to NHIS coverage. Furthermore, it is shown in Table 7.7 that in all cases after matching, the pseudo-R^2 was found to be low. This is further indicative of a high matching quality (Caliendo and Kopeinig, 2008) as it indicates that the distribution of observed characteristics was successfully balanced among members and non-members.

Table 7.6: Mean standardized bias before and after the matching

	Unmatched	NN	NN without replacement	Radius	Kernel
Consulted a health practitioner	11.000	2.900	4.900	2.900	3.300
Hospitalised	11.000	2.900	4.900	2.900	3.300

Source: GLSS 2012/2013, author's calculations

Table 7.7: Pseudo-R^2 before and after the matching

	Unmatched	NN	NN without replacement	Radius	Kernel
Consulted a health practitioner	0.090	0.004	0.018	0.004	0.005
Hospitalised	0.090	0.004	0.018	0.004	0.005

Source: GLSS 2012/2013, author's calculations

7.2.2.2 Sensitivity Analysis

The application of PSM does not come without limitations. The main limitation of PSM is that only observed confounders can be included when estimating the propensity score. Unobserved omitted variables bias cannot be controlled for using this method. As Blanchet et al. (2012) point out: "some of the observed differences in behaviour may reflect differences in unobservable characteristics rather than a true causal effect of insurance on health seeking behaviour" (p.82). Violation of the conditional independence assumption and hidden bias can result in non-robust matching estimators (Becker and Caliendo, 2007).

Thus, it is of interest to understand "how strongly an unmeasured variable must influence the selection process in order to undermine the implications of the matching analysis" (Becker and Caliendo, 2007, p.2). Mantel-Haenszel test statistics can determine how much positive or negative hidden bias is necessary for an unobservable factor to affect the ATT significantly. Such a sensitivity analysis of the ATT helps to recognize the strength of the results above presented. In Table 7.8 and Table 7.9, the outcomes of the Mantel-Haenszel bounds tests for Γ=1 (no hidden bias) to Γ=1.5 are presented. The results illustrate that, even when an unmeasured variable increases or decreases the odds of NHIS enrolment by as much as 50% (Γ =1.5), the ATT on consulting a health practitioner or visiting an inpatient facility still is significant. This validates the above findings.

Table 7.8: Mantel-Haenzel bounds for outcome: consulted a health practitioner

	NN				**NN with replacement**				**Radius**				**Kernel**			
Gamma (Γ)	Q_{mh+}	Q_{mh-}	P_{mh+}	P_{mh-}	Q_{mh+}	Q_{mh-}	P_{mh+}	P_{mh-}	Q_{mh+}	Q_{mh-}	P_{mh+}	P_{mh-}	Q_{mh+}	Q_{mh-}	P_{mh+}	P_{mh-}
1	8.35	8.35	0.00	0.00	12.04	12.04	0.00	0.00	7.83	7.83	0.00	0.00	13.30	13.30	0.00	0.00
1.1	7.30	9.42	0.00	0.00	10.54	13.55	0.00	0.00	6.76	8.90	0.00	0.00	11.71	14.90	0.00	0.00
1.2	6.35	10.40	0.00	0.00	9.20	14.94	0.00	0.00	5.80	9.90	0.00	0.00	10.27	16.39	0.00	0.00
1.3	5.49	11.32	0.00	0.00	7.96	16.24	0.00	0.00	4.92	10.83	0.00	0.00	8.96	17.77	0.00	0.00
1.4	4.69	12.18	0.00	0.00	6.83	17.46	0.00	0.00	4.12	11.69	0.00	0.00	7.76	19.06	0.00	0.00
1.5	3.96	12.99	0.00	0.00	5.78	18.60	0.00	0.00	3.37	12.51	0.00	0.00	6.64	20.28	0.00	0.00

Q_{mh+} : Mantel-Haenszel statistics (assumption: over-estimation of treatment effect); Q_{mh-} : Mantel-Haenszel statistics (under-estimation of treatment effect); p_{mh+}: significance level; p_{mh-}: significance level

Source: GLSS 2012/2013, author's calculations

Table 7.9: Mantel-Haenzel bounds for outcome: hospitalization

	NN				**NN with replacement**				**Radius**				**Kernel**			
Gamma (Γ)	Q_{mh+}	Q_{mh-}	P_{mh+}	P_{mh-}	Q_{mh+}	Q_{mh-}	P_{mh+}	P_{mh-}	Q_{mh+}	Q_{mh-}	P_{mh+}	P_{mh-}	Q_{mh+}	Q_{mh-}	P_{mh+}	P_{mh-}
1	7.81	7.81	0.00	0.00	12.04	12.04	0.00	0.00	7.88	7.88	0.00	0.00	13.29	13.29	0.00	0.00
1.1	6.75	8.89	0.00	0.00	10.55	13.55	0.00	0.00	6.82	8.96	0.00	0.00	11.70	14.89	0.00	0.00
1.2	5.79	9.89	0.00	0.00	9.20	14.94	0.00	0.00	5.86	9.95	0.00	0.00	10.26	16.38	0.00	0.00
1.3	4.91	10.81	0.00	0.00	7.97	16.24	0.00	0.00	4.98	10.87	0.00	0.00	8.96	17.76	0.00	0.00
1.4	4.11	11.68	0.00	0.00	6.83	17.46	0.00	0.00	4.18	11.74	0.00	0.00	7.75	19.06	0.00	0.00
1.5	3.36	12.50	0.00	0.00	5.78	18.60	0.00	0.00	3.43	12.56	0.00	0.00	6.64	20.27	0.00	0.00

Q_{mh+} : Mantel-Haenszel statistics (assumption: over-estimation of treatment effect) Q_{mh-} : Mantel-Haenszel statistics (under-estimation of treatment effect); p_{mh+}: significance level; p_{mh-}: significance level

Source: GLSS 2012/2013, author's calculations

7.2.3 Equity in the Value Gain of Insurance Coverage

Progress towards universal health coverage can only be fully assessed when taking an equity dimension into consideration (Neal et al., 2015, WHO and The World Bank, 2014). Measurements of improvements in UHC should be disaggregated by place of residence, gender and living standard (household income, expenditure, or wealth) (WHO and The World Bank, 2014). The previous chapter already highlighted inequalities in the access to healthcare. Wealth, sex and place of residency were found to have a significant influence on enrolment in the NHIS.

The utilisation of healthcare can be unequal, even in the case of equal opportunities to access healthcare when needed (Oliver and Mossialos, 2004). Thus, the principles of equity not only cover equal access to healthcare but also equal utilisation of health (Oliver and Mossialos, 2004). This thesis estimates the value gain of NHIS coverage between the aforementioned equity groups. In so doing, it goes beyond the work of Blanchet et al. (2012) and Mensah et al. (2009) whose previous research measured only the overall benefit of NHIS coverage on healthcare utilisation without considering the equity dimension.

The previous chapter highlighted disadvantages in NHIS coverage among the poor, and rural residents. NHIS uptake was found to be greater in urban areas than in rural areas due to the better availability, accessibility, and quality of care. Furthermore, wealthier older adults were found to be more likely to enrol in the NHIS due to the better affordability of premium payments (Alfers, 2013). Looking at gender, social security is particularly important for women in old age as traditional gender divisions and unequal access to capital exacerbates poverty among older women. Women have a lower probability of being entitled to social security in the form of pensions as they tend to have carried out unpaid work such as family care (United Nations Economic Commission for Europe, 2009). As highlighted in the previous chapters, the opportunity for women to enrol in the NHIS can contribute to greater usage of care as they do not have to ask for monetary household resources once enrolled.

The unconditional means of healthcare usage by residence, expenditure, and sex are presented in Table 7.10. The figures show significant differences in the usage of inpatient and outpatient care among members and non-members based on all three variables. Again, these differences can be biased due to differences in characteristics between members and non-members, which means that the PSM results are likely to be more accurate.

Table 7.10: Unconditional means of healthcare usage by residence, expenditure and sex in percentage

	Consulted a health practitioner (%)		Sample size	Hospitalised (%)		Sample size
Rural						
Covered	20		3316	13		3,315
Not covered	10		2757	6		2,753
Difference	10	***		7	***	
Urban						
Covered	20		2198	13		2,192
Not covered	10		1167	8		1,997
Difference	10	***		5	***	
Poor						
Covered	16		2087	11		2,086
Not covered	9		2001	5		2,013
Difference	7	***		6	***	
Middle						
Covered	23		1900	15		1,897
Not covered	12		1165	7		1,162
Difference	11	***		8	***	
Rich						
Covered	23		1527	11		1,524
Not covered	11		758	8		758
Difference	12	***		3	*	
Male						
Covered	17		2339	12		2,334
Not covered	9		1971	5		1,968
Difference	9	***		7		
Female						
Covered	22		3175	13		3,173
Not covered	11		1953	7		1,949
Difference	11	***		6	***	

**p<0.05, **p<0.01, ***p<0.001 based on a simple two-sided t-test*

Source: GLSS 2012/2013, author's calculations

When comparing healthcare usage across the place of residence, a positive impact of NHIS coverage on attaining healthcare can be observed in urban as well as rural areas (see Table 7.11). However, those living in rural areas tend to have *the greater gain* in NHIS membership compared to urban dwellers when seeking care. Depending on the matching technique, the difference in inpatient care between insured and uninsured ranged from 5% to over 6% in rural areas. In urban areas, the difference in inpatient care utilisation between NHIS members and non-members was between 2% and 3%, and only when using the kernel matching approach was this difference found to be significant. For all other matching techniques, the usage of inpatient care in urban areas was not found to be significantly different between insured and non-insured. This is in line with the findings

of Gnawali et al. (2009) who also found no significant difference in the usage of inpatient care between members and non-members of the community health insurance scheme in Burkina Faso.

The finding of no significant difference in urban areas could be due to the higher concentration of healthcare by the Ghanaian Health service and the greater availability of hospitals in urban areas (Makinen et al., 2011). NHIS enrolment was found to encourage the use of public facilities provided by the Ghanaian Health Service (Makinen et al., 2011). The review of the literature highlighted increased general use of healthcare in urban areas compared to rural areas, regardless of insurance status. The results suggest that if urgent care (hospital treatment) is needed, older adults will make use of these services if available even without insurance enrolment. The affordability of hospitalisation and other expensive surgical treatment is especially limited in rural areas where incomes tend to be lower than in urban areas. For this reason, insurance in rural areas is seen as a way to make treatment affordable (Aggarwal, 2010).

Looking at outpatient-use, the difference between NHIS members in rural and urban areas was similar. This could be due to a greater availability of outpatient care services at the community level while inpatient care services tend to be administered at the district level and tend to be available in central urban environments.

Table 7.11: PSM results by place of residence

		Rural			**Urban**		
		Difference	SE*	p-value	Difference	SE*	p-value
Consulted a practitioner	NN	7.755	2.000	0.000	11.278	1.980	0.000
	NN without replacement	10.485	0.700	0.000	7.883	1.500	0.000
	Radius**	7.755	2.000	0.000	10.045	2.000	0.000
	Kernel	8.267	1.100	0.000	9.947	1.400	0.000
Hospitalised	NN	4.920	1.500	0.001	2.976	2.000	NS
	NN without replacement	6.393	0.800	0.000	2.405	1.200	NS
	Radius**	6.068	1.500	0.000	3.343	2.000	NS
	Kernel	5.928	0.800	0.000	3.336	1.500	0.021

**Bootstrapped ** Imposed caliper width rural: 0.046 urban: 0.045*

Source: GLSS 2012/2013, author's calculations

In order to fully understand the benefit of NHIS coverage, the value of NHIS coverage among different expenditure groups was measured. Johnson et al. (2015b) show that the NHIS premium exemption for pregnant women mainly benefits the rich by improving uptake of skilled birth care and to a lesser extent the poor. Table 7.12 shows a positive effect of NHIS coverage among all expenditure groups was found conditional on all observable characteristics. Keeping all observable factors constant, among those in the poorest expenditure tertile the use of outpatient healthcare

services was between nearly 6% and 9% more likely when enrolled in the NHIS. The richest individuals, however, were up to 14% more likely to consult a health practitioner when enrolled, compared to their non-enrolled counterparts. This indicates that richer individuals benefit most from NHIS membership when looking at outpatient care. This is in line with findings in Burkina Faso (Gnawali et al., 2009) where a higher usage of outpatient care was found among the richest members. It indicates that holding health insurance alone is not enough to ensure equal access to healthcare and that barriers to admission to healthcare services go beyond simple conceptions of monetary affordability. Indirect economic healthcare costs, such as long waiting times, loss of earnings when seeking care, or travel costs, can reduce the usage of healthcare even when it is free of charge (Besley, 1989).

Most remarkably, there is no significant difference in the usage of inpatient care services over the last 12 months between the richest enrolled and non-enrolled older adults. This shows that when it comes to attending a hospital, rich older adults will use the services, regardless of insurance status. In contrast, poorer enrolled older adults were up to 6% more likely to have stayed in a hospital overnight when they were enrolled.

Overall, these findings illustrate that once enrolled in the NHIS, the benefits differ by wealth. The NHIS was unsuccessful in equalising the usage of care once enrolled. This is an important message arising from the analysis as wealth was also found to be a significant determinant of choosing to be enrolled in the NHIS.

Table 7.12: PSM results by expenditure

		Poor			Middle			Rich		
		Difference	SE*	p-value	Difference	SE*	p-value	Difference	SE*	p-value
Consulted a practitioner	NN	8.737	2.500	0.007	10.063	2.200	0.000	14.089	2.300	0.000
	NN without replacement	8.495	2.600	0.044	11.674	1.500	0.000	10.554	1.900	0.000
	Radius**	7.777	2.600	0.003	10.805	2.110	0.000	11.730	2.200	0.000
	Kernel	5.552	11.400	0.000	9.808	1.600	0.000	11.932	1.800	0.000
Hospitalised	NN	5.715	2.000	0.004	6.950	1.800	0.000	1.970	2.100	NS
	NN without replacement	6.159	0.800	0.000	6.454	1.300	0.000	0.923	1.400	NS
	Radius**	4.433	2.000	0.029	6.419	1.900	0.001	1.051	2.200	NS
	Kernel	5.648	0.900	0.000	5.905	1.400	0.000	1.774	1.600	NS

**Bootstrapped , ** Imposed caliper width poor/middle 0.045, rich: 0.041*

Source: GLSS 2012/2013, author's calculations

Finally, the differences in impact of NHIS coverage between males and females was assessed. Table 7.13 illustrates benefits in the utilisation of outpatient and inpatient services among males and females. Depending on the matching technique, enrolled males were between 6% and 8% more likely to use outpatient care services compared to their unenrolled counterparts and around 5% more likely to use inpatient care service. For women, the likelihood of using outpatient care services increased by over 11% when they were enrolled but interestingly only by over 4% when measuring whether they have stayed overnight at a hospital.

Table 7.13: PSM results by gender

		Male			Female		
		Difference	SE*	p-value	Difference	SE*	p-value
Consulted a practitioner	NN	6.295	2.000	0.001	10.752	2.000	0.000
	NN without replacement	8.067	1.100	0.000	11.008	1.200	0.000
	Radius**	7.066	2.000	0.000	10.753	2.000	0.000
	Kernel	7.552	1.100	0.000	9.957	1.200	0.000
Hospitalised	NN	5.265	1.600	0.000	4.177	1.600	0.015
	NN without replacement	5.502	0.800	0.000	3.171	1.000	0.000
	Radius**	4.487	1.600	0.000	4.000	1.700	0.002
	Kernel	5.010	1.000	0.000	3.265	1.700	0.001

**Bootstrapped, ** Imposed calliper width male 0.047, female: 0.043*

Source: GLSS 2012/2013, author's calculations

It is important to note that the matching in these models was found to be of a lower quality when compared to the full model. The standardized bias after the matching was not reduced to lower than 5% in all cases (see Table 7.14). However, for all models at least one matching approach performed well and the similar results across the different matching techniques give confidence in the results. Using different matching techniques illustrated the lower and upper effect of the NHIS coverage on healthcare usage. Overall, the NN without replacement method reduced the mean standardized bias after the matching the least. This indicates that this matching method may be too restrictive; meaning that too many participants were omitted from the common support area.

Table 7.14: Mean Standardized bias before and after the matching by place of residence and age group

			Unmatched	NN	NN without replacement	Radius	Kernel
Residence	Rural	Consulted a health practitioner	10.90	2.90	6.90	2.70	2.10
		Hospitalized	10.90	2.70	5.70	2.70	2.10
	Urban	Consulted a health practitioner	10.40	5.50	2.30	5.50	3.00
		Hospitalized	10.40	5.50	2.30	5.50	3.00
Expenditure	Poor	Consulted a health practitioner	11.90	2.50	10.50	1.60	2.60
		Hospitalized	11.90	2.50	10.50	2.50	2.90
	Middle	Consulted a health practitioner	11.00	3.00	4.40	3.90	3.50
		Hospitalized	11.00	3.90	4.30	3.90	3.50
	Rich	Consulted a health practitioner	10.40	3.50	4.20	3.50	3.40
		Hospitalized	10.40	3.50	4.20	3.50	3.40
Gender	Male	Consulted a health practitioner	11.70	3.60	7.60	3.60	4.70
		Hospitalized	11.30	3.60	5.10	3.60	5.50
	Female	Consulted a health practitioner	10.50	3.30	3.70	3.30	2.40
		Hospitalized	10.70	2.40	3.50	2.40	2.40

Source: GLSS 2012/2013, author's calculations

7.3 Discussion

The effectiveness of the NHIS has to be evaluated with great care. The previous chapters highlighted characteristics which predispose individuals to joining the NHIS. Variables like wealth, age, education, residence or marital status were associated with NHIS enrolment. These predispositions create selection bias and can act as confounders of analyses of NHIS effectiveness. Randomisation would control for this selection bias, however, the nationwide right to use the NHIS makes the use of randomised control trials impossible. In order to evaluate the success of the NHIS, other measurements had to be taken into consideration. The statistical propensity score matching approach was applied in order to understand the effect of NHIS coverage on the usage of healthcare. In the context of this study, PSM is an operative measure to balance two groups (enrolled and unenrolled) based on observed confounders. Matching the participants on a similar propensity score allowed adjustment for predisposition to join the NHIS, making the two groups comparable. There is no single best technique to match participants which is why four different methods where applied, all of which show similar findings and suggest robustness in the results.

This analysis indicates that NHIS coverage indeed increased the usage of healthcare, however, the estimates based on the PSM indicate that there is a smaller effect of NHIS coverage on healthcare utilisation than when comparing the simple mean differences of members and non-members. Generally, the results show that being enrolled in a health insurance scheme increases the likelihood of receiving outpatient and inpatient care as intended by the NHIS when first established. However, important differences in the value gain of membership were uncovered. While differences by wealth status and sex were demonstrated, the different effects among urban and rural Ghanaians is especially remarkable.

The results in this chapter indicate that richer older adults benefit most from insurance coverage when using outpatient care. In order to improve access towards UHC, efforts need to be undertaken to improve enrolment of the NHIS to cover all Ghanaians. As shown in the previous chapters, the often substantial costs of enrolment itself forms an important obstacle to NHIS membership. Thus, efforts need to be made to identify the core poor better and the lowering or abolishing of registration fees for this group needs to be (re-)considered. Currently, enrolment is not entirely free as a registration fee is charged even for those who qualify for the premium exemption. More research is needed to determine the average registration fee in a region or district to understand whether registration costs form significant further hindrance to enrolment and whether these costs can be centrally funded. The literature so far mainly focuses on premium payment without considering the effect of the registration fee.

Meanwhile, debates continue as to whether the NHIS is unfair as well as inefficient (Averill and Marriott, 2013). Reforms are necessary as the NHIS is fearing bankruptcy and is increasingly struggling with the reimbursement of payments (Saleh, 2013, Witter and Garshong, 2009). Achieving a wide population coverage with a relatively comprehensive benefits package is challenging in light of the limited funding the NHIS is receiving (Witter and Garshong, 2009). This makes it is essential for the NHIS to target the poorest and most vulnerable people first to ensure a fair allocation of recourses. The findings of this chapter and the previous chapter show that rich older adults are more likely to enrol in the NHIS compared to poor older adults. But the analysis also found that the usage of inpatient care among the richest does not increase when they are enrolled in the NHIS. Rich people will access healthcare regardless of insurance. The latter finding taken with the others detailed above shows that health funding is swallowed by payments for care for rich patients who could otherwise afford to pay out of pocket, at the expense of poorer Ghanaians who cannot afford to enrol or access care. That money could be better distributed to ensure equal access to care among the poorest people. This raises the normative question as to whether the NHIS should be free for all older adults in light of limited funding. Several districts in Ghana experience deficits (Makinen et al., 2011). One possible solution to the problem of funding distribution would be to reconsider the premium exemption for older adults aged 70 plus. On the basis of the findings presented above, it is advised that the premium exemption should be expanded among the poorest and abolished among the richest, regardless of age. This would require expanding the already existing income-scaled premium payment system and ensuring a more authentic application. The current problems with implementing the scaled premium payment in practice show that this might not be a realistic target. In addition, the income from the premium payments is minor and thus improved tax collection and economic growth is needed in order to improve NHIS funds (Garshong and Akazili, 2015).

As discussed above, this thesis indicates that the removal of financial barriers when enrolling in the NHIS is not sufficient for ensuring equal usage of care. The findings clearly show that more measures have to be taken to guarantee full benefits of the NHIS to poor older adults once enrolled. Even when covered under the NHIS, the expectation of informal payments can hinder poorer individuals from making use of services. The review of the literature illustrated an increase in informal payments due to the financial difficulties of the NHIS. On top of this, transport costs are not covered under the NHIS, which can limit poor people's access to services.

The previous chapter signposted that availability and physical accessibility are important determinants of NHIS enrolment. The differences in the value gain of NHIS membership by residence indicate that geographic accessibility needs to be advanced, particularly in rural areas, in order to improve NHIS membership. Accessing an NHIS card in rural areas is challenging as the

distribution of cards is administered at district level. However, importantly, the results of this study show that once enrolled, the value gain is particularly high in rural areas. This could be attributed to services becoming available free of charge at a community level once enrolled, particularly since the NHIS augmented its facility accreditation including among the CHPS facilities. In rural areas, the CHPS are the main service provider (Makinen et al., 2011). Generally Ghana is prioritizing basic healthcare at lower community levels through the CHPS and reserving higher level facilities for specialised care (NHIA, 2013b). CHPS were found to perform better than clinics in terms of service quality (NHIA, 2013b). This indicates that services may remain underused when not having an insurance card. Up to date data are needed to assess whether the recently introduced biometric registration improved enrolment in rural areas. Insurance cards gained through biometric registration are placed in client's hands immediately, which may encourage people to travel to the district offices to enrol.

The previous chapter further claimed that NHIS enrolment can be seen as an instrument for improving women's usage of healthcare. As argued before, NHIS enrolment can act as a tool to narrow gender-related discrimination in access to healthcare. In Ghana, the decision-making power for allocating funds from the household budget for healthcare often lies with the male household head who tends to control access to and allocation of household resources (Tolhurst et al., 2008). The findings of this chapter show that women tend to benefit from NHIS enrolment more than men when it comes to the usage of outpatient care. Once enrolled at district offices, outpatient care services become freely available at the more accessible community level. Enrolled women were 11% more likely to use outpatient care services compared to non-enrolled. Enrolled males were between 6% and 8% more likely to utilise outpatient services compared to their unenrolled counterparts. Dou et al. (2015) used the SAGE to examine healthcare usage among older adults with cardiovascular disease in China and they confirmed a higher outpatient care usage for older women compared to older men. Peltzer et al. (2014) examined healthcare utilisation in the six countries the SAGE was conducted in and concluded that compared with men, women were more likely to use outpatient care.

The difference in the utilisation of inpatient care between enrolled and non-enrolled women is less extensive. Inpatient care services are only available at district level. This means that women still depend on money to travel to a healthcare facility for inpatient care - money which, in many households, is controlled by the men. Evidence in the literature of gender differences in seeking inpatient care is contradictory. Dou et al. (2015) found no significant difference in the usage of inpatient care between older men and women. Peltzer et al. (2014) showed older women were less likely to utilise inpatient care compared to older men.

Although the results in this chapter suggest that insurance coverage increases the usage of healthcare, it has to be noted that a social health insurance system alone is not sufficient to move towards UHC. Findings in this chapter highlight a higher service utilization of insured compared to non-insured but that the general utilisation of care is low. The WHO (2015b) argues that "in populations with poor or suboptimal health infrastructure, the service utilization rate is an indicator of access". Based on the WHO (2015b) guidelines the target for outpatient service utilisation is 5 outpatient visits per capita per year and 10 hospital discharges per 100 population per year. Kowal et al. (2012b) used the World Health Survey to examine the utilisation of healthcare in different countries and reported that "a far smaller proportion of respondents in low income countries access health care services compared to those in high income countries (15% vs 33% for inpatient care; 55% vs 69% for ambulatory care)". Kowal et al. (2012b) estimated that "approximately 1 in 3 respondents used inpatient health care services in the last five years in high income group versus 15% in the low income group". In Ghana only 10% of non-insured older adults and 20% of NHIS members consulted a health practitioner in the last two week prior the interview and 6% of non-insured and 13% of insured older adults reported being hospitalised overnight. In other words, any gains in utilisation of care observed in Ghana start from a very low baseline.

Chapter 2 and 3 highlighted that the general quality performance of healthcare facilities in Ghana was found to be poor. Ghana has been criticised for the low priority given to improvements in health infrastructure. The availability of drugs were found to be low and Ghana lacks skilled health professionals. Moreover, even with insurance coverage, informal payments were still reported. This could lead to a low usage of care even among insured. Further qualitative research would provide a more detailed understanding of the reasons for low healthcare usage, particularly among older adults in Ghana. Mensah et al. (2009) point out, in the long run, health insurance can only improve healthcare efficiently when a consistent infrastructure exists, including well-located facilities, the provision of well-organized healthcare providers, as well as a good functioning and efficient administration. Further research is needed to also examine the long-run effect of NHIS coverage on health outcomes to fully understand the long term gains of the system. This thesis assumed that with improving medical access, the health status of older adults will improve as well. Even though the NHIS improves access to an extent, that alone does not necessarily demonstrate the success of the NHIS.

Looking at survey limitations, the GLSS only captures outpatient healthcare usage in the last two weeks prior to the interview. Participants who used outpatient care services at any other time are therefore excluded from the PSM analysis in chapter 7. Further research should investigate whether similar results can be found when considering healthcare usage over a longer period of time.

Taken together, the findings of this chapter and the findings of the previous chapter indicate that the Ghanaian government needs to remove many kinds of barriers that limit access to healthcare in order to move towards UHC. The NHIS does improve access to care but inequalities in service usage still remain. This means that the government should consider alternative methods for improving equal utilisation of healthcare beyond a simplistic lowering of financial barriers though insurance. The provision of services needs to be improved and the allocation of limited recourses must be prioritised in a way that favours improvement of coverage among the poorest. In addition, the NHIS has been criticised for not being responsive enough to the healthcare needs of older adults. In order to meet the challenges of population ageing, the healthcare system in Ghana will need to expand in line with the specific needs of older adults due to a rising burden of non-communicable diseases.

Chapter 8: Discussion and Conclusion

Population ageing in Africa is occurring rapidly (United Nations, 2015a), yet older adults have been marginalized by health policies , with attention focusing on maternal and child health largely driven by the health related MDGs (Lloyd-Sherlock, 2005). Population ageing is associated with an increasing demand for healthcare meaning that healthcare systems in low and middle-income countries need to respond now to the increasing number of older adults. This is essential to ensure that older adults enjoy healthier longevity free from unnecessary morbidity.

Essy (2003) points out with reference "to the usual physical, mental and physiological changes associated with ageing, old people in Africa are particularly disadvantaged due to lack of social security for the everyday social and economic needs" (p.5). Only a small percentage of older adults in Sub-Saharan Africa benefit from social security and receive a pension (Faye, 2007) and increasingly, older adults have to survive on their personal income sources due the decline in traditional family support which makes the provision of social security essential for older adults (Apt, 2012). The United Nations (2002) summarises that several factors have an effect on the safety net for older adults including urbanization, migration as well as the shift from extended to smaller families. Financial risk protection when seeking healthcare is a key element of UHC, which aims to ensure that all people can obtain needed healthcare.

Ghana has been selected as a case study in this thesis due to its rapidly ageing society and its history of health reforms. It introduced a comprehensive social insurance scheme aimed at providing affordable healthcare to all. Specifically, this thesis focuses on the crucial case of the Ghanaian NHIS; first implemented in 2005. The NHIS in Ghana has been described as the most important driver towards UHC in the country (Blanchet and Acheampong, 2013).

The thesis had four main objectives, all aimed at providing evidence for health authorities and policymakers on NHIS enrolment and its effect on healthcare usage among older adults, so that the healthcare system in Ghana can be reformed to adjust to an increasingly ageing population.

Specifically, research in the thesis has examined the quality of available surveys that measure insurance coverage in Ghana. This thesis further analysed the correlates of NHIS enrolment among younger and older adults by applying different advanced statistical techniques utilising large-scale survey data. Finally, the thesis inspected the impact of NHIS enrolment on healthcare utilisation among older adults. By focusing on an improvement in older adults' usage of healthcare, it is expected that the health outcomes for older adults will improve in the long run.

Findings of this thesis illustrate that the opportunity to carry out research with a focus on older adults is still limited due to the restricted availability of surveys that sample this population group. Analysis of literature and data sources highlights a paucity of information on this important group in general, and specifically in Ghana. The only two nationwide surveys that focus on older adults and insurance coverage in Ghana are the SAGE and GLSS. The SAGE includes a large breadth of information for research on health status among older adults. The GLSS is more suitable when carrying out research on insurance affiliation due to its detailed questionnaire on this topic. Comparison of the different surveys (DHS, GLSS and SAGE) nevertheless gave confidence in the robustness of the results in this thesis and illustrated a rising NHIS coverage among younger, middle-aged and older adults since the scheme's implementation.

The results from this study provide further evidence that older and younger adults enrolled in the NHIS have similar user characteristics. This is an important finding, as so far research that has confirmed these similar patterns among younger and older adults has not been extensive. It offers confidence to policymakers that efforts undertaken to increase NHIS enrolment rates are applicable to a wide population, which is particularly true when looking at wealth as an enrolment barrier.

Initially, the introduction of the NHIS was a pro-poor initiative. Its aim was to reduce financial hardship when seeking healthcare, especially among the most vulnerable groups in Ghanaian society (Akazili et al., 2014). The findings presented in this analysis challenge the assumption that the poor benefit compared to rich people from NHIS enrolment. A positive relationship between rising living standards and NHIS coverage was found. Younger, middle aged and older adults belonging to a more prosperous household were more likely to be insured compared to people from poorer households. One factor that could explain why even rich older adults aged 70 plus (who are exempt from the NHIS premium) are still more likely to enrol compared to poorer older adults is the cost of registration fees. Although no premium has to be paid, registration fees (around GH¢4 which can vary by district) still apply (Parmar et al., 2014, Kusi et al., 2015). Older adults are often the most vulnerable members of a family with limited access to resources (Barrientos et al., 2003). Thus, even small registration fees can hinder the poorest in affording NHIS membership (Parmar et al., 2014).

Spatial barriers in NHIS enrolment and usage of care were highlighted in chapter 6. The findings in that chapter call for a better provision of services. Mapping the provision of hospitals showed that density of hospitals in Ghana is poor. Older adults, particularly those who live in rural areas, may be unable to travel to the district offices in a country with poor road quality and where a lack of cars and public transport makes travelling difficult. Residential differences in NHIS coverage require a targeted policy response. In rural areas especially, the NHIS enrolment rate needs to be improved.

In addition, improvements in the stewardship of the NHIS, better service quality and administration can lead to higher enrolment. The literature review showed that at the moment, long waiting times and delays in the processing and delivery of NHIS cards has led to some negation of trust in the system (Gobah and Liang, 2011).

Finally, this thesis showed that indeed, the NHIS does increase healthcare usage among older adults. Insured older adults were around 9-11% more likely to use outpatient care and between 7-8% more likely to utilise inpatient care compared to uninsured. This highlights the success of the NHIS and encourages extension of coverage. However, inequalities in the usage of healthcare indicate that access barriers need to be further reduced in moving towards UHC. Wealthier older adults were found not only to be more likely to enrol in the NHIS, but also more likely to use outpatient care services. When considering the use of inpatient care services, no difference in usage between rich insured and rich uninsured were confirmed. This indicates that if richer older adults need urgent care (like hospital treatment), they will be able to seek care regardless of insurance coverage. Given the limits to funding for the NHIS, it is important to ensure and prioritise equal access to care among the poorest and most vulnerable. Poorer older adults have been found to be more likely to use any kind of health service once enrolled in a health insurance scheme. The NHIA points out that "measures intended to benefit the poor if not properly targeted are likely to result in an increased use of services by more resourceful people who previously (before the introduction of the social protection programme) utilised private health facilities" (NHIA, 2013b, p. 49).

This thesis further showed that once enrolled in the NHIS, the benefit of coverage in rural areas is significantly higher than in urban areas. This finding calls for improvements in insurance enrolment among rural dwellers who are found to be less likely to enrol in the NHIS in the first place. Once enrolled, members can find it easier to access services as benefits of the NHIS package are provided on a community level.

8.1 Limitations

Limitations to this thesis need to be addressed openly and these limitations have to be kept in mind to fully understand the findings of this thesis.

The aim of chapter 5 and 6 was to determine the correlates of NHIS enrolment. One limitation is that it was not possible to control for all factors that potentially influence insurance enrolment. Omitted variable bias can occur by omitting variables that potentially influence NHIS affiliation (Jehu-Appiah et al., 2011). In cases of omitted variable bias, it is expected that the effect of other explanatory variables is overestimated (Jehu-Appiah et al., 2011). A specific limitation was not being able to control for the quality of a healthcare service. Although there is a common agreement in

studies within an African context that wealth is the main driver of insurance enrolment (Mills et al., 2012b), in Guinea it was found that poor quality of services was the main explanation for low enrolment in the Mutual Health Organisation Community Insurance Scheme, not wealth (Criel and Waelkens, 2003).

In terms of methodological limitations, PSM as applied in chapter 7 cannot give any information on the distribution effect of an intervention. Only mean effects can be analysed when using PSM (Bryson et al., 2002). Furthermore, PSM assumes that the control group is not in any way affected by the existence of the intervention. In practice, however, the programme itself can influence outcomes and decisions for non-participants. The long waiting times reported by an NHIS patient, poor administration of the programme, and the recent economic difficulties of the NHIS can influence non-members to buy private insurance or pay out of pocket instead of considering NHIS membership. Makinen et al. (2011) give evidence that shorter waiting times is a notable predictor for choosing a private provider. People belonging to the middle and upper socioeconomic class might be more willing to pay for better services. Specifically, urban areas have a high concentration of private self-financed services (Makinen et al., 2011) which could lead to self-selection bias in urban areas.

In addition, the variance in kinds of treatment, as well as differences in health outcomes, have not been taken into consideration. To fully assess movements towards UHC, not only should the usage of care be considered, but also health outcomes need to be considered to understand whether improved healthcare utilisation results in better health.

Moreover, the review of the literature showed that moral hazard influences the relationship between insured and insurer (Pauly et al., 2006). Insurers face the problem that individuals may abuse insurance offers by using healthcare services for minor issues without actually needing care in order to feel they are not wasting their premium payment. Therefore, the higher utilisation of healthcare found in this study may not necessarily reflect the true success of the NHIS.

Finally, this thesis used national representative survey data to show patters of insurance enrolment and highlighted the effect of insurance enrolment on healthcare utilisation among people aged 50 plus. The advantage of quantitative research is that it enables research to generalise and to show broad patterns. In order to expand this analysis and understand in more depth reasons, motivations and opinions for insurance enrolment the use of qualitative research is encouraged. Qualitative research would dive deeper into the problems associated with insurance coverage and could help to understand what drives insurance reenrolment and drop out. Qualitative research would help to understand whether NHIS accredited facilities offer services that cover the complex healthcare needs of older adults. Although this thesis showed that insurance enrolment increased healthcare

usage, overall healthcare utilisation among older adults has been found to be low. Qualitative research can provide insights into this problem and can help to understand why the utilisation of care is low even under NHIS members, exploring what can be done to increase the usage of care.

8.2 Future Work

The work done in this thesis can be taken forward to further improve the understanding of insurance coverage as a strategy to move towards UHC in the context of population ageing.

The above mentioned limitations of this thesis should be given priority in forthcoming studies in order to expand the research on population ageing and insurance coverage in Sub-Saharan Africa. These include research on monitoring the long-run progress towards UHC. This thesis does not evaluate the development towards UHC in Ghana but only captures a snapshot of the current situation in Ghana. The analysis presented here looked only at the healthcare system currently implemented in Ghana and does not answer the question of whether the NHIS model is the most-effective system in moving towards UHC. Data from the DHS 2014 suggest an increase in NHIS coverage at least among younger and middle aged adults over time. Wave 1 and the upcoming wave 2 of the longitudinal SAGE survey will provide clearer information on changes in health insurance status among older adults, and motivations for enrolment and usage of care. Additional waves of the GLSS can also be used to evaluate progress over time towards UHC. The second wave of the SAGE can also be used for longitudinal analysis allowing analysts to capture changes in insurance coverage status.

Further research is needed to understand the long term effects of health insurance programmes on health status among older adults in low and middle-income countries. This thesis was unable to look at health outcomes but assumes that the increased utilisation of healthcare due to insurance coverage will improve the health status of older adults. Although this assumption is plausible, only further research can confirm this statement. The health status of older adults is complex and they often suffer from multiple conditions, known as multi-morbidity (Beard et al., 2016). As mentioned earlier in this thesis work by Lloyd-Sherlock et al. (2012b) suggests a positive effect of NHIS enrolment on the awareness of hypertension. Further work is desirable to evaluate whether the Ghanaian healthcare system is able to meet the needs of an ageing population. In particular, the provision of long-term care for older adults has not received considerable attention from policymakers in low and middle-income countries (Lloyd-Sherlock, 2014a). Population ageing requires thinking beyond the formal provision of healthcare services and targeting the particular needs of older adults. Research which understands the healthcare needs of older adults and

provides new effective measures for their particular health needs can help move healthcare provision of older adults onto policy agendas before crises emerge.

The PSM analysis in chapter 7 could be extended to children, younger and middle aged adults to compare the effect of insurance enrolment on healthcare usage among different groups. This would give further insights as to whether the NHIS responds equally to the needs of older adults or favours the needs of younger adults, women or children.

Further research should also unpack what effect NHIS coverage has on out of pocket expenditure and whether out of pocket payments for healthcare services dropped significantly after the introduction of the NHIS. Such analysis will reveal whether the NHIS successfully replaced the old 'cash and carry' health system or whether more needs to be done to protect older adults from financial hardship when seeking healthcare.

In addition, the thesis provides evidence that wealthier older adults are more likely to be a member of the NHIS. Based on the work done in this thesis, it is recommended that future studies should examine whether older adults are aware of the premium exemption and whether lowering the age of the exemption would be a feasible strategy for improving enrolment among deprived older adults. Qualitative work in particular can support this research as without knowing whether the premium exemption is advertised, it is difficult to determine what exactly drives insurance enrolment at older age.

Generally, the lack of research on population ageing in Africa is driven by limited availability of survey data that focuses on older adults. In order to fully inform policymakers, more data focusing on older adults is desirable. Accumulated evidence from different surveys can help in designing policies to improve the access to healthcare and health status among older adults. A subsample of the DHS which collected information on insurance coverage of older adults would improve data collection among the population aged 50 plus. Additionally, the SAGE should improve its section on insurance coverage to have comprehensive longitudinal data examining the progress of the NHIS. More up to date data from the NHIA are needed in order to have accurate ongoing coverage estimates. Such data will inform whether NHIS coverage is increasing or decreasing in 2016 and whether more needs to be done to improve enrolment or whether current strategies (like biometric registration) have been successful.

8.3 Implications for policy

The findings of this thesis can be used as evidence to improve NHIS coverage among older adults, and a number of action points were identified that can bring Ghana closer to the realisation of UHC.

Action points identified in this thesis can be summarised into the categories of *improving equal access to enrolment; data; service provision;* and; *expansion of the benefit package*.

Improving equal access to enrolment

This thesis provides evidence that wealthier older adults benefit in particular from insurance coverage and that poorer elderly are less likely to enrol. Even for people aged 70 plus, enrolment is driven by wealth. It shows that the NHIS needs to improve enrolment among the poorest.

Jehu-Appiah et al. (2010) criticised the lack of a clear definition of who is classified as indigent in the NHIS. Therefore, in the first instance policymakers should seek to provide a clear definition of who is classified as indigent. This will help to target the poor more efficiently and maximise the impact of policy interventions among the poorest members of society. Effective monitoring of functionality in the system is also a key concern. Further action should include monitoring the income scaled enrolment progress and premium exemption. Improving efficiency in the registration progress will help to identify who is eligible for free enrolment. Makinen et al. (2011) pushes for an establishment of an 'on the ground' committee formed of health sector regulatory bodies to monitor the provider performance, the quality of care, the income scaled enrolment and identify other challenges and resolve them.

Although individuals have the opportunity to pay the NHIS premium fees in small amounts, it is unclear whether people are aware of this option. Awareness of the NHIS premium exemptions and possibilities for alternative financing could be improved through increased publicity of the system, potentially at markets, churches, or community hubs. Social clustering was found to influence NHIS coverage meaning that it is important to inform communities as to the possibilities for enrolment in the NHIS. Further community trust in the system can encourage community members to join the NHIS. Other countries in Africa like Uganda, Senegal and Mali had success with similar policies (Dixon et al., 2011). Burkina Faso, for example, successfully increased the premium payments of its healthcare system by collecting the payment around harvest time (Dixon et al., 2011).

Data

In order to monitor progress over time and to meet the challenges of population ageing, survey data including information on healthcare utilisation, out of pocket expenditure, and health status are essential. Surveys should focus on older adults as despite their projected growth in numbers, older adults have been marginalised in health debates in low and middle-income counties. In addition, the NHIA needs to monitor and release accurate data on NHIS membership in order to evaluate the development of the NHIS. Up to date administrative data on enrolment rates should be published in a more timely way. The latest annual report was published by the NHIA in 2013

meaning that up to date administrative data on enrolment is not available. Data collected on insurance coverage in a survey should be nationally and regionally representative and should include control questions to determine the uninsured, list different sources of insurance coverage, and use the specific state-insurance scheme names. In addition, data on health status and healthcare usage among older adults in surveys are essential to measure the impact of health interventions such as insurance coverage.

Service provision

It is further advised that the current capacities of the NHIS should be expanded to meet the needs of older adults. Older adults are not as mobile as younger adults and travelling to healthcare facilities can be a particular challenge for them. Older adults predominately live in rural areas where access to health services is limited. Healthcare services need to be expanded to ensure that all people can access healthcare within the recommended 8 km radius of their place of residence. In addition, travel costs should be reimbursed when enrolling in the NHIS to improve equality in access to healthcare. Alternatively, expanding NHIS enrolment to community level so that older adults do not have to travel to district facilities to register should be considered. This thesis showed that NHIS enrolment improves healthcare usage in rural areas in particular, but that older adults in rural areas are less likely to enrol. Once enrolled, they can use services available at community level free of charge. Expanding the NHIS benefits to the CHPS and private facilities can improve access to care by using the existing health infrastructure.

Another possibility would be to enrol households instead of individual people. This has been done in other countries such as Cambodia. It would mean that older adults do not have to travel to the district offices to enrol if another family member can do so. This would also reduce the overall waiting times and long queues when enrolling as only one person per household would have to sign the registration. However, 10% of older people aged 60 plus in Ghana were found to live on their own (Ghana Statistical Service, 2013), and such a strategy would only be successful for older adults who live in household with younger adults. Therefore, incentives and aid to enrol need to be diversified to respond to the diversity of social situations that older adults increasingly find themselves in.

Expanding the benefit package

This thesis showed that older adults benefit from NHIS enrolment in terms of increasing healthcare usage. However, when thinking about UHC in the context of population ageing, it has to be ensured that the rapidly rising number of older adults in Ghana will continue to benefit from the NHIS. The increase in the proportion and number of older adults requires reconsideration of benefit coverage.

The NHIS has been criticised for not being responsive enough to the healthcare needs of older adults. What is meant here is that the health system in Ghana should be reformed to stimulate an overall age-friendly environment. In order to increase health practitioner's awareness of the healthcare needs of older adults, training on gerontological issues among health practitioners, as suggested by the WHO (2015d), will help to create an age-friendly health sector in the long run.

Furthermore, home visits for bed-ridden older adults should be included in the NHIS benefit package to ensure reduction spatial barriers of healthcare usage. The WHO (2015d) is pushing for more home-based as well as community–based care to empower older adults in access to healthcare. Finally, long-term care facilities are not in place in Ghana. Such facilities are needed to improve healthy ageing in the long run (WHO, 2015d).

8.4 Case Study Ghana: What Can Other Low and Middle-income Countries Learn?

This thesis can conclude that the NHIS was to some extent successful in improving access to healthcare among older adults. It showed that older adults with insurance coverage were more likely to use outpatient and inpatient healthcare services. However, challenges remain in achieving UHC particularly in the context of population ageing. Inequalities in enrolment and access to care predominantly among wealth and residence were established.

It has to be pointed out that Ghana cannot be taken as representative of Sub-Saharan Africa as a whole. Ghana represents a case where a generous insurance scheme has been introduced, but in a context that continues to suffer from inadequate service infrastructure reflected in chronically poor availably, accessibility and quality of healthcare services. The NHIS improved the usage of care compared to non-insured, however, even among NHIS members, the overall utilisation of care was found to be low. Nevertheless, other countries who want to establish a subsidised health insurance scheme to improve access to care can learn from the Ghanaian system and its experience. The following advice is given to other countries considering social insurance coverage as a tool towards UHC:

1. **Ensure equal access to care and enrolment.** The NHIS was a pro-poor policy with the intention of improving access among the most vulnerable. This thesis revealed that wealth is still a determinant of NHIS coverage, indicating inequalities in enrolment. Although income-scaled fees exist, in reality, flat-rates are charged which encourages enrolment among the rich and places a burden on the poor. Even when individuals are exempt from premium payments, registration fees are still charged. Other countries in Sub-Saharan

seeking to improve equal access to care are encouraged to develop a monitoring system and strategies to clearly identify and enrol indigents. This can be done by working closely together with community groups or other social protection programmes and investing properly in administrative monitoring.

2. **Remove spatial barriers.** In Ghana, geographic barriers in the access to care remain. Location affects NHIS membership in the sense that people living in rural areas are less likely to enrol. Other countries are encouraged to carefully plan the desired distribution of insurance membership and care facilities and think of efficient ways to hand out insurance cards. Further insurance membership will only be beneficial in countries that have healthcare delivery systems with services that are not only available but easily accessible. Living in rural areas was found to be a particular challenge for older adults. Enrolment should be easily accessible for all members of society including older adults who face difficulties in travelling long distances to enrol and are unable to queue to receive their card. This makes it particularly important to offer both administrative facilities for enrolment as well as healthcare at a community level, especially in remote locations. The NHIA in Ghana collaborated with the Community-Based Health Planning and Services (CHPS) in order to improve essential community -based health services.

3. **Do not marginalise the needs of older adults.** Population ageing is occurring in nearly every country in the world and will have a profound impact on countries' healthcare systems. Given the fast pace of population ageing, health authorities need to adjust their healthcare system today to respond to the needs of an ageing society. Healthy ageing can only be guaranteed if age-friendly services are offered, including coverage of non-communicable diseases, home services, or long-term care in insurance packages.

4. **Ensure financial stability.** Due to financial problems, the NHIS suffers from fraud, insured being refused services, and long waiting times. The NHIS is mainly financed through taxes and formal sector contributions. This however, is not a sustainable source for a country with a small formal sector. Liaropoulos and Goranitis (2015) argue that in high as well as low and middle-income countries, "employment contributions as a source of health financing are incompatible with universal coverage, quality of services, and rising life expectancy" and suggest "a move towards general taxation to meet health care needs" (p.4). Strategies for financing need to be adapted to a country's economic profile to ensure the funding necessary to deliver on needed care.

8.5 Summary

It is estimated that 400 million people globally still do not have access to necessary healthcare services and that over 100 million people each year are pushed into poverty when paying for necessary care (WHO, 2015c). UHC has been described as the most powerful tool of public health to improve access to healthcare without fearing financial hardship.

Population ageing, however, presents considerable challenges for UHC. Global population ageing occurs due to falling fertility and reduced mortality. Longevity is a success of public health but comes with challenges. It is associated with a rising burden of non-communicable diseases and rising use of healthcare services. By 2050, 22% of the world's population will be aged 60 and over. In Sub-Saharan Africa alone, the number of people aged 60 and over will account for 10% of the population (United Nations, 2015a).

This thesis aimed to fill the gap in research on UHC in the context of population ageing, by drawing evidence systematically from the case of Ghana. By 2030, Ghana will have the largest share of older adults among all low and lower middle-income countries in Sub-Saharan Africa, making Ghana an important case study.

Older adults are often left without a regular income and struggle to make a healthcare payment. Social healthcare systems can protect people by improving their financial protection when seeking care. In low and middle-income countries in particular, pooled funding through social health insurance schemes has become a popular method in attempts to move towards UHC.

The introduction of the NHIS in Ghana was seen as a way to improve equal access to healthcare. Until now, there has been a substantial lack of studies that examine the correlates of insurance coverage specifically among older adults in Ghana, and examine the impact of the system on the usage of healthcare among people aged 50 plus. This thesis showed that although the system intended to benefit the most vulnerable people in the society, inequalities in coverage in Ghana persist. People enrolled in the NHIS tend to be more educated, wealthier and live in urban areas. This thesis gives evidence that the NHIS was found to make a strong contribution to improving access to care among older adults once they are enrolled in the system. The insured benefit from higher utilisation of care. Outpatient care services became more accessible at community level under the NHIS, and enrolment was found to be an instrument for improving older women's usage of healthcare. However, inequalities in usage of services persist as richer older adults benefitted most from insurance coverage when using outpatient care.

This shows that the NHIS needs to make an even greater effort to improve Ghana's transition to UHC. In order to meet the challenges of population ageing, the healthcare system in Ghana has to

expand its attention to the specific needs of older adults. It is advised that further research should examine the long-run effects of NHIS coverage on health outcomes among older adults in order to fully understand the long term gains of the system.

Appendix A Odds Ratio of NHIS Enrolment Among Adults Aged 18-49

In chapter 5 the odds ratio of NHIS enrolment among adults aged 18-49 were estimated. This appendix expands the analysis and tests an interaction effect between age and sex.

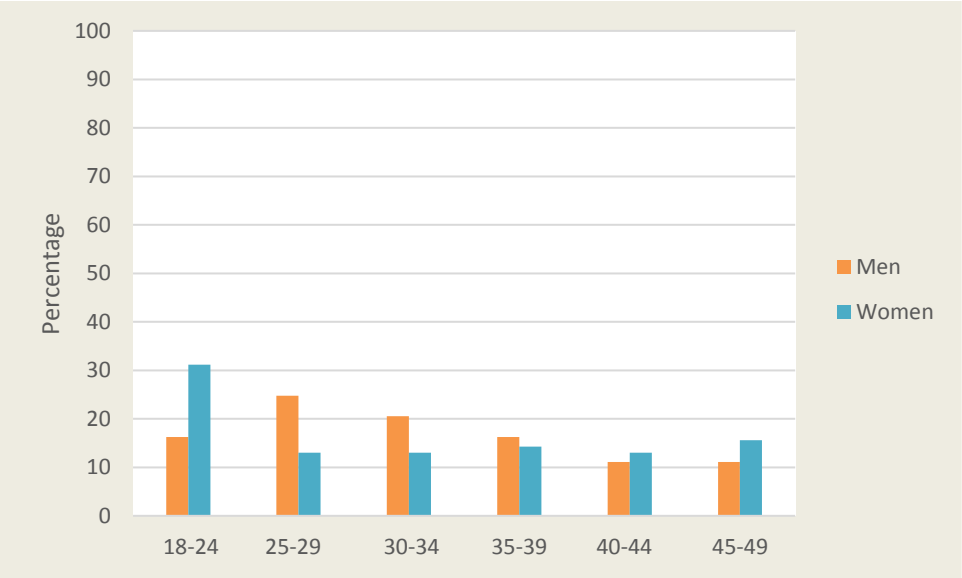
		DHS 2008				GLSS				DHS 2014			
Variable	**Characteristics**	**Odds Ratio**		**95% Conf. Interval**		**Odds Ratio**		**95% Conf. Interval**		**Odds Ratio**		**95% Conf. Interval**	
Sex	Male	**1.000**				**1.000**				**1.000**			
	Female	1.331	*	1.071	1.653	1.443	***	1.277	1.630	1.794	***	1.476	2.180
Marital Status	Married	1.000				1.000				1.000			
	Separated/Divorced	0.639	***	0.499	0.818	0.796	**	0.682	0.929	0.587	***	0.485	0.709
	Widowed	0.589	*	0.361	0.961	1.057		0.804	1.389	0.807		0.599	1.087
	Never married	0.703	***	0.589	0.839	0.920		0.833	1.016	0.658	***	0.567	0.762
Education	None	**1.000**				**1.000**				**1.000**			
	Primary	1.445	**	1.112	1.877	1.667	***	1.486	1.871	1.133		0.932	1.377
	Secondary	2.932	***	2.318	3.709	3.044	***	2.430	3.814	1.596	***	1.328	1.918
	Tertiary	12.531	***	5.619	27.941	8.111	***	4.295	15.317	7.074	***	2.712	18.452
Age	18-25	**1.000**				**1.000**				**1.000**			
	25-29	0.671	**	0.501	0.900	0.631	***	0.540	0.737	0.626	**	0.475	0.825
	30-34	1.237		0.915	1.671	0.734	***	0.620	0.868	0.651	**	0.479	0.885
	35-39	1.157		0.854	1.569	0.794	**	0.667	0.946	1.073		0.785	1.467
	40-44	1.167		0.834	1.634	0.960		0.796	1.156	0.996		0.718	1.382
	45-49	0.933		0.661	1.315	1.087		0.894	1.323	1.174		0.843	0.843
Wealth assets	Poorest	**1.000**				**1.000**				**1.000**			
	Poor	2.137	***	1.506	3.034	1.804	***	1.544	2.108	1.480	**	1.156	1.895

		DHS 2008				GLSS				DHS 2014			
Variable	**Characteristics**	**Odds Ratio**		**95% Conf. Interval**		**Odds Ratio**		**95% Conf. Interval**		**Odds Ratio**		**95% Conf. Interval**	
	Middle	4.851	***	3.040	7.741	2.133	***	1.668	2.728	3.185	***	1.961	5.173
Region	Greater Accra	**1.000**				**1.000**				**1.000**			
	Western	2.814	***	2.188	3.620	1.450	***	1.257	1.672	2.912	***	2.422	3.501
	Central	1.616	**	1.208	2.162	1.017		0.881	1.175	1.552	***	1.258	1.914
	Volta	2.516	***	1.920	3.298	1.820	***	1.584	2.090	4.522	***	3.698	5.529
	Eastern	4.704	***	3.688	6.000	2.044	***	1.782	2.345	2.806	***	2.325	3.388
	Ashanti	2.325	***	1.872	2.887	1.858	***	1.627	2.121	2.213	***	1.846	2.652
	Brong Ahafo	5.849	***	4.473	7.649	3.096	***	2.685	3.569	5.998	***	4.938	7.284
	Northern	6.029	***	4.598	7.904	1.942	***	1.681	2.244	3.308	***	2.662	4.111
	Upper East	9.952	***	7.465	13.268	7.431	***	6.329	8.725	6.749	***	5.420	8.405
	Upper West	7.863	***	6.034	10.248	10.148	***	8.705	11.831	5.332	***	4.225	6.730
Residence	Rural	**1.000**				**1.000**				**1.000**			
	Urban	1.084		0.938	1.253	1.132	**	1.047	1.223	1.110		0.993	1.241
Age*Sex	25-29*Female	2.141	***	1.499	3.058	1.874	***	1.536	2.286	1.948	***	1.419	2.674
	30-34*Female	1.332		0.928	1.911	1.506	***	1.222	1.855	1.795	**	1.281	2.514
	35-39*Female	1.530	*	1.070	2.188	1.634	***	1.323	2.018	1.146		0.815	1.613
	40-44*Female	1.656	*	1.070	2.468	1.342	**	2.018	1.679	0.968		0.677	1.385
	45-49*Female	1.597	*	1.056	2.415	1.270		0.993	1.624	0.886		0.614	1.279
Education*wealth	Primary*Middle	0.828		0.519	1.321	0.773	**	0.643	0.928	0.790		0.563	1.108
	Primary*Rich	0.386	**	0.214	0.695	0.809		0.621	1.053	0.522	*	0.287	0.950
	Secondary*Middle	0.591	**	0.399	0.874	0.730	*	0.538	0.991	0.820		0.618	1.089
	Secondary*Rich	0.422	***	0.260	0.684	0.777		0.556	1.087	0.537	*	0.326	0.884
	Tertiary*Middle	0.332	*	0.116	0.951	0.531		0.249	1.131	0.603		0.204	1.787
	Tertiary*Rich	0.213	**	0.084	0.542	0.370	**	0.185	0.738	0.213	**	0.073	0.626
N		7,735				28,316				11,610			

Appendix B Reasons for Not Having a Health Insurance

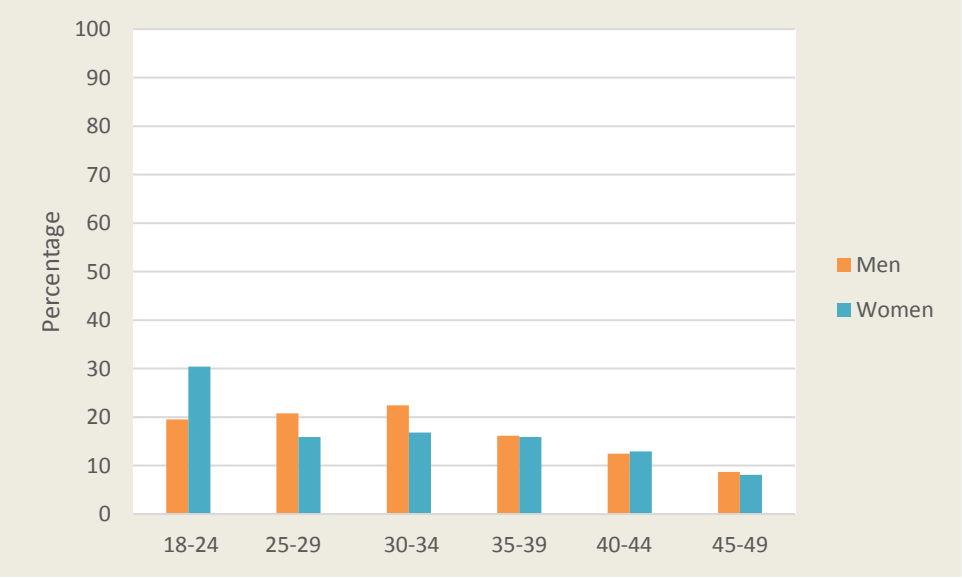
The Ghanaian Living Standards Survey asked about reasons for non-insurance. The reasons for non-insurance coverage among men and women aged 18 to 49 are highlighted in this appendix.

B.1 Percentage of adults aged 18-49 who reported that health insurance does not cover the services they use



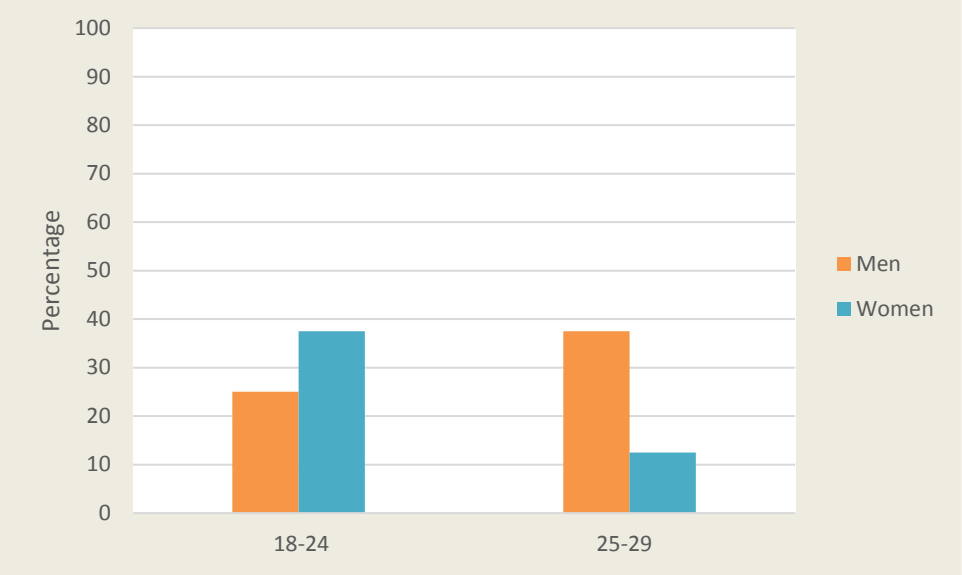
Source: GLSS 2012/2013, author's calculations

B.2 Percentage of adults aged 18-49 who reported that they do not need health insurance



Source: GLSS 2012/2013, author's calculations

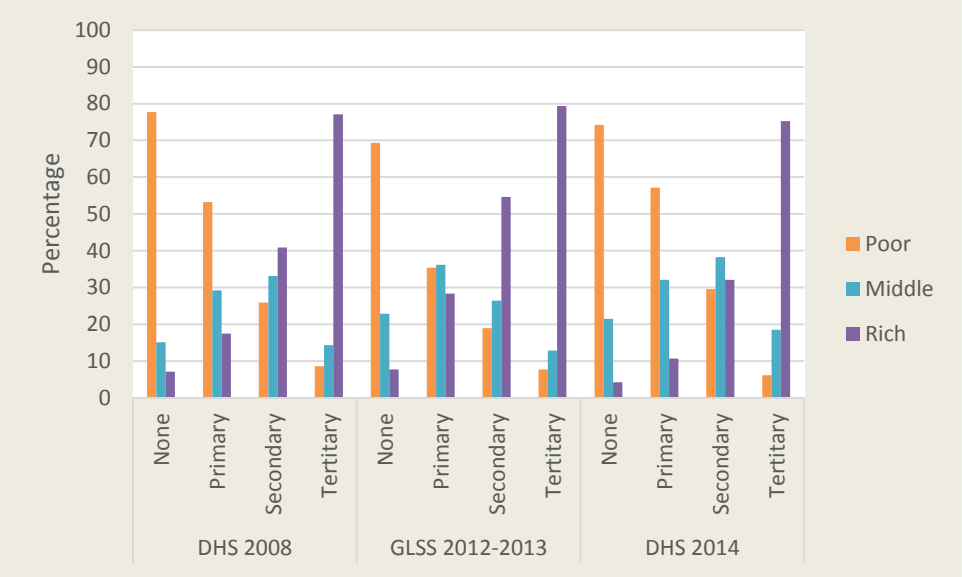
B.3 Percentage of adults aged 18-29 who reported that they do not know about any health insurance scheme



Source: GLSS 2012/2013, author's calculations

Appendix C Cross Tabulation Between Education and Wealth by Different Surveys

This appendix shows that the higher-educated adults aged 18-49 tend to be wealthier than the lower-educated adults.



Source: GLSS 2012/2013, DHS 2008, DHS 2014, author's calculations

Appendix D Odds Ratio of NHIS Coverage Among Older Adults Using the Ghanaian Living Standards Survey

This appendix illustrates a significant interaction between age and wealth and between education and wealth when using the Ghanaian Living Standards Survey.

Variable	Characteristics	Odds Ratio		95% Conf.	Interval
Region	Greater Accra	**1.000**			
	Western	2.150	***	1.628	2.839
	Central	1.313	*	1.012	1.704
	Volta	2.611	***	2.020	3.375
	Eastern	2.962	***	2.305	3.807
	Ashanti	3.021	***	2.328	3.920
	Brong Ahafo	5.179	***	3.934	6.817
	Northern	1.862	***	1.414	2.453
	Upper East	6.185	***	4.641	8.244
	Upper West	8.171	***	6.163	10.834
Residence	Rural	**1.000**			
	Urban	1.251	**	1.089	1.437
Sex	Male	**1.000**			
	Female	1.897	***	1.660	2.168
Age	50-59	**1.000**			
	60-69	1.248	*	1.016	1.532
	70plus	1.873	***	1.526	2.300
Marital Status	Married	**1.000**			
	Separated/Divorced	0.628	***	0.515	0.766
	Widowed	0.738	***	0.629	0.866
	Never married	0.353	***	0.207	0.603
Education	None	**1.000**			
	Primary	1.317	**	1.076	1.613
	Secondary	3.413	***	1.804	6.455
	Tertiary	7.212	***	2.698	19.277
Expenditure	Poorest	**1.000**			
	Poor	1.713	***	1.330	2.204
	Middle	1.981	***	1.416	2.773
Age*Wealth	60-69*Middle	1.172		0.859	1.599
	60-69*Rich	1.335		0.945	1.886
	70plus*Middle	1.317	***	0.952	1.821
	70plus*Rich	1.955		1.331	2.871
Education*wealth	Primary*Middle	0.911		0.686	1.210
	Primary*Rich	1.439	*	1.002	2.067
	Secondary*Middle	0.842		0.377	1.881
	Secondary*Rich	0.469	*	0.221	0.992
	Tertiary*Middle	0.808		0.250	2.617
	Tertiary*Rich	0.391		0.136	1.126
N		9,504			

Source: GLSS 2012/2013, author's calculations; *** p<0.001, ** p<00.1 * p<0.05

Appendix E Sample Size Study on Global Ageing and Adult Health Wave 1

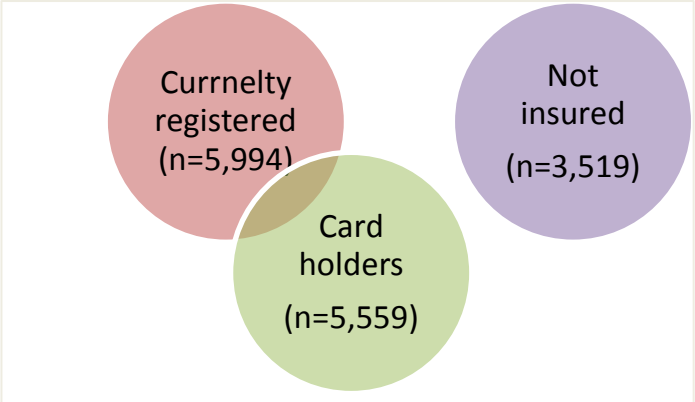
This appendix shows the sample size by region in the Study on Global Ageing and Adult health wave 1.

Region	18-49	50 plus
Greater Accra	110	491
Western	95	513
Central	90	453
Volta	76	411
Eastern	77	560
Ashanti	128	684
Brong Ahafo	77	410
Northern	67	387
Upper East	46	263
Upper West	39	133

Source: SAGE 2007/2008, author's calculations

Appendix F Insurance Status Among Older adults in the Ghanian Living Standards Survey

This appendix highlights how many older adults aged 50 plus reported that they are currently registered under the NHIS, have a NHIS insurance card or are not insured.

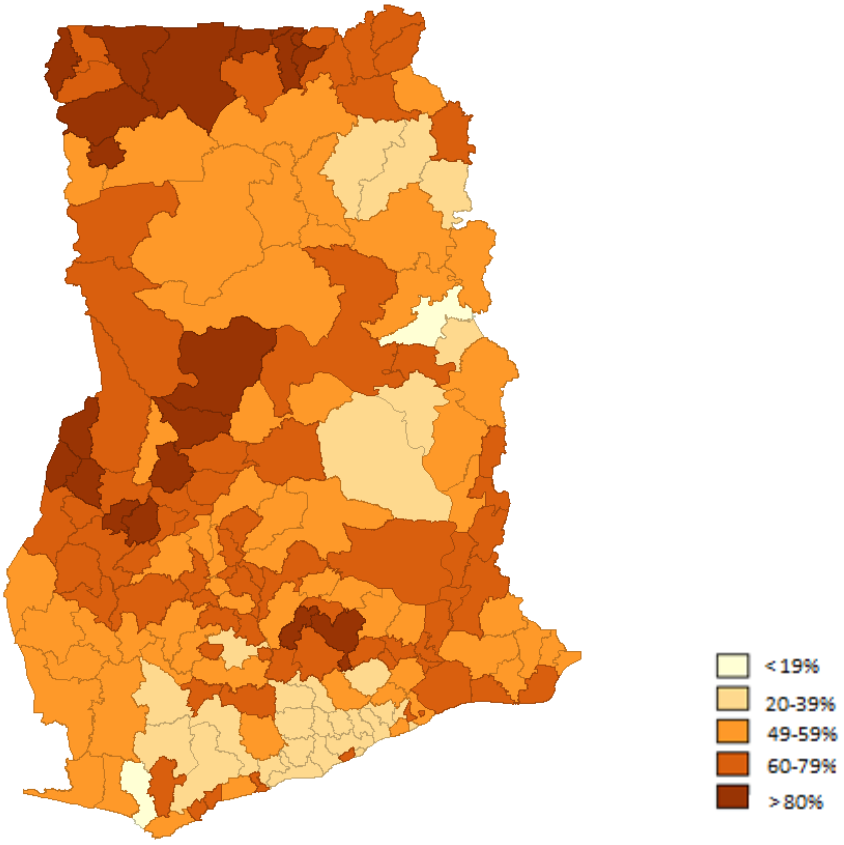


Source: GLSS 2012/2013, author's calculations

Appendix G NHIS Coverage and Distance to Healthcare Facilities

This appendix highlights that the NHIS coverage varies by districts. It also visualises the average distance to a healthcare facility and hospital.

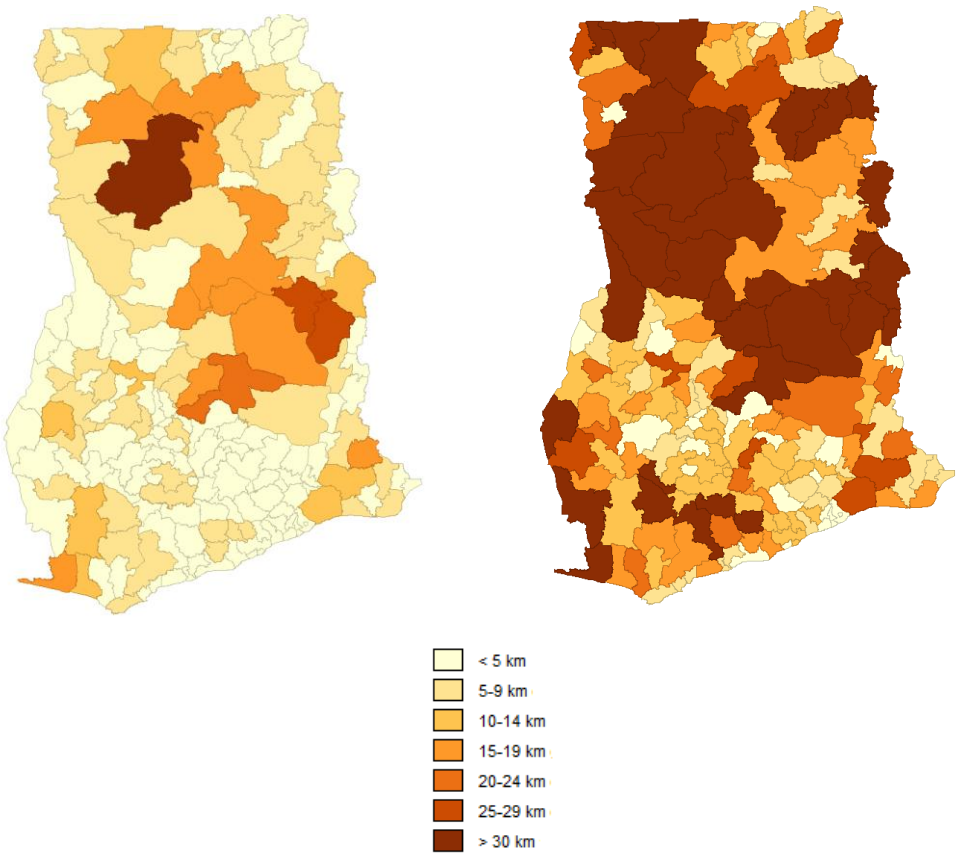
G.1 Average NHIS registration among districts



Source: GLSS 2012/2013, author's calculations

G.2 Average distance to a) healthcare facilities and b) hospitals

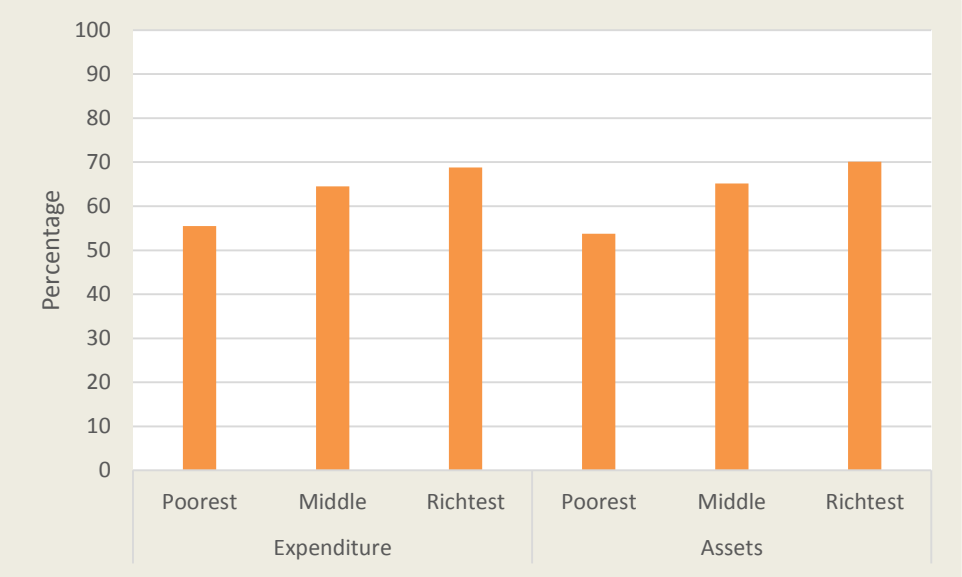
a) b)



Source: CPC Healthcare Facilities Dataset 2012, author's calculations

Appendix H NHIS Registration Among Older Adults by Expenditure and Assets Tertile

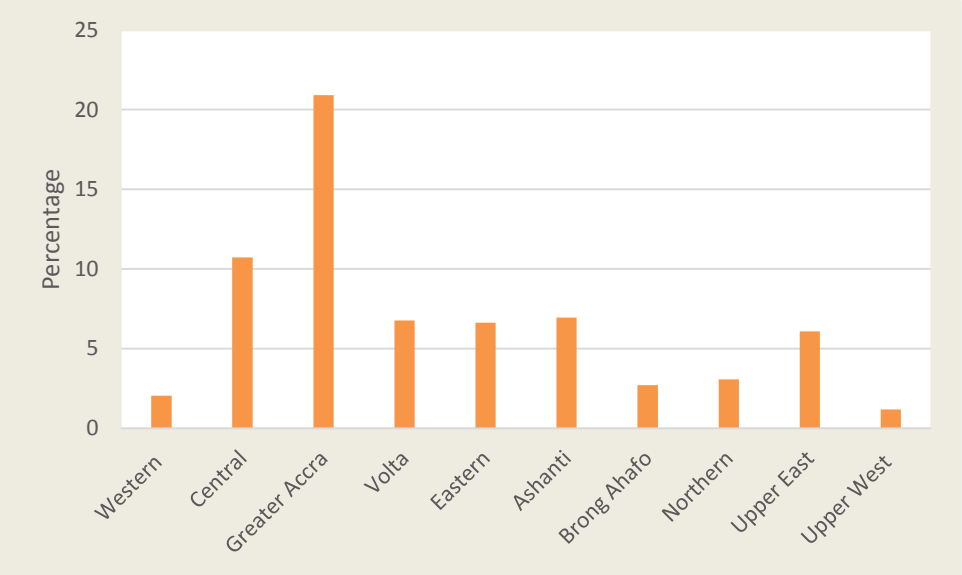
This appendix compares the distribution of NHIS registration among older adults by expenditure and asset tertile.



Source: GLSS 2012/2013, author's calculations

Appendix I Confidence in the Operators of Insurance Schemes

This appendix visualises the percentage older adults who reported in the Ghanaian Living Standards Survey that they do not have confidence in the operators of insurance schemes.



Source: GLSS 2012/2013, author's calculations

Appendix J Odds Ratio of NHIS Registration Among Older Adults Using Asset Tertiles

Chapter 6 highlighted an increasing NHIS enrolment with expenditure. As a robustness check, this appendix uses assets instead of expenditure tertiles.

Variable	**Characteristics**	**Odds ratio**		**95% Conf. Interval**	
Travel time	≥ 15 min	**1.000**			
	16 -30 min	0.700		0.4309	1.1372
	31 – 45 min	0.690		0.4226	1.1274
	46 – 60 min	1.020		0.5963	1.7460
	> 1 hour	0.766		0.4422	1.3281
Region	Greater Accra	**1.000**			
	Western	1.803	*	1.0706	3.1288
	Central	1.105		0.6377	1.9149
	Volta	2.911	***	1.6437	5.1584
	Eastern	2.806	***	1.7242	4.5668
	Ashanti	3.405	***	2.0185	5.7445
	Brong Ahafo	8.435	***	4.9379	14.4091
	Northern	2.631	**	1.4935	4.6378
	Upper East	9.637	***	4.6864	19.8198
	Upper West	9.038	***	4.5795	17.8391
Residence	Rural	**1.000**			
	Urban	1.532	***	1.3410	1.7509
Diversity	Religious	0.271	**	0.0985	0.7508
	Ethnic	0.657		0.3512	1.2296
Hospital in district	No	**1.000**			
	Yes	1.145		1.5454	1.9153
Sex	Male	**1.000**			
	Female	1.721		1.5455	1.9153
Age	50-59	**1.000**			
	60-69	1.383	***	1.2330	1.5502
	70plus	2.260	***	1.9876	1.9876
Disability	No	**1.000**			
	Yes	0.970		0.7951	1.1844
Marital Status	Married	**1.000**			
	Separated/Divorced	0.609	***	0.5138	0.7216
	Widowed	0.766	***	0.6714	0.8737
	Never married	0.391	***	0.2467	0.6190
Household size	Log	0.965		0.8951	1.0410
Internet usage	No	**1.000**			
	Yes	1.229	*	1.0028	1.5078
Employed in formal sector	No	**1.000**			
	Yes	2.390	***	1.7289	3.3065
Education	None	**1.000**			
	Low	1.318	***	1.1679	1.4881
	Medium	1.612	***	1.2537	2.0734
	High	2.091	***	1.5592	2.8066
Assets	Poorest	**1.000**			
	Middle	1.742	***	1.5408	1.9711
	Richest	2.727	***	2.2887	3.2511
N				9,438	

Source: GLSS 2012/2013, author's calculations; *** p<0.001, ** p<00.1 * p<0.05

Appendix K Odds Ratio of NHIS Registration by Different Age Groups

Chapter 4 showed that age heaping is a problem in the Ghanaian Living Standards Survey. A sensitivity analysis using different cut-off points for the age variable is highlighted in this appendix.

Variable	Characteristics	Odds Ratio		95% Conf. Interval	
Travel time	≥ 15 min	**1.000**			
	16 -30 min	0.719		0.438	1.180
	31 – 45 min	0.687		0.416	1.133
	46 – 60 min	1.011		0.584	1.750
	> 1 hour	0.766		0.436	1.343
Region	Greater Accra	**1.000**			
	Western	1.655		0.957	2.863
	Central	1.038		2.863	1.821
	Volta	2.819	**	1.570	5.059
	Eastern	2.555	***	1.554	4.200
	Ashanti	3.020	***	1.771	5.148
	Brong Ahafo	7.490	***	4.341	12.923
	Northern	2.428	**	1.361	4.330
	Upper East	9.803	***	4.677	20.543
	Upper West	8.943	***	4.453	17.961
Residence	Rural	**1.000**			
	Urban	1.623	***	1.423	1.850
Diversity	Religious	0.209	**	0.074	0.592
	Ethnic	0.740		0.389	1.407
Hospital in district	No	**1.000**			
	Yes	1.170		0.856	1.600
Sex	Male	**1.000**			
	Female	1.738	***	1.561	1.935
Age	50-53	**1.000**			
	54-57	1.203		1.039	1.392
	58-63	1.411		1.224	1.628
	64-67	1.657		1.389	1.977
	68-73	2.198	***	1.854	2.605
	74plus	2.856	***	2.425	3.365
Disability	No	**1.000**			
	Yes	1.203		0.835	1.245
Marital Status	Married	**1.000**			
	Separated/Divorced	0.622	***	0.524	0.737
	Widowed	0.762	***	0.668	0.870
	Never married	0.424	***	0.268	0.669
Household size	Log	1.070		0.991	1.155
Internet usage	No	**1.000**			
	Yes	1.199		0.976	1.473
Employed in formal sector	No	**1.000**			
	Yes	2.397	***	1.735	3.310
Education	None	**1.000**			
	Low	1.315	***	1.164	1.485
	Medium	1.677	***	1.305	2.156
	High	2.164	***	1.614	2.902
Expenditure	Poorest	**1.000**			
	Middle	1.931	***	1.704	2.189
	Richest	2.361	***	2.007	2.778
N		9,438			

Source: GLSS 2012/2013, author's calculations; *** p<0.001, ** p<00.1 * p<0.05

Appendix L Propensity Score Matching Results

Chapter 7 estimated the propensity score without controlling for disabilities. This appendix highlights the propensity score matching results controlling for disability when estimating the propensity score.

		Difference	SE*	p-value
Consulted a practitioner	NN	10.238	0.034	0.000
	NN without replacement	9.760	0.007	0.000
	Radius**	8.723	0.014	0.000
	Kernel	8.780	0.008	0.000
Hospitalised	NN	4.916	0.011	0.000
	NN without replacement	5.157	0.007	0.000
	Radius**	3.168	0.012	0.007
	Kernel	4.749	0.007	0.000

**Bootstrapped **Imposed calliper width: 0.044*

Source: GLSS 2012/2013, author's calculations

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