THE EFFECTS OF NATIONAL HEALTH INSURANCE SCHEME ON HEALTHCARE UTILISATION, FINANCIAL PROTECTION AND HEALTH STATUS IN GHANA

by

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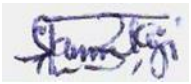
DECLARATION

I, SAMUEL SEKYI (Student Number: 64066363), declare that this thesis, entitled **"The Effects of National Health Insurance Scheme on Healthcare Utilisation, Financial Protection and Health Status in Ghana"**, is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

I further declare that I submitted the thesis to originality checking software and that it falls within the accepted requirements for originality.

I further declare that I have not previously submitted this work, or part of it, for examination at Unisa for another qualification or at any other higher education institution.



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SIGNATURE **DATE**

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DEDICATION

I dedicate this thesis to my sons, Fiifi Essel Sekyi and Yaw Appiah Sekyi.

ACRONYMS

CBHI – Community-Based Health Insurance
CHAG – Christian Health Association of Ghana
CHE – Catastrophic health expenditures
CMP – Conditional Mixed Process
CSRPM – Centre for Scientific Research into Plant Medicine
DHS – Demographic and Health Survey
DID – Differences-in-Differences
DMHISs – District Mutual Health Insurance Schemes
EAs – Enumeration Areas
FBD – Facility-Based Delivery
FDA – Foods and Drug Authority
GCPS – Ghana College of Physicians and Surgeons
GDP – Gross Domestic Product
GHI – General Health Insurance
GHS – Ghana Health Services
GNDP – Ghana National Drugs Programme
GRNMA – Ghana Registered Nurses' and Midwives' Association
GSPS – Ghana Socioeconomic Panel Survey
HeFRA – Health Facilities Regulatory Agency
HEFs – Health Equity Funds
HIE – Health Insurance Experiment
IMF – International Monetary Fund
KATH – Komfo Anokye Teaching Hospital
KBTH – Korle-Bu Teaching Hospital
MDC – Ghana Medical and Dental Council
MDG – Millennium Development Goals
MHA – Mental Health Authority
MHOs – Mutual Health Organisations
MoH – Ministry of Health
NAS – National Ambulance Service
NCMS – New Cooperative Medical Scheme
NHIA – National Health Insurance Authority

NHIL – National Health Insurance Levy

NHIS – National Health Insurance Scheme

NRCMS – New Rural Cooperative Medical Scheme

OHIE – Oregon Health Insurance Experiment

OOP – Out-of-pocket

PCG – Pharmacy Council Ghana

PSM – Propensity Score Matching

RCTs – Randomized Control Trials

RMHC – Rural Mutual Health Care

RSBY – *Rashtriya Swasthiya Bima Yojna*

SAH – Self-Assessed Health

SDGs – Sustainable Development Goals

SSC – Seguro Campesino Social

SSNIT – Social Security and National Insurance Trust

TTH – Tamale Teaching Hospital

UHC – Universal Health Coverage

WHO – World Health Organization

ABSTRACT

Health insurance is predicted to increase healthcare utilisation, lower out-of-pocket health spending, and improve household health and productivity. This thesis aimed to assess the effects of Ghana's National Health Insurance Scheme on healthcare utilisation, financial protection and health status of beneficiaries. The data for the study comes from the Ghana Socioeconomic Panel Survey (GSPS) wave 1, 2 and 3 datasets involving a total sample of 31,807 individuals. The study employed the logit model, negative binomial regression model, two-stage residual inclusion (2SRI), the two-part model (i.e., probit model and log-linear model), Heckman selection model, Copula-based Heckman selection model, endogenous switching regression for ordered outcomes and Conditional Mixed Process (CMP) model. The results revealed that NHIS membership improves healthcare utilisation by increasing visits to a health facility and formal care usage. The heterogeneous effects of NHIS on healthcare utilisation further show an increased probability of seeking formal care irrespective of residential status and income. Concerning health facilities visits, the study found increased visitations for the insured rural residents, whereas the probability of visiting a health facility increases for the NHIS members irrespective of income. The Copula-based Heckman sample-selection model was chosen as the preferred model for examining the determining factors of out-of-pocket health spending after a series of examinations of different models. Estimates from the superior Copula-based Heckman sample-selection model indicated that NHIS significantly reduces out-of-pocket health spending at the point of using healthcare services, thereby offering financial protection to its members. The study further found that NHIS membership was associated with decreasing probability of self-reporting lower health status, but rather increases the likelihood of self-reporting good health, suggesting that NHIS membership improves the health status of beneficiaries. The study recommends premiums subsidisation for the poor in the society by the government and other benevolent organisations as such targeted demand-side subsidy will help the country achieve universal health coverage.

Keywords

Copula-based Heckman selection model; Endogenous switching regression for ordered outcomes; Financial protection; National Health Insurance Scheme; Two-stage residual inclusion (2SRI); Universal Health Coverage (UHC)

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CHAPTER ONE: INTRODUCTION

1.1 Background to the study

Globally, universal access to good quality healthcare continues to remain a key concern of most health systems. Over the last few years, international health concepts and experiences have focused on achieving universal health coverage (UHC). In 2005, the World Health Organisation's (WHO) 58th World Health Assembly passed a resolution encouraging countries to transition to universal health coverage in their health systems. The WHO resolution identified social health insurance as one of the ways to be used to mobilise additional resources for healthcare, risk pooling, boosting access to health care for the poor, and providing high-quality healthcare to its member countries, particularly low-income countries (World Health Organization, 2005), a strategy also supported by the World Bank (Hsiao and Shaw, 2007). Prepayment rather than out-of-pocket (OOP) payments at the time of use is a significant step toward avoiding the financial hardship of paying for health services (World Health Organization, 2010a).

Achieving UHC is now an accepted international development goal. In 2015, The United Nations announced the Sustainable Development Goals (SDGs). The third of the SDGs focuses on guaranteeing healthy lifestyles and promoting well-being for all ages. There are several targets under goal 3. One of these targets is target 3.8, which seeks to achieve UHC. Financial risk protection, access to quality critical health care services, and access to safe, effective, high-quality, and inexpensive essential medicines and vaccines are all included in universal health coverage. Globally, the WHO together with the World Bank Group is in charge of tracking progress toward SDG target 3.8 on universal health coverage. To develop a global action plan to achieve health-related SDGs, including UHC world leaders assembled at the United Nations for the SDG Summit on 23 September 2019. The summit adopted a Political Declaration that, among other things, recognised the importance of strong global, regional, and national partnerships that bring together all key stakeholders to support UN Member States' efforts to attain universal health care (United Nations, 2019).

The financial barrier to health care access and utilisation is a problem worldwide, especially for the poor in many developing countries. Many of the world's 1.6 billion people, accounting for 22% of the global population, still lack access to basic health services, owing to blemish in healthcare financing and delivery (World Health Organization, 2018a). Financial barriers to

care may force most families to postpone or forego treatment that would otherwise improve their health and well-being. Furthermore, many people who utilise healthcare services face financial difficulty or even poverty resulting from payment for treatments at the point of need (World Health Organization, 2010a).

In several low-and-middle-income nations, the establishment or extension of national or social health insurance, where service providers are paid from an assigned government fund partly financed through taxes, is emerging as the solution to reduce costs to families at the point of need (Acharya *et al.*, 2013). A well-functioning prepayment scheme that allows for effective risk-pooling and risk-sharing among the general public has been highlighted as having a high potential for improving financial protection against ailment (Baeza and Packard, 2006; Escobar, Griffin and Shaw, 2010; World Health Organization, 2010b). Several low-and-middle-income countries (for example, Chile, China, Colombia, Costa Rica, Nigeria, Republic of Korea, Taiwan and Tanzania) are expanding government-funded health insurance to disperse financial risk among taxpayers. In theory, health insurance coverage can boost wellbeing in two ways: by improving health and lowering financial risk due to lower out-of-pocket spending (Barnes *et al.*, 2017).

Ghana's healthcare financing has undergone several transformations. During the colonial era, which dated back to the 1880s, curative services were on a fee-paying basis. Ghana's independence in 1957 brought with it several benefits, including "free" healthcare for all Ghanaians. Tax revenue and donor funds were the primary sources of funding for healthcare. Nevertheless, in the 1960s and 1970s, the repercussions of a stagnant and declining economy made it difficult to provide "free" healthcare. As a result, in 1969, the Government of Ghana introduced user fees at public health facilities nationwide. In 1985, user fees were increased substantially to recover at least 15 per cent of recurrent expenditure (Ministry of Health, 2003). "Cash and Carry" was the name given to this user fee arrangement. After introducing user fees, OOP spending became the principal source of health care financing in the country. While user fees increased operating revenues at some healthcare facilities, they also constituted a financial barrier to health care access, particularly for the poor, resulting in a drop in healthcare utilisation across the country. Evidence suggests that the introduction of user fees resulted in a decrease in antenatal attendance, supervised delivery and outpatient attendance (Waddington and Enyimayew, 1990; Agyepong, 1999). Again, Lund (2003) found that urban healthcare utilisation (in the Greater Accra region) declined by more than 50 per cent a year after the rise in user fees.

Unfortunately, exemptions intended to shield the poor from the consequences of user fees did not protect them from catastrophic healthcare expenses, with 84% of those who qualified never receiving them (Garshong *et al.*, 2002). Evidence demonstrates that just eliminating user fees, as some demand, is not a long-term answer to financing health care but must be accompanied by an increase in funding via pre-payment systems (Gilson and McIntyre, 2005).

Recognising the problems posed by user fees, particularly its effects of reducing health care access and utilisation, the Government of Ghana in the 1990s commissioned different studies into alternative funding of health care, essentially insurance-based ones (Sekyi, Aglobitse and Addai-Asante, 2015). Acknowledging the potential of Mutual Health Organisations (MHOs) to eradicate user fees and improve utilisation of health care, the Ghanaian Government enacted the National Health Insurance Act 650 (HI Act) in August 2003. The HI Act authorised the creation of district-level MHOs per national guidelines and a National Health Insurance Authority (NHIA). Later the district-level MHOs were transformed to a National Health Insurance Scheme (NHIS). The NHIS serve as a long-term measure to provide financial risk protection against the high cost of healthcare and address the financial access constraints posed by the "Cash and Carry" system (Government of Ghana, 2003). In other words, the policy aimed at removing OOP spending by providing financial access to health care for persons residing in the country.

This attempt by the government to form a national health insurance scheme based on the MHO concept was a novelty. It also made Ghana one of a few low-income countries, along with Colombia, the Philippines, Burundi, and Kenya, enact legislation to allocate a significant amount of funding to establish universal health insurance coverage. These health insurance schemes provide a comprehensive basic benefits package with no cost-sharing, and they start the process of covering the poor and other vulnerable groups (Schieber *et al.*, 2012).

The NHIS provides a tremendously handsome benefits package to its members by covering more than 95 per cent of all disease conditions afflicting Ghanaians, including outpatient and inpatient care, deliveries, diagnostic tests, generic medicines, and emergency care. The NHIS is financed by a 2.5 per cent Value Added Tax (VAT), 2.5 per cent of formal sector workers' Social Security and National Insurance Trust (SSNIT) contributions and individual premiums for non-SSNIT contributors. The NHIS has had a tremendous expansion in terms of coverage since its inception. For instance, within four years of its implementation, total membership was more than 12.5 million, representing 61 per cent of the total population, thus surpassing the

NHIS target of 40 per cent (National Health Insurance Authority, 2008). Again, a total of 4,004 health care providers were accredited to provide services to insured members across the country (National Health Insurance Authority, 2014).

The positive effect of health insurance on the usage of health care services has been well-documented and widely acknowledged. Hadley's (2003) health services research conducted between 1978 and 2003 in the developed world offers a solid case that having health insurance would improve the health of the uninsured. Although some governments in low-and middle-income countries, such as Ghana, have implemented health insurance schemes in recent years, few studies have examined their effect. However, these studies did not use rigorous econometric techniques.

1.2 Problem statement

Global estimates reveal that close to 150 million individuals face catastrophic healthcare payments annually due to direct expenditures for healthcare utilisation resulting in approximately 100 million pushed into poverty (World Health Organization, 2010b). This situation is because such individuals do not have access to prepayment schemes and must pay for care at the time of service delivery. As a result, many low-income families receive substandard or no medical care at all when they become ill (Malik and Syed, 2012).

In the 1980s through to the early 2000s, many countries initiated World Bank-sponsored health system reforms which increased user fees in public health facilities. Afterwards, OOP spending became the dominant mode of financing health care in most developing countries. Granted that the destitute were exempt from paying user fees, the definition of poor was arbitrary, resulting in only modest assistance for the majority of them (Thakur and Ghosh, 2009). Thus, most households in low-income countries were spending a higher percentage of their healthcare cost out-of-pocket. For instance, in 2012, India’s OOP was 86 per cent of her total private health expenditures and close to 58 per cent of total health expenditures. In Pakistan, in 2010, the share of her OOP payment was 67% of total health expenditure and 85% of private spending on health (World Health Organization, undated). The situation is not different in the region. In 2017, in Cameroon, Equatorial Guinea, Nigeria and Sudan, OOP health spending exceeded 70% of total health expenditure (Asante, Wasike and Ataguba, 2020). Ghana’s total health spending as a share of GDP rose steadily from 5 per cent to 5.9 per cent of GDP between 2003 and 2015. In the same period, OOP share dropped from about 62 per cent of total health

expenditure in 2003 (the year government enacted National Health Insurance Act) to 36 per cent in 2015 (The World Bank, 2018). According to Ahmed *et al.* (2018), OOP payments are the most regressive financing healthcare mechanism and a gross measure of financial protection.

The World Health Organisation dedicated a section of its 2010 World Health Report to health care finance options towards UHC. According to the report, healthcare funding systems must be precisely structured to provide all persons with adequate access to required health services while warranting that their use does not put them in financial hardship (Ministry of Health, 2015). UHC goals encompass equity in service utilisation or use based on need, quality and universal financial protection.

In several developing nations, healthcare financing via social health insurance or tax-funded systems has become a critical component of attaining universal financial protection for healthcare. Even though health insurance is only available in a few African nations, there is considerable interest in investigating the prospect of employing social health insurance to increase healthcare utilisation and affordability. Social health insurance is one of the health financing options that can spread risks across populations and time (Wagstaff, 2009).

Health insurance advocates claim that these schemes can boost healthcare utilisation (Dror and Jacquier, 1999). Regarding national health insurance, Pritchette (1996) observed that it is efficient and equitable healthcare delivery and protects families from the high cost of healthcare. Chen and Jin (2012) suggested that theory supports the fact that health insurance can affect a household via increased healthcare utilisation, better health, and higher productivity as additional financial resources become available from medical costs.

The uninsured individuals are often the focus of policymakers mainly because health insurance coverage is assumed to improve health. Previous studies find a favourable and statistically significant influence of NHIS on healthcare quality received, healthcare-seeking behaviours, out-of-pocket health spending, among others. For example, a study in Ghana by the National Development Planning Commission (2009) revealed that being an active NHIS member increases your likelihood of seeing high-quality health professionals such as doctors and medical assistants against consult drugstores and traditional providers. Likewise, members of the scheme are more likely to get prescriptions, visit clinics, and seek professional or formal healthcare when they are ill (Blanchet, Fink and Osei-Akoto, 2012). In addition to the many achievements of the NHIS, within five years of inception, Ghana had transitioned its prevailing

community-based health insurance schemes to district mutual health insurance schemes, standardised the benefits package and administrative processes, and primarily changed these schemes into local branches (Schieber *et al.*, 2012). These achievements have been quite impressive.

Despite these successes chopped, the scheme has experienced growing pains and now finds itself at a crossroad as revenue may be insufficient to keep the NHIS afloat under its existing spending patterns and expansion ambitions (Schieber *et al.*, 2012; IMANI Africa, 2017). Besides its success story of improving healthcare access, enrolment is relatively low, and the dropout rate is high (National Health Insurance Authority, 2011). The impoverished who are the policy target enrol less (Asante and Aikins, 2008; Sarpong *et al.*, 2010). On the issue of enrolment, for instance, total active membership of the scheme as of 2016 was more than 11 million representing 41 per cent of the national population (Ministry of Finance, 2017) compared with 2009 figure of more than 10.6 million, representing 48 per cent of the total population.

Notwithstanding Ghana's NHIS, the country out-of-pocket spending exceeds the 20 per cent maximum recommended by the 2010 World Health Report to ensure that financial catastrophe and impoverishment resulting from seeking health care is at a minimum (World Health Organization, 2010b). The relatively low government health expenditures continuously make out-of-pocket payments play an important role in Ghana's health financing system. These challenges are likely to make the government dream of achieving universal coverage a mirage. Evidence suggests there is a commitment by the Government of Ghana to pursue a universal health system. However, since the legislative inception of Ghana's NHIS in 2003 and implementation in 2005, there is little or no systematic empirical evaluation on the interrelationship between health insurance, healthcare utilisation, financial protection and health status. This study aims to fill this gap. This study aims at analysing Ghana's National Health Insurance Scheme within the context of healthcare utilisation, financial protection, and health status against this backdrop.

1.3 Research questions

The key questions this study seeks to address are:

- How does the National Health Insurance Scheme affect healthcare utilisation in Ghana?
- How does the scheme offer financial protection to its members at the point of service?

- How does health insurance coverage affect the probability that a person would seek medical care?
- What kind of relationship exists between health insurance, healthcare utilisation, healthcare expenditure and health status?

1.4 Objectives of the study

The general objective of this study is to assess the effects of the national health insurance scheme on healthcare utilisation, financial protection and health status of Ghanaians.

The specific objectives of the study are to:

i. Evaluate the effects of NHIS on healthcare utilisation in Ghana.
ii. Analyse the effects of NHIS on financial protection of beneficiaries.
iii. Explore the impact of NHIS membership on the health status of beneficiaries.
iv. Examine the interrelationship between health insurance, healthcare utilisation, healthcare expenditure and health status.

1.5 Significance of the study

The current study contributes to our understanding of the contextual dynamics of health insurance in Ghana by building on previous studies by providing rigorous methodological alternatives in analysing healthcare utilisation, financial protection and health status. These methodological techniques include the two-stage residual inclusion (2SRI), Copula-based Heckman selection model, endogenous switching regression for ordered outcomes and the Conditional Mixed Process (CMP) model. The study would also contribute to the existing empirical literature on the health insurance scheme, and we believe that our findings would provide further investigations into these schemes.

This study will serve as a guide for researchers, stakeholders, and practitioners in the field of healthcare financing as well as spur further research into the additional value of social health insurance as a financial risk management tool for the poor. The study will look into whether health insurance might be a way to achieve universal health coverage and provide a hedge against financial risks resulting from health shock. Also, it will provide valuable insights into future health care policy design on whether insurance can be used as a tool to combat rising healthcare costs.

This study promises to conduct high-quality research not only to assess the effects of NHIS but also to gather new evidence about the broader impacts of insurance on health care utilisation, financial protection and health status. This has become necessary because most of the world's national and/or social health insurance systems particularly in developing countries were established some few decades ago. Hence, there is minimal empirical evidence on their impacts on various health outcomes since there is little or no data for the era before their introduction. For a developing country like Ghana to establish a national health insurance scheme, its experience provides us with an exclusive opportunity to address this gap. We expect that our research findings would provide valuable insights, especially for nations seeking to establish a national health insurance scheme.

This work adds to the current body of knowledge in the health insurance field by considering the interconnected nature of healthcare decisions. The study used appropriate econometrics approaches in dealing with sample selection and endogeneity. Our decision to modelled four healthcare decisions, mainly health insurance coverage, healthcare utilisation, healthcare expenditure and health status simultaneously, is novel.

1.6 Chapter organisation

The thesis would be structured as follows: Chapter one of this study covers the background to the study, problem statement, research questions, objectives of the study, significance of the study and chapter organisation.

Chapter two comprises an overview of the health sector in Ghana. This chapter reviews the literature on the health sector in Ghana. It would cover topics such as demographic, socioeconomic and health-related SDGs indicators for Ghana; an overview of the health care delivery in Ghana; the evolution of health care financing in Ghana; the historical background to the introduction of Ghana's national health insurance scheme and major challenges facing the scheme; Ghana's health expenditure and current funding sources for the health sector.

Chapter three provides an overview of the health financing mechanisms by highlighting its various dimensions. The chapter begins with an explanation of concepts and terms as used in health insurance intended to ease readers' understanding. Other areas this chapter cover include health financing functions/targets, criteria for assessing health financing mechanisms, global health spending trends and current global efforts in mobilising finance for health development.

The review of relevant theoretical and empirical literature of this study would constitute chapter four. The chapter gives a comprehensive review of existing literature (both domestic and international) on the effects of health insurance on health care utilisation, financial protection and health status.

Chapter five describes the research methodology. The chapter would cover descriptive statistics and key variables, econometric considerations, model specifications, estimation procedures and methods of data analysis.

Chapter six discusses the interpretation of estimated results. These results would provide us with the needed empirical results on the effects of Ghana's NHIS on healthcare utilisation, financial protection and health status.

Chapter seven presents the discussion of research findings, conclusions, policy recommendations, limitations of the study and suggestions for further research.

CHAPTER TWO: OVERVIEW OF THE HEALTH SECTOR IN GHANA

2.1 Introduction

The principal goal of this chapter is to provide a background to the Ghanaian health sector with a view of showing the key characteristics of the state of health care delivery in Ghana. This chapter starts by profiling Ghana based on demographic and socioeconomic indicators. The overview of health care delivery in Ghana constitutes the third section. The fourth part traces the evolution of health care financing in Ghana. The historical background to the introduction of Ghana's national health insurance scheme and the main challenges facing the NHIS will constitute the succeeding two sections, section 2.5 and section 2.6, respectively. Ghana's health expenditure and current funding sources for Ghana's healthcare system will be discussed in sections 2.7 and 2.8, respectively. A discussion of the health-related Sustainable Development Goals indicators constitutes the next section. The last section provides a conclusion for the chapter.

2.2 Demographic and socioeconomic indicators

Table 2.1 reveals some major demographic and socioeconomic indicators of Ghana. The Ghana Health Service constructed these indicators from various data sources including, the World Health Organisation (World Health Statistics), Ghana Statistical Service (Population and Housing Census 2010 and Demographic and Health Surveys), UNICEF, International Monetary Fund (IMF), and The World Factbook.

The demographic vital statistics revealed that Ghana's population is a youthful one. For instance, according to the 2010 population census, the proportion of population below 15 years was 39.3 per cent, lower than the Africa average but higher than the global average of 26.0 per cent (see Table 2.1). Ghana's young population has some implications for the economy. The youthful population could provide a valuable economic resource in a cheap workforce and a rise in tax revenues, resulting from a larger working population. However, some potential problems include a high dependency ratio, pressure on housing and public services, unavailability of jobs in the future etc.

Table 2.1: Demographic and socioeconomic indicators

Indicator	Ghana Value	Africa Average	Global Average
Population density (per sq. km) (2010 pop census)	124.4	43.7	57.38
Population sex structure (%) males (2010 pop census)	49.0	49.97	50.4
Population sex structure (%) (female)	51.0	50.03	49.6
Median age of population (2010 pop census)	20	19.0	30.0
Proportion of population below 15 years (%) (2010 pop census)	39.3	42.0	26.0
Proportion of population above 60 years (%) (2010 pop census)	6.5	5.0	12.0
Proportion of population living in urban areas (%) (2010 pop census)	49.0	38.0	53.0
Coverage of birth registration (%) (2014)	70.5	43	£ 65
Coverage of death registration (%) (2015)	21.0	N/A	33
Net primary school attendance ratio - male (%) (2014)	69.6	80.0	92
Net primary school attendance ratio - female (%) (2014)	69.6	76.0	90
Total gross domestic product (2017)	$47 Billion	$6.757 Trillion	$75.5 Trillion
Gross domestic product per capita (2017)	$1,707.7	$6,136	$15,800
Annual economic growth rate (%) (2014)	4.2	3.8	3.9
Population living on less than 1 US$ dollar per day (2014)	28.6	47.0	14.6

Source: Ghana Health Service (2018b: 13)

Approximately 49 per cent of the population resides in urban areas with a population of 5,000 or more. This figure is more than the African average of 38 per cent. Opportunities for job development, technical and infrastructural advancements, enhanced transportation and communication, superior educational and medical facilities, and increased living conditions are just a few of the benefits of the country becoming more urbanised. The negative consequences of Ghana's urbanisation include pollution and overcrowding, which have adverse effects on health.

The World Population Review (2019) estimates reveal that Ghana's fertility rate is 3.94 and 2.78 children per woman in rural and urban areas, respectively. Also, the World Population Review estimates Ghana's population growth rate at 2 per cent per annum. The high population growth provides an opportunity for a large and cheap workforce in the future, a growing market

for manufactured products, and a large tax base for Ghana. An added advantage of urbanisation in Ghana is that persons living in urban areas frequently have better access to public health. These are demographic dividends Ghana must harness.

The high population growth and the rapid urbanisation put a strain on health services. The growing population often necessitates the establishment of health facilities and other physical and social infrastructure to care for the needs of the people. Health hazards associated with rapid urbanisation include environmental pollution, unsanitary conditions and uncontrolled settlement, which lead to slums development with its attendant problems. This situation exposes a large proportion of the urban residence, particularly the urban poor to both communicable and non-communicable diseases. Diseases such as cholera, diarrhoea, measles, dysentery and typhoid are very rampant in the cities, especially among the children (Oteng-Ababio, 2000). Additionally, the relatively high fertility rate exposes women and children to many health risks through the course of pregnancy, labour, childbirth and after, hence the need for government to improve maternal and child health services. The growing and structurally changing population in Ghana poses a challenge to health services and other social programme s. All these have the potential to increase healthcare demand, thereby making the NHIS handy in meeting the healthcare needs of Ghanaians.

Ghana's economy is one of the fastest-growing economies in the world partly due to the discovery of crude oil in commercial quantities in 2007. According to the IMF, Ghana's real gross domestic product (GDP) growth was 14.4 per cent in 2011 making the country one of the fastest-growing economies in the world (The Association of Chartered Certified Accountants, 2013). However, Ghana could not maintain its double digits GDP growth rate figure. In 2012, the growth rate lost its momentum declining to 9.3, and further fell to 2.2 in 2015 (Ghana Statistical Service, 2015, 2019).

Ghana achieved a lower-middle income country status in 2011 with GDP per capita at $1,318 following a statistical rebasing of the economy in 2010 which reflected on new sectors such as oil exploration, forestation and telecommunications. These developments resulted in Ghana's GDP going up by 60.3 per cent from $18 billion to $30 billion (The Association of Chartered Certified Accountants, 2013). However, Ghana's Total GDP and GDP per capita for 2017 are lower than Africa and global averages (see Table 2.1).

Real GDP growth in 2018 was 6.8 per cent higher than the Africa and global averages (Ministry of Finance, 2018). Despite these impressive growth figures, Ghana is an aid-dependent country

and estimates from the Ghana Statistical Service indicates that 28.6 per cent of the population lived in poverty, though this figure is above Africa average (see Table 2.1).

2.3 Overview of health care delivery in Ghana

The government is responsible for providing for most of the health care needs of the people. This obligation is done through the Ministry of Health (MoH) and Ghana Health Services (GHS). The MoH is charged with the health of Ghanaians and the provision of public health services, managing the country's healthcare industry, and constructing hospitals and health education institutions. The MoH is in charge of all health-related matters in the country. In the past, the MoH was on duty of providing direct public health services. But, with the passage of the Ghana Health Service and Teaching hospitals ACT (ACT 525) of 1996, the functions of promotion, preventive, curative, and rehabilitative are now the responsibility of the Ghana Health Service and Teaching hospitals. As a result, the Ministry is now in charge of policy creation, monitoring and evaluation, resource mobilisation, and regulation of the country's health service delivery.

The health sector's vision is for a healthy population to support national development, while the goal is for a healthy and productive population that can reproduce securely. To achieve these, the MoH works through nineteen (19) agencies: Ghana Health Service (GHS), Ghana Medical and Dental Council (MDC), Ghana National Drugs Programme (GNDP), Ghana College of Physicians and Surgeons (GCPS), Ghana Registered Nurses' and Midwives' Association (GRNMA), Pharmacy Council Ghana (PCG), Alternative Medicine Council, Foods and Drug Authority (FDA), National Health Insurance Authority (NHIA), Allied Health Professionals Council, Health Facilities Regulatory Agency (HeFRA), National Ambulance Service (NAS), National Blood Service, Christian Health Association of Ghana (CHAG), Centre for Scientific Research into Plant Medicine (CSRPM), Tamale Teaching Hospital (TTH), Korle-Bu Teaching Hospital (KBTH), Komfo Anokye Teaching Hospital (KATH), and Mental Health Authority (MHA). The agencies are in charge of implementing the health ministry's policies in service delivery, regulation, financing, research, and training. Table 2.2 and Figure 2.1 show the agencies and their functions and the organisation of the health system in Ghana, respectively.

Additionally, the MoH collaborates with other key stakeholders such as Ministries Department and Agencies (MDAs), Metropolitans Municipals and District Assemblies (MMDAs),

development partners and the private sector. Figure 2.1 gives a snapshot of the many areas and organisations for which the Ministry of Health is responsible.

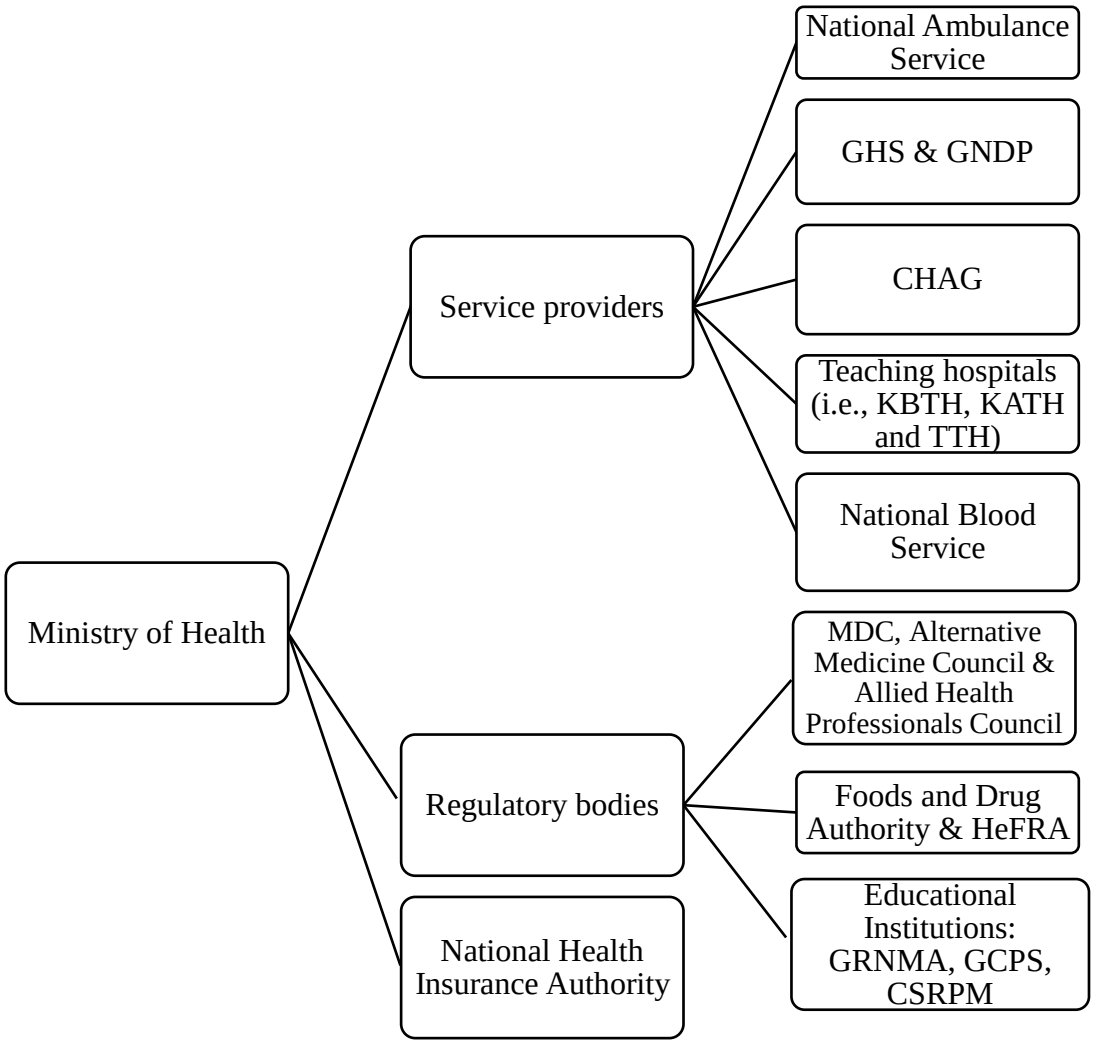
Table 2.2: Health agencies and their functions

Agency	Functions
Ghana Health Service	The Ghana Health Service Council, which reports to the Minister of Health, is in charge of the GHS. GHS is responsible for putting national policy into action.
Ghana Medical and Dental Council	The council is responsible for ensuring that medical and dental practitioners have the highest level of training and for prescribing and enforcing professional standards of conduct.
Ghana National Drugs Programme	Its mission as an organisation under the Ministry of Health is to create medicines policy and manage policy execution in public and private pharmaceutical sectors.
Ghana College of Physicians and Surgeons	In medicine, surgery, and similar disciplines, promotes specialist education and ongoing professional growth. Also, promote postgraduate medical education and research in medicine, surgery, and allied fields and contribute to sound health and public health policies development.
Ghana Registered Nurses' and Midwives' Association (GRNMA)	The GRNMA concentrates on the education and regulation of nursing and midwifery professionals in Ghana.
Pharmacy Council Ghana	PCG's principal role is to ensure that pharmacy practice is held to the highest standards possible in Ghana.
Alternative Medicine Council	To promote, control, and regulate Traditional and Alternative Medicine practices by developing, implementing, coordinating, monitoring, and evaluating policies and programs that contribute to the national development agenda.
Foods and Drug Authority	The FDA's mission is to protect public health by ensuring the safety, quality, and efficacy of human and veterinary drugs, food, biological products, cosmetics, medical devices, household chemical substances, and clinical trials, as well as the control of tobacco products, by enforcing relevant standards.
National Health Insurance Authority (NHIA)	The NHIA is in charge of licensing, monitoring, and regulating the functioning of health insurance programmes in Ghana.
Allied Health Professionals Council	To govern allied health professions training and practice in Ghana. The Council has a duty of giving professional certification to all allied health programmes as part of its mandate.
Health Facilities Regulatory Agency	The Agency is responsible for issuing licenses and overseeing facilities that provide public and private health care services. Its responsibilities include the following: receiving, reviewing, and approving license applications; inspecting and licensing establishments that provide public and private healthcare services; controlling and monitoring

	operations to evaluate the adequacy and standard of health care offered in practice; and setting the basic and minimal equipment and personnel requisite for the type of services to be given.
National Ambulance Service	Its primary mission is to offer efficient and fast pre-hospital emergency medical care to the sick and injured and safe transportation to medical facilities.
National Blood Service	Its mandate is to provide a coordinated countrywide approach to providing safe, appropriate, and efficient blood and blood products that is timely, accessible, and inexpensive for all patients requiring blood transfusion therapy in public and private health care facilities across the country.
Christian Health Association of Ghana (CHAG)	CHAG delivers health care to the most disadvantaged and underserved people, primarily in rural areas.
Centre for Scientific Research into Plant Medicine	The institution conducts and promotes scientific research in herbal medicine, and provides quality control and technical assistance to organisations and independent herbalists.
Korle Bu Teaching Hospital	It serves as a national referral Centre in the country. The Hospital delivers sophisticated and scientific investigative procedures and specialisation in different fields such as Neurosurgery, Cardiothoracic surgery etc.
Komfo Anokye Teaching Hospital	Its legal mandate is to provide specialist care, training undergraduate and postgraduate health professionals and conduct medical research to address emerging health problems of Ghana. It receives referrals from the northern part of Ghana.
Tamale Teaching Hospital	The hospital is authorised to perform three main functions providing advanced clinical health services, assisting in the training of undergraduates and postgraduates in medicine, and conducting health-related research to improve health care. It functions as a referral hospital for Ghana's northern regions.
Mental Health Authority	The authority is responsible for creating, advocating, and implementing mental health policies across Ghana and delivering culturally acceptable, compassionate, and integrated mental health care.

Source: Author (2019)

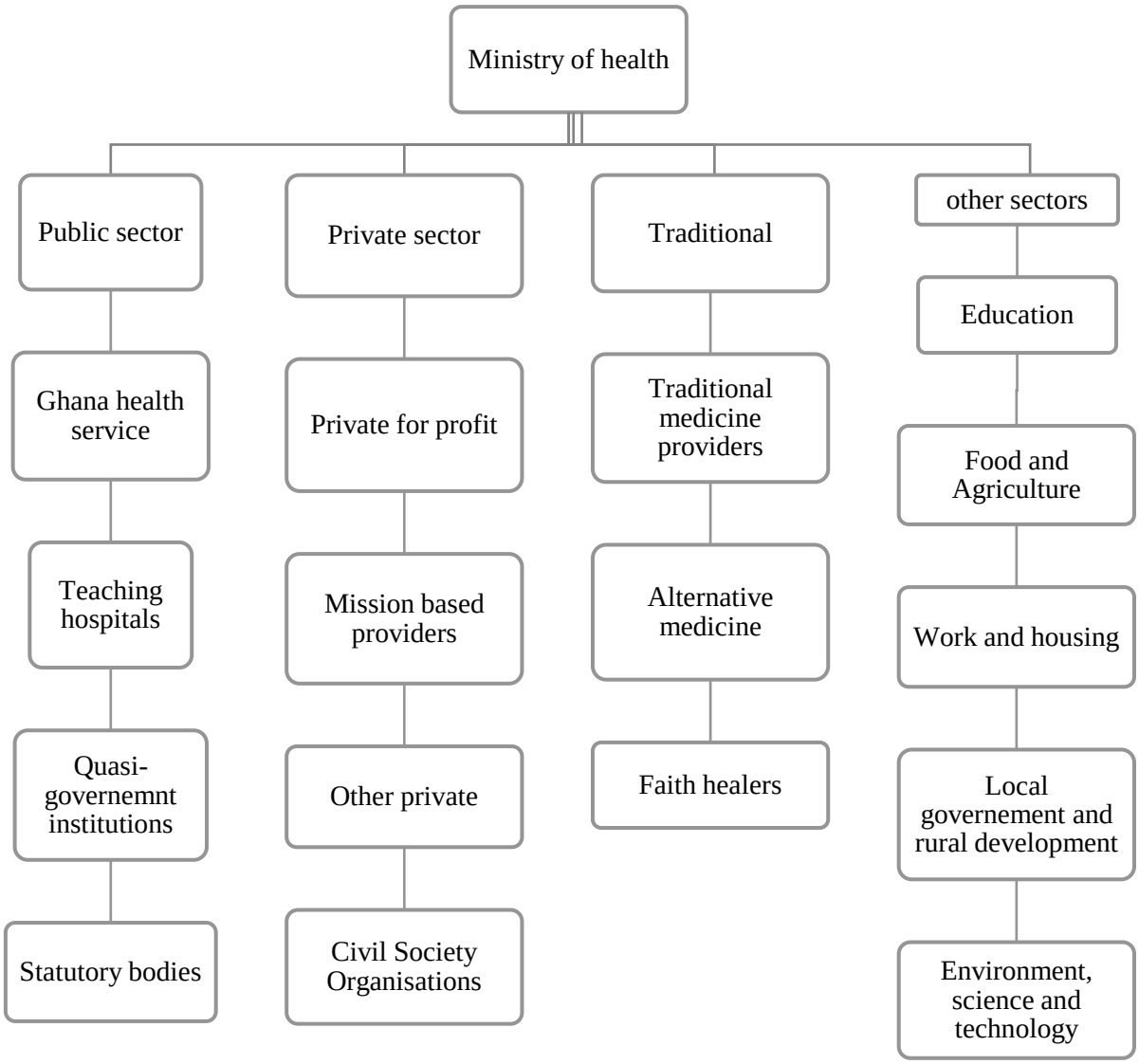
Figure 2.1: Organisation of Ghana's health system



Source: Schieber *et al.* (2012:17), modified by the Author

The GHS is a government-run organisation founded in 1996 under Act 525, as mandated by the 1992 constitution. Its task is to implement national policies under the auspices of the Minister of Health via its governing Council (i.e., the Ghana Health Service Council) as an independent executive agency. Under the direction of its administrative offices, GHS focuses on developing primary health care services at all levels when implementing policies. Private mission health services, such as the Christian Health Association of Ghana and the Teaching Hospitals, are autonomous from GHS (Ghana Health Service, 2017a).

Figure 2.2: Relationship of the Ministry of Health to the various sectors and organisations



Source: Ghana Statistical Service (2003:16)

The GHS is organised at three levels administratively: the national, regional, and district. The GHS is structured at five levels functionally: national, regional, district, sub-district and community. Leadership and governance of the GHS encompass a twelve (12)-member council enacted by the Act 525 that promotes teamwork with the Ministry of Health, Teaching Hospitals and other organisations, and offer recommendations on health policies and programmes to the Minister of Health and the like (Ghana Health Service, 2017a). The GHS is headed by the Director-General and the Deputy Director-General and assisted by ten (10) directorates. Regional Directors of Health Services assist the Director-General, whereas

District Directors of Health Services assist the Regional Directors. The 2016 Annual Report of Ghana Health Service revealed 10 Regional Directorates and 216 District Directors of Health Services assisted by a District Health Management Team, District Health Committee and sub-District Health Management Teams. As one moves down the healthcare system, from national to sub-district, services become more integrated. This integration has come as a result of the decentralisation of the health sector and health sector reforms. Also, the District Directors of Health Services are in charge of overseeing Private Health Care Providers in their various districts.

The GHS goals are to implement ratified national policies for health delivery in the country, promote access to high-quality health care, and responsibly manage the resources available to provide health care. The establishment of the Service is a vital step in Ghana's efforts to create a more equitable, efficient, accessible, and responsive healthcare system, as outlined in the Health Sector Reform process delineated in the Medium Term Health Strategy (MTHS). To fulfil the above goals, the GHS provides wide-ranging health services throughout Ghana at all levels, both directly and indirectly, through subcontracting and cooperation with other organisations. Some of the services rendered include: formulate strategies and technical plans to implement national policies; managing and administering the health resources within the Service; promoting a healthy way of life and good health habits among people; and establishing effective disease surveillance, prevention, and control mechanism, among other services (Ghana Health Service, 2017a).

Ghana has a well-developed, multilevel, integrated health system spread across the country. The system encompasses community-based health planning and services zones, health centres, district, regional, and teaching hospitals, private health providers and non-governmental health-related organisations. The Ghana Health Service, non-governmental organisations (the Christian Health Association of Ghana), private providers, and the NHIA and many governmental and regulatory institutions at different levels of Ghana's highly decentralised health system support the MoH as the system's steward (Schieber *et al.*, 2012). Overall, one can conclude that Ghana has a well-developed healthcare delivery system. Expectations are that with a comprehensive health service delivery system in place, people confidence in the provision of health care would increase, which would increase their demand for health insurance.

2.4 Evolution of health care financing in Ghana

Ghana's healthcare financing has experienced numerous significant changes and transformations. Before Ghana's independence, especially during the colonial era, which dated back to the 1880s, curative services were fee-paying. Senah (2001) stated that the provision of health care during colonial rule, as in many other Africa colonies, was limited and served the white settler population and their workers typically. Furthermore, at the peak of the colonial medical service, only around 10 per cent of the population had access to allopathic care, and health care services were primarily cities concentrated (Senah, 2001).

When Ghana achieved independence in 1957, it was committed to providing 'free for all' health care services. As a result, no direct out-of-pocket payment was required at the time of service. In other words, the Government of Ghana started to provide its citizens with free access to primary health care services through public health facilities. Healthcare services were financed mainly through tax revenue and external donor support. During this time, efforts were made by the government to extend a wide range of primary health care facilities around the nation (Waddington and Enyimayew, 1990). After independence, the provision of health care in Ghana reflected Kwame Nkrumah view of the government responsibility in encouraging development and guaranteeing equitable distribution of wealth (Arhinful, 2003).

This "free for all" healthcare policy lasted until the country economic crises (stagnation and declining economy) in the 1960s and 1970s when the government found it difficult to sustain it. Therefore, in response to this problem, the Government of Ghana in 1969 introduced user fees at all public health facilities across the country through the enactment of the Hospital Fees Decree 1969, which was amended in 1971 to become the Hospital Fees Act (Waddington and Enyimayew, 1990). This Act which imposed nominal fees for services was to decrease excess demand or 'frivolous' demand. Patients paid a token for consultations at the start of the user fee implementation. The fees collected were so minimal that they had no impact on cost recovery compared to the actual cost of providing health care (Ministry of Health, 1971). However, this grew into a situation where patients paid a fixed fee for consultation, examination, laboratory, and other diagnostic procedures (Nyonator and Kutzin, 1999).

The decline in Ghana's economy in the 1980s resulted in government budget expenditure and GDP on health care falling from 6.45 per cent and 0.95 per cent in 1980 to 4.38 per cent and 0.35 per cent in 1983, respectively (Ministry of Health, 2001). This period witnessed government spending on health care dropping by 32 per cent, resulting in supply shortages,

demoralised workforce and a halt on investment in infrastructure (The Association of Chartered Certified Accountants, 2013). With the continued deterioration of the Ghanaian economy coupled with huge external debt and pressure from international financial institutions, the Government of Ghana pursued a neoliberal approach to health care provision. With strong encouragement from the World Bank and the IMF, the Government of Ghana implemented the Structural Adjustment Programme s (SAP) in the 1980s. Programmes intended to recover costs were implemented under SAP as part of the World Bank financed macroeconomic policies. In return for financial support, the government increased user fees substantially in 1985. The goal was to recover at least 15 per cent of its total recurrent expenditure (Ministry of Health, 2003). The user fees came to be named "cash and carry". The utilisation of health services fell rapidly due to the user fee introduction. For example, the utilisation of health services fell by more than 50 per cent and over 70 per cent countrywide and in rural areas, respectively (The Association of Chartered Certified Accountants, 2013). Though user fees improved operating revenues at some health facilities, however, it produced a financial barrier to health care use particularly among the poor. Studies have since revealed that the introduction of user fees resulted in a decline in antenatal attendance, supervised delivery and outpatient attendance thereby making citizens shift from modern medicine to traditional medicine or self-medication for treatment (Waddington and Enyimayew, 1990; Agyepong, 1999; The Association of Chartered Certified Accountants, 2013). User fees, therefore, created equity problems in access to health care especially for the poor.

In the mid-1980s, the government implemented an exemptions policy for a limited number of health services to protect vulnerable people from the consequences of user fees. In 1997 the policy was extended to cover children under five years old, the elderly (70 years and above) and the poor. However, the exemptions policy suffered implementation challenges. One of the challenges was application difficulties, including health provider access to exemption funds, ascertaining each patient's proof of age, poverty authentication, and non-uniform implementation of exemptions (Asenso-Okyere *et al.*, 1998; The Association of Chartered Certified Accountants, 2013). For instance, the exemption clauses of providing service for the poor and treatment of emergencies, whether they are in a position to pay or not, were hardly used. Additionally, the verification of the poverty status of persons involved extra 'social work' because if a mere statement of inability to pay for service is used, then everyone would become "too poor to pay" (Agyepong, 1999).

In the early part of the 1990s, some districts in Ghana introduced community-based health insurance (CBHI) schemes. The type of relationship between the scheme and the service provider is one of the characteristics of CBHI schemes. Some are integrated with the service provider while others operate outside of the providers, thereby called provider-based and community-based schemes (Ekman, 2004). Most CBHI schemes in Ghana were sponsored and managed by service providers, such as St. Dominic's Hospital and St. Theresa's Hospital. On the other hand, St. Rose's Secondary School Health Insurance Scheme and Nkoranza Health Insurance Scheme were under the management of mission hospitals. These service providers, mainly mission hospitals, introduced these schemes to deal with the complications associated with paying for treatments at the point of care. CBHI schemes such as Nkoranza and Dangme West were established and became models for other communities to emulate and replicate. These schemes became known nationwide. In 2003, there were 258 of these schemes across the country. However, coverage was limited to only two per cent of the country's population in the same year (The Association of Chartered Certified Accountants, 2013).

In 2001, the Ghanaian government declared that it would eliminate the "Cash and Carry" system and investigate the viability of adopting a national health insurance scheme in response to the difficulties caused by user fees.

2.5 Historical background to the introduction of Ghana's National Health Insurance Scheme

To extenuate the effects of user fees, particularly among the poor, the government of Ghana commissioned different studies investigating alternate health care finance mechanisms, mainly insurance-based ones. Several efforts have been made to assess the viability of establishing a National Health Insurance Scheme (NHIS) in Ghana. Proposals to create and operate an NHIS had been on the national policy agenda for quite some time. As early as the 1980s, the Ministry of Health (MoH) hired numerous technocrats from inside and outside the country to study and proposed a national health insurance program to increase healthcare access in Ghana. Upon a formal request from MoH, organisations such as the International Labour Organisation (ILO), World Health Organisation (WHO), European Union (EU) and London School of Hygiene and Tropical Medicine all made visits to Ghana and provided technical advice.

In August 1995, a proposal came from a private consultancy group to the Ministry of Health in a report entitled "A Feasibility Study for the Establishment of a National Health Insurance Scheme in Ghana". The study recommended establishing a centralised National Health

Insurance Company to administer a mandatory "Mainstream Social Insurance Scheme" for all Social Security and National Insurance Trust (SSNIT) contributors and registered cocoa producers. For those in the non-formal sector and the urban self-employed, the report recommended the setting up of "rural-based community financed schemes" and profit or non-profit private schemes based on voluntary membership, respectively. Nonetheless, this report did not give how the MoH would carry out these tasks in detail (Aikins, 2005).

In 1997, the National Democratic Congress (NDC) government formally launched a pilot NHIS in the Eastern Region in four districts, namely New Juaben, Suhum/Kraboa/Coaltar, Birim South, and Kwahu South. The NHIS Secretariat was established to handle the planning and implementation of the programme. The Secretariat laid the groundwork for broad coverage of the schemes by supplying public instructional materials such as booklets and pamphlets. By 1999, the proposed pilot NHIS had died a stillbirth without insured persons (Agyepong and Adjei, 2008). The pilot NHIS stuck due to disagreements over the strategic direction of health financing policy in general and the pilot scheme.

To sum up, there was no agreement among technocrats on a government-run health insurance scheme. Even though the pilot scheme failed, it stimulated public discussion on the need for an alternative healthcare financing system in Ghana (Arhinful, 2003). Following the failure of the pilot NHIS, the SSNIT began plans for a centralised health insurance scheme to be operated by the Ghana Health Care Company. Unfortunately, it never came into being despite some advances of public expenditure on personnel, feasibility and software (Agyepong and Adjei, 2008).

The Government of Ghana recognised the many problems allied with the "Cash and Carry" system. As a result, the Government made its intent clear to abolish and replace the "Cash and Carry" with an NHIS. The Government was encouraged to create a viable NHIS by the modest accomplishments of several CBHI initiatives. However, a change of Government in January 2001 truncated the vision of the NDC government to introduce an NHIS. During the 2000 elections campaign, the main opposition party, the New Patriotic Party (NPP), promised to abolish the highly unpopular "cash and carry" system of health delivery. After winning the elections, the NPP government initiated the policy-making process to implement an NHIS. Subsequently, the National Health Insurance Act (Act 650) was passed in August 2003, authorising the establishment of district-wide Mutual Health Organisations [MHOs] across the country. In March 2004, the NHIS became operational and replaced the cash-and-carry system,

ensuring health care access, especially among the poor and the vulnerable. Ghana's NHIS is unique as it mixes social health insurance and mutual health insurance concepts (Jehu-appiah *et al.*, 2011).

The National Health Insurance Act sanctioned the formation of three types of health insurance; district mutual health insurance schemes (DMHISs), private mutual insurance schemes and commercial health insurance schemes. The DMHISs were public insurance schemes available to persons living in Ghana. The DMHISs were primarily funded by the central government through the National Health Insurance Levy (NHIL) and augmented by yearly contributions from members. Private mutual insurance schemes were established by a group of people, possibly members of a church or social club, to meet group health needs. The private mutual insurance schemes were to be funded entirely by member contributions. But, commercial health insurance schemes were to be financed mainly from member contributions. The Act explicitly enjoins every Ghanaian to join either of these. However, the government provides a subsidy for the DMHISs members. This subsidy payment incentivises people to stay in the integrated national health insurance system rather than purchase private insurance.

Ghana's NHIS aspires to provide all Ghanaians with equitable universal access to a high-quality basic package of health care without requiring them to pay out-of-pocket at the time of service delivery. The long-term policy goal for adopting the NHIS in Ghana is for every Ghanaian to be covered by a health insurance program that is adequate for them. Thus, the following principles guide the design of Ghana's NHIS; equity, risk equalisation, cross-subsidisation, quality care, efficiency in premium collection and claims administration, community or subscriber ownership, partnership and reinsurance (Ministry of Health, 2004b, 2004a).

The scheme sources of funds include an NHIL of 2.5 per cent on specific goods and services, 2.5 per cent of formal sector workers' SSNIT contributions and income-adjusted premiums. The National Health Insurance Fund (NHIF) generates revenue to provide reinsurance for the DMHIS and pay premiums for exemptions such as children under the age of 18 whose parents are registered members, pregnant women, elderly individuals over the age of 70 and the core

poor[1]. Other miscellaneous funds include returns from investment and funds from the Government of Ghana as allocated by Parliament.

Ghana's NHIS provides a handsome package of benefits to its members by covering more than 95 per cent of all diseases afflicting Ghanaians. Currently, the benefits package under the scheme is grouped into six, namely outpatient services, inpatient services, oral health, eye care services, maternity care, and emergencies. Outpatient services include consultations and reviews. The following are some of the conditions the scheme treats at outpatient setting: malaria, respiratory tract infection, diarrhoeal, hypertension, eye and ear infections, rheumatism, anaemia, typhoid fever, dental caries, diabetes mellitus, STIs; investigations, including laboratory investigations and x-rays; ultrasound scans; HIV/AIDS symptomatic treatment for opportunistic infections, among other services (National Health Insurance Scheme, 2019). Some inpatient service rendered includes general and specialist inpatient care; laboratory investigations, x-rays and ultrasound scans; cervical and breast cancer treatment; diagnosis and complications from other cancers, feeding, medication and (processing for) blood and blood products, and the like (National Health Insurance Scheme, 2019).

Oral health includes pain relief that includes incision and drainage, tooth extraction and temporary relief: dental restoration, fillings and dressing. Eye care services include refraction, visual fields, scan, Keratometry, Cataract removal and Eyelid surgery. Maternity care includes antenatal care, deliveries, caesarean section and post-natal care. The scheme offers coverage for all because these are crises that demand urgent intervention. Services under emergencies include medical and surgical emergencies (e.g., brain surgery or heart surgery resulting from accidents), Paediatric emergencies, Obstetric and Gynaecological emergencies, Road Traffic, Industrial and workplace accidents, among other services (National Health Insurance Scheme, 2019).

Some services excluded from the benefits package include: rehabilitation other than physiotherapy; cosmetic surgeries and aesthetic treatment; HIV antiretroviral medicines; assisted reproduction; orthotics; dialysis for chronic kidney failure; cancer treatment other than cervical and breast cancer; organ transplantation; diagnosis and treatment overseas; medical

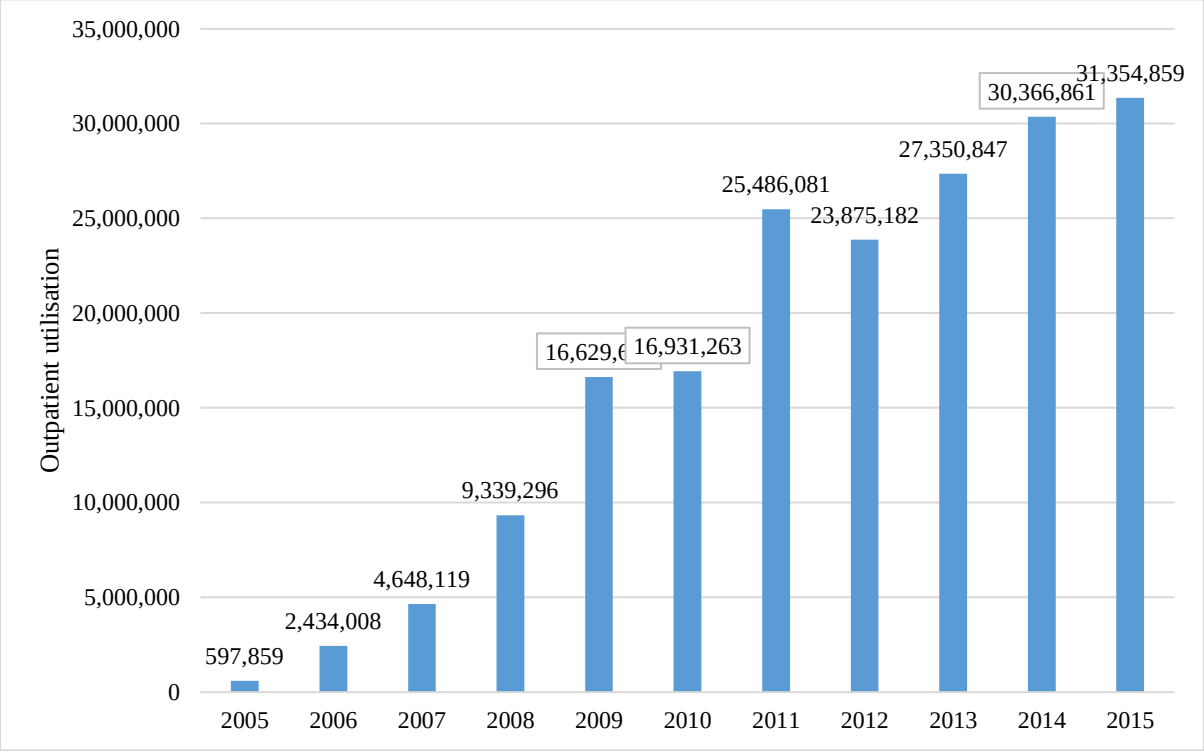
[1] Adults who are unemployed and have no source of income are considered core poor since they are unable to support themselves financially (Ministry of Health, 2004c).

examinations with the aim of employment, among other services (National Health Insurance Scheme, 2019).

The NHIA is duty-bound for regulating the schemes, accrediting providers and managing the NHIF. Act 650 provides a legislative framework for the establishment of such a regulatory body. The NHIA also educates the general public on health insurance concerns and resolves complaints from insurance schemes, members, and providers. The authority is responsible for guiding the NHIF's implementation and management.

On issues of enrolment, the scheme had 11,164,673 active members as at the end of June 2016. The number represents 41 per cent of the total population of Ghana (Ministry of Finance, 2017). By implication, this estimate indicates that over 15 million people residing in Ghana are not benefitting from the scheme based on estimated population, leaving these people to access healthcare through out-of-pocket payments.

Figure 2.3: Outpatient utilisation trends, 2005-2015



Source: Author (2019)

The scheme has increased access to health care substantially despite its inability to achieve the 50 per cent enrolment level it set for itself within five years of implementation (Ministry of Health, 2004c). The number of outpatient utilisation has been rising over the years. For

instance, the number of outpatient visits of insured members increased from 597,859 in 2005 to 31.2 million in 2015, except 2012 which recorded a marginal fall to 23.9 million (see Figure 2.3). Figure 2.3 shows the utilisation[2] trend of NHIS members over the years, as data was obtained from NHIA annual reports. In addition, beneficiaries of the scheme make an average of 85,000 hospital visits per day. The scheme is expected to reduce financial barriers, improve healthcare access and improve the health seeking behaviour of Ghanaians.

2.6 Challenges facing Ghana's National health Insurance Scheme

Despite the many successes achieved by Ghana's NHIS, the scheme faces some challenges which threaten its survival or sustainability. According to IMANI Africa (2017), the increase in coverage unaccompanied by a corresponding increase in resources or premium payments had resulted in a considerable financial strain for both the plan and the country as a whole. Since 2009 claims expenditure growth has outstripped the revenue growth of the scheme, thereby causing a sizable deficit. For instance, claims expenditure rose from GHS 7.6 million in 2005 to GHS 1.1 billion in 2014, and by the end of 2014, the shortfall had widened to GHS 300 million (Wang, Otoo and Dsane-selby, 2017). Three main factors have contributed to the rising claims expenditure over time. These factors are the increase in enrolment, an increase in health care utilisation and rising unit costs. Unfortunately, 69 per cent of the scheme membership does not pay premiums, hence making premium payments to cover only 3.4 per cent of the NHIS' funding (IMANI Africa, 2017). The shortage of finances, which is frequently owing to a delay in the release of the statutory fund, has led to NHIA's ongoing indebtedness to service providers. For instance, as of April 2017, the NHIS total debt owed to service providers was estimated at GHS 1.2 billion, with at least 12 months arrears (IMANI Africa, 2017). The long delay in reimbursement of funds to providers threatens the financial sustainability of hospitals as several service providers are reluctant to receive NHIS cards as a mode of payment.

Another challenge facing the scheme is the long delay in processing and payment of claims. The NHIA is frequently unable to process and pays claims on time due to high claim numbers submitted by service providers, manual vetting procedures, and delays in receiving statutory funds (Addae-Korankye, 2013). For example, NHIA processes 2.4 million claims each month

[2] Utilisation implies the number of times people have used the NHIS card to seek healthcare within a given period.

on average with most claims submitted through paper forms; only 8 per cent are submitted electronically (Wang, Otoo and Dsane-selby, 2017). Even though Legislative Instrument (L.I 1809) requires health care providers to submit claims within sixty days of rendering service, and the scheme makes payment within four weeks after submission, hardly do these schedules follow. Other problem areas failing the NHIS include allegations of fraud and abuse, incorrect record-keeping and the weak human capacity for claims management. These setbacks often cause many agitations among service providers, thereby undermining service delivery to clients.

There are serious concerns that the system has failed to address the poorest citizens health needs, granted that NHIS has improved overall health care access (The Association of Chartered Certified Accountants, 2013). According to research done by the National Development Planning Commission in 2008, fewer than 30 per cent of those in the lowest socioeconomic quintile were members of the scheme, compared to nearly 60 per cent of those in the wealthiest quintile (National Development Planning Commission, 2009). Additionally, 77 per cent of the respondents cited affordability as the main reason for not belonging to the scheme. Although the program exempts the poor, the procedures for identifying them have proven inefficient and ineffectual. The rigidity of the mean test for identifying the poor has been described. This test does not reflect local contexts, thereby making enrolment of indigents into the scheme decline over the years (Addae-Korankye, 2013). Therefore, the scheme has failed to achieve universal rollout especially targeting the poor. As of June 2016, only about 41 per cent of the total population were active members (Ministry of Finance, 2017). Given the small number of persons who joined up from the informal sector, the system appears to favour wealthier Ghanaians who are more educated urban dwellers who comprehend the scheme's benefits and confidently and fluently use it. On the contrary, the system complexity can be intimidating for many rural residents, typically uneducated, and registration offices are frequently too far away (The Economist Intelligent Unit, 2016).

2.7 Health expenditure of Ghana

There are various ways to measure health expenditure, each of which provides additional performance information. We can analyse health expenditure in terms of total, public, private or out-of-pocket expenditure in domestic currency units or some numeraire currency such as U.S. dollars (based on exchange rates) or international dollars (based on purchasing power

parity). Additionally, we can analyse health expenditure in nominal or real terms, in terms of total or per capita spending, and relative to GDP and total government spending (Schieber *et al.*, 2012). Table 2.3 shows how Ghana's health expenditure indicators compare to African and global values.

Total government expenditure as a percentage of GDP measures the size of the state in the economy (i.e. fiscal capacity). Ghana had a lower average fiscal capacity (relative to the size of its overall economy) of 5.6 per cent according to Table 2.3, less than the global average (8.6%) but slightly above the Africa average (5.6%).

Priority of health is measured as the total government health spending as a proportion of total government spending. It reflects the allocation share of total expenditure that the government made to health. In 2014, government expenditure on health as a portion of total government expenditure was 6.8 per cent less than both Africa (11.40%) and global averages (14.1%). Private spending as a share of total health spending (31.67%) and out-of-pocket health expenditure as a share of private expenditure on health (40.2%) were lower than both Africa and global averages.

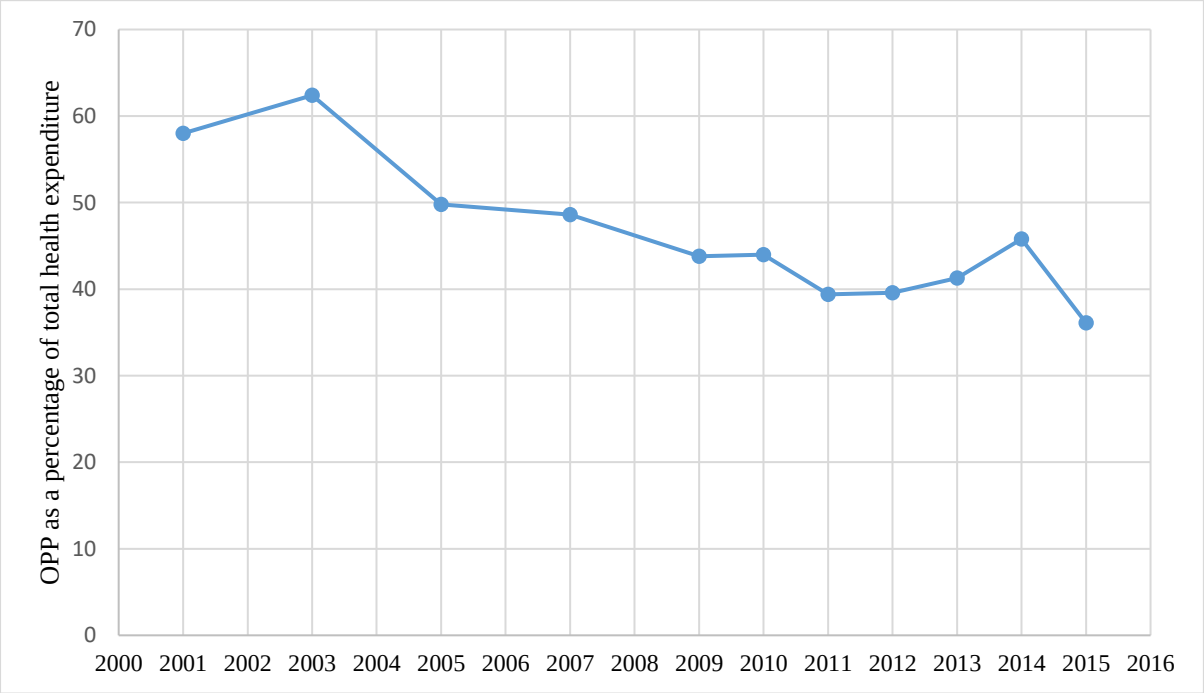
Table 2.3: Selected health expenditure indicators of Ghana

Indicator	Ghana Value	Africa Average	Global Average
Total expenditure on health as % of gross domestic product (2015)	5.9	5.6	8.6
General government expenditure on health as % of total expenditure on health (2012)	68.33	50.8	38.8
Private expenditure on health as % of total expenditure on health (2012)	31.67	49.2	42.3
General government expenditure on health as % of total government expenditure (2014)	6.8	11.4	14.1
Out-of-pocket expenditure on health as % of private expenditure on health (2015)	40.2	60.6	52.6
Per capita total expenditure on health at the average exchange rate (US$) (2014)	57.89	105	1,025
Per capita government expenditure on health at average exchange rate (US$) (2011)	59	53	615

Source: Ghana Health Service (2018b: 15)

Before NHIS became operational in March 2004, household out-of-pocket health spending as a share of total health expenditure was increasing. For instance, Figure 2.4 revealed that the OOP increased from 58 per cent in 2001 to 62.4 per cent in 2003. Interestingly, the introduction and implementation of the NHIS saw a declining out-of-pocket spending from close to 50 per cent in 2005 to 36 per cent in 2015, except 2013 and 2014 which saw a marginal increase. Figure 2.4 was construction from The World Bank data. It must be noted that out-of-pocket expenditure in Ghana is far higher than the 15–20 per cent benchmark recommended by the WHO (Saleh, 2013). The inability to meet the recommended benchmark of out-of-pocket spending implies that Ghana's population is not protected financially against illness.

Figure 2.4: Out-of-pocket health expenditure as a percentage of total health expenditure



Source: Author (2019)

Table 2.4: Total health expenditure for 2002, 2005, 2010 and 2012

Year	2002	2005	2010	2012
THE (GHS billion)	GHS ¢234.57	GHS ¢621.41	GHS ¢1,421.75	GHS ¢3,549.47
THE (US $billion)	$278.42	$338.46	$964.68	$1,933.26

Source: Ministry of Health (2014)

A cursory look at Table 2.4 reveals that total expenditure on health has been increasing from $278.42 billion in 2002 to $1,933.26 billion in 2012. These estimates are from the 2012 National Health Accounts. However, most of the public expenditures on health in Ghana are

taken over by remunerations (approx. 65%) and capital investments (approx. 20%), leaving very little fiscal space for operational expenses for service delivery (Netherlands Enterprise Agency, 2015). In a more recent study, Okine (2018) analysed the health budget of Ghana spending from 2016 to 2018 and observed that total allocation to the health sector remains around 7 per cent of the total national budget. And of this amount about 60 per cent of the allocation is spent on compensations. With these figures, one can say that overall health financing in Ghana is woefully inadequate, and this puts the country in a precarious situation.

The health sector portion of the total government budget grew in nominal terms from 9.8 per cent in 2009 to 13.5 per cent in 2014, except in 2012 when it marginally decreased to 10.7 per cent (see Table 2.5). Intestinally, the 2014 figure shows a rise of 1.0 per cent over the previous year value.

Table 2.5: Progress towards Abuja Target (2009 – 2014)

Year	2009	2010	2011	2012	2013	2014
Abuja Target	15%	15%	15%	15%	15%	15%
Health share of total government budget	9.8%	11.1%	11.6%	10.7%	12.5%	13.5%
Health share of domestic resources	7.9%	7.6%	8.4%	6.5%	11.1%	10.4%

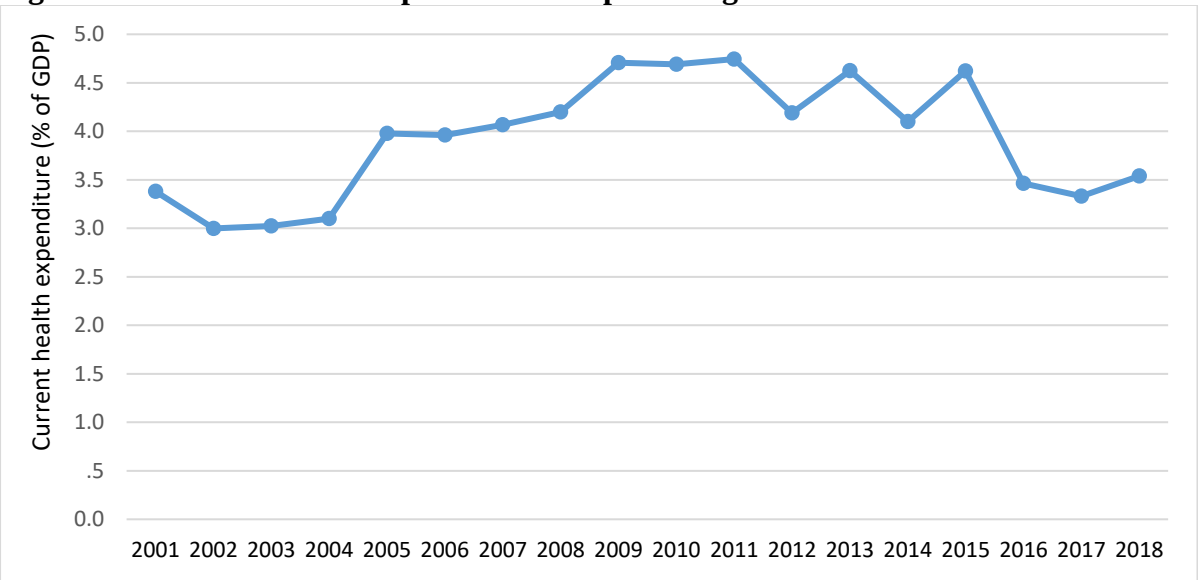
Source: Ghana Budget Statement, (2009 – 2014)

In April 2001, African heads of states met at an African Union summit in Abuja, Nigeria. They agreed to devote at least 15% of their annual budget to the health sector to improve healthcare delivery. The decision by African leaders to use at least 15 per cent of their annual budget to improve the health sector came to be called the Abuja Declaration. The WHO sees the Abuja Declaration as an aspirational goal even that a few rich nations are yet to achieve that (World Health Organization, 2010b). Tracking the progress towards achieving this target indicates that from 2009 to 2014, Ghana, like many African countries failed. Ironically, the percentage of the domestic budget allotted to the health sector in 2014 fell by 0.7 per cent below the 2013 value.

As observed earlier, Ghana's health expenditure has been rising in absolute terms in recent years. However, the health sector is losing ground in terms of health expenditure as a percentage of GDP. According to Ghana's Ministry of Health (2014), in 2010 total health expenditure as a percentage of GDP fell substantially to 3.28 per cent, a reduction of 3.13 per cent over the 2005 value. This estimate is related to the rebased GDP figures of 2006, which

saw the economy growing by over 200 per cent within the five year period. Notwithstanding this growth in the economy, it was unmatched by an increase in health expenditure which increased by about 40 per cent within the same period (Ministry of Health, 2015). Figure 2.5 depicts Ghana's current health expenditure as a percentage of GDP spanning from 2001 to 2018. Data came from The World Bank World Development Indicators. Observation shows that health expenditure as a percentage of GDP has been volatile over the years. The period from 2004 to 2009 saw a steady rise that is 3.1% to 4.7%. Between 2009 and 20011 witnesses a stable value of 4.7%, but in 2016 it began to decline.

Figure 2.5: Current health expenditure as a percentage of GDP



Source: Author (2021)

2.8 Current funding sources of the Ghana health system

Financing of the health sector in Ghana comes from three main sources namely; the Government of Ghana (GoG), internally generated funds (IGF) and donor funding. A little amount of funding also emanates from the Annual Budget Funding Amount (ABFA). As indicated in Table 2.6, the overall government budget allocation to the health sector has increased over time. Relative change between 2016 and 2017 suggests a favourable trend but an extremely slight increase in the health budget between 2017 and 2018. According to the Ministry of Finance (2019), the 2018 Budget Statement approved GHS 4.42 billion for the health sector. This amount consists of funding from GoG of GHS 2.66 billion (ABFA – GHS 50.00 million), IGF GHS 1.35 million and Donor funding of GHS 413.51 million. As of half-year, the sector had spent 47.0 per cent of its total budget, with execution rates of 53.5 per cent,

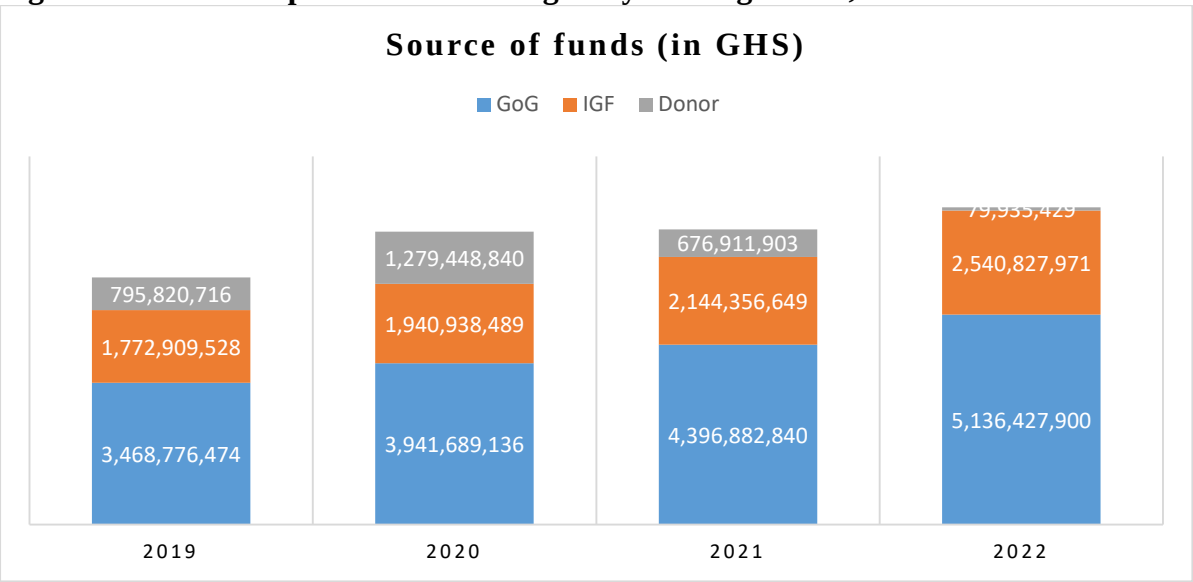
46.0 per cent, 7.8 per cent, and 14.4 per cent for GoG, IGF, ABFA, and Donor, respectively. However, due to rising compensation costs, the sector is anticipated to exceed its budget by December 2018 (Ministry of Finance, 2019).

Table 2.6: Expenditure trends between 2016 and 2018 (in Million GHS)

Source of Funds	2016		2017		2018 Half Year	
	Approved Budget	Actual Expenditure	Approved Budget	Actual Expenditure	Approved Budget	Actual Expenditure
GoG	1,613.37	2,098.48	2,480.02	3,425.28	2,613.43	1,397.84
IGF	1,293.58	727.27	977.25	1,039.04	1,345.41	618.29
ABFA	33.00	2.39	50.00	7.09	50.00	3.92
Donor	446.82	963.56	718.88	1,039.51	413.51	59.57
Total	3,386.76	3,791.70	4,226.15	5,510.91	4,422.35	2,079.62

Source: Ministry of Finance (2019: p. 12)

Figure 2.6: Health expenditure and budgets by funding source, 2019-2022



Source: Author (2021)

Figure 2.6 gives a snapshot of the different funding sources of the health system in Ghana relative to budgeted health expenditure. Data came from the Medium Term Expenditure Framework (MTEF) for the Ministry of Health spanning from 2019 to 2022 as provided by the Ministry of Finance (2019). Between 2019 and 2021, total health funding is expected to

increase at a 9% yearly rate, while GoG financing is planned to expand at 13% per year. These rates were much lower than the entire GoG budget which was predicted to grow at 28% per year (UNICEF, 2020). According to UNICEF (2020), this statistic indicates that the government does not prioritize healthcare funding relative to other sectors. Projection of donor funding predicted a very steep decline for 20222. This shortfall in revenue throws an obligation on the government to carry out the vision outlined in the Ghana Beyond Aid strategy plan. Additionally, the government needed to fund those services that were previously donor-funded.

2.9 Health-related Sustainable Development Goals indicators for Ghana

In profiling the country on health-related SDGs, the current study gave attention to indicators for which data were readily accessible in internationally comparable form or publicly available global databases. However, indicators with "no data" or "insufficient trend data" were not discussed.

2.9.1 Maternal mortality ratio

The first health-related SDGs indicator is the maternal mortality ratio. By definition, the maternal mortality ratio (MMR) is maternal deaths per 100,000 live births. Data from WHO and its partner agencies such as UNICEF, UNFPA, World Bank Group, and the United Nations Population Division revealed that Ghana's MMR has been reducing over the years.

From Table 2.7, we observe that before the introduction of NHIS, between 1990 and 2000, the MMR reduced from 634 maternal deaths per 100,000 live births to 467 maternal deaths per 100,000 live births, respectively. Maternal deaths among females within the reproductive age, between 1990 and 2000, reduced from 23.6 per cent to 1.1 per cent, respectively. In 2005, a year after the full implementation of NHIS, maternal deaths declined to 376 per 100,000 live births. The reduction continued in 2010 to 325 per 100,000 live births and further reduced to 319 per 100,000 live births in 2015. One may attribute the improvement in maternal deaths to the Government policy of providing free care for pregnant women under the NHIS. The government launched free care for pregnant women on the 1st of July 2008. As stated in the implementation guidelines, the focus of the policy was to reduce maternal mortality (Ministry of Health, 2008). The policy provided waivers of premiums, registration fees, and waiting times as pregnant women were entitled to the entire package under the NHIS (Witter, Garshong and Ridde, 2013).

Table 2.7: Maternal mortality ratio for Ghana from 1990 to 2015

Year	Maternal mortality ratio (MMR)[a] (Per 100 000 live births)	Maternal deaths (Numbers)	AIDS-related indirect maternal deaths (Numbers)	Live births[b] (Thousands)	Proportion of maternal deaths among deaths of female reproductive age (PM %)
1990	634 [436-911]	3,600	10	572	23.6
1995	532 [378-746]	3,200	42	606	17.7
2000	467 [342-645]	3,100	98	654	13.1
2005	376 [282-506]	2,700	130	727	10.3
2010	325 [237-437]	2,700	95	820	10.0
2015	319 [216-458]	2,800	10	884	11.3

[a] MMR and PM are calculated for women 15-49 years.
[b] Live birth data are from World Population Prospects: the 2015 Revision. New York, Population Division, Department of Economic and Social Affairs, United Nations Secretariat; 2015.
Source: WHO (2015: 1)

In calculating the MMR, the 2017 Ghana Maternal Health Survey (2017 GMHS) divided the age-standardised maternal mortality rate for women aged 15-49 in the seven years preceding the survey by the general fertility rate (GFR) for the same period. Aside from producing representative estimates for maternal mortality indicators for the entire country, the 2017 GMHS provided estimates for each of the three geographical zones, Coastal (Western, Central, Greater Accra and Volta), Middle (Eastern, Ashanti and Brong Ahafo) and Northern (Northern, Upper East and Upper West).

Table 2.8: Maternal mortality ratio by zones

Zone	Maternal mortality ratio	Confidence interval
Coastal zone	336	151 to 521
Middle zone	296	177 to 414
Northern zone	276	186 to 365
National	310	217 to 402

Source: GSS, GHS and ICF (2018: 11)

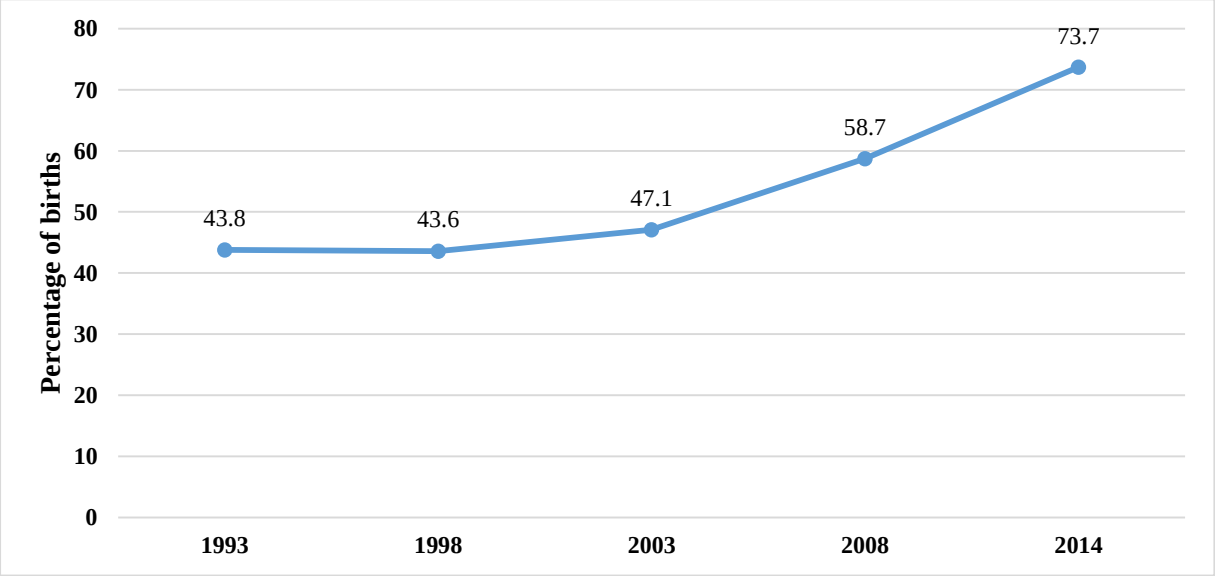
Table 2.8 shows 2017 GMHS estimates for maternal-related deaths per 100,000 live births for the seven years preceding the survey. The GMHS estimated MMR for Ghana was 310 deaths per 100,000 live births, with confidence intervals ranges from 217 to 402 deaths per 100,000 live births. At the zonal level, there were few differences in the point estimates. However, the confidence intervals for each zone tend to overlap, making the differences not statistically significant. Trends are lacking because the GMHS is the first to estimate using the updated MMR definition.

Although maternal health care in Ghana has improved over time, it remains relatively high. The rate of decline has been modest, and the government will need to put in more effort to meet the SDG 3.1 goal of lowering global maternal death to less than 70 per 100,000 live births by 2030.

2.9.2 Proportion of births attended by skilled health personnel

This indicator measures the proportion of deliveries attended by health personnel trained in providing lifesaving obstetric care, including giving the necessary supervision, care and advice to women during pregnancy, labour and the postpartum period, conducting deliveries on their own, and caring for new-borns. This proportion excludes traditional birth attendants who have received short training.

Figure 2.7: Percentage of births attended to by skilled health personnel for Ghana



Source: Author (2019)

Figure 2.7 construction was from various Ghana Demographic and Health Surveys (GDHS) data collected by the Ghana Statistical Service. Estimates from the GDHS indicate that the percentage of women who utilize health facilities during delivery increased from 43.8 per cent in 1993 to 47.1 per cent in 2003 (see Figure 2.7). However, in 2008, the year that the government introduced free care for pregnant women, skilled delivery care increased to 58.7 per cent. In 2014, deliveries by skilled health personnel further increased to a moderate rate of 73.7 per cent. To this end, one can conclude that the implementation of government free care for pregnant women under the NHIS is having a positive effect on utilisation of skilled assistance deliveries as pregnant women need not pay any fees at health facilities during delivery.

In terms of urban-rural disparities, there was a marginal increase among urban women (from 86% to 91%), while utilisation of health facilities for delivery care among rural women saw a tremendous increase (from 39% to 69%). Table 2.9 traces skilled assistance deliveries between 2007 and 2017.

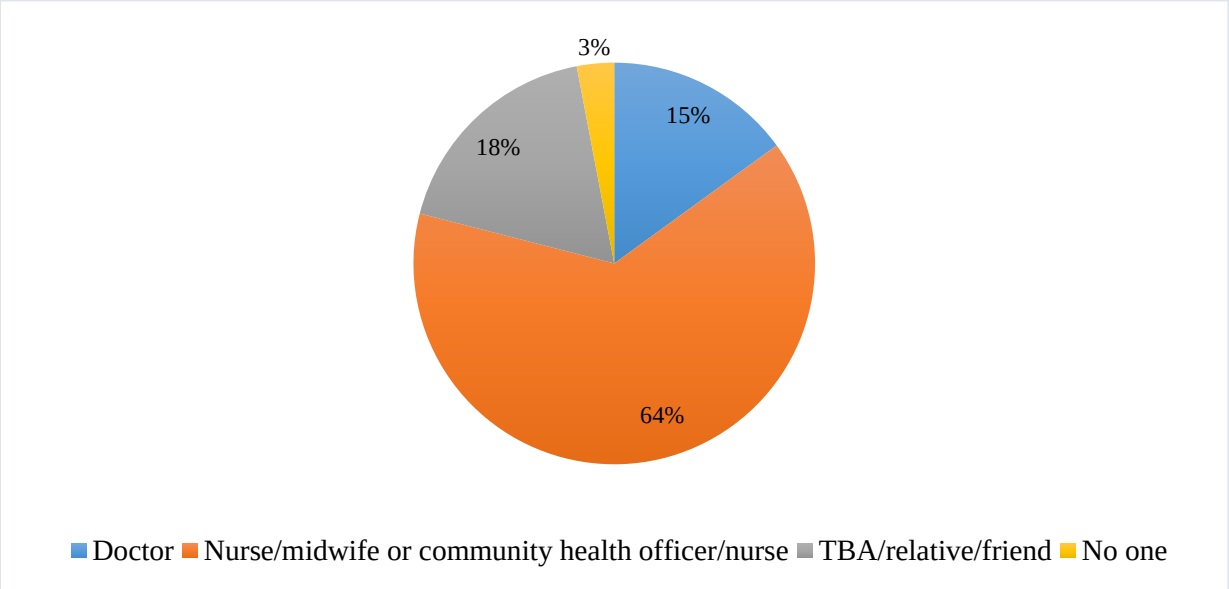
Table 2.9: Trends in skilled assistance at delivery (in percentage)

	Urban	All live births and stillbirths	Rural
2007 GMHS	86	54	39
2017 GMHS	91	79	69

Source: GSS, GHS and ICF (2018: 61)

A recent estimate by the 2017 GMHS shows that between 2007 and 2017, institutional deliveries (i.e., deliveries that occur in a health facility) increase from 54 per cent to 79 per cent, respectively. Within the same period, home deliveries fell from 45 per cent to 20 per cent (Ghana Statistical Service, Ghana Health Service, 2018). By extension, these estimates revealed that more than three-quarters of all live births or stillbirths take place in a health facility, primarily in the public sector, while a quarter takes place outside of medical facilities. Figure 2.8 shows the percentage distribution of most recent live births or stillbirths in the five years preceding the 2017 GMHS by a person assisting in delivery. The 79 per cent institutional deliveries in 2017 constituted 15 per cent aided by a doctor and 64 per cent assisted by a nurse or midwife or a community health officer/nurse. Only 18% of the remaining 21 per cent of deliveries were assisted by a traditional birth attendant (TBA), a relative, or a friend, while 3 per cent were unsupervised.

Figure 2.8: Percentage of person providing delivery assistance



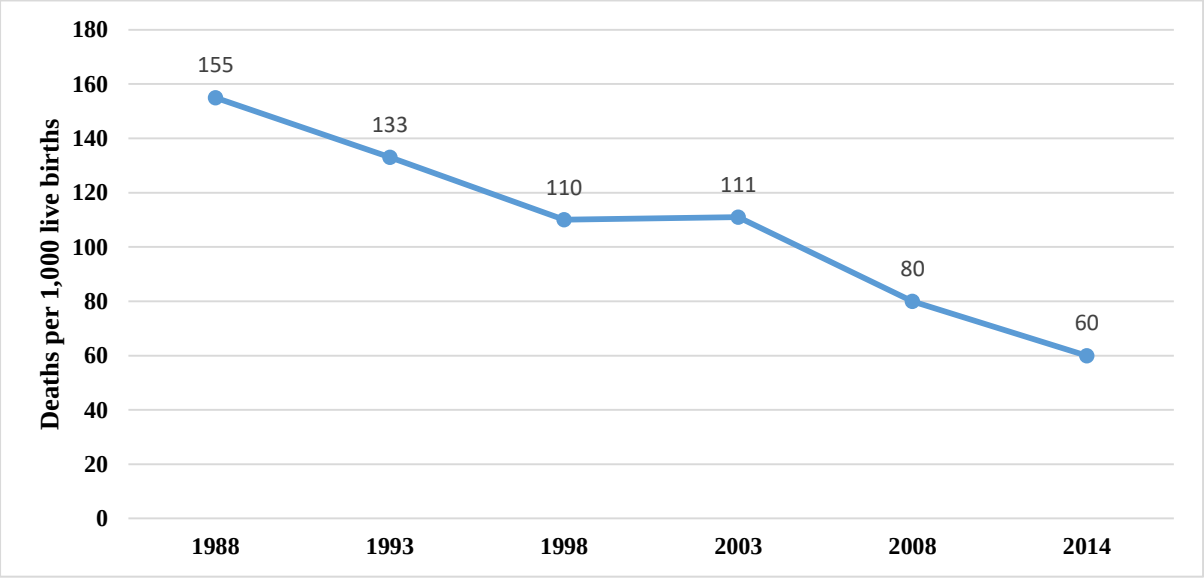
Source: Author (2019)

2.9.3 Under 5 mortality rate

The under–five mortality rate, by definition, is the probability (expressed as a rate per 1,000 live births) of a child born in a specified year dying before reaching the age of five if subject to current age-specific mortality rates (The World Bank Group, 2004).

Data from the Ghana Statistical Service through its various GDHS indicate that under-five mortality is decreasing over the year except for 2003, which observe a marginal increase (see Figure 2.9). From observation, pre-NHIS saw under-five mortality decreased from 155 per 1,000 live births in 1988 to 111 per 1,000 live births in 2003. Under-five mortality also fell during the NHIS, from 80 per 1,000 live births in 2008 to 60 per 1,000 live births in 2014. Ghana has a comparatively high under-five mortality rate compared to other nations with analogous income and health spending, such as Nigeria, Senegal, Kenya, Thailand, Tunisia, and Rwanda (Schieber *et al.*, 2012; Saleh, 2013).

Figure 2.9: Under 5 mortality rate (per 1000 live births) for Ghana



Source: Author (2019)

Again, between 1990 and 2015, the country could not achieve the Millennium Development Goals (MDGs) target of reducing under-five mortality by two-thirds. The United Nations Development Programme cited the following as some of the reasons for Ghana's failure in meeting the MDG 4 (reduce child mortality): difficulty to maintain funding for the Expanded Programme on Immunisation; inadequate human resources and skills within the health system; inadequate national data to offer comprehensive and dependable child health information, among others (United Nations Development Programme, no date).

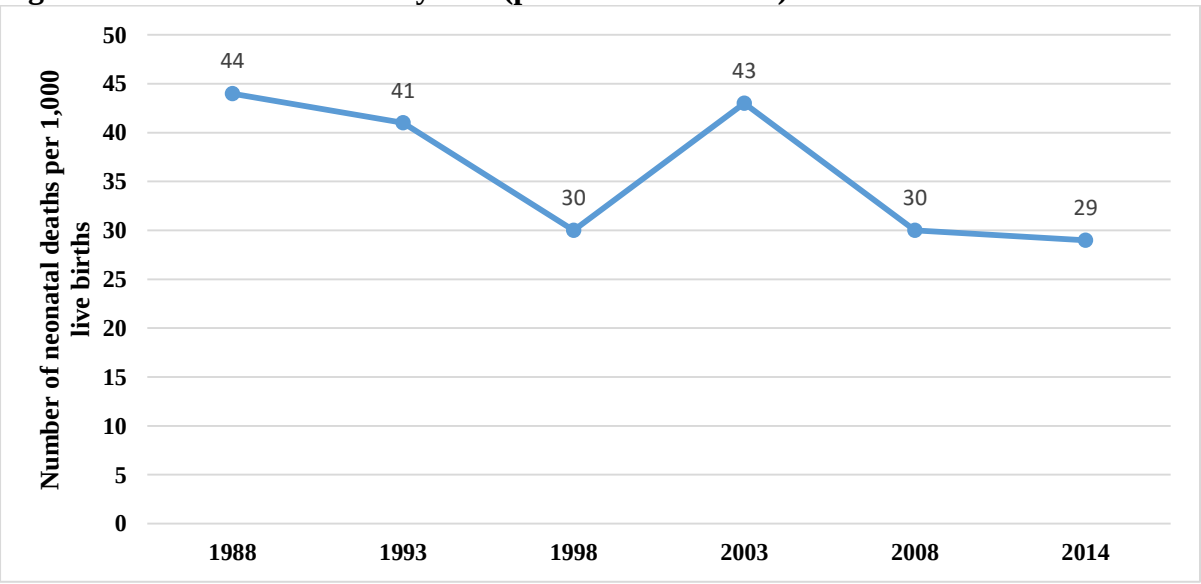
Failure of Ghana to achieve this MDGs target calls for health efforts by the government and other stakeholders to ensure that the SDGs target of reducing under-five mortality to at least 25 per 1,000 live births by the year 2030 would not be a mirage. Effective child survival interventions like provision of sustainable funds for immunisation and the scaling up of new technologies such as low osmolarity ORS and zinc for the management of diarrhoea, and vaccines such as 2nd dose measles vaccine, pneumococcal vaccine and rotavirus vaccine should be encouraged.

2.9.4 Neonatal mortality rate

The neonatal mortality rate is the probability that a child born in a specific year or period will die during the first 28 completed days of life if subject to age-specific mortality rates of that period, expressed per 1000 live births. The neonatal period, which is the first 28 days of life, is considered the most vulnerable time for a child's survival. According to global estimates, 2.5 million children died in their first month of life in 2018, with an average of 18 deaths per 1,000 live births (UNICEF, 2019).

Data from the Ghana Statistical Service shows neonatal mortality rate has been falling gradually over the years. For example, the rate declined from 44 per 1,000 live births in 1988 to 29 per 1,000 live births in 2014, exception 2003, when it increased by 43 per 1,000 live births but has remained stable over time (see Figure 2.10). The neonatal mortality of 29 deaths per 1000 live births accounts for over half of the country's under-five mortality (Ghana Health Service, 2017b). Ghana's maternal mortality rate is relatively high compared to other nations with comparable GDP and health investments. Ghana's endeavour to meet the SDGs target of decreasing neonatal mortality to at least 12 per 1,000 live births would be unattainable without a coordinated effort by the government to address causes of neonatal mortality.

Figure 2.10: Neonatal mortality rate (per 1000 live births) for Ghana



Source: Author (2019)

The 2017 GMHS provided both national and residential information on childhood mortality. At the national level, neonatal, infant and under-5 mortality rates before the survey were 25, 37 and 52 deaths per 1,000 live births, respectively (see Table 2.10). In terms of neonatal and

infant mortality rates, there were no significant variations between urban and rural areas. However, for the under-5 mortality rate, there was a marginal difference of 8 deaths per 1,000 live births, with urban and rural reporting 48 and 56 deaths per 1,000 live births, respectively.

Table 2.10: Childhood mortality (deaths per 1,000 live births)a

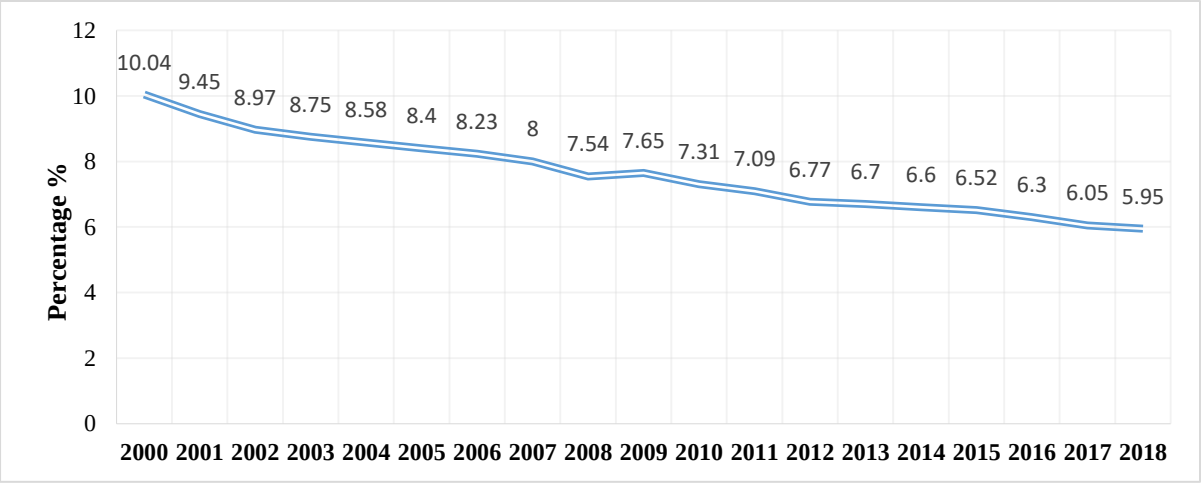
Indicator	Ghana	Urban	Rural
Neonatal mortality	25	25	24
Infant mortality	37	36	38
Under-5 mortality	52	48	56

[a] Figures are for the ten-year period before the survey except for the national and urban-rural rates, in italics, which represent the five-year period before the survey
Source: GSS, GHS and ICF (2018: 16)

2.9.5 HIV incidence and prevalence rate

HIV incidence, by definition, is the number of new HIV infections per 1,000 person-years among the uninfected population (Beusenberg, no date). The incidence rate is the number of new cases per population at risk in a given period. On the other hand, the HIV prevalence rate in selected populations refers to the percentage of people tested in each group who were found to be HIV positive. Figure 2.11 shows the trend of HIV incidence from 2000 to 2018. According to UNAIDS data, the HIV prevalence rate in Ghana has significantly decreased over time. For example, the HIV prevalence rate fell from 10.04 per 1,000 people in 2000 to 5.95 per 1,000 people in 2018.

Figure 2.11: HIV incidence (% of uninfected population ages 15-49) for Ghana

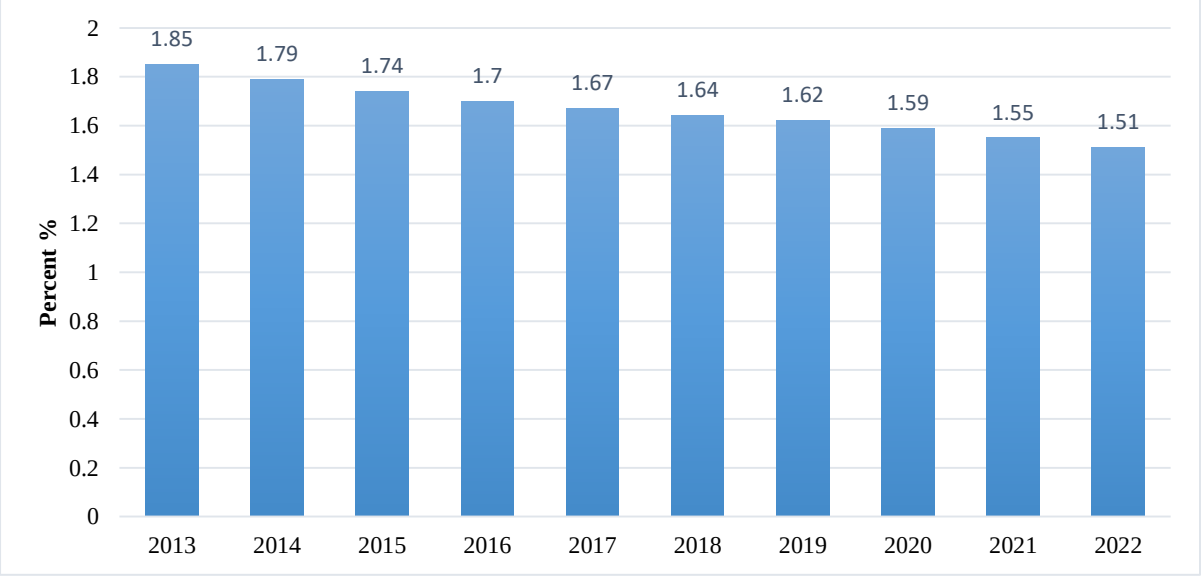


Source: Authors' construction from UNAIDS (2019) estimates

In 2017, the Ghana AIDS Commission provided a technical report on Ghana's National HIV Prevalence Estimates and Projections for 2013 to 2022. HIV and AIDS data from various sources, including Antiretroviral Therapy (ART) and routine Prevention of Mother to Child Transmission (PMTCT) data, were collected and used for the projection to supplement the HIV Sentinel Survey and Survey data. To make demographic projections of the HIV epidemic to determine annual estimates of HIV prevalence in countries, UNAIDS and WHO, working in collaboration with foreign scientists and researchers, have developed a set of methods and assumptions to model epidemic trends (Ghana AIDS Commission, 2017).

Data for the construction of Figures 2.12 to 2.15 came from the Ghana AIDS Commission, showing trends and projections from 2013–2022. Observation from Figure 2.12 reveals that the estimated and the projected adult national HIV prevalence rates have been falling over the years. For instance, the estimated adult national HIV prevalence rates continued to fall from 1.85 per cent in 2013 to 1.67 per cent in 2017. Projections are that by 2022, the adult national HIV prevalence rate would drop to 1.51 per cent.

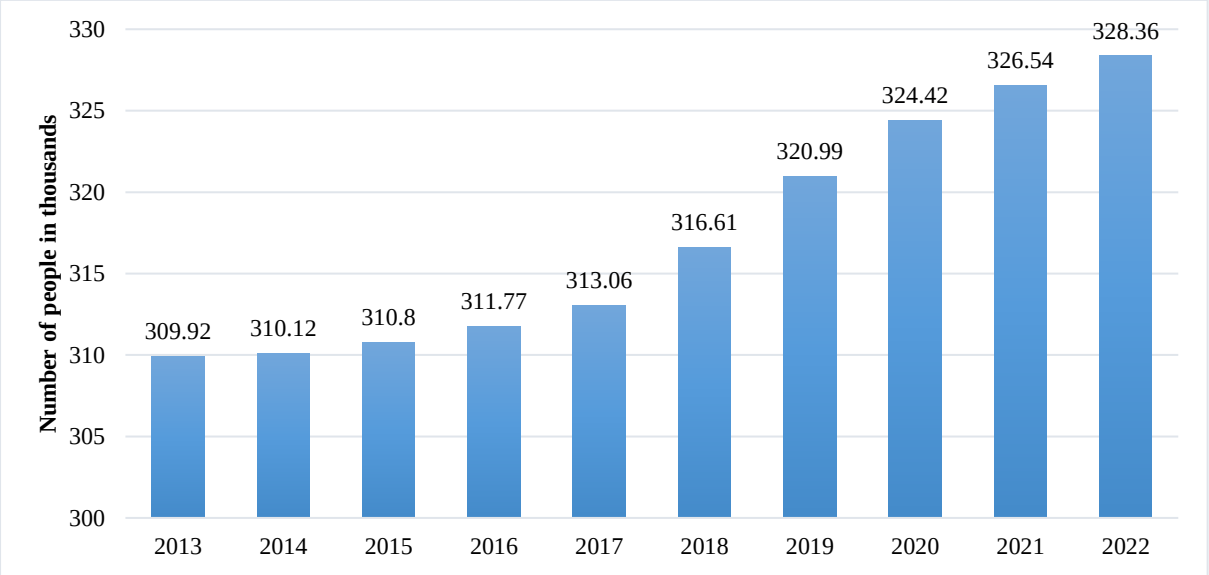
Figure 2.12: Trend and projections of adult HIV prevalence (%) from 2013 to 2022



Source: Author (2019)

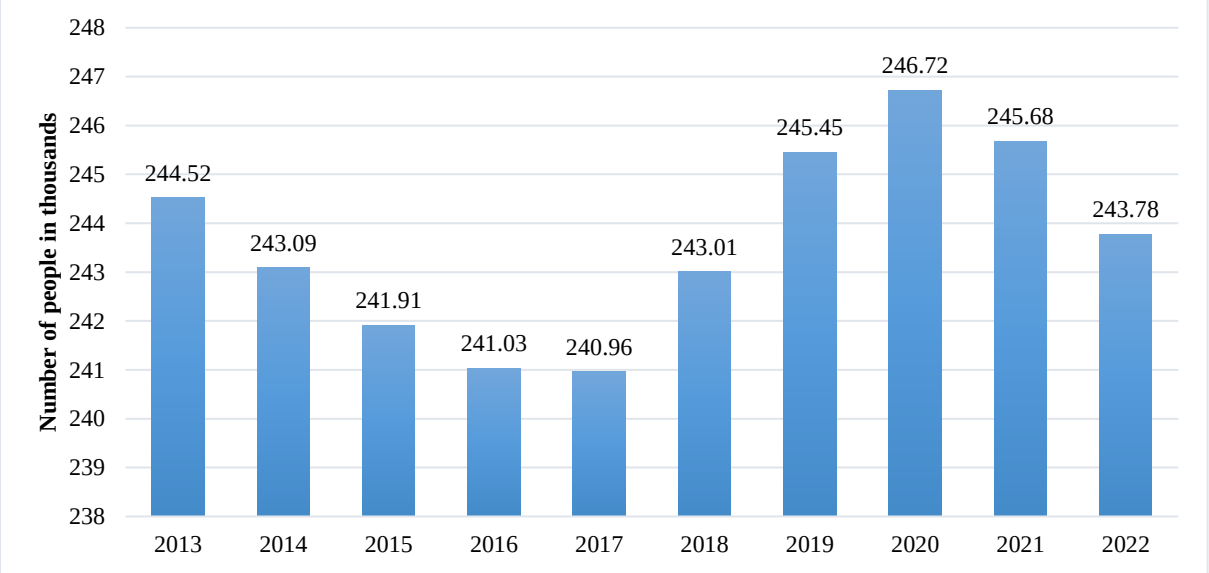
Figure 2.13 shows the trend and projections of the total HIV population for Ghana. The HIV population is estimated to rise gradually from 309,918 to 328,364 in 2013 and 2022, respectively. This increase of about 5.95% over the period is due to increased survival of the widespread use of ART over the years (Ghana AIDS Commission, 2017).

Figure 2.13: Trend and projections of total HIV population from 2013 to 2022



Source: Author (2019)

Figure 2.14: Trend and projections of total HIV population (15-49) from 2013 to 2022

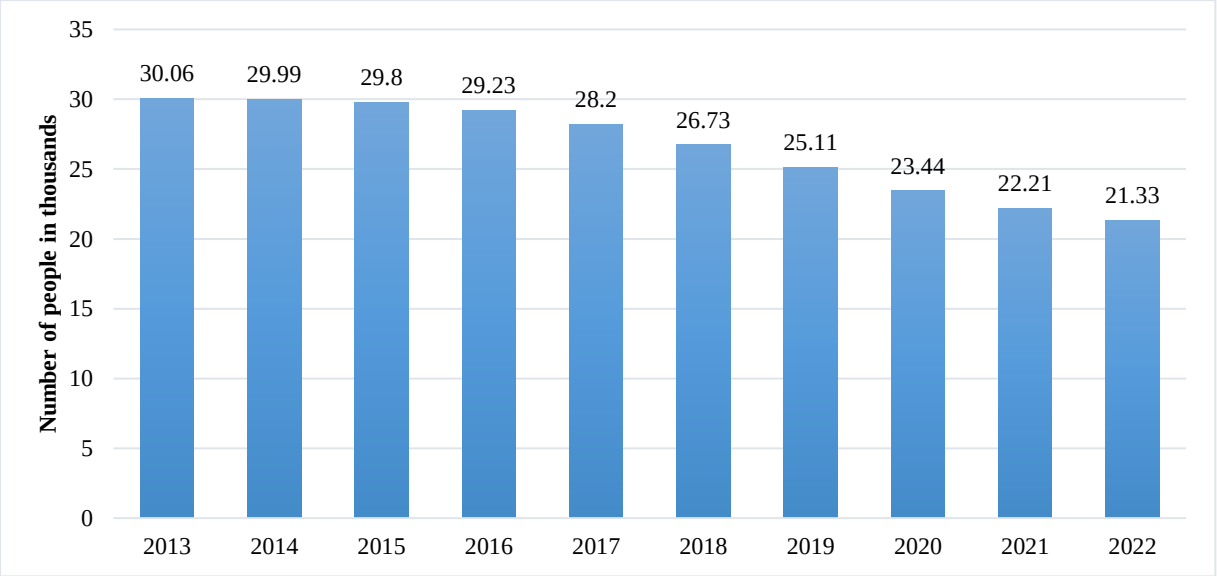


Source: Author (2019)

Figure 2.14 provides information on the total HIV population aged 15-49 years from 2013 to 2022. The HIV infected population with the age bracket 15-49 years gradually fell from 244,520 to 240,960 persons in 2013 to 2017, respectively. However, these estimates rise from 243,010 in 2018 to a peak of 246,720 in 2020 and are eventually decline to 243,780 in 2022 as projected.

Figure 2.15 demonstrates that the HIV population among children aged 0 to 14 is declining steadily, from 30,061 in 2013 to 21,327 in 2022. This decline of 29.05 per cent over the period is attributable to an expected reduction in new child infections via PMTCT (Ghana AIDS Commission, 2017).

Figure 2.15: Trend and projections of total HIV population (0-14) from 2013 to 2022



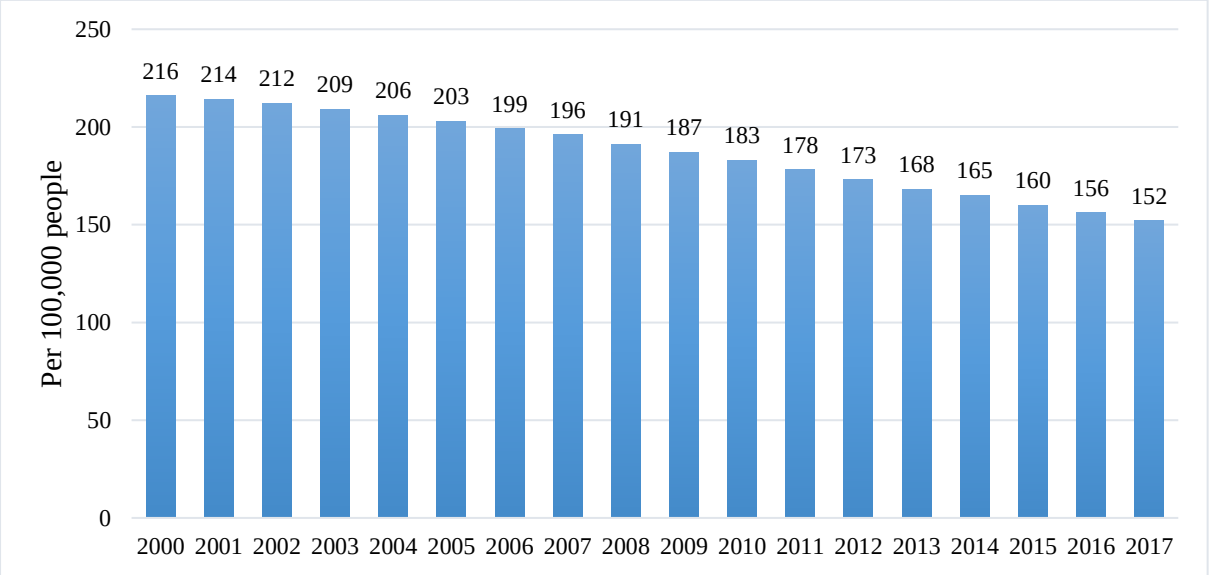
Source: Author (2019)

2.9.6 Incidence of tuberculosis

Incidence of tuberculosis refers to the number of new and relapse TB cases (all forms of TB, including cases of people living with HIV) arising in a given year, expressed as a rate per 100,000 population. Globally, TB is still a leading cause of illness and death, accounting for one of the top ten causes of death. According to the Global Tuberculosis Report 2019, 10.0 million (range: 9.0–11.1 million) persons contracted tuberculosis in 2018, though the figure has remained largely steady in prior years. The TB incidence rate has seen reductions over time worldwide, with an average percentage of decline being 1.6% per year in the period 2000−2018, 2.0% between 2017 and 2018 and 6.3% cumulative reduction between 2015 and 2018 (World Health Organization, 2019).

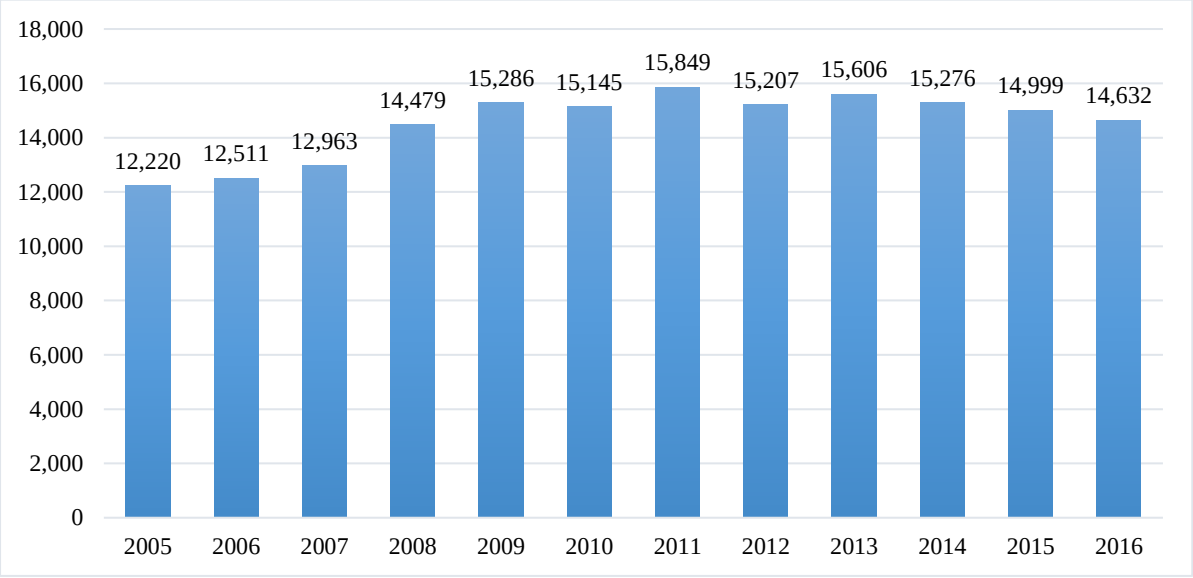
Data from the World Development Indicators (2019) indicates that tuberculosis incidence in Ghana has been falling gradually from 216 cases per 100,000 in 2000 to 152 per 100,000 cases in 2017 (see Figure 2.16).

Figure 2.16: Incidence of tuberculosis (per 100,000 people) for Ghana



Source: Author (2019)

Figure 2.17: Trend of reported TB cases (All forms) 2005 – 2016



Source: Author (2019)

Besides, notification data from the National Tuberculosis Control Programme reveal a drop in the number of reported TB cases over the years. The total number of detected TB cases increases slowly from 12,220 in 2005 to 15,286 in 2009 but dips marginally to 15,145 in 2010 (see Figure 2.17). However, the detected cases peaked at 15,849 in 2011, but in 2012 it fell and afterwards constantly declined. Between 2015 and 2016, Ghana witnessed a 2.45 per cent

decrease in the total number of TB cases. The GHS attributes this variance to complex screening questionnaires and poor access to TB services (Ghana Health Service, 2017a).

After 57 years of its first national TB prevalence survey, Ghana conducted its second survey in 2013. Estimates from the survey put the national TB prevalence rate at 290 per 100,000 population (Ghana Country Coordinating Mechanism [CCM], 2019). According to the CCM, this prevalence rate indicates that the disease burden in the country is four times higher than WHO estimations of 71 per 100,000 population for the same year. TB infection affects people of all ages, although older males (above 45 years) bear the biggest brunt of the disease. The Ghana Country Coordinating Mechanism (CCM) of the Global Fund to fight AIDS, Tuberculosis and Malaria further revealed that men are predominantly affected, with a male to female ratio as close to 2:1. Notification rates of the disease are highest with HIV patients, inmates, miners, pregnant women and diabetics. TB mortality rate in the country is believed to be relatively high, varying between 6 and 9% per 1,000 infected people. However, mortality rates are high among inmates (32.6%) and people living with HIV (20%) (Ghana Country Coordinating Mechanism, 2019).

Tuberculosis control efforts in Ghana date back to the colonial era. The colonial authority recognised the need to combat the disease because of the damage it posed to society. The Ghana Society for the Prevention of Tuberculosis was founded in July 1954 to aid and supplement the government efforts in the fight against tuberculosis. However, until the early 1990s, post-independence efforts to combat tuberculosis were marred by inconsistency in funding (Ghana Country Coordinating Mechanism, 2018).

In 1994, Ghana launched the National Tuberculosis Control Programme (NTP), which aimed at reducing the transmission of TB disease in the country to a level that would no longer be a public health problem. The WHO Directly Observed Treatment Short-course (DOTS) technique was adopted and implemented in the same year. As of the end of 1998, Ghana had integrated TB services into primary health care across the country. Also, by the end of 2005, Ghana had achieved 100 per cent DOTS coverage. In the same year, Ghana adopted the WHO interim policy on TB/HIV, setting the national TB/HIV co-infection rate at 14.7% (Ghana Country Coordinating Mechanism, 2018). Currently, the NTP is the organization that is implementing the new Stop TB Strategy of WHO.

Ghana’s health system aims to achieve the World Health Assembly’s (WHA) and Stop TB Partnership's post-2015 TB control strategy targets to eradicate the country’s TB epidemic

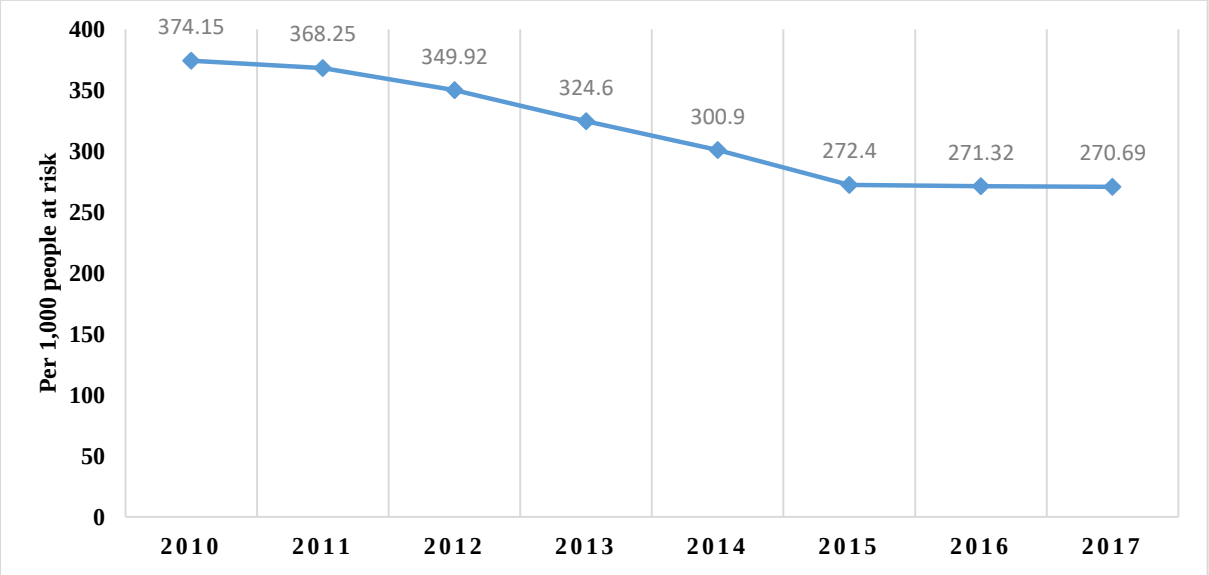
(Bonsu *et al.*, 2014). As a result, the NTP mandate includes providing leadership and management to speed coordinated efforts to lower adult tuberculosis burdens. The NTP has adapted the approved Global TB Strategy as endorsed in WHA 67 resolution towards the post-2015 sustainable developmental agenda. The health sector has set three goals to achieve the Global TB Strategy of stopping the TB epidemic. These goals are (Bonsu *et al.*, 2014: p. 57): to reduce the 2013 TB prevalence baseline level of 286 per 100,000 person population by 20% by 2020, in line with the post-2015 Global TB Control Strategy; to reduce the 2012 TB mortality rate baseline of 4 deaths per 100,000 person population by 35% by 2020; to eradicate the TB epidemic in Ghana by 2035 without catastrophic cost to TB affected households.

Some key strategic interventions to achieve these goals include (Bonsu *et al.*, 2014): improve health facility based TB case finding, TB screening in key affected populations such as household contacts, diabetics, prisoners and miners, improve quality of laboratory diagnosis, engagement with private care providers, communication strategy to reduce stigma, early diagnosis of drug resistant TB, improve quality clinical care of TB patients (DOTS), intensify TB Case finding among people living with HIV, procure technical assistance, among others. The expectation is that Ghana would be able to implement these interventions and thereby end the TB epidemic by 2030, as stated in the SDGs.

2.9.7 Incidence of malaria

Incidence of malaria measures the number of malaria cases per 1,000 persons per year. In 2017, estimates from the World Malaria Report 2018 put malaria cases at 219 million worldwide. The same report indicated that the global incidence of malaria has been falling. For example, between 2010 and 2017, the incidence rate dropped from 72 to 59 cases per 1,000 population at risk (World Health Organization, 2018b). According to the World Bank development indicators, the malaria incidence in Ghana has been dropping over the years. The incidence of malaria, for example, has decreased from 374 occurrences per 1,000 people in 2010 to 270 cases per 1,000 people in 2017 (see Figure 2.18). The 2017 estimate reveals that more than a quarter of the population is at risk of contracting malaria in a given year.

Figure 2.18: Incidence of malaria (per 1,000 population at risk) for Ghana



Source: Author (2019)

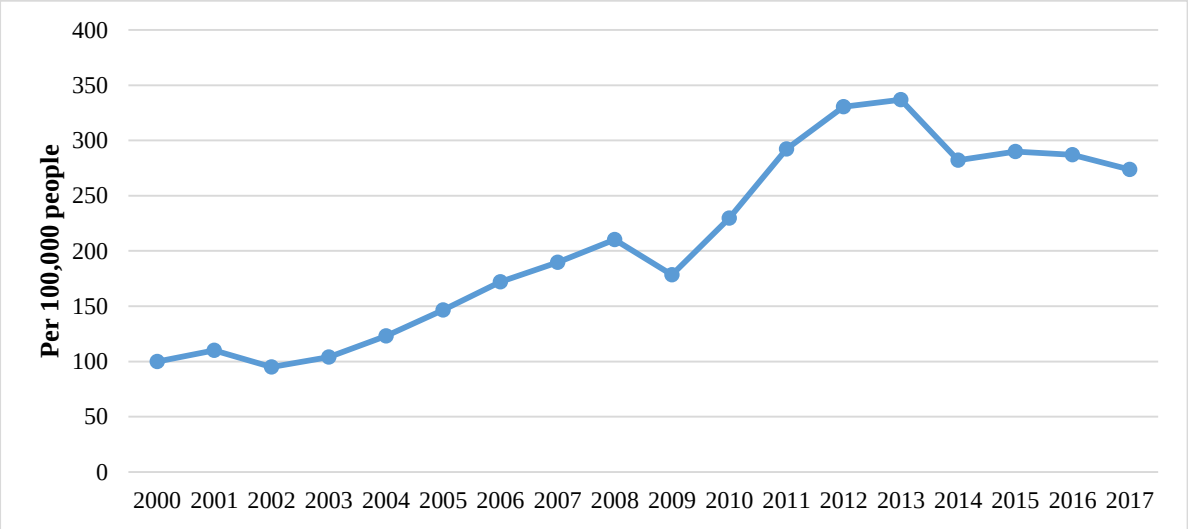
Malaria is an endemic disease, as all Ghanaians are susceptible to its infection. Data from the Ghana Health Service District Health Information System shows that in 2014 about 30 per cent of all Outpatient Department (OPD) cases, 30.6 per cent of all admission cases and about 7.2 per cent of all deaths on admission were from malaria (Ghana Health Service, 2016). Also, in the year 2016, the country recorded a total of 10.4 million suspected malaria cases (Ghana Health Service, 2018b). In 2017, malaria incidence accounted for 34 per cent of all outpatient attendance, with children under-5 years of age and pregnant women being most vulnerable (Ghana Health Service, 2018b).

The 2018 World Malaria Report named Ghana among 11 countries as places where new malaria cases are high. These other countries include Burkina Faso, Cameroon, the Democratic Republic of the Congo, India, Mali, Mozambique, Niger, Nigeria, Uganda and the United Republic of Tanzania. These countries account for more than 70 per cent of global malaria cases and deaths (World Health Organization, 2018b). Effective malaria vector management, such as insecticide-treated mosquito nets and indoor residual spraying, is recommended by the WHO to protect all persons at risk of malaria. It is worth mentioning that in 2019, Ghana, Kenya, and Malawi all began testing malaria vaccinations in their respective countries. For Ghana to end malaria infection by 2030 as set out in the SDGs, the government should intensify efforts, especially in the highest-burden regions such as the forest zone.

2.9.8 Hepatitis B incidence

Hepatitis B incidence is the number of new hepatitis B infections per 100,000 population in a given year. The estimation of hepatitis B incidence is from the prevalence of total antibodies against hepatitis B core antigen (Total anti-HBc) and hepatitis B surface antigen (HBsAg) positive among children five years of age, adjusted for sampling design. Hepatitis B infections have been progressively increasing from 100 cases per 100,000 people in 2000 to 273 cases per 100,000 people in 2017, according to data from the World Bank's World Development Indicators (2019), with brief dips in 2002, 2009, and 2014 (see Figure 2.19). While the incidence of tuberculosis and HIV has been declining, the hepatitis B incidence is increasing.

Figure 2.19: Hepatitis B incidence for Ghana



Source: Authors' construction from The World Bank data

Globally, Hepatitis B and C are leading causes of death from infectious diseases. The Ghana Health Service (GHS) acknowledged the prevalence of chronic hepatitis B and C virus infections. According to the GHS, out of 117,095 viral hepatitis cases registered at various health facilities across the country between 2014 and 2018, 421 persons died (GhanaWeb.com, 2019). Unfortunately, Ghana is one of the nations where chronic hepatitis B infection is prevalent, with an estimated 8 per cent of the population infected. Yet, there is a lack of public knowledge of the condition and inaction of duty-bearers. The GHS called for increased funding for the prevention, testing and treatment to achieve the SDGs target of ending Hepatitis B by 2030. The Government of Ghana should ensure Hepatitis testing, vaccination and treatment plans nationwide. Other measures may include the following: setting aside special funds and

investments and seeking accessible, inexpensive and high-quality drugs and diagnostics for viral hepatitis (GhanaWeb.com, 2019).

2.9.9 Neglected Tropical Diseases (NTDs)

Neglected tropical diseases (NTDs) are parasitic and bacterial diseases that cause extensive ailments worldwide (USAID END in Africa project, 2019). These diseases include Lymphatic Filariasis (elephantiasis), Onchocerciasis, Trachoma, Schistosomiasis (Bilharzia), Soil-transmitted helminthiasis, Buruli ulcer, Yaws, Leprosy, Guinea worm, Human African Trypanosomiasis, Cutaneous Leishmaniasis and Rabies. NTDs are prevalent in Ghana, affecting every region and putting an estimated 25 million Ghanaians at risk of developing one or more (USAID END in Africa project, 2019).

The Government of Ghana is worried about these diseases, and as a result, put in place a national master plan expanding from 2013 to 2017 to address the state of affairs. This five-year strategic plan directs programmes and activities aimed at reducing NTD morbidity and death. The NTD programme targeted the five most common NTDs, Lymphatic Filariasis, Onchocerciasis, Schistosomiasis, Soil-transmitted helminthiasis and Trachoma. The intervention strategy was annual/or bi-annual mass drug administration (MDA) supplemented by morbidity control (clinical care of complications) and public education.

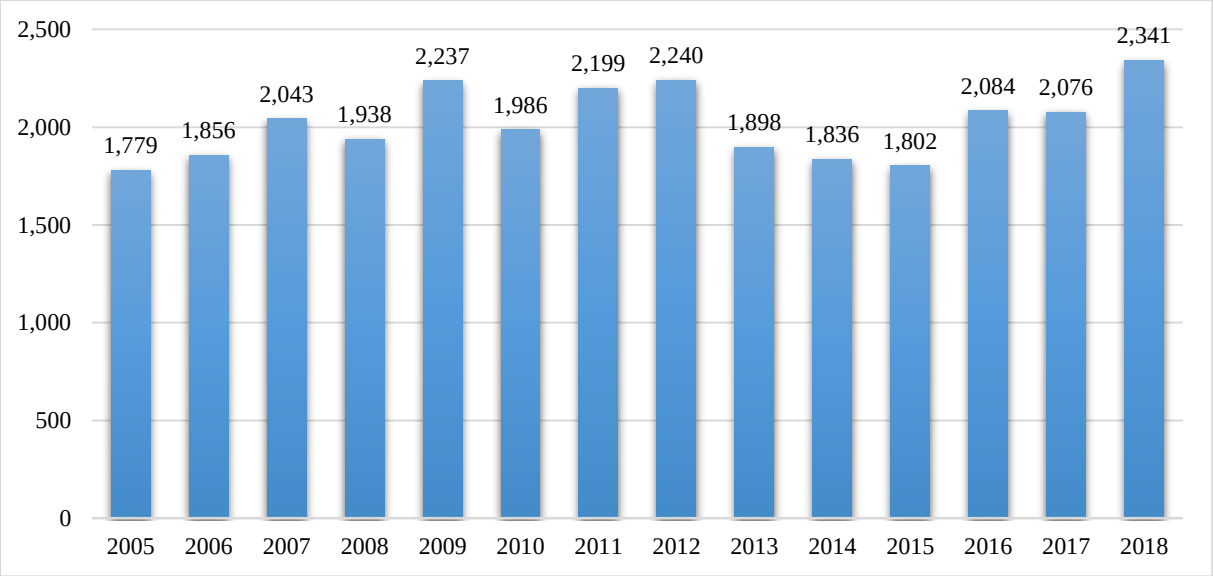
Regarding Ghana's NTD programme, good progress has been made, particularly against trachoma, and to some extent, lymphatic filariasis (USAID END in Africa project, 2019). Nonetheless, schistosomiasis, onchocerciasis and soil-transmitted helminthiasis remain a threat to health and wellbeing. Lack of information, unsafe health practices, and inadequate access to safe water and sanitation are challenges Ghana has in its fight against NTDs (ibid).

2.9.10 Road traffic accidents

Road traffic accidents and their associated injuries and deaths are particularly urgent problems confronting the transport sector, making road safety issues a relevant and priority area. According to global estimates, over 3,500 people die in traffic accidents every day, and over 1.25 million people die in road accidents each year (United Nations, 2017). Of these road traffic deaths, 90 per cent happen in low-and middle-income nations, though these nations own only 54 per cent of the world vehicle population (World Health Organization, 2015). Figure 2.20

depicts yearly deaths from road traffic accidents as revealed by the Ghana Police Service's Motor Traffic and Transport Department (MTTD). In a few years, the country saw a decrease in the number of people killed in car accidents, but it was insignificant. From 1,779 deaths in 2005 to 2,043 deaths in 2009, the figure peaked at 2,341 deaths in 2018.

Figure 2.20: Yearly deaths from road traffic accidents from 2000-2018



Source: Author (2019)

Data from the National Road and Safety Commission (NRSC) show that 46,284 persons died of road traffic accidents between 1991 and 2018 (Afful-Mensah, 2019). This figure is alarming since it means that the number of people who died is high enough to fill Ghana's largest stadium, the Kumasi Sports Stadium. These figures do not account for accidents in remote locations and go unreported due to the inadequate reporting system of developing countries. Estimates from the World Development Indicators reveal that road traffic mortality for Ghana was 24.9 per 100,000 people in 2016. Data from the Ghana Police Service, Motor Traffic and Transport Department (MTTD) further suggests that road accidents deaths increased from 2,076 persons in 2017 to 2,341 persons in 2018, indicating a 12.76% increase in deaths within the period (Safo, 2019). According to the same data, 1,714 people are killed on Ghana's roads each year on average.

It is impossible to overstate the importance of road safety as a sustainable development issue. As a result, road safety forms part of the United Nations 2030 Agenda for Sustainable Development. By 2020, target 3.6 aims to reduce global road traffic deaths and injuries by half, while target 11.2 aims to provide everyone access to safe, affordable, accessible, and

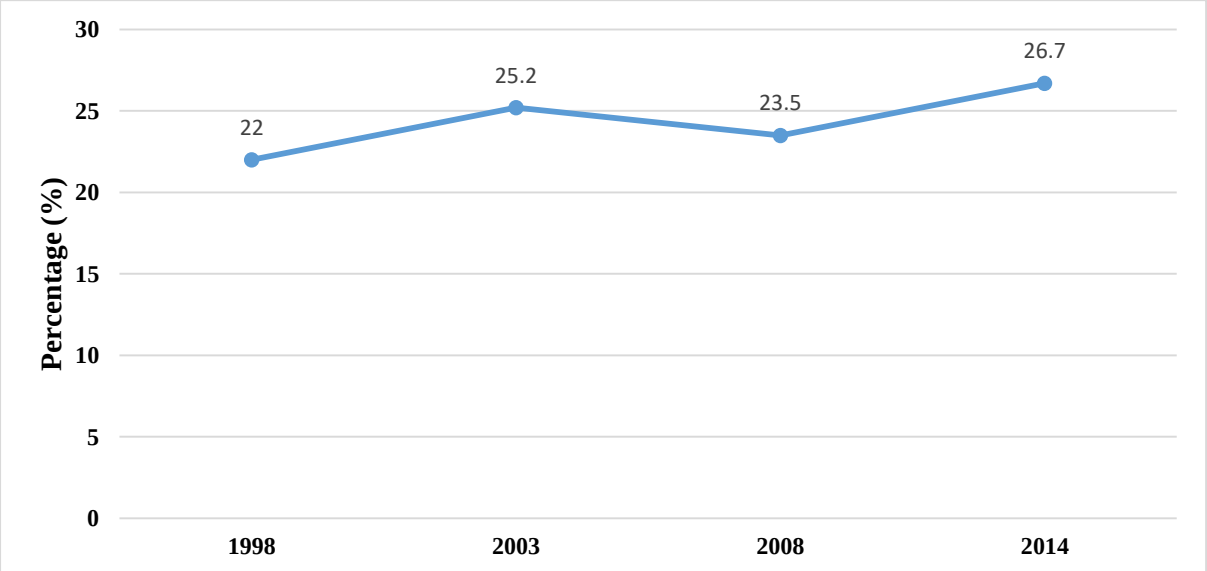
sustainable transportation systems by 2030. To achieve the SDG 3.6 target, Ghana's is to halve the 2011 fatality figure by 2020 (Afful-Mensah, 2019). With 2,199 deaths reported in 2011, the estimated targeted number of deaths from road traffic accidents will be around 1,100 by 2020. For Ghana to achieve this target, the number of deaths from road traffic accidents should drop by about 53 per cent using the 2018 recorded deaths for the calculations. This figure represents an ambitious task leading to the 2020 deadline.

Adherence to the following recommendations can help reduce the high spate of crashes on Ghana's roads and meet the SDG targets: road safety education, enforcement of traffic laws and regulations; enforcement of seat-belt wearing, helmet wearing by motorcycle riders; intensification of road safety checks and auditing of all major road projects to guarantee the safety of road infrastructure; prioritisation of pedestrian and motorcyclist safety; and finally, research on risk factors of road traffic crashes, among other measures (Ministry of Transport, 2017).

2.9.11 Demand for family planning

The SGDs target 3.7.1 indicator place emphasis on the percentage of women of reproductive age (15-49 years) who are sexually active and who have their need for family planning satisfied with modern methods.

Figure 2.21: Percentage of women of childbearing age (aged 15-49 years) who get their family planning needs fulfilled using modern methods



Source: Author (2019)

Table 2.11: Family planning (among married women age 15-49)

Indicator	Ghana	Urban	Rural
Current use of any method of family planning (%)	31	30	31
Current use of any modern method of family planning (%)	25	23	27
Current use of any traditional method of family planning (%)	6	8	4

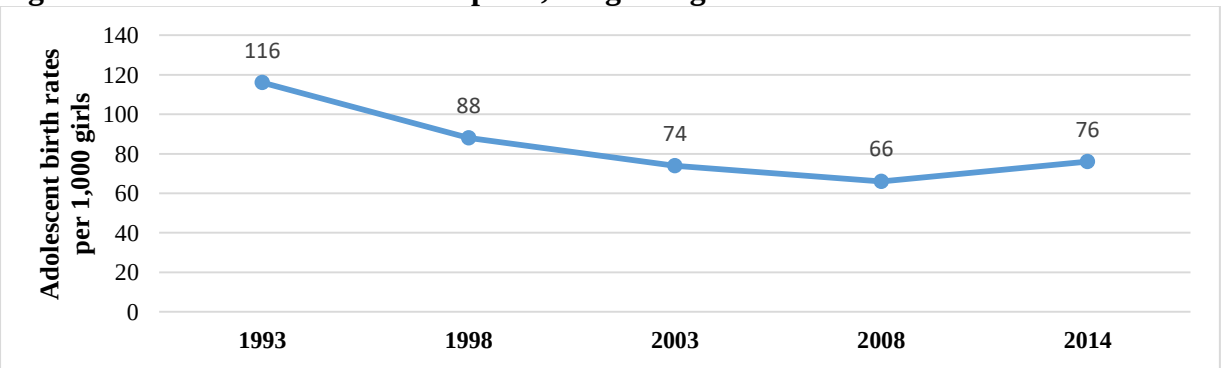
Source: GSS, GHS and ICF (2018: 16)

Various GDHS data by the Ghana Statistical Service indicates an increase in modern contraceptive use among married/in-union women. For example, the proportion of women of childbearing age (aged 15-49 years) who use modern methods to meet their family planning needs raising from 22 per cent in 1998 to 26.7 per cent in 2014 (see Figure 2.21). The 2017 GMHS provided information on family planning among married women age 15-49 years. An interesting finding was that married women aged 15-49 in rural areas use the modern method of family planning than their urban counterparts, which is 27 per cent and 23 per cent, respectively. Additionally, rural married women aged 15-49 use the traditional method of family planning less than their urban counterparts, which is 4 per cent and 8 per cent, respectively (see Table 2.11).

2.9.12 Adolescent birth rate

Adolescent birth rate or adolescent fertility rate is the number of births per thousand girls aged 15-19. These rates are presented for the three years preceding the survey. Figure 2.22 shows the adolescent birth rate extending from 1993 to 2014. There has been a consistent drop in the adolescent birth rate, except in 2014, when it jumped by 76 per 1,000 women aged 15-19. For instance, the adolescent birth rate fell from 116 in 1993 to 66 in 2008.

Figure 2.22: Adolescent birth rate per 1,000 girls aged 15-19 for Ghana



Source: Author (2019)

Ghana's demographic transition over the last two decades has resulted in a demographic dividend. The overall fertility rate has declined from 6.4 children per woman in 1988 to 4.2 children per woman in 2014 (Ministry of Gender, Children and Social Protection, 2017). The structure of Ghana's population has changed as the population below age 15 years fell from around 45 per cent in 1970 to 38.3 per cent in 2010. Nevertheless, it seems that the decline in fertility rate is unaccompanied by a corresponding increase in family planning usage. Some fear that induced abortion, especially among young people, could account for Ghana's fertility decline (Ministry of Gender, Children and Social Protection, 2017).

The increasing numbers of adolescent pregnancies with its attendant problems on the health and socio-economic well-being of the youth, particularly adolescent girls, call for stakeholders' collaboration to decrease the incidence of unplanned pregnancies and childbearing. For this reason, Ghana's Ministry of Gender, Children, and Social Protection has devised a five-year strategic plan to combat adolescent pregnancy, which will run from 2017 to 2022. The following are the plan's strategic objectives: empower adolescents to make decisions about their sexual debut and prevent early and unplanned pregnancies; promote institutional and community engagement to avoid adolescent pregnancy; ensure that adolescents, particularly those who are sexually active, have access to youth-friendly and gender-responsive sexual and reproductive health information and services; and expand adolescents' access to education and retention beyond Junior High School especially for girls. Expectations are that effective implementation of these strategic objectives could enable Ghana to meet the SDGs target of reducing the adolescent birth rate.

2.9.13 Total net official development assistance to the health sector

Official development assistance (ODA), by definition, is government assistance aimed at promoting the economic development and welfare of developing nations. This government aid excludes loans and credits for military uses. Bilateral assistance can be delivered directly from a donor to a recipient or through a multilateral development organisation like the UN or the World Bank (OECD, 2019). Included in aid are grants, "soft" loans (with a grant component of at least 25% of the total) and the provision of technical assistance.

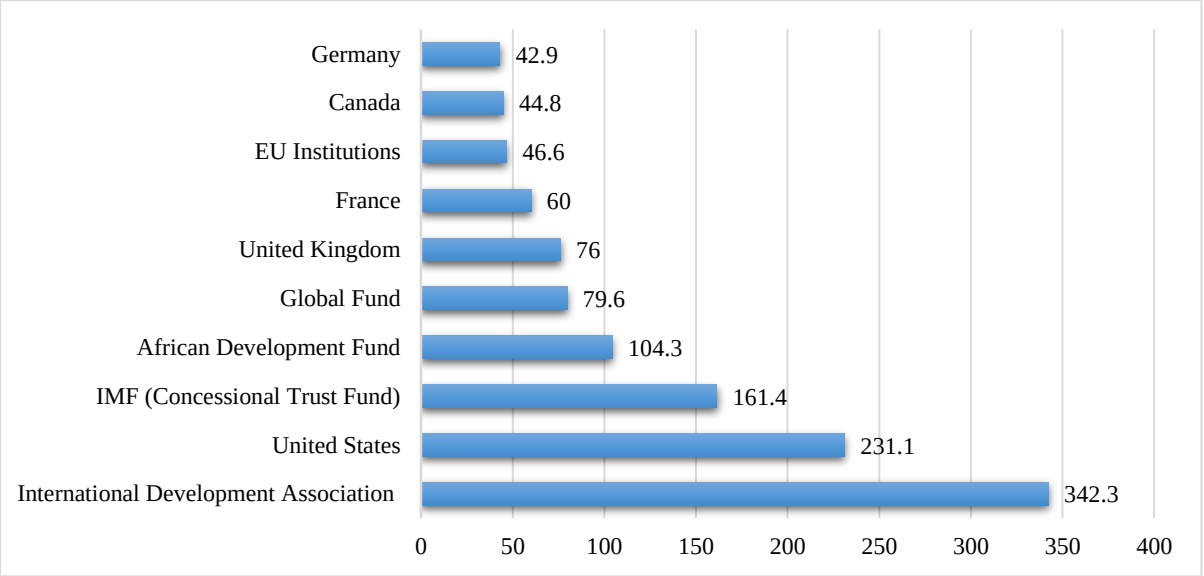
According to the Organisation for Economic Cooperation and Development data, net ODA increased from $1,775.4 million in 2015 to $3,062.9 million in 2016 (see Table 2.12). During the same period, total net receipts increased from US$1,256.7 million to U$1,768.7 million.

Table 2.12: ODA receipts for Ghana (2015-2017)

Indicator	2015	2016	2017
Net ODA (USD million)	1,775.4	2,975.7	3,062.9
Net ODA/GNI (%)	44.5	44.7	34.4
Gross ODA (USD million)	1,402.8	1,432.1	1,882.0
Bilateral share (gross ODA) (%)	2.7	3.2	4.8
Total net receipts (USD million)	1,256.7	1,316.2	1,768.7

Source: Author (2019)

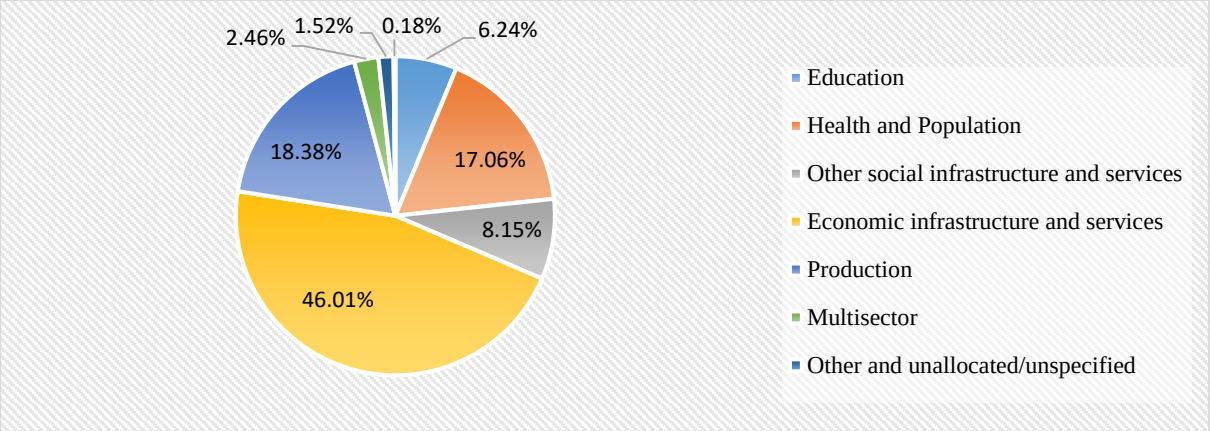
Figure 2.23: Top ten donors of gross ODA for Ghana, 2016-2017 average (USD million)



Source: Author (2019)

Figure 2.23 displays the top ten donors of Gross ODA for Ghana, averaging 2016-2017 periods. The International Development Association is the largest donor with US$342.3 million, followed by United States with US$231.1 million, with Germany contributing the least amounting to US$42.9 million.

Figure 2.24: Bilateral ODA by sector for Ghana, 2016-17 average



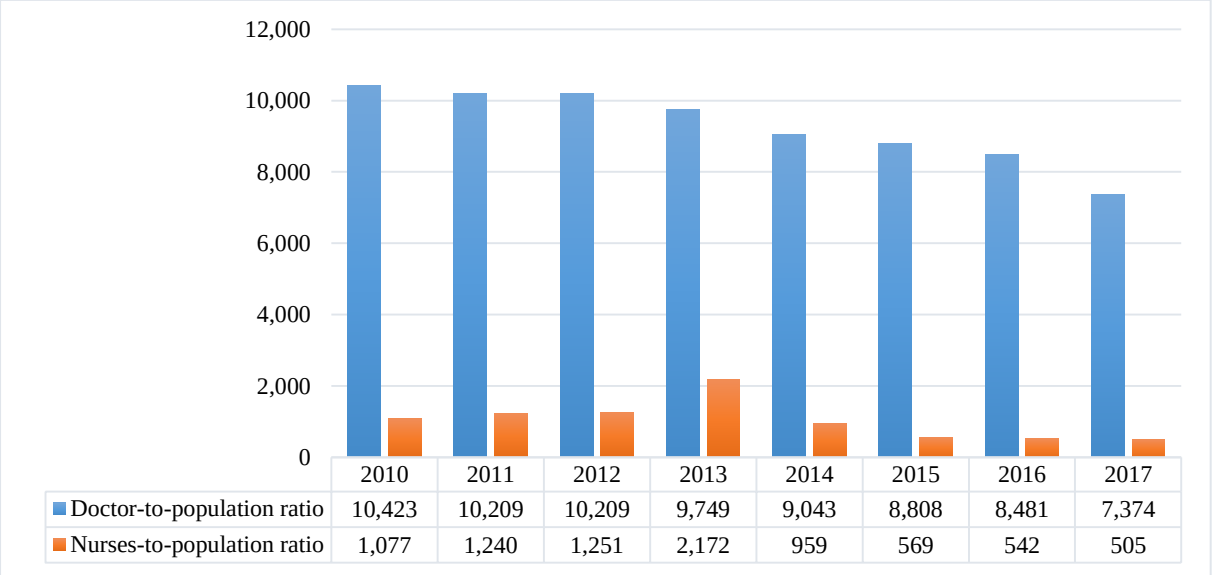
Source: Author (2019)

The pie chart displays the bilateral ODA for the various sectors for Ghana, averaging 2016-17 values. Data for the construction of Figure 2.24 was from OECD (2019). Figure 2.24 shows that during 2016-17, the health and population sector (17.06%) was the third recipient of bilateral ODA, following economic infrastructure and services (46.01%) and education (18.38%).

2.9.14 Health worker density and distribution

No health care delivery system can function without human resources. The WHO recognised the importance of human resources as inputs into any health system, thereby making health workers the backbone of any health system in health services delivery (World Health Organization, 2000). Data from the Human Resource Development Division (HRDD) of the Ghana Health Service put the total health professionals in Ghana at 107,985 as of 2017 (Ghana Health Service, 2018c). The distribution of health workers in the country is biased toward affluent southern regions. Two southern regions, Ashanti and Greater Accra have the highest percentage of health workers, at 18.2 per cent and 18.8 per cent, respectively, accounting for 39 per cent of all health employees. Furthermore, the Korle Bu and Komfo Anokye Teaching hospitals employ more than 45 per cent of the country's doctors, whereas less than 15 per cent are engaged by the district hospitals (Ghana Health Service, 2018c).

Figure 2.25: Doctor and nurse to population ratios



	2010	2011	2012	2013	2014	2015	2016	2017
Doctor-to-population ratio	10,423	10,209	10,209	9,749	9,043	8,808	8,481	7,374
Nurses-to-population ratio	1,077	1,240	1,251	2,172	959	569	542	505

Source: Author (2019)

Ghana has made significant improvements in the doctor-to-population and nurse-to-population ratios, demonstrating that the health care sector's efforts to close the equality gap are paying off. Data compiled by the HRDD reveals that doctor and nurse to population ratios have been improvising over the years. Doctor to population ratio fell from 1:10,423 in 2010 to 1:7,374 in 2017. By implication, a doctor in Ghana is responsible for 7,374 patients with this doctor-to-population ratio (see Figure 2.25). This ratio is worrisome because Ghana is still far from the WHO-recommended doctor-to-population ratio of 1:1,000. However, Ghana's nurse-to-population ratio has improved dramatically, from 1:1,2172 in 2013 to 1:505 in 2017, exceeding the WHO-recommended nurse-to-population ratio of 1:1,000.

To address shortages and uneven distribution of human resources within the sector, the Ministry of Health developed the Staffing Norms for healthcare facilities across the country. Staffing norms, by definition, are planning tools based on the WHO-endorsed Workload Indicators of Staffing Needs (WISN) technique, which determines the cadre and number of health workers needed in a given healthcare facility depending on their workload (Ghana Health Service, 2018a). Through the World Bank assistance, a facility-by-facility Human Resources for Health (HRH) gap analysis commenced in all hospitals, polyclinics, health centres and Community-Based Health Planning and Services (CHPS) zones in 2017. The goal of this study was to create a complete database for employee recruitment and redistribution

planning. The exercise intended to build capacity at the regional and district levels to efficiently practise staffing norms and their related means for HR planning and decision-making.

2.10 Summary

Health expenditure in Ghana has been increasing in absolute terms in recent years, but in terms of health expenditure as a percentage of GDP, the country is losing ground. Ghana has also failed in achieving the Abuja target of committing 15 per cent of its domestic budget to health. Ghana's health care financing has seen several changes, from free health care with the government bearing all costs to the current age of a hybrid government-funded and cost-recovery system that includes a mix of health insurance and direct out-of-pocket payments. Furthermore, health care financing in Ghana is witnessing a changing structure. Now fewer financing comes from donors, and the NHIS is becoming the foremost financing agent. The next chapter gives an overview of the health financing mechanisms highlighting their various dimensions.

CHAPTER THREE: OVERVIEW OF THE HEALTH FINANCING MECHANISMS

3.1 Introduction

The purpose of this chapter is to provide an overview of global health financing mechanisms. Besides, the chapter would highlight the various dimensions of health financing arrangements, paying much attention to Ghana. This chapter begins by explaining concepts and terms used in health insurance, intending to ease readers understanding. The subsequent section will deal with health financing functions/targets. Health financing mechanisms and the criteria for assessing these mechanisms will constitute the succeeding sections, section 3.4 and section 3.5, respectively. Section 3.5 pays special attention to social health insurance financing by evaluating its financing options within the Ghanaian context. Sections 3.7 and 3.8 highlight global health spending trends and current global efforts in mobilising finance for health development, respectively, whereas the last section provides a chapter conclusion.

3.2 Concepts and terms used in health insurance

3.2.1 Member

Consumers who join an insurance fund are referred to as members.

3.2.2 Cover/Provision/Benefit/Entitlement

The terminology used to describe the benefits that a member may obtain from an insurance fund.

3.2.3 Adverse selection

Adverse selection refers to a situation in which higher-risk or sick individuals, who have higher health care needs, purchase health insurance, whereas healthy people decide to delay or abstain from purchasing insurance coverage. Due to adverse selection, the distribution of fit and unwell people signing up for health insurance can be abnormal.

Adverse selection means more claims and spending, leading to an increase in premiums charged or a reduction in the cover provided by the insurance companies. Health insurance companies' finances can be impacted negatively by an adverse selection problem as a result of fewer insurers remaining in the insurance market or higher rates for those who tend to purchase

insurance. This situation is possible because as healthy people drop out of the health insurance marketplace, what remains is then a pool of high-risk individuals. The implication is that, in comparison to the number of policies in place, the insurance company would have to pay a higher percentage of claims, owing to the disproportionately high number of covered people who use more health care. Additionally, the lack of healthy individuals could reduce the total amount of premiums that the insurance company would receive. This phenomenon can force the insurance company to raise premiums to make up for the difference. Unfortunately, this could result in more healthy individuals giving up their policies due to the high insurance cost. The high cost of insurance may serve as a disincentive for lower-risk persons to take up an insurance policy, mainly when membership is voluntary.

3.2.4 Moral Hazard

A moral hazard occurs in insurance when the expected loss from an adverse event rises as insurance coverage rises (Pauly, 2007). Moral hazard also refers to a change in risk behaviour induced by the presence of insurance coverage. Individuals may be tempted to take risks (e.g., not taking care of their health) since some or all of the costs are covered. In the context of health insurance, for example, persons with insurance coverage are less likely to take cautionary measures such as wearing seat belts, which would lessen their health care expenditures. Furthermore, people having health insurance may drive recklessly or engage in more harmful activities such as extreme sports.

Moral hazard tends to manifest itself in the overuse of minor complaints such as common colds and other generic symptoms. In such cases, persons with a health insurance policy may seek doctor attention for virtually any problem. These result in a situation where health care usage is more relative to the amount of premium paid. Moral hazard initiates more use of health insurance as insured persons take on more risky behaviours. Health insurance companies may face financial losses resulting from moral hazards mixed with adverse selection, as they are compelled to pay out more claims and charge more premiums, making health insurance less accessible for healthier people.

3.2.5 Premium

Premium is the term used for the regular payments made by the consumer (or insured) to a health insurance company to keep coverage fully active. It is the amount of money payable by

the consumer to purchase insurance coverage. Often premium payments have a due date plus a grace period. Where a client fails to pay a premium in full at the end of the grace period, the health insurance company reserves the right to suspend or terminate the coverage. Only when a person's premium payments are up to date is he insured. However, just because someone is insured does not guarantee that all of their medical expenses are covered. Other health insurance costs must be paid when medical treatment is needed. These include deductibles, coinsurance, and co-payments.

3.2.6 Deductibles

A deductible is an amount a consumer (or insured) pays each year for qualifying medical services or prescriptions before his health plan begins to share the cost of those services. For example, if a person's yearly deductible is GHS 1,000, he will be responsible for paying GHS 1,000 of his total qualified medical costs before his plan kicks in.

3.2.7 Coinsurance

Coinsurance is a portion or share of the costs of a health care service paid after the customer has met the deductible. Usually, it is assumed as a percentage of the amount the consumer is allowed to be charged for health services. Suppose that a person’s coinsurance is 20 per cent. If he had already met his yearly deductible and he pays GHS 1,000 in health care expenses, then he will pay GHS 200 whereas his health insurance plan pays GHS 800. Coinsurance is a term that describes how the insured and the insurer each pay a portion of the total eligible costs.

3.2.8 Co-payment

A co-payment is a fixed amount that the insured must pay for a healthcare treatment when he receives it. The fee varies according to the type of service rendered. The health insurance plan determines what constitutes co-payment of the insured for various services and when he has one. A health care beneficiary typically pays co-payment after paying a deductible. In some instances, there is no deductible that an insured or a health care beneficiary has to pay first, just a co-payment. In sum, co-payments are cost-sharing between clients and health insurance companies, with the cost-sharing amount defined in the policy.

3.3 Health financing functions or targets

Health financing involves three main functions: fund collecting, fund pooling, and purchasing/paying for health services (i.e., allocation of funds to providers and services) (World Health Organization, 2010a). Normand and Weber (2009) elaborate on the same ideal, stating that health financing systems should aim for three main goals: to create adequate and sustainable resources for a health care system (revenue collection); to use these resources optimally (through proper motivation for patients, providers, and administrators, i.e., optimal procurement); and to guarantee that everybody has financial access to quality care (pooling).

The means through which the health system gets funds from individuals, corporations, the government, and other organisations, including donors, is revenue collection. Revenue collection is linked to revenue generation and the goal of universal access to health care. Revenue collection also relates to the sources of health care funding contributions and how organised these contributions are, and the body or organisation selected to collect them (Mcintyre, 2007). The fundamental concern in funding sources is the balance between external and domestic sources and between commercial companies (or employers) and individuals within domestic sources (or households). Again, concerning contribution mechanisms, the key challenges have to do with the way they are designed and the extent to which they are equitable or not (i.e., either progressive or regressive). Finally, regarding the type of revenue collecting entity or organisation, the government, a parastatal or private organisation could be used, but if it is a private organisation, for example, it could be a for-profit or not-for-profit (Mcintyre, 2007).

Purchasing is "the process by which financial resources are used to pay providers to deliver a set of health interventions" (Normand and Weber, 2009: 24). It could be either passive or strategic. When it comes to paying bills, passive purchasing adheres to predefined budgets. On the other hand, strategic purchasing, is the recommended way of finding the best payment mechanism, incentive structure, and supplier pool for health services. According to Mcintyre (2007), central concerns in the purchasing function of health care financing are the choice of benefit package beneficiaries are entitled to, including service and provider types, and the method through which various services should be accessed, and the choice of mechanism for paying providers or the path employ to transfer resources from purchaser to provider.

Pooling is "the accumulation and management of revenues in order to limit a person's payments for health care so that he or she no longer bears the risk alone" (Normand and Weber,

2009: 24). Kutzin (2001: 177) described the "pooling function of health care financing as the accumulation of prepaid health care revenues on behalf of a population". Within the health system, pooling is usually known as the "insurance function", and is closely associated with the universal financial accessibility of health services as well as resource generation.

3.4 Health care financing mechanisms

Health care financing mechanisms are various parts of financing health care systems. They are the forms of health care financing arrangements through which individuals get health services. These financing arrangements, among other things, include direct payments by households and third-party. There are separate sets of rules that control the form of participation, the foundation for entitlement to health care, and the procedures for raising and then pooling the revenues of a specific scheme for third-party financing schemes (OECD, European Union, and WHO, 2017). There are different health care financing mechanisms. We identified six categories of health financing mechanisms, namely general revenue, social health insurance, private health insurance, community financing, out-of-pocket spending and external funding.

3.4.1 General revenue

General tax revenue (also known as tax-funded systems) is a vital funding source of health care in low, middle and high-income nations. Here health services are paid for out of revenue collection through a broad-based tax. Revenue may come from a wide range of direct taxes (e.g., income tax, profit tax, etc.) and indirect taxes (e.g., value-added, sales taxes, excise and import duties, etc.). Generally, a mixture of taxes is used by countries depending on individual circumstances. However, low-income nations depend on indirect taxes, such as import and export duty taxes, which are easier to collect (The World Bank Group, 2016). For instance, Ghana increased its VAT rate by 2.5% to generate extra revenue specifically for the funding of its NHIS. General revenue health financing systems are usually pay-as-you-go arrangements, where current revenues are used to finance current expenditures (Glied, 2008).

Health systems that are funded mainly through taxes are called National Health Services (NHS). In most cases, NHS systems give free healthcare to everybody who lives in a country at service delivery points. Therefore, there is no linkage between payment and entitlements (Normand and Weber, 2009). The primary goal of the NHS is to give access to free health care services comprehensively. In some cases, if it is appropriate, co-payments may be applied.

Under the NHS systems, health providers are mostly publicly owned though many schemes contract services from public and private providers such as nongovernmental organisations, faith-based organisations etc. Conversely, general revenues can pay for treatment from private providers or a combination of public and private providers. Examples of middle-income nations employing general revenue as their primary source of health financing include Brazil, Ecuador, Kazakhstan, Lithuania, Malaysia, and Ukraine.

Even though National Health Service systems are theoretically known to deliver health care to the entire populace at no cost, the reality is less encouraging. In most developing nations, relying on general revenues to fund health systems is becoming increasingly problematic, as public health expenditure as a percentage of the budget continues to remain low. Gottret and Schieber (2006: 8) argued that "reliance on general government budgets is vulnerable to the vicissitudes of annual budget discussions and changes in political priorities".

The following reasons may explain why general revenues cannot be the only means of sourcing funds for health care in Ghana. First, Ghana has a large informal sector, employing about 85 per cent of its workers (Boateng, 2014). The informal sector, on the other hand, is defined by low-income earnings, unpredictable income, and a lack of business growth potential. All of this makes taxing the informal economy extremely difficult, if not impossible, hindering efforts to collect general taxes to fund the health sector. Second, Ghana has relatively low income and high inequality levels. Government ability to raise revenues is strongly associated with income levels. With low incomes, the administrative ability of the Ghana Revenue Authority to raise taxes is limited. Unfortunately, the government cannot adequately tax society's wealthiest elites to enhance tax contributions to fund the health system. Finally, there is a high competing need or demand on general revenue. Like any other sector, Ghana's health sector competes with agriculture, roads, education and the like for general tax revenue. In furtherance of this, Ghana has a huge debt burden, leading to an increase in debt service payments relative to fiscal revenue. For instance, Ghana's debt service-to-revenue ratio increased from 37.1 per cent in 2015 to 43.4 per cent in 2016 (International Monetary Fund, 2018). As a result of this circumstance, government debt servicing spending as a proportion of GDP is higher than spending on public health care. Limited resources, corruption, and the said problems make it impossible to use general income as the sole funding source for health care in Ghana, especially for the poor.

3.4.2 Private health insurance

Private health insurance, also called "voluntary health insurance", by definition, is "any health insurance paid for by voluntary contributions" (Gottret and Schieber, 2006: 11). Under this system, consumers willingly buy insurance from private, autonomous, and competitive sellers who charge premiums that reflect consumers' risks instead of their capacity to pay. Private health insurance organisations could be both for-profit and non-profit, even though in some circumstances, consumers may purchase it from public or quasi-public bodies. Purchases of this form of insurance can be for groups and individuals. In many countries, businesses may buy insurance (i.e. employer-based insurance) or may have self-arranged insurance for their employees in the organisation. Usually, the purchase of voluntary insurance may come from private insurance organisations (both for-profit and non-profit). In some circumstances, the purchase may come from public or quasi-public bodies. Very few countries have used mainly private health insurance to offer health coverage for their people. The Netherlands and Israel are two countries that have implemented this method. All citizens in these two countries are obligated to acquire insurance from a private insurer. Across the world, private health insurance is used as either supplementary (e.g., Canada) or complementary (e.g., England) to public insurance.

Of course, Ghana's healthcare system cannot be funded primarily by health insurance premiums. Historically, private health insurance has "been the preserve of higher-income groups" (Mcintyre, 2007: 3). With income levels generally low in Ghana, very few people can afford private health insurance. Further, the insurance penetration rate[3] in Ghana is relatively low. For instance, as of the end of 2017, Ghana's insurance penetration rate was 1.2 per cent of GDP (Williams and Romeo, 2018). Now, if one disaggregates, then private health insurance is virtually non-existent. These factors explain why publicly financed health insurance programs like the NHIS must be made available to individuals who cannot afford private insurance to serve as a safety net. However, with a growing middle class in Ghanaian society, we can expect a greater preference for private health insurance in the future. Hence, it is commendable to integrate private health insurance into the health funding systems of Ghana, either as a supplementary or complementary role.

[3] The insurance penetration rate is calculated as the ratio of insurance premium to a country's Gross Domestic Product.

3.4.3 Community financing

Sometimes, community financing is called “community-based health insurance” (CBHI), “mutual health insurance”, “community-based prepayment schemes”, “community health funds”, or “health micro-insurance”. In recent years, community financing has become well-known in Africa and Asia. According to Lanthaume (2012), community financing is a mechanism for health financing at the sub-national/community level (households in a village or district, a socio-economic, professional or ethnic group. They are not-for-profit prepayment policies for health care operated by a community based on voluntary membership. Comparatively, members pay low premiums to cover the expenses of a given set of health services for themselves and frequently other family members. A CBHI may, in rare cases, be subsidised by the central government, as is the case in Rwanda (OECD, European Union, and WHO, 2017). These schemes provide coverage to a subpopulation that is usually difficult to reach. Often benefit packages of CBHI schemes are not comprehensive because of the limited economic capacity of members to pay premiums. As a result, the focus of these systems is either on diseases that are rare and require expensive treatment, or the benefits package covers prevalence diseases that require less expensive treatment.

The introduction of community financing schemes in Ghana was a reaction to the problems posed by user fees in the 1990s. By the end of 2003, there were 258 such schemes nationwide, serving close to two per cent of the country’s population (The Association of Chartered Certified Accountants, 2013). Nonetheless, the ability of these schemes to deliver financial protection to resident Ghanaians and the sustainability of the CBHIs themselves were doubtful. These schemes often were unable to raise significant funds, mainly due to the limited income of community members. Hence, risk pooling was small, making it impossible for the schemes to distribute their risk across a larger population, compromising their financial protection role. Again, most of these schemes were in the hands of community members who had limited management skills. Also, the CBHI schemes could not provide coverage to the very poor in society, though premiums charges were generally low.

In all, CBHI schemes were unlikely to solve the bulk of Ghana’s health financing problems, although they served as the forerunner to the country’s current social health insurance system called the NHIS. Therefore, community financing schemes can implicitly provide complementary or supplementary coverage in Ghana’s pluralistic health financing arrangement.

3.4.4 Social health insurance

Social health insurance (SHI) refers to "a financing arrangement that ensures access to health care based on a payment of a non-risk-related contribution by or on behalf of the eligible person" (OECD, European Union, and WHO, 2017: 169). A specific public law establishes the scheme indicating the eligibility, benefit package, and contribution payment requirements, among other things. In the literature, the terms "social health insurance" and "national health insurance" (NHI) are frequently interchanged. However, NHI is a type of social health insurance that covers residents, including persons who have not paid to be members of the scheme. The social solidarity principle is the cornerstone of the SHI. The government or quasi-government agencies may administer the SHI but not necessarily. In some nations, the system is managed by both government and non-government entities for different subpopulations.

Essentially, SHI has three main distinguishing features. First, membership is compulsory, at least for the majority of the population. Contributions or premiums are not risk-related. The premium payments are typically wage-related or referred to as a dedicated payroll tax in the economic literature. The government may pay the premiums for some categories such as the poor, the elderly and children. Second, eligibility is restricted. SHI is not universal because only citizens are eligible to receive benefits after paying the requisite premium. Finally, premium payments and benefits are outlined in a social compact between enrolees and the social insurance plan under the SHI. The law specified the premium payment and benefits, making it difficult to change. Therefore, the premium rate and benefits are secure and are not subject to annual budgetary controls by the government (Hsiao and Shaw, 2007).

Across the globe, SHI schemes have been established in over 60 countries (Gottret and Schieber, 2006). SHI was the primary source of funding scheme in thirteen OECD countries in 2009 (including Austria, France, Germany, Japan, Korea and the Slovak Republic). Countries in Africa that have introduced social health insurance include Ghana, Tanzania, Kenya, Rwanda and Ethiopia. Many other nations have SHI schemes, however they are generally limited in population coverage.

Two main reasons may account for the successful launch of SHI in Ghana. First, there was an incentive for Ghanaians to pay premiums. One argument put forward by Hsiao and Shaw (2007) was that people would be motivated to prepay only when they currently pay for their health services at a high cost. The introduction of the "cash-and-carry" system in the 1990s made patients pay for care at a high cost. The voluntary prepayment arrangements such as

community-based mutual health organisations were developed to mitigate the effects of the "cash-and-carry" system. The government passed the legislation to establish SHI nationwide in recognition of the potential of the MHOs. The Government of Ghana sees the introduction of the NHIS as a measure to mitigate the negative consequences of the user fees. Again, there was a political will to abolish the "cash-and-carry" system. For instance, to fulfil the campaign promise of abolishing the "cash-and-carry" system, the New Patriotic Party (NPP) government initiated the policy-making process to implement an NHIS. In the face of economic difficulties, the Government of Ghana passed the National Health Insurance Act in 2003 and subsequently executed it. In section 3.6, we provide detailed information about the financing of SHI.

3.4.5 Out-of-pocket spending

By definition, out-of-pocket payments (OOPs) are payments made directly to health care providers at the time of service usage. For out-of-pocket payments, patients do not receive reimbursable from insurers or other third parties. Expenditure counts as OOPs are official user fees (service charges), co-payments and deductibles for doctor visits and prescription medications, unofficial (informal) payments, and expenses imposed on service users for supplies and tests inaccessible at the health facilities. The calculations of OOPs for health care may exclude transportation and other costs.

Out-of-pocket expenditure is the leading source of health care financing in lower-income nations, which is frequently greater than government spending (The World Bank Group, 2016; OECD, European Union, and WHO, 2017). Generally, OOPs as a share of total national health expenditures are larger in lower-income countries than what pertained in the advanced nations (Hsiao and Shaw, 2007). Out-of-pocket payments tend to drop as a share of total national health expenditures as country income rises. Usually, as a country's income increases, new types of health financing mechanisms such as social and private insurance emerge, and with increasing government spending, out-of-pocket spending is then substituted.

Globally, OOP payments have been widely cited as a poor way to finance health care (The World Bank Group, 2016). The World Bank Group also claimed that OOP payments disproportionately benefit the sick (no risk pooling) at a point when healthcare is most needed and that they disproportionately harm the poor. When people rely solely on out-of-pocket expenditures to get health care, they risk losing their financial protection, leading to catastrophic spending, asset loss, and poverty (Normand and Weber, 2009). Household poverty

resulting from OOP spending is the highest cause of overall impoverishment (OECD and WHO, 2003; The World Bank, 2004). Unfortunately, OOP payments account for a higher proportion of total household health expenditures, especially among the lowest income group in developing countries.

In Ghana, the introduction of user fees, a form of out-of-pocket payments in all public health facilities in the 1980s, hindered access to health services across the county. With the introduction of user fees, out-of-pocket payments became an enormous component of household healthcare spending, putting a tremendous financial strain on the less healthy and impoverished. Out-of-pocket payments deterred patients from seeking necessary health care, leading to worse health outcomes for the majority of the population (Waddington and Enyimayew, 1990; Nyonator and Kutzin, 1999; Wagstaff and van Doorslaer, 2003). Out-of-pocket payment, in particular, is a regressive way to fund health services. It was to address these adverse effects of OOP payments that the government introduced the NHIS in 2004. Therefore, the prime objective of the NHIS was to reduce the financial barrier to health care services by lowering out-of-pocket expenses.

3.4.6 External financing sources

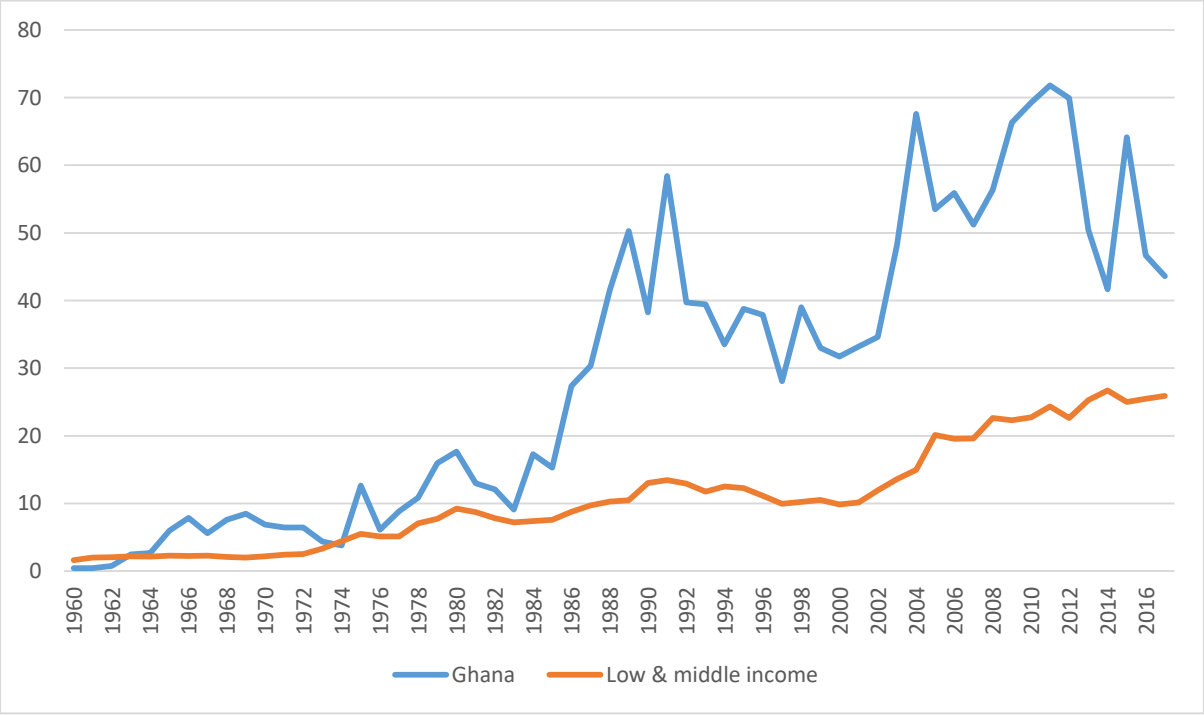
External funding, by definition, is the sum of resources from all non-resident institutional units channelled towards health, explicitly labelled to health or not, through the government or private sector to be used as a means of payments of health goods and services by financing agents in the government or private sectors (World Health Organization, 2014). These resources include loans, cash and in-kind donations. External funding, such as health-specific development assistance, also referred to as health aid, is a significant health financing source, particularly in low-income countries.

Global health expenditures financed through external assistance is very small. In 2015, for instance, development assistance for health (DAH) amounted to barely over US$19 billion, which is less than 0.3 per cent of global health expenditure (Xu *et al.*, 2018a). The same report reiterates that the situation is different in several low-income nations. For these countries, the influence of external assistance on health costs is relatively colossal. In 2015, on average, 33

per cent[4] of health expenditures funding in low-income countries were through development assistance (Xu *et al.*, 2018a).

A recent study by Ortiz-Ospina and Roser (2019) disclosed that donor support for healthcare tends to fall as countries become wealthier. The study revealed that less developed nations with a per capita GDP of less than US$500 per year had donor funding accounting for approximately 45 per cent of total health expenditure, on average. This value dropped to 34 per cent for countries with a per capita GDP up to US$1,000. When the data was expanded to include nations with per capita of up to GDP US$1,500 and later extended up to US$3,000 per capita per year, donor funding accounted for just under 30 per cent and below 25 per cent, respectively. Finally, for most countries with a GDP per capita of more than US$3,000 per year, donor funding makes up a relatively small share of total health expenditure, usually less than 5 per cent (with a few exceptions). Therefore, external assistance is often the leading source of healthcare funding for less developed countries. However, this is usually replaced by other sources as countries move from lower to middle incomes.

Figure 3.1: Ghana's net ODA received per capita (current US$)



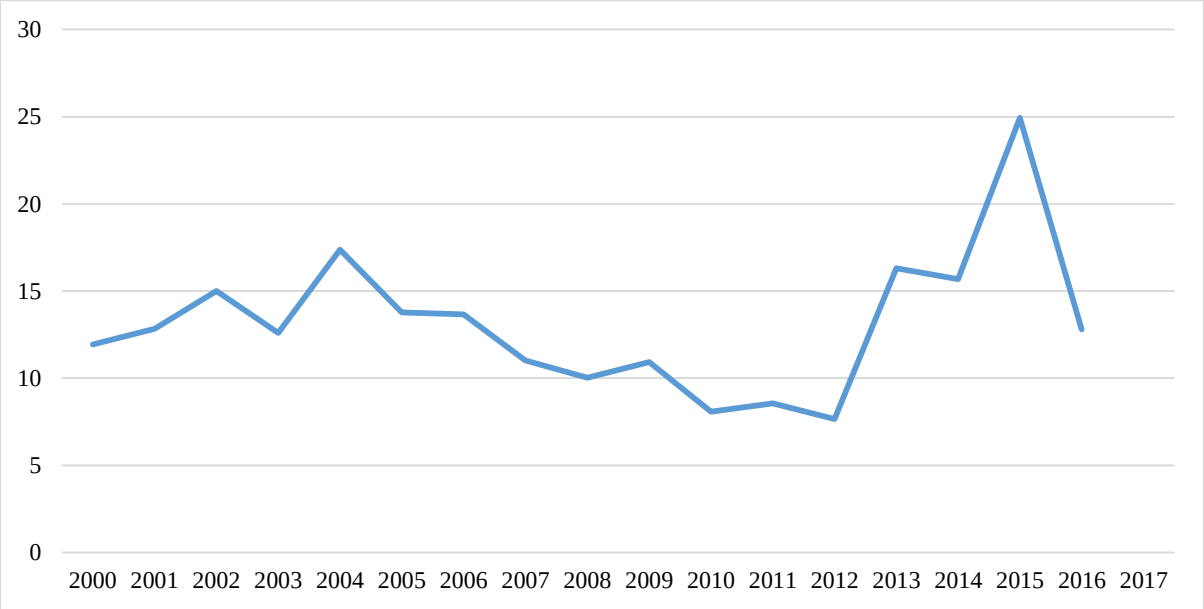
Source: Author (2019)

[4] This is an unweighted average, reflecting an average of the percentage of externally sourced health spending across all low-income countries.

Recent data show that official development assistance to Ghana is decreasing. The fall in net official development assistance (ODA) is attributed to Ghana's graduation from a low-income country to lower-middle-income country status in 2010. Data used to construct Figure 3.1 was from The World Bank. Figure 3.1 shows that Ghana's net ODA has been volatile, but paying attention to recent years, we observed a decline from 2012 to 2014, 2016 and 2017. However, Ghana's net ODA is above the low and middle-income average.

Ghana cannot rely merely on external resources to fund its health systems. Over the years, external resources to the health sector have been very erratic. Figure 3.2 constructed from The World Bank data shows Ghana's external resources for health as a percentage of total expenditure on health. This metric indicates the health sector reliance on outside funding to purchase health services. A high proportion reveals that a country cannot fulfil many of its critical governmental responsibilities, such as basic public services delivery, without the assistance of foreign aid and expertise (Brautigam, 2000).

Figure 3.2: Ghana's external resources for health as a percentage of total expenditure on health



Source: Author (2019)

Generally, external resources for the health sector have dropped in recent years. Ghana saw a consistent decline in external resources between 2006 and 2010, with a marginal increase in 2011. According to Bonneau (2013), Ghana's migration to a lower-middle-income status is a reason for the fall in the external resources for health in 2012. Another possible reason for the general fall in external funding for health sectors is donor fatigue. Other criticisms levelled

against this form of health financing mechanism are that they tend to be short-term and are very volatile. The high volatility of external resources has a strong negative effect on a country's capacity to plan and use resources effectively and efficiently. According to a study on DAH by Moon and Omole (2013), assistance volatility diminishes the value of help to the recipient country by 15–20 per cent. Donor funding is unpredictable, and this can affect the long term financial sustainability of the health care system, hence making external resource flows uncertain and insufficient to achieve universal health coverage. Therefore, it is the government responsibility to resort to alternative measures to create the needed fiscal space[5] for the health sector. At best external funding could play a complementary or supplementary role in Ghana's pluralistic health financing arrangement.

3.5 Criteria for assessing health financing mechanisms

Efficiency, equity, sustainability and feasibility are used to judge the performance of any health financing mechanism. These four criteria are widely used to evaluate and identify health care financing mechanisms that exemplify best practices (Mcintyre, 2007).

3.5.1 Efficiency

It is problematic to determine whether a health financing mechanism is efficient or otherwise. Nevertheless, any health financing mechanism that is capable of generating a relatively substantial amount of funds while at the same time avoiding the need for many funding mechanisms, with each generating merely an insufficient amount, could be said to be efficient. Furthermore, an efficient finance structure must administer and collect funds at a low cost, allowing as much revenue as feasible for actual health service delivery (Hoare and Mills, 1986).

3.5.2 Equity

It is a subject of debate when given a precise definition of equity. Generally, the agreed meaning of equity in health care funding reflects a concern for a fair distribution of health care recognising differences in health needs. Equity means fairness in the distribution of the benefit and burden of health care. In assessing the equity impact of health care financing options, it is

[5] Fiscal space denotes budgetary room that allows a government to devote resources to specific services or activities without jeopardising the sustainability of its financial position (Tandon and Cashin, 2010).

crucial to ask these questions: “who gains what from the system” and “who pays what into the system”. We can distinguish two issues under equity, vertical equity and horizontal equity. Vertical equity archetypally refers to the degree to which a fair distribution of benefits and burden of health care between the rich and the poor. For example, the financial burden of paying for health care must reflect inequalities in financial capabilities. However, horizontal equity necessitates a similar distribution of benefits and burdens across people of similar income levels.

An equitable health care financing system frequently involves cross-subsidies from the wealthy to the poor and from the healthy to the sick (Mcintyre, 2007). These cross-subsidies should guarantee that no one suffers financial hardship resulting from healthcare needs and that an unexpected healthcare cost is not borne alone by an individual/household.

3.5.3 Sustainability

The sustainability of a health financing mechanism relates to “its long-term stability and potential for generating revenue” (Mcintyre, 2007: 6). Revenues generated by a health care financing mechanism should not be a subject of substantial and frequent fluctuations. Otherwise, such a mechanism would be considered unreliable and replaced by a more predictable financing mechanism. Again, sustainability concerns the ability of a financing mechanism to preserve its funding level in the long run while at the same time expanding its funding level as the need for health care rises (McPake and Kutzin, 1997).

3.5.4 Feasibility

It is easy to neglect feasibility when assessing financing mechanisms. According to Mcintyre (2007), feasibility raises two main critical questions: first, are stakeholders (i.e., customers, government, service providers, external partners etc.) going to back or oppose a given financing mechanism? Second, is there sufficient administrative ability (e.g., actuarial expertise, information systems, etc.) to guarantee that a given financing mechanism is implemented successfully?

Table 3.1 evaluates the six health financing mechanisms identified in this study measured against the criteria for assessing health financing mechanisms. As shown in Table 3.1, insurance scores high in efficiency relative to out-of-pocket spending, external funding and

general revenue. The reason is that people naturally are willing to contribute to an entity from which they can benefit directly. Hence, insurance can generate more funding than even general revenue obtains from taxes. However, high administrative costs of insurance, particularly private health insurance, may decrease the net revenue generation available for health care services (Mcintyre 2007).

Table 3.1: Comparison of health financing mechanism in terms of efficiency, equity, sustainability and feasibility

Financing method	Efficiency	Equity	Sustainability	Feasibility
General revenue	Less efficient	Less equitable	Most sustainable	Moderate feasible
Private health insurance	Inefficient	Moderate equitable	Less sustainable	Moderate feasible
Community financing	Moderate efficiency	Moderate equitable	Moderate sustainable	Moderate feasible
Social health insurance	Most efficient	Most equitable	Moderate sustainable	Most feasible
Out-of-pocket spending	Moderate efficiency	Least equitable	Moderate sustainable	Less feasible
External funding	Least efficient	Less equitable	Least sustainable	Least feasible

Source: Author (2019)

Private health insurance, community financing, and social health insurance meet the equity criteria more than the other health financing mechanisms. Social health insurance is the most equitable financing mechanism since it can redistribute the burden of health care within the covered population. Besides, SHI can meet its objectives of providing health care based on need and paying for health care based on income, especially when payments of contribution is on the principles of ability to pay. For private health insurance and community financing, the burden of health care can be redistributive within a group and a community, respectively. Out-of-pocket payment is the least equitable funding source because it does not allow for cross-subsidies from the affluent to the needy or from the healthy to the unwell but creates inequities in health care usage.

General revenue is the most sustainable financing mechanism. The situation is that countries experience economic expansion throughout time, which tends to boost the prospect of raising

tax revenue to meet health care needs, resulting in general revenue being the most sustainable health financing mechanism. Conversely, external funding is the most unsustainable health care funding source. External funding from donors is unreliable and unpredictable due to donor fatigue and high volatility. On the other hand, loans are unsustainable due to their tendency to increase the debt stock of nations in the long term.

General revenue and health insurance perform creditably on feasibility criteria. According to Mcintyre (2007), people are more enthusiastic to pay taxes dedicated to the health sector than agree to increase general tax rates or new taxes. On the other hand, insurance surpasses general revenue because individuals are more eager to pay for health insurance because of the direct benefits of health care compared to taxes. External funding is the least feasible. External funds in the form of loans may face opposition because of conditional attachment and concerns about donors influencing the country's health policy.

3.6 Financing social health insurance

Different combinations of financing sources are both possible and likely under social health insurance. We can distinguish the following funding sources, namely insurance contributions (premiums); government subsidies (e.g., financed from taxes) and tax relief; donor funds, co-payments, user charges and fines, and interest on reserves.

3.6.1 Contributions or premiums

There are different ways of calculating contributions payments. The calculation of the payment of the contributions may be (in increasing order of complexity) (Normand and Weber, 2009: p. 47):

i. universal flat rate;
ii. different rate for specific groups (e.g. lower premiums for low-income groups, with or without a means test, or different rate according to the available infrastructure in a geographic region);
iii. wage-related or income-related rate (scaled, proportionate, progressive or regressive, with or without a minimum premium or an upper limit).

Dependants may be included in one of the three payment schemes listed above, or they may be required to pay their contributions (which may be the same or lower than the initial contributor).

A foremost objective of Ghana's NHIS is to reduce exposure to financial risk when seeking care by Ghanaians. The NHIS law mandates all Ghanaians to enrol, but enforcement has not been possible in practice. Most of the scheme members are not required to pay annual premiums. Exemption groups include children under 18 years, pregnant women, the elderly (≥ 70 years), SSNIT pensioners and the "core poor". Other members, mainly those in the informal sector who do not contribute to SSNIT, are supposed to pay annual premiums, ranging from US$8-$12 (USAID, 2016). Calculation of premiums is income-related, but lack of data, especially in the informal sector, has made this impossible. By 2014, the contribution of premiums paid by workers in the informal sector to Ghana's NHIS funding amounted to 3.4 per cent (National Health Insurance Authority, 2016).

3.6.2 Co-payments

Co-payments are a form of user fees or charge. According to Normand and Weber (2009), co-payments might take the following forms: percentage co-payment (a certain percentage of the price or fee); flat rate (per day, per item, per prescription); excess payment, which means that the insurance only pays up to a certain amount, and the patient is responsible for any amount charged by the provider over the maximum amount (price or fee) reimbursed by the health insurance; any of the above options is subject to a yearly limit (stop-loss), beyond which the insurance is responsible for the costs.

Different variants of co-payment combinations may exist. For instance, a mixture of flat-rate and percentage co-payments with an upper limit on the total sum could be what a customer would pay during a specific period (usually one year). This form of co-payment is a stop-loss benefit and may be needed to safeguard severely ill people. Certain people (e.g., students, retirees, and the jobless), diseases and some circumstances (e.g., maternity leave) may get an exemption from co-payment. For services and goods excluded from coverage, patients are supposed to bear the total cost.

The law establishing Ghana's NHIS does not allow members to pay deductibles or co-payments when accessing health care. Unfortunately, service providers have a history of charging unlawful fees to insured members, which are erroneously referred to as "co-payments" (National Health Insurance Authority, 2016). In its 2015 Annual Report, the Christian Health Association of Ghana states that providers have to do balanced billing forcibly to cover the gap between what the National Health Insurance Authority (NHIA) pays and what it costs providers

to deliver care, resulting in out-of-pocket expenditures (co-payment). Some of the reasons for "informal" or so-called co-payments include delayed payments and reimbursements and the NHIA's uneconomic and unrealistic tariff structure for providers.

3.6.3 Government subsidies

Funds from government budgets inevitably play a vital role in the running of SHI schemes. Experience has shown that SHI schemes are rarely able to raise the needed revenue independent of government support. Government subsidies emanate from the government budget, which is financed generally from taxes. Political decision-makers will decide whether to use a portion of government budget revenues to subsidise health insurance. The Ministry of Finance often determined the amount of money allocated from the budget to subsidise health insurance. However, there are instances where the government may further define a tax to its spending – i.e., earmarking certain tax income to be used on health or precisely on SHI subsidies.

Another common means of earmarking taxes for health is the use of the so-called "sin taxes". Sin taxes refer to levies on socially harmful practices applied on such items as cigarette products and alcohol, among other things. These taxes aim to dissuade people from engaging in socially damaging activities and behaviours while also providing governments with revenue. The argument is that making people pay for the repercussions of their behaviour is appropriate. It is for this reason that certain countries have implemented this principle. For example, in France, vehicle insurance premiums are subject to a special tax directed to the health insurance budget (Normand and Weber, 2009). Equally, the taxes placed on tobacco products may be earmarked for the health sector or subsidise SHI.

Funding of Ghana's NHIS is principally from general government revenues. The scheme is typically fund by 2.5 per cent of the Valued Added Tax called the national health insurance levy (NHIL). The 2.5 per cent VAT is an earmarked tax for NHIA, which is used to finance exempt and subsidised groups and deficits of the district mutual health insurance schemes. According to the NHIA, the contribution of NHIL to the Ghana's NHIS funding amounted to 74 per cent and over in 2014 (National Health Insurance Authority, 2016). Additionally, the scheme obtains funds from the Government of Ghana, as may be allocated by the Parliament of Ghana.

3.6.4 Interest on reserves

Interest on the reserves that health funds are obliged (or choose) to hold is a source of revenue for SHI. Revenue generated from this particular source would depend on the amount and the quality of the health fund's financial management (Normand and Weber, 2009). Management is responsible for keeping the health fund financially stable, including keeping a sufficient operational reserve (to cover unanticipated short-term risks). SHI is typically run on a pay-as-you-go basis. Running on pay-as-you-go means that they met their costs from the current income generated out of contributions. The health funds need to keep an operating reserve to meet unanticipated changes such as morbidity (e.g., outbreaks, accidents), costs (e.g., staff, apparatus), and income (e.g., greater unemployed which may reduce the number of contributions) (Normand and Weber, 2009).

The health funds size determined the size of the reserve. A small fund with fewer enrolees (less than 10,000 members) will require a proportionately higher reserve than a large fund with millions of members because risks are distributed more widely in a colossal health fund than in a smaller fund. The general rule is to have at least two months' worth of revenue in reserve. The recommendation for a newly formed health fund is to start with a large reserve fund and reduce it only when it becomes evident that a lower level is sufficient.

Prudent investment of collected funds is also the responsibility of management. A portion of the fund should be placed in short and medium-term securities, with the remainder available on demand. The law establishing the scheme should clearly define what types of financial transaction reserve resources could be used. It is not prudent for management to invest reserve funds in stocks or high-risk bonds (Normand and Weber, 2009).

Expectations are that the NHIA would invest the National Health Insurance Fund (NHIF) reserve funds. Because Ghana's NHIS is experiencing financial difficulties, it cannot invest large sums of money, resulting in low investment returns. For instance, as of 2014, interest income accounted for merely 1.6 per cent of the scheme funding sources (National Health Insurance Authority, 2016). Prudent financial management is required to increase the contribution of returns from investment to fund the scheme.

3.6.5 Donor funding

Donor funding may play a vital role in developing countries, particularly during the embryonic stage of the introduction of SHI. Donor funding may come in technical assistance, capacity

building programmes, equipment, and even a start-up fund. Bilateral and multilateral donor interest has increased considerably in SHI in recent decades. Examples of countries that have benefitted from donor funds in setting up SHI schemes are the Philippines and Vietnam.

In the past, international donors have offered support for developing countries health systems because they perceive it as a priority. Such funds, it is argued, should be paid into SHI in the same way that government subsidies are. Nonetheless, determining the specific impact of donor funds is sometimes challenging, making SHI less appealing to donors. Such payments might be connected to specific and predictable SHI expenditures, for instance, chronic disease care, HIV treatment, or preventive or maternity treatments to address this issue (Normand and Weber, 2009).

Donor funding to finance SHI has the drawback of being potentially unsustainable, as most funds have a temporal restriction. Furthermore, donor funds are always subject to the donor's desire to continue making payments, putting the community's health at risk. Currently, there is not much information about donor funding of Ghana's NHIS, and even if there is, expectations are that it will be negligible.

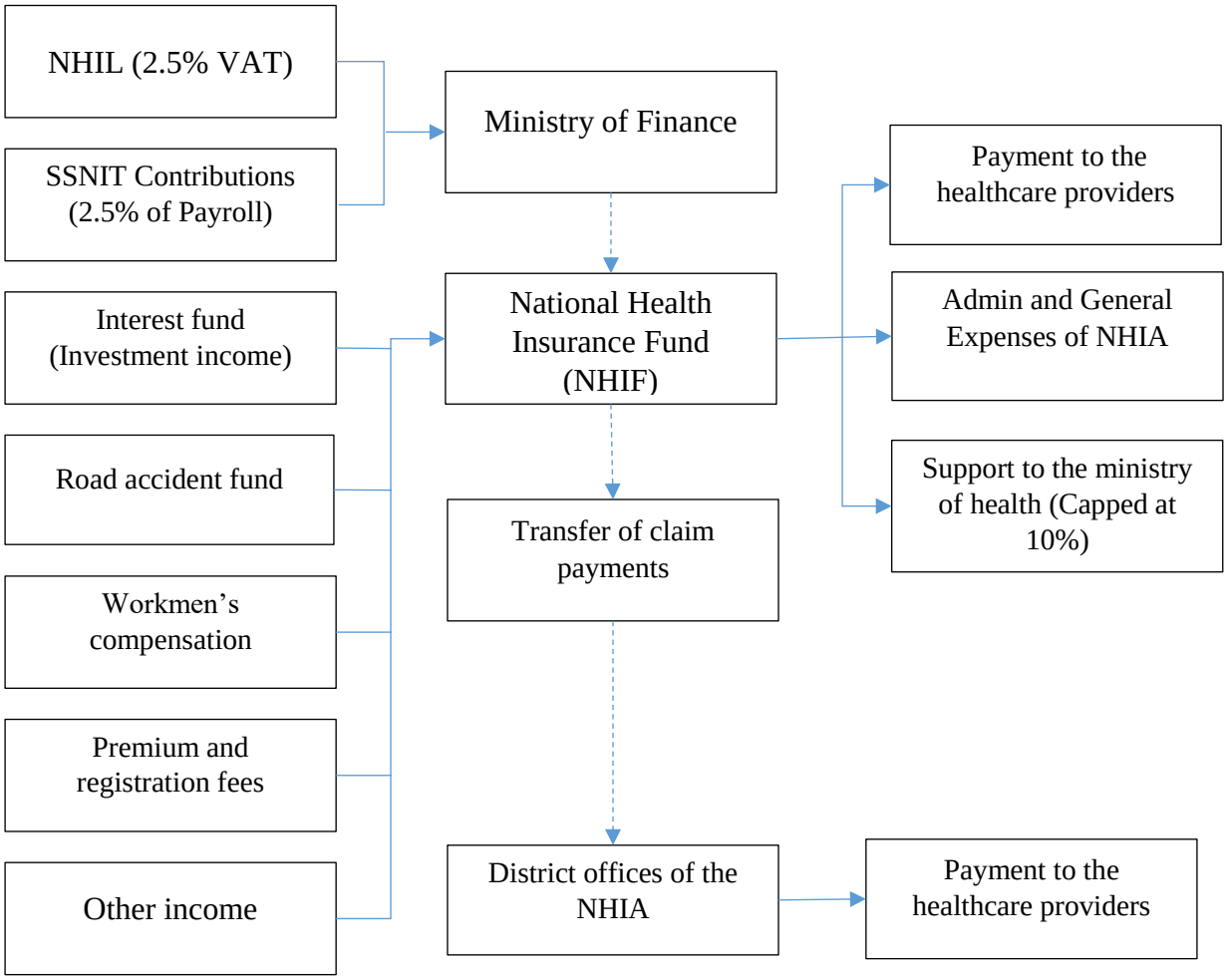
3.6.6 Other sources of revenue

Additional sources of revenue may be obtained for the health fund, though these sources represent merely a small portion of the total revenue. Fines for late payment, self-referral fees, payments for services delivered on behalf of other establishments, indemnities (e.gs., those paid by other insurance groups for health services), and revenue from the sale of goods and services by the health fund are examples of some of these (Normand and Weber, 2009).

Ghana has not exploited these other sources of revenue as of now. However, given the rising need for health insurance, increased use of health services, and increasing population, providing an additional source of finance remains the most critical barrier to the long-term sustainability of Ghana's NHIS. Because insufficient financing remains a problem, shareholders have encouraged the government to seek additional funding to address the scheme's financial and logistical challenges. In 2017, the NHIA recommended increased revenue to break the cycle of indebtedness of NHIS to its service providers. The recommendations include increasing the NHIL from 2.5 per cent to 3.5 per cent, imposing levies on tobacco and alcohol and requiring workers to contribute 1 per cent of their salaries to the scheme while their employers add 2 per cent. Before this, Mr Sylvester A. Mensah, the

then-Chief Executive of NHIA, proposed the following additional funding sources in November 2013: an increase in the NHIL; a review of the NHIL exemptions policy; a 5% road fund; a levy on tobacco and alcoholic beverages; and a 20% communications service tax and a levy on the petrochemical industry (Mensah, 2013). These and other innovative revenue generation strategies are needed to ensure the scheme's financial sustainability. Figure 3.3 shows revenue sources and allocations of Ghana's NHIS.

Figure 3.3: NHIS revenue sources and allocations



Source: Mensah (2013: 8)

3.7 Global health spending trends

Globally, the health sector is a significant source of economic growth. Health investments not only result in healthier lives, but they also create jobs, promote social and political stability,

stimulate technological innovation, and contribute to increased productivity and economic output (Xu *et al.*, 2018b). These benefits derived for health explain the investments made in the health sector yearly worldwide.

The WHO estimates that in 2016, the world spent approximately US$7.5 trillion on health. The amount constitutes nearly 10% of global GDP. Health expenditure as a proportion of GDP is highest in high-income nations, accounting for roughly 8.2 per cent on average, while it accounts for about 6.3 per cent in low-and middle-income nations (Xu *et al.*, 2018b). Globally, health care spending continues to remain highly unevenly distributed. Although low and middle-income nations have the fastest-growing health spending and GDP, there is a significant disparity between developed and developing countries. For example, in 2016, the average per capita health spending for high-income countries was over US$2,000. Nevertheless, just a fifth of that amount, that US$400 was spent in upper-middle-income, and one-twentieth of that amount (i.e., US$100) was spent in low and lower-middle-income countries GDP (Xu *et al.*, 2018b).

The inequity in global health spending exemplified the imbalances between health spending and the population. For instance, close to 80% of the worldwide health spending is incurred by merely 20% of the world's population who live in high-income nations. In 2016 the top 10 and the bottom ten countries spent US$5,000 or more and less than US$30 on each person on health, respectively (Xu *et al.*, 2018b). This inequity of stupendous proportion has not seen any significant change since 2000.

The Lancet Commission for Investing in Health estimates that between US$70 and US$90 billion in additional health investment is required yearly to ensure that a set of health targets included in the SDGs as crucial stepping stones toward UHC are universally available (Okonjo-Iweala, 2016). This estimate indicates that at present levels of health spending, low- and middle-income nations will need to triple their health spending to meet the SDGs. Henceforth, sustained progress towards UHC is possible when resources for health are sufficiently, efficiently and fairly mobilise, pooled and used up.

3.8 Global efforts in mobilising funds for health development

Universal health care (UHC) is at the top of the global health policy agenda. The UHC calls for health systems where each person has access to the health services they need. Additionally, these services are of adequate quality to be effective while also ensuring that their use does not

put them in financial hardship. The WHO estimates that 100 million people are forced into poverty each year, with another 150 million facing financial ruin due to out-of-pocket healthcare spending (Okonjo-Iweala, 2016). Therefore, increasing public funding for health is crucial to reduce out-of-pocket payments.

The SDG agenda for health is fairer and more ambitious than the MDGs agenda because of its focus on universal access to health systems, including non-communicable diseases (Bustreo, 2015; Ottersen *et al.*, 2017). Tailored efforts which focus on the vulnerable and the hard to reach population are inevitable to achieve the SDGs for health. The international health community is working hard to get funding to meet the lofty Goal 3 targets. The success of achieving this wave of goals depends on how countries succeed in moving towards universal coverage. To achieve UHC, the availability of funds for health is a fundamental question all countries must answer.

In July 2015, 193 UN Member States met at the Third International Conference on Financing for Development in Addis Ababa, Ethiopia, and this resulted in the Addis Ababa Action Agenda (AAAA). The AAAA welcomed UHC and called on governments to sign a new social compact ensuring that everyone had access to fiscally viable and nationally appropriate social protection systems and measures (Elovainio and Evans, 2017). Raising additional domestic funds was central to the AAAA for achieving the health (and sustainable development) goals.

Evidence suggests that there has been some success in terms of boosting healthcare resources. For instance, in low-income nations, government health expenditures increase from 1.7 per cent to 2.6 per cent of GDP between 1995 and 2013, even more than what pertains to higher-income countries. Moreover, average health spending as a share of GDP increased from 4.9 per cent to 6.4 per cent during the same period (Bustreo, 2015; Okonjo-Iweala, 2016). According to the WHO worldwide report, global health spending climbed every year between 2000 and 2016, expanding at an annual rate of 4.0 per cent in real terms on average (Xu *et al.*, 2018b). The report further revealed that this growth rate was even faster than the global economy growth rate of 2.8% per annum during the same period. In most low and middle-income nations, health spending grows at a quick rate of roughly 6% or more per year on average. Members of the African Union, on the other hand, are far from meeting their own self-imposed goals of allocating 15% of government expenditure to health, as promised in the Abuja Declaration.

Diversification of funding sources is vital if countries can continually increase their overall budget allocation for health. According to Bustreo (2015), an effective method is to share the costs of health care across the population utilising taxation or insurance or both. This method of pooling funds becomes necessary if the intention is to provide services for all. Other measures include increased budget allocations for health, more effective tax collection, mandatory insurance contributions, and the generation of additional funds through various creative funding arrangements. Kyrgyzstan is a good example where the pooling of general revenues with insurance payroll taxes has enhanced access to health care and financial protection for the most disadvantaged populations (i.e., women and children).

The AAAA obligated governments to improve international tax cooperation to help raise domestic resources. It acknowledged the need for extra tax revenues to implement the new social compact and support long-term development by improving domestic tax administration and expanding international tax cooperation to secure adequate funding. Countries agreed to increase capacity building using ODA support. The United Nations Member States also decided to promote current international tax cooperation programmes by focusing on growing the participation of developing nations. For this reason, Member States agreed to strengthen the UN Committee of Experts on International Cooperation in Tax Matters in terms of effectiveness and operational capacity and involvement with the Economic and Social Council. This agreement emphasises the need for national tax agencies to cooperate and communicate among themselves (United Nations Department of Economic and Social Affairs, 2015).

Other innovative taxes with the potential to boost revenue are on the agenda as a means of raising additional resources domestically for health. These taxes include “sin taxes”, telecoms taxes, extra corporate and social responsible tax etc. For instance, from the perspective of health, “sin taxes”, often referred to as taxes on products and behaviours that are unhealthy, can raise revenue. The AAAA and the 2030 Agenda for Sustainable Development have advanced interest in tobacco taxation. The AAAA considered taxing harmful substances as a means to deter consumption and also increase domestic resource generation. The AAAA also agreed that taxing tobacco and similar products could reduce usage while also being a source of cash for several countries (United Nations Department of Economic and Social Affairs, 2015). Evidence suggests that taxes on alcohol and tobacco products help lower consumption and promote health (Chaloupka, Straif and Leon, 2011).

Philanthropic contributions and leveraging private sector corporate social responsibility will continue to be vital sources of funds for health. Even though these forms of funds come with some challenges relating to predictability and adequacy in revenue generation, they could play a supplementary role. In some countries, corporations take funding of health care services as part of their corporate social obligation. For instance, mining companies in Papua New Guinea provide funding, logistical and other support to health care facilities in their areas of operation (Thomason, 2011; Elovainio and Evans, 2017).

Though the spotlight is on increasing domestic funds for health, the fact is external financing will continue to play a vital role for many developing countries, specifically fragile states. Low-income countries cannot solely depend on domestic resources to achieve the SDGs. Estimates reveal a funding gap of $152–$163 billion per annum in these nations (Schmidt-Traub, 2015; Ottersen *et al.*, 2017). Hence, the use of external resources for health is inevitable as these countries need considerable DAH to improve the health of their populations. Interestingly, both the AAAA and the 2030 Agenda for Sustainable Development emphasised the need to scale up international support in the form of concessional and non-concessional financing for countries. These two agendas recommitted developed countries to provide 0.7 per cent of their gross national income as ODA (World Health Organization, 2016), with 0.15 to 0.2 per cent allocated to the least developed countries (LDCs) (United Nations, 2020).

Raising more funds for health is not enough to achieve the SDGs, but rather it should be accompanied by a strong emphasis on cost-effectiveness and innovation. Cost-effectiveness is central to the achievement of SDG3 and UHC. Approximately 20–40 per cent of health resources are used inefficiently or inappropriately, though needed to achieve progress toward universal coverage (Bustreo, 2015). Sometimes expensive medications are utilised when cheaper and equally effective options are available (World Health Organization, 2010b). In all countries, opportunities exist for value for money to achieve more health. The AAAA and the 2030 Agenda for Sustainable Development recognise the need to explore the nature of resources available and their usage, rather than focusing merely on the volume required to achieve UHC (World Health Organization, 2016). The availability and allocation of public funds and their mode of spending influence healthcare coverage and financial protection.

3.9 Summary

Health care financing is central to efforts to improve health and health systems. In all, the study identified six health financing mechanisms, namely general revenue, social health insurance, private health insurance, community financing, out-of-pocket spending and external funding. Only social health insurance outperformed the other financing mechanisms when measured against the four criteria of efficiency, equity, sustainability, and feasibility. The performance of SHI against the criteria for assessing health financing mechanisms explains why developed nations often use SHI to mobilise funds and pool risks for health. We noted that no one country in the world relies on a single health financing mechanism but rather a combination of these sources with a mixture depending on country context. Ghana introduced a form of social health insurance called NHIS. General government revenue contribution to the funding of the scheme is the largest.

Several countries adopt UHC policies as their health sector development aim, in line with SDG target 3.8, making funding imperative. The current global efforts in mobilising resources for health development are driven by The Addis Ababa Action Agenda and the 2030 Agenda for Sustainable Development. These two agendas show how the health sector can move closer to universal health coverage by improving domestic health funding, external financing, cost-effectiveness and innovation.

The introduction of Ghana's NHIS is a novelty. The scheme is a bold step by the government intended to improve healthcare utilisation and health outcomes and provide financial risk protection. Proponents of the NHIS argue that it improves health outcomes by reducing out-of-pocket payments and increasing the utilisation of health services. An important question that needs an answer is: what does the literature say in this regard? The main thrust of chapter four is to give a comprehensive literature review, both theoretical and empirical, on the effects of health insurance on utilisation of healthcare services, financial protection and health status.

CHAPTER FOUR: REVIEW OF RELATED LITERATURE ON HEALTH INSURANCE

4.1 Introduction

The purpose of developing this chapter is to review past research works to obtain theories and empirical evidence to support the current study. One of the aims of this review is to place previous studies within the context of their contribution to our understanding of the research questions outlined in chapter one. This exercise would highlight gaps that exist in the literature. Finally, the chapter would help locate the current study within the context of existing literature in the area of health insurance.

The foremost bibliographic techniques for discovering relevant work for review were a variety of secondary data sources. A systematic search was conducted using combinations of keywords and terms. These keywords include national health insurance scheme (NHIS), social health insurance scheme (SHI), Private health insurance (PHI), community-based health insurance (CBHI), mutual health organisations, health insurance and healthcare utilisation, health insurance and financial protection, health insurance and out-of-pocket health expenditure, health insurance and health status, among others. These search terms were entered into various electronic databases, including PubMed, Google Scholar, Scopus, JSTOR, Web of Science, EconLIT, IDEAS/RePEc, Science Direct (Elsevier), Taylor & Francis Journals, Emerald, Wiley Blackwell and the like. The review selection criteria include: peer-reviewed articles and working papers published in English; studies related to NHIS, SHI, PHI and CBHI; studies that assessed at least one of the outcome indicators of health insurance such as healthcare utilisation, financial protection and health outcomes; and research carried out in advanced and low-and middle-income countries. Articles not published in the English language were excluded to save money on translation.

The following is how the chapter is organised: Section 4.2 presents theoretical models used to explain the demand for health insurance and the utilisation of healthcare services. We traced the analysis of demand for insurance to the pioneering work of Daniel Bernoulli in 1738 who first postulated the concepts of utility and diminishing marginal utility. Discussion includes notable authors such as Friedman and Savage (1948), Pauly (1968), Mossin (1968), Zeckhauser (1970), Kahneman and Tversky (1979), de Meza (1983) and Nyman (2006) whose work contributed to our understanding on the value of health insurance. The evolution of theories on the value of health insurance includes expected utility theory, state-dependent utility theory,

prospect theory and the standard theory. In addition, the review discusses the four theoretical models, namely the Rosenstock model, the Suchman model, the Andersen model and the Gross model used in explaining individual's utilisation patterns of healthcare services.

In section 4.3, we explore worldwide empirical literature that focuses on the influence of health insurance on healthcare utilisation, financial protection and health status. Noticeable empirical studies include the pioneering work of the RAND Health Insurance Experiment, and other earliest contributors such as Cameron et al. (1988) and Waters (1999). Empirical studies reviewed cut across the advanced countries such as the USA and Germany and low-and middle-income countries such as Georgia, Jordan, Cambodia, Ecuador, India, China, Ethiopia, Gabon, Ghana, among others. Section 4.4 provides the chapter summary and conclusion, while section 4.5 discusses the contribution of this research to the literature.

4.2 Theoretical framework

In this section, we explain theoretical frameworks for the demand for health insurance and healthcare services utilisation. The review starts with the history of theoretical thinking concerning the value of health insurance, including the concepts of utility and diminishing marginal utility. The theoretical models for explaining individual's utilisation patterns of healthcare services, including the Rosenstock model, the Suchman model, the Andersen model and the Gross model are also discussed.

4.2.1 Evolution of theories on the value of health insurance

The analysis of demand for insurance is traced historically to the work of Daniel Bernoulli's in 1738, which first proposed the concepts of utility and diminishing marginal utility, while the modern analysis is derived from Friedman and Savage's famous paper (Bernoulli, 1738; Friedman and Savage, 1948). This analysis assumes that utility increases with income or wealth at a decreasing rate. When confronted with the possibility of losing a predetermined amount of income or wealth due to chance, a consumer will opt for insurance since the insured person's expected utility from insurance is greater than that of individuals who do not have insurance.

Assuming y_1 represents the original level of income or wealth and the chance of losing it occurring is given as $(y_1 - y_0)$ with an associated probability of π. Since a person becomes ill and must expend that amount of money in other respect disposable income or wealth

(henceforth, just "income", the "or wealth") on medical care. The expected utility without insurance is expressed as (Nyman, 2006):

$$Eu^{u}(y) = \pi u[y_1 - (y_1 - y_0)] + (1 - \pi)u(y_1)$$
$$= \pi u(y_0) + (1 - \pi)u(y_1) \qquad (4.1)$$

If y^* denotes the expected value of the income conditioned on health care expenditure, with the actuarially fair premium sum given as $(y_1 - y^*)$, so the expected utility of insurance with a payoff covering the full loss is expressed as (Nyman, 2006):

$$Eu^{i}(y) = \pi u[y_1 - (y_1 - y_0) + (y_1 - y_0) - (y_1 - y^*)] + (1 - \pi)u[y_1 - (y_1 - y^*)]$$
$$= \pi u(y^*) + (1 - \pi)u(y^*) = u(y^*) \qquad (4.2)$$

Suppose the consumer's utility function displays the standard concave or 'risk averse' functional form, then insurance would have a higher expected utility than without insurance. Therefore, a consumer who wants to maximize expected utility would select insurance coverage. Since the expected levels of income remain unchanged with or without fair insurance contract, the welfare gain was ascribed to "choosing certainty in preference to uncertainty" (Friedman and Savage, 1948: p. 279). Hence, the demand for insurance and its related welfare gain was linked to the efficiency resulting from certainty. This model and several later applications of it intended to assess health insurance, the gain from certainty or the gain from the 'avoidance of risk', turned to be the only source of value acknowledged by economic theory (Nyman, 2006).

To employ efficiency gains to health insurance, the effects of illness were limited to the loss of existing income caused by health care cost, which was comparable to the loss of current wealth under fire and casualty insurance. Here, expenditure on health care when one is ill was dealt with in like manner as the loss of wealth when a consumer's house is burned down or if a consumer is involved in an accident that damaged his or her automobile. As a result, health insurance was modelled as paying a predetermined amount for health care conditioned on becoming sick, and the benefit of having health insurance was limited to the certainty of paying a premium equal to the expected cost of that expenditure, rather than bearing the risk of suffering this predetermined loss or not (Nyman, 2006).

This viewpoint offered by Friedman and Savage (1948) dismisses several relevant sides to the insurance contract. To begin with, people who are insured receive health care in exchange for the money they spend on it. This health care that the insured persons receive is often treasured by them since it affects their health and lives (Nyman, 2006). This perspective contracts fire or casualty insurance where, for example, a fire merely destroys something of value. Moreover,

the predetermined loss assumption (i.e. paid for either by the insurer or the uninsured consumer) dismisses that insurance is a contract where income is transferred from the healthy to the ill, resulting in persons having more income likely to buy more health care when ill compared to persons with low income. Therefore, the view that insurance would pay for care epitomises an effective increase in income to the insured persons who react by buying more health care since health care is a normal good. Because having health care makes insurance worthwhile, the revenue transfer in insurance is likely to allow consumers to acquire health care outside of their budget constraints.

One of the criticisms levelled against this model specification is that it neglects the effect of the income transfer on medical care consumption (Nyman, 2006). Conventionally, the model specification is a choice between certainty and uncertainty. Understanding this means that people prefer a guaranteed loss to an uncertain loss of similar expected magnitude when purchasing insurance. However, this choice specification obliterates the underlying income transfer from healthy to ill, thereby distracting experts from treasuring the part that income transfers perform in raising health care consumption.

The prospect theory (Kahneman and Tversky, 1979), one of the first economic theories based on experimental data, provides another critique of the expected utility theory. Subjects in these experiments were given specific choices. Many consistently favoured uncertain loss to the sure loss of similar expected magnitude, contrasting the conventional explanation propounded by the expected utility theory. Prospect theory questioned the assumptions underpinning the expected utility theory and stated that the choice concerns the prospects of gains or losses and not the level of uncertainty. Within the context of insurance, prospect theory submits that people get insurance because of the advantage and not because insurance decreases uncertainty. People will evaluate their health risk level and subsequent deviation from it at a predetermined premium level. For instance, I can assess that my health is bad and expect it to get worse. Individuals may choose not to insure for a gain prospect because they anticipate paying a smaller premium for their health risk than the deviation. This choice can be risky since the difference could be higher than expected and causes a loss. From the prospect theory perspective, concerning losses, individuals are risk preferring. As a result, people will only buy insurance if they are sure that a loss will occur, not because they are risk-averse, as expected utility theory suggests (Kahneman and Tversky, 1979).

Kenneth Arrow argument before the United States government enacted the Medicare and

Medicaid programmes is that if health insurance were provided at actuarially fair charges to those who maximised expected utility and had risk-averse utility functions, the insurance case would be overwhelming (Arrow, 1963). Medicaid is a public assistance healthcare programme that offers health insurance coverage to the poor and vulnerable households in the USA regardless of age. On the other hand, Medicare is an age-based federal health insurance programme that guarantees coverage for persons aged 65 and over and some younger persons with disabilities. Arrow's paper exerted that the gain from insurance owed exclusively to certainty (or risk avoidance), supporting Friedman and Savage's (1948) model that insurance creates a welfare gain.

Replying to Arrow's paper, Mark Pauly published one of the most influential articles in health economics in the last third of the 20th century (Pauly, 1968). Pauly quizzed the supposition that a welfare gain was related to health insurance mainly due to the presence of a moral hazard. He acknowledged that if insurance pays off by reimbursing for somewhat health care expenditure that occurs, and the consumer is aware of this, insurance payoff is equal to changing the price of health care to zero. Since this price is artificial, the actual price remains the marginal cost of producing care. Insurance creates a welfare loss that is related to the extra health care consumed when insured. Pauly observed that the associated welfare loss could be so huge to inundate the gain from certainty, occasioning a net utility that could be negative (Pauly, 1968).

Regarding Pauly's model (Pauly, 1968), health care itself went into the welfare computation for health insurance. Contrary to Friedman and Savage (1948), who considered the health care related to health insurance as producing a financial loss, the extra health care in Pauly's model had value. However, this value was less than the cost of delivering this health care, creating the moral hazard welfare loss linked to health insurance (Nyman, 2006).

Nyman (1999) offered three main criticisms against Pauly's model: first, Pauly's approach exaggerates the welfare loss, owing to the inclusion of the income influence on consumption. Second, the relevant income effects in health insurance are associated with income transfers from persons who stay healthy to persons who become ill. These transfers are linked to the risk of disease, which is decided exogenously and has nothing to do with the price reduction. Any additional consumption resulting from income transfers does not need to be factored into the welfare loss estimates. Lastly, the welfare loss can be viewed as the transaction cost of insurance. Nyman *et al.* (2018) offered two more criticisms against Pauly's model. First, that

the model failed to recognise that the price reduction (i.e., the variation of market price to the coinsurance rate as specified in the contract of health insurance) could serve as a means of transferring income from healthy persons who buy insurance to persons who purchase the insurance and fell sick. Second, the model failed to acknowledge that this form of income transfer could cause the purchase of extra health care, leading to welfare gain.

The models proposed by Friedman and Savage (1948) and Pauly (1968) controlled the thinking concerning health insurance value in the USA throughout the latter half of the 20th century. They represented the established standard through which health insurance was viewed and measured in the USA. The paradigm dominance is shown by several studies that based their empirical calculations and conclusions concerning the value of health insurance on these theories only (Pauly, 1969; Feldstein and Friedman, 1977; Manning *et al.*, 1987; Cutler and Zeckhauser, 2000).

Several other models emerged from the literature after Friedman and Savage (1948) and Pauly (1968) publication on insurance demand and health insurance. Many of these models made significant contributions. The work of Mossin (1968) is widely regarded as the seminal paper on the theory of demand for insurance, though parts were implicitly and explicitly found in Arrow (1963) and Smith (1968) works. Mossin's work is well-known for revealing that: first, for a risk-averse expected utility maximiser, partial insurance cover is optimal if the insurance premium is applied proportionately to the actuarial value of the policy, and second, insurance is an inferior good when the individual has a decreasing absolute risk aversion. Mossin (1968) suggested that insurance demand decreased with wealth. However, his findings were based on the implicit presumptions that the individual is confronted with only one risk and that the risk amount is constant (unrelated to wealth or income) (Louberge, 2013).

Regarding the literature related to health insurance, the work of Richard Zeckhauser (1970) is worth mentioning. The state-dependent utility theory is traced to the publication of Eisner and Strotz (1961). Nonetheless, it was Zeckhauser who first applied the state-dependent utility to health insurance. State-dependent utility theory submits that consumers' utility level and tastes are determined by their state, for example, their health or socio-economic status (Schneider, 2004).

Zeckhauser (1970) unequivocally demonstrated that when insurance pays out in the form of a lump sum payment to the receiver, the insured consumes more medical care than the uninsured, providing a basic model of moral hazard (Winter, 2013). Zeckhauser (1970) and Pauly (1968)

suggested demand-side cost-sharing measures such as insurance deductibles and co-payments to decrease demand-driven moral hazard and inefficiencies. After these publications, insurance companies and government policies responded positively to the supposition that these measures are the solution to the welfare loss resulting from the moral hazard (Dror and Firth, 2014). This period marked the beginning of high co-payments and deductibles in the United States (Jiang, 2009). Nevertheless, the most enduring contribution of Zeckhauser's work was possibly his conceptualisation of optimal health insurance as a trade-off between risk spreading and appropriate incentives (Nyman, 2006). His conceptualisation is consistent with the welfare gain and loss reported by Friedman and Savage, and Pauly. Zeckhauser's model ignores the inclusion of the income transfer. The inability to recognise the income transfer makes it extremely difficult to comprehend the welfare implications of insurance price reduction (Nyman, 2006).

Another important paper that needs mentioning is the work of de Meza (1983). He looked at the issue of why individuals buy contingent claims health insurance instead of putting money aside for a "rainy day" (i.e. accumulate savings cautionary to pay for health care) or borrow upon the onset of illness. Contingent claims health insurance is a type of health insurance in which a recipient receives a lump-sum payment after a health problem. De Meza's work produced significant incisive additions to our knowledge of conventional insurance, even though he offered a model of contingent claims health insurance. A summary of his work is as follows. First, the author presumes utility is state-dependent. This assumption implies that utility is not dependent on spending disposable income on other commodities when one is healthy but also on spending disposable income on medical treatment and other goods when one is sick (Nyman, 2006). Following that, he established a standard assumption that when someone is sick, they apportioned their disposable income that the marginal utility of spending on other goods equals the marginal utility on medical care cost. He assumes further that because of these added demands, the marginal utility of disposable income (optimally shared among medical care and other commodities) when ill outstrips the marginal utility of disposable income when healthy. In other words, the argument put forward by de Meza (1983) was that an insured person's demand curve when ill is not the same when he is uninsured. Instead, the insurance company's reimbursement of healthcare spending shifts the demand curve outward, similar to a cash transfer. Therefore, the willingness of consumers to pay more increases with insurance coverage, thus arguing that Pauly's (1968) model overstates the inefficiency resulting from moral hazard. Responding to de Meza (1983), Pauly (1983) recognised that

income effects might be an issue for patients who are critically ill but stated that inefficiency induced by moral hazard was enormous for healthier individuals (Eisenhauer, 2006). Moreover, de Meza demonstrated that insured health care expenditure is higher than health care expenditure when financed by either saving or borrowing (Nyman, 2006). He showed that the cost of health care, when funded by insurance, is relatively lower in terms of current consumption foregone than the cost of health care when financed by saving or spending.

Regardless of de Meza's insights, the theory that has ruled health economics research and policy for decades holds that consumers prefer certain losses to uncertain ones of similar expected magnitude, but that the extra health care consumed as a result of health insurance makes consumers worse off. During this period, the empirical computations of the value of health insurance proceeded to submit that moral hazard thus ruled welfare calculations that health insurance at existing coverage parameters made consumers worse off (Nyman, 2006).

In the recent decade, Nyman (1999), Nyman and Maude-Griffin (2001) and Nyman (2003) proposed an alternative model called the standard theory. The standard theory is based on two tenets. The first tenet suggests that a health insurance contract is a quid pro quo transaction. When people get health insurance, they pay a premium when they are healthy in exchange for an income transfer when they are sick. Specifying the insurance demand compatible with the quid pro quo transaction is merely to get the difference between equations (4.1) and (4.2) (Nyman, 2006):

$$Eu^{i}(y) - Eu^{u}(y) = \pi u(y^{*}) + (1-\pi)u(y^{*}) - [\pi u(y_0) + (1-\pi)u(y_1)] \qquad (4.3)$$

Rearranging terms related to the same states of the world we obtain the following expression:

$$Eu^{i}(y) - Eu^{u}(y) = \pi[u(y^{*}) - u(y_0)] + (1-\pi)[u(y^{*}) - u(y_1)] \qquad (4.4)$$

Thus, health insurance demands an income transfer when ill, rather than risk avoidance. The premium paid when healthy is the contract price, and the net gain can be conceptualised as the expected consumer surplus. In conceptualising this, according to Nyman (2006), the financial loss from medical spending is no longer the focus and is substituted by a change in health status.

The second tenet of the standard theory submits that the reduction in health insurance price does not denote a movement along the demand curve but rather a channel for transferring income from consumers who continue to stay healthy to consumers who become sick. This scenario stems from the realisation that lowering the price of most medical treatments to zero will not entice healthy people to purchase them. Hence, for most health care, the price reduction

is effective only for persons who are sick. Concerning this, price reduction acts as a vehicle for transferring income to consumers (Nyman, 2003).

The fundamental conclusion of Nyman's (2006) standard theory is that moral hazard is into two parts. The first part is due to the income transfer, and the second part is due to the pure price effect (the substitution effect), which results from using a fall in price to transfer income. Moral hazard owed to income transfer presents increased efficiency and welfare while the moral hazard owed to pure price effect presents decreasing inefficient and welfare. As a result, the welfare consequences of health insurance differ significantly from those predicted by conventional theory. The welfare loss is not only reduced in this case because inefficient moral hazard only represents a portion of the overall moral hazard, but the remaining part of the moral hazard is a welfare gain rather than a welfare loss. In the welfare calculations, when the gain is substituted for a loss, the value of health insurance rises dramatically.

Nyman (2003) demonstrated that the inefficiency related to moral hazard change widely across individuals contingent on their income levels. Since the income effect resulting from insurance benefit is more pronounced for an insured person with low income than for insured with high income, other things held constant the inefficiency increases with initial income. He asserted that the efficient part of moral hazard tends to overshadow the inefficient share for most people in low-income countries. According to Eisenhauer (2006), this facet of the standard model is arguably the most vital contribution. Its policy implication is that providing insurance or subsidising it for the indigent might cost less in terms of efficiency. Moral hazard, on the surface, refers to the purchase of extra health care that consumers would otherwise be unable to pay. This enhanced access to expensive and frequently life-saving health care generating an essential welfare gain which previous theories failed to recognise (Nyman, 2006).

In evaluating the standard theory, Eisenhauer (2006) acknowledged the valuable contribution it made to moral hazard literature and the need for national health insurance but concluded that the overall explanation provided by the standard theory failed in offering a robust substitute to the conventional model of demand for health insurance. The review on the evolution of theories of the value of health insurance indicates at least four theories, namely expected utility theory, state-dependent utility theory, prospect theory, and the standard theory. These theories suggest that health insurance is valuable.

4.2.2 Theoretical models explaining healthcare services utilisation

The discussion in this part focuses on four main models that have theoretically emerged to explain individual healthcare utilisation patterns. The four theoretical models are the Rosenstock model, the Suchman model, the Andersen model and the Gross model. These models epitomise conceptually sophisticated thinking and have influenced empirical research in health services utilisation for the past years. We begin with a brief discussion on the development of models for the study of healthcare services utilisation.

4.2.2.1 The Rosenstock model/Health Belief Model

The Rosenstock model was developed in the late 1950s to explain why several people failed to participate in public health programmes such as x-ray screenings to detect tuberculosis (Rosenstock, 1974). Later, the model was used to study how people reacted to ailments that had been diagnosed, including obedience to medical regimens. The model emphasises a person's emotional rather than cognitive "beliefs" as crucial to understanding how they use healthcare services (Joseph and Phillips, 1984). This pioneering work used a social-psychological approach, where health perception variables are integrated with social variables to explain utilisation behaviour. Becker (1974) further improved the Rosenstock model and became known as the Health Belief Model (HBM). The model proposes that the readiness to take "health action" is influenced by perceived susceptibility, perceived severity of a health problem, perceived benefits and barriers to taking action, and cues that initiate appropriate behaviour (Wan, 1987: p. 63). Though barriers such as costs, distances, and inconvenient hours could reduce or prevent attendants, cues such as physicians' reminders or preventive mass-media announcements could provide an impetus for utilisation (Rosenstock, 1960, 1966). In its earlier version, the model suggested that distance could be a barrier to health care reception even if the psychological readiness and awareness of the need to use exists.

A critique of the HBM is that it lacks clear definitions of components and the association among the variables (Sheeran and Abraham, 1996; Armitage and Conner, 2000). Consequently, the model has been criticised for its erroneous measurement in descriptive and intervention research (Mimiaga *et al.*, 2009). Several offshoots have been proposed to address this limitation in the HBM. For instance, in a model of preventive health behaviour, Antonovsky and Kats (1970) submit three classes of variables intended to build on the HBM. These three classes of variables were predisposing motivation, blockage variables and conditioning variables. Desires to avoid illness, earn approval from others, and pursue personal beliefs were all factors that influenced predisposition motivation. The lack of knowledge and resources constitutes

blockage variables. Conditioning variables involve factors that modify the above variables, for example, perceived susceptibility, socioeconomic status, and previous illness experience. In this model, cognitive factors work primarily by altering motivation. This model differs from the HBM in that it included motivation and used a threshold model to replace the linear link between variables and health behaviours.

A further critique of the model is that it fails to address several behavioural determinants, including socio-cultural factors, and supposing that health is of utmost importance for most individuals (accordingly, it may be inapplicable for persons who place a lower value on their health). Responding to critics in the 1970s, Rosenstock (1974) supplemented the model by adding demographic (such as sex, age), socio-psychological (such as personality and social class), and structural (such as knowledge of a disease) factors as exogenous factors. However, the author concedes that there is no direct effect of these variables on utilisation of health care. In the 1980s, Rosenstock, Strecher and Becker (1988) extended the HBM to include the health problem treatment. The model's predictive power and popularity have increased throughout time as a result of many improvements made to it. Nonetheless, the model's major flaw is its disregard for the function of the healthcare institution and policy (Yang and Hwang, 2016).

4.2.2.2 The Suchman model

The Suchman model was developed in the mid-1960s and is a sociologically oriented model for health-seeking behaviour. The model stresses the influence of social groupings and linkages on the utilisation of healthcare services. The social network of family and friends in which a person finds himself, as well as the "lay referral system", in which those considered to be authoritative are contacted before the professional physician, are significant determinants of utilisation behaviour (Booth and Babchuk, 1972; McKinlay, 1972). Thus, the levels of health knowledge of kin and contacts are vital in determining utilisation. Furthermore, cultural groups, low socioeconomic status groups and minority groups who are more secluded and have lower actual levels of disease and treatment knowledge may have considerably different attitudes around sickness and treatment awareness. As a result, people in this category may be afraid of or sceptical of medical treatment, and they may grow reliant on lay advice. A further argument is that a "cosmopolitan" social structure is more likely to associate with a "scientific" orientation to health and medicine , whereas a "parochial" or traditional society is more likely to hold popular or folk beliefs (Suchman, 1964, 1966).

Specifically, Suchman's theory/model states the five stages an individual goes through when deciding to utilize healthcare. At stage one, the individual experiences symptoms (pain, feeling sick), indicating illness and subsequent adoption of the sick role. Second, after assuming the sick role, the person seeks out other people's opinions for affirmation and to learn about available treatment alternatives. Third, the individual decides to seek professional help. Their social networks, either "parochial" or "cosmopolitan", influence their professional seeking behaviour (Suchman, 1964: p. 325). As they seek treatment in the fourth stage, the individual becomes reliant on their healthcare practitioner. The final phase is where the individual recovers from illness. But if the sickness is incurable, the person assumes a permanently unwell status.

The Suchman model has been critiqued for disregarding the role of the healthcare delivery system and failing to address the resources required to receive healthcare services. The incorporation of micro-networks overlooks the importance of incorporating the influence of social and healthcare institutions into the choice to seek care. The model could not explain the open nature of social networks in contemporary society (Geertsen *et al.*, 1975). By re-examining Suchman's original data and comparing them to the latest data, Geertsen *et al.* (1975) revealed that the cultural and socio-economic structure, in addition to personal lifestyle factors, could come before family interaction and medical knowledge in the causal pattern of illness behaviour. In Geertsen's formulation, medical orientation and social group behaviour are mediating factors. Besides, the effects on the behaviour of demographic and perceptual factors failed to establish causal associations.

The Suchman model was taken one step further by Andersen *et al.* (1981). They encompassed institutional and structural effects on sickness behaviour. Andersen and Aday (1978) found the main determinants of health-seeking behaviour as (i) population features involving predisposing factors (such as gender and age), enabling factors (insurance and income), and need factors (severity and incidence) for health services; (ii) health system influences comprising availability, service mix and organisational factors; (iii) environmental factors comprising political, geographic, environmental and economic influences.

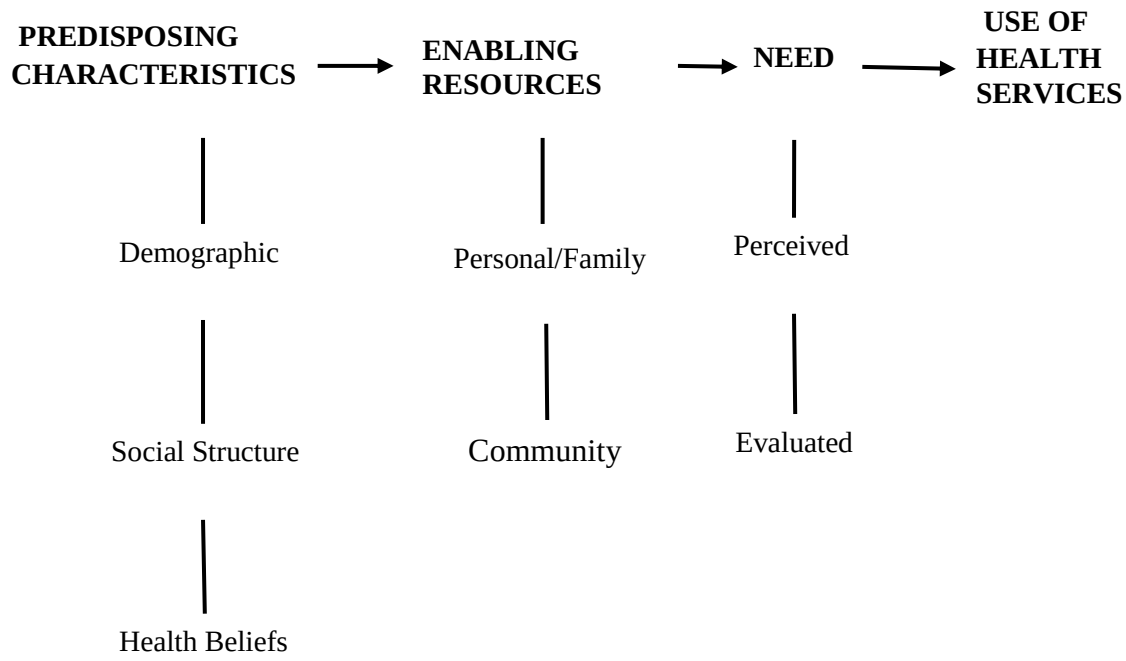
4.2.2.3 The Andersen model

The Andersen model was developed in 1968 and is one of the most acknowledged behavioural models of health services utilisation. Andersen (1968) postulates a model explaining utilisation behaviour as a series of factors that regulate the volume of health services consumed. His model

is sometimes referred to as a life-cycle determinants model because he emphasised family life cycle stages as determinants of utilisation.

Specifically, the Andersen Healthcare Utilisation Model is a conceptual model establishing the determinants of health services usage. The model suggests that the utilisation of health services comprising inpatient care, physician visits, dental care and the like is influenced by three dynamics, predisposing factors, enabling factors, and need. The predisposing factors can be categorised into three main determinants: demographic factors (age and sex), social structure (e.g., education and occupation) and health beliefs (e.g., attitudes and values). The enabling factors are all those resources in the family and community that make healthcare more accessible. For instance, the family would need sufficient resources such as income, savings and insurance to access treatment. Families who have enough of these resources are more probably to seek care. Also, communities with the requisite resources possibly expressed in terms of the ratio of hospital beds or physicians to the local population are more likely to use them. Need constitutes both perceived and the actual need for health care services. In other words, the need factors reflect how strongly people believe there is a need for healthcare.

Table 4.1: The initial Andersen's health utilisation model



Source: Andersen (1995: 2)

The original Andersen model has seen expansions through numerous iterations, for example, Aday and Andersen (1974) and Andersen and Davidson (2001). For instance, the iteration in Aday and Andersen (1974) included systematic concepts of health care. For example, current

policy, resources and organisation, and extended the outcome of interest beyond health services utilisation to consumer satisfaction.

The Andersen model has evolved and now goes beyond health services utilisation and ends at health outcomes (Andersen, 1995). Figure 4.1 depicts the initial Andersen's Health Utilisation Model. Individuals' use of health services, according to the model, is a consequence of their inclination to utilise services, factors that enable or inhibit use (enabling factors), and their need for treatment.

The revised Andersen model can account for both individual and medical care. The present study intends to test the hypothesis that enabling factors (e.g., health insurance and income) are predictors of healthcare utilisation. This test of enabling factors would give us a fair idea about whether there is inequity in the health service utilisation in Ghana.

4.2.2.4 The Gross model

The Gross model, proposed by Gross in 1972, is the fourth healthcare utilisation model (Gross, 1972). Gross working within a behavioural framework proposed a regression model for utilisation of health services. Gross model incorporated accessibility variables into predisposing, enabling and need factors.

The Gross model certainly seems to be more comprehensive relative to the other three models mentioned earlier. However, Veeder (1975) argued that the variables expressed in the Gross model were not explicitly defined, notwithstanding the seeming precision of the formula, and further questioned whether the model will enhance the understanding of health services utilisation behaviour. Marking reference to his model, Gross (1972: p. 75) stated, "we need to know a lot more about the relative explanatory powers of behavioural or predisposing variables, the enabling variables (including financial and spatial-temporal accessibility measures) and health level indicators on the utilisation of health services" before the model can be utilised. This statement is a clear admission of the complexity of using such a model. A researcher is likely to encounter collinearity, reverse causality and data gathering problems in conducting these studies.

A summary of the four models shows a progression in explaining individual's patterns of healthcare services utilisation. However, there are difficulties in comparing one model with another, mainly due to differences in intent and idiosyncrasies in definitions (Joseph and Phillips, 1984). Regardless, each of these models adds to our understanding of an individual's

healthcare utilisation behaviour by building on previous models. The health belief and Andersen theoretical models are the two most commonly used models to describe how people use health services. The Andersen model, which explains the determinants of services utilisation by predisposing, enabling, and need factors, is widely used as a theoretical model for studying health services utilisation (Li and Zhang, 2013; Ye *et al.*, 2019; Tolera, Gebre-Egziabher and Kloos, 2020). Therefore, the Andersen model would lead the multivariate analysis of healthcare utilisation in this current study.

4.3 Theoretical framework adopted to explain utilisation of healthcare services

The current study submits a simple theoretical framework of health investment and consumption with health insurance choices as a pathfinder to our empirical analysis. The work of Woldemichael, Gurara and Shimeles (2019) served as the foundation for this theoretical framework. Bolhaar, Lindeboom and van der Klaauw (2012), and Bajari *et al.* (2014) used a similar framework. In this framework, households act directly to maximize utility. Households choose the optimal amount of health services and consumption subject to a budget constraint.

Presume that the i^{th} individual earns income Y_i, which can be spent on consumption c_i and medical expenses m_i such that $Y_i = c_i + m_i$. The utility that the household derives from consumption and health, h_i is given as (Bolhaar, Lindeboom and van der Klaauw, 2012; Woldemichael, Gurara and Shimeles, 2019):

$$U(c_i, h_i) = u(c_i)^{\alpha} h_i^{1-\alpha} \qquad (4.5)$$

where α is the relative preference for health and consumption. A higher α represents a lower preference for health. Likewise, utility from health and consumption depends on the degree of risk aversion, in the sense that risk-averse individuals have a preference to avoid consumption shocks and invest in health to lessen shocks. Let health investment, represented by V_i, consists of the purchase of healthcare and related services such as transportation to healthcare facility. In the presence of health insurance options such as NHIS membership, households medical spending can be specified as $m_i = rI_i + p(I_i)V_i$, where I_i denotes health insurance, r represents exogenously determined premium rate and $p(I_i)$ is the price of medical services.

The level of household health depends not only on the volume of health investment, but also on existing health conditions denoted by μ and health shocks denoted by Δ_i, that is,

$$h_i = f(V_i, \mu, \Delta_i), \qquad (4.6)$$

where health h_i increases with the volume of health investment ($f_{v_i} > 0$), decreases with an increasing number of prevailing conditions and health shocks ($f_{\mu} < 0 \; and \; f_{\Delta_i} < 0$). Further, health shocks Δ_i can just take values 0 and 1 and the probability λ of the incidence of a negative health shock (Δ_i = 1) is recognised by the household.

Then, the i^{th} household maximises expected utility by choosing optimal levels of health insurance and the volume of health investment. Households choose optimal health insurance coverage before the realisation of shocks and choose the optimal level of health investment after the realisation of shocks. That is, the i^{th} individual makes optimal insurance choice by maximising expected utility expressed as:

The optimal health insurance decision comes from maximising expected utility with and without insurance. Expected utility with insurance is expressed as (Bolhaar, Lindeboom and van der Klaauw, 2012):

$$E\,[U(c_i, h_i)|I = 1, \mu] = \lambda U[V(\Delta = 1, I = 1, \mu)] + (1 - \lambda)U[V(\Delta = 0, I = 1, \mu)] \quad (4.7)$$

Expected utility without insurance is expressed as:

$$E\,[U(c_i, h_i)|I = 0, \mu] = \lambda U[V(\Delta = 1, I = 0, \mu)] + (1 - \lambda)U[V(\Delta = 0, I = 0, \mu)] \quad (4.8)$$

The i^{th} individual chooses to insure if:

$E\,[U(c_i, h_i)|I = 1, \mu] > E\,[U(c_i, h_i)|I = 0, \mu]$, impling

$$\lambda\,\{U[V(\Delta = 1, I = 1, \mu)] - U[V(\Delta = 1, I = 0, \mu)]\} > (1 - \lambda)\{U[V(\Delta = 0, I = 1, \mu)] - U[V(\Delta = 0, I = 0, \mu)]\} \quad (4.9)$$

In a situation of negative health shock occurring having insurance is invariably more advantageous and health investments are higher than in the event of no health shock. This enforces that

$$U[V(\Delta = 1, I = 1, \mu)] - U[V(\Delta = 1, I = 0, \mu)]\} > U[V(\Delta = 0, I = 1, \mu)] - U[V(\Delta = 0, I = 0, \mu)] \quad (4.10)$$

It must be noted that the optimal level of health insurance investment depends on the prevailing health conditions in addition to preference parameters. Taking constant relative risk aversion (CRRA) utility function[6] as:

[6] The CRRA utility function is frequently employed in applied theory and empirical work merely due to its tractability and appealing implications.

$$u(c_i) = \frac{c_i^{1-\gamma}}{1-\gamma} \tag{4.11}$$

Households choose the optimal level of health investment by maximising utility subject to the budget constraint and health function which gives us (Bolhaar, Lindeboom and van der Klaauw, 2012; Woldemichael, Gurara and Shimeles, 2019):

$$\frac{\partial U}{\partial V_i} = 0: \frac{c_i}{h_i} = \frac{\alpha(1-\gamma)}{1-\alpha} \frac{p(I_i)}{\frac{\partial f(V_i,\mu,\Delta_i)}{\partial V_i}} \tag{4.12}$$

By replacing the expressions from the first order condition, the optimal out-of-pocket health spending can be expressed as (Woldemichael, Gurara and Shimeles, 2019):

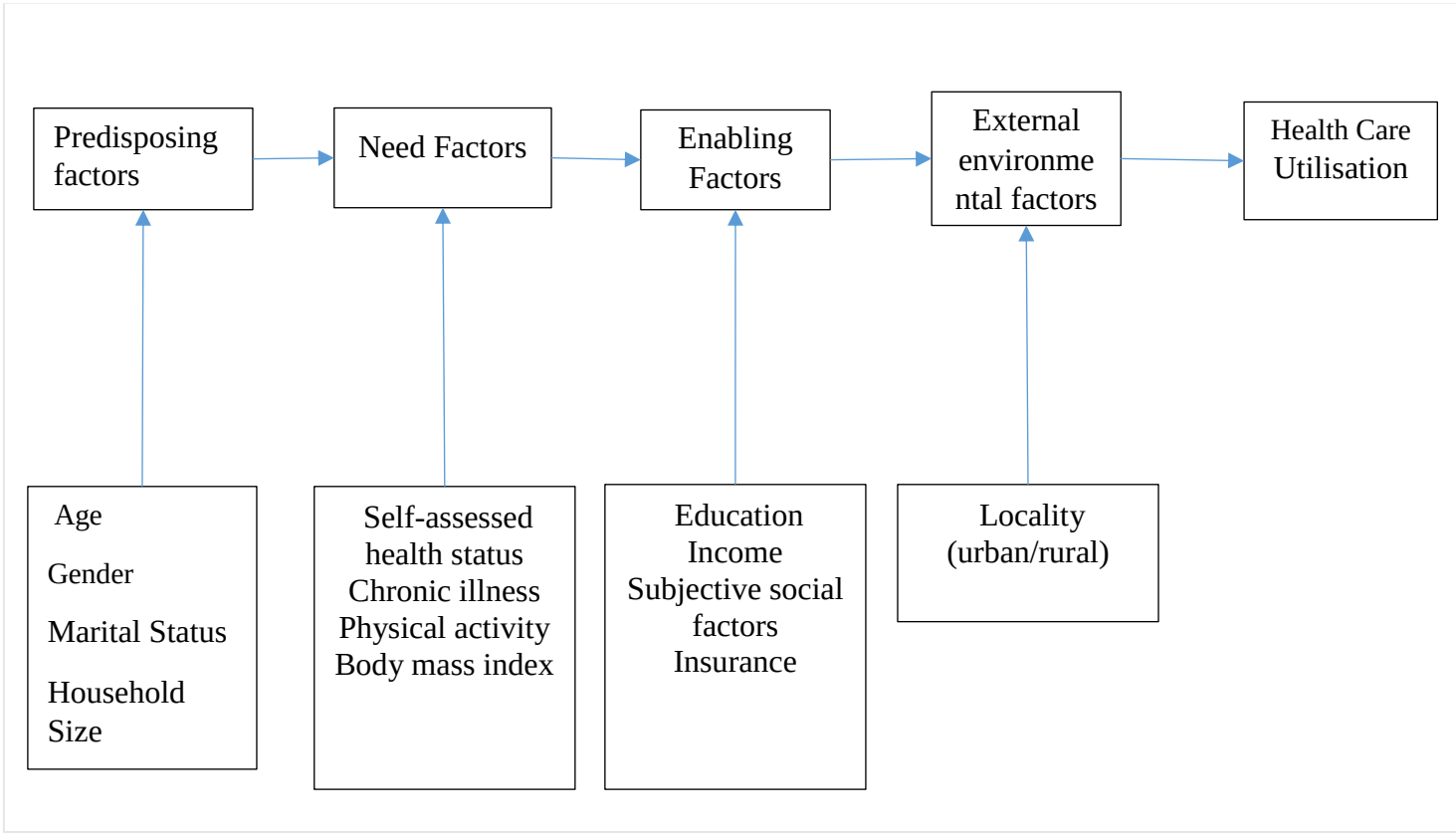
$$m_i = (I_i^*, V_i^*; Y_i, r, \gamma, \delta, \mu, \Delta) = rI^* + p(I^*)V^* = Y - \frac{\alpha(1-\gamma)}{1-\alpha} \frac{p(I^*)f(V^*,\mu,\Delta)}{f_v(V^*,\mu,\Delta)} \tag{4.13}$$

Equation 4.13 implied that out-of-pocket expenditure depends on income, health insurance status, price of healthcare services, the level of health, returns to health investment, optimal volume of health investment, the relative weight of health in the utility function ($1-\alpha$), and the degree of risk aversion (γ). This means that higher income, higher health status, higher weight on health investment ($1-\alpha$) and lower risk preference (γ) increases out-of-pocket healthcare expenditure. Whenever the returns to health investment [$f_v(V^*, \mu, \Delta) = 0$] and the weight on consumption (α) are closer to zero, the model predicts zero out-of-pocket spending.

The theoretical framework suggested by Woldemichael, Gurara and Shimeles (2019) highlights self-selection health insurance. Unobservable factors such as prevailing health conditions, preference towards health and risk aversion appear in optimal health insurance choice and optimal out-of-pocket healthcare expenditure. It also implies more heterogeneity in out-of-pocket spending due to differences in reported features such as incomes and unobserved factors such as risk choice and relative health weighting, among other things.

Our empirical application of out-of-pocket healthcare spending captures the main predictions of this theoretical model. The study estimates the impact of the NHIS enrolment decision on out-of-pocket healthcare spending. Consistent with the theoretical model formulation, we expect insured households to have higher healthcare services utilisation and lower out-of-pocket expenditure relative to their uninsured counterparts.

Table 4.2: Conceptual framework for health care utilisation



Source: Author (2019)

The current study adopts a modified version of the Andersen (1995) behavioural model framework for health care utilisation to identify factors that potentially promote or hinder individuals' visits to the health facility. The model predicts that a series of factors categorised under predisposing, enabling and need determine health care utilisation. Socio-demographic characteristics such as age, gender and household size are all predisposing factors. Individuals' use of services is facilitated or hampered by enabling factors. Education, subjective social status, insurance, and distance to a health institution are all enabling variables.

Lastly, need factors are overall health condition which motivates individuals' service use. These factors include self-assessment health status, chronic illness and physical activity. The current study adds an external factor measured by locality (urban or rural). In Ghana, urban and rural areas differ in the areas of social and economic development. Thus, the inclusion of this variable would help examine inequity in healthcare utilisation. Figure 4.2 gives a snapshot of the conceptual framework for health service utilisation as a modification of Andersen's behavioural model.

4.4 Empirical evidence

Generally, empirical literature suggests that health insurance can be an effective health care financing mechanism for improving healthcare utilisation, providing financial protection by decreasing out-of-pocket health expenditure and promoting health, though the evidence is sometimes mixed.

4.4.1 The effects of health insurance on healthcare utilisation

Evidence in the body of literature indicates that health insurance schemes do improve healthcare utilisation. This observation is in order with studies that reviewed the influence of health insurance coverage in the advanced countries (see, for example, Hullegie and Klein, 2010; O'Connor, 2015) and in low-and-middle-income nations (Giedion, Alfons and Díaz, 2013). On the contrary, other studies do not find a positive impact of health insurance on health care utilisation (see King *et al.*, 2009; Thornton *et al.*, 2010; Bauhoff, Hotchkiss and Smith, 2011). These studies describe limitations in study design (such as short period of assessment) or programme implementation (such as beneficiaries being uninformed of their membership status, claims, or qualified persons not receiving the vouchers to enrol) as factors that may explain the unsatisfactory results (Giedion, Alfons and Díaz, 2013).

The empirical literature on the responsiveness of health care utilisation to insurance coverage dates back to the pioneering work of the RAND Health Insurance Experiment (HIE) carried out in the 1970s (Newhouse, 1974). The study was carried out in six locations across the USA, namely Dayton, Ohio; Seattle, Washington; Fitchburg and Franklin County, Massachusetts; and Charleston and Georgetown County, South Carolina. Nearly 5,800 individuals from almost 2,000 households were randomly assigned to health insurance plans, making the RAND HIE the first experimental study in health insurance. The study recorded participants' health care consumption and health outcomes over three to five years. The objective of the RAND HIE was to examine how health services cost affected individuals' usage of health care, the satisfaction of health care, the quality of care, and health status. A notable finding of the RAND HIE in health care utilisation was that individuals who received free care utilised health services more than their counterparts who paid for a part of health care cost (Newhouse, 1974; Manning *et al.*, 1987). The RAND HIE has two drawbacks: First, the study failed to randomise individuals with no health insurance coverage but instead assigned individuals only based on

health insurance plans with varying degrees of cost-sharing. Second, the RAND experiment focused on the effects of cost-sharing on health care utilisation and health outcome but not on the expansion of social health insurance (Newhouse, 1993).

Another experimental study to be conducted in the USA was the Oregon Health Insurance Experiment (OHIE). The OHIE aimed to assess the influence of public health insurance on healthcare utilisation, health outcomes, financial strain and the well-being of low-income adults. The OHIE was the first to use a randomised controlled trial, regarded as the gold standard in medical and scientific research, to randomly assign people to have or not have insurance coverage (National Bureau of Economic Research, no date). The state of Oregon, in 2008, used a lottery to expand the Medicaid programme to 10,000 low-income adults. To determine the impact of Medicaid on health outcomes, individuals randomly selected were compared to those who were not selected. The results reveal that Medicaid coverage increases medical care utilisation by significantly increasing outpatient visits, hospitalisations, prescription medications, and emergency department visits. A constraint of experimental studies is that they are expensive. This cost constraint partly explains why the USA is the only country to have conducted the two experimental studies (i.e., The RAND HIE and the OHIE). As a result, many researchers resort to either quasi-experimental studies or observational studies.

One of the earliest contributors to health insurance and utilisation literature was Cameron *et al.* (1988). With the help of micro-level data from the 1977-78 Australian Health Survey, the authors' modelled health care utilisation conditioned on insurance choice using the negative binomial model and generalised Poisson. The results showed that health status was a key determinant of health care service use than health insurance choice. The findings also showed that income was a better predictor of health insurance choice than of healthcare service consumption in general. Even though these authors recognised self-selection (or endogeneity) in insurance choice, the approaches employed failed to address the problem. One might want to agree with the authors that typical endogeneity correction approaches had not been extended to the models they used at the time of the study. However, with advances in econometric modelling, this problem can be handled by the two-stage residual inclusion (2SRI).

In Germany, Hullegie and Klein (2010) estimated the influence of private insurance coverage on the number of doctor visits, hospital stays and self-assessed health. According to the study, private insurance coverage had a negative influence on the number of doctor visits, no effect

on the number of hospital nights spent and a positive effect on health status. One advantage of this quasi-experimental study is that it uses potentially exogenous shifts in private insurance coverage to control the selection of insurance. However, such a design only allows us to ascertain the mean impact of insurance coverage at the threshold for selection. In an actual situation that may involve heterogeneous effects across units, this local effect might change from units effect away from the threshold for selection (Battistin and Rettore, 2003).

Applying the behavioural model to health service utilisation, O'Connor (2015) tried to ascertain how a need for service, enabling factors and predisposing factors influence access to health services. The author examined the moderating influence of predisposing variables on insurance and health services utilisation. The author used data from a major metropolitan hospital in the USA. A logistic regression model was used to estimate the likelihood of scheduling a preventive health service appointment. The results show that insurance and predisposing factors have a direct effect on health service utilisation type. The insurance effect, on the other hand, is observed to differ depending on demographic characteristics. A limitation of this study was that it failed to address self-selection (or endogeneity) in insurance choice.

A study in Jordan by Ekman (2007) examined the effect of different health insurance programmes on the probability of utilising health care, the intensity of health care utilisation, and out-of-pocket expenditure. The primary providers of health insurance in Jordan include the Ministry of Health, the Royal Military Services, Jordan University Hospital, United Nations' regional refugee programme and the private sector, with the largest offered by the Ministry of Health (Ekman, 2007). The study applies the two-part model approach to evaluate the effect of insurance on utilisation and expenditures, using national household survey data. First, a logit model was employed to evaluate the likelihood of a healthcare visit if the patient was sick. The second part of the model used a log-linear model to estimate out-of-pocket costs based on positive outpatient care utilisation. A negative binomial model was used to estimate the intensity of healthcare utilisation. The study results revealed that health insurance increases the intensity of health care utilisation but reduces out-of-pocket spending. However, these impacts were only discovered for a few insurance programmes, and the best-performing programmes were those accessible to the slightly better-off groups. In particular, the probability of seeking care increases for the uses of insurance provided by the Ministry of Health. In terms of healthcare utilisation intensity, the insurance programmes ran by the Ministry of Health and the Royal Medical Services increase outpatient visits significantly. A study of this nature is worthwhile because it isolates the individual effects of insurance type, as aggregation hides the

true impact of insurance. In Ghana, the ACT establishing the NHIS allows for private insurance, but their coverage is negligible. Therefore, the current study would only pay attention to the NHIS.

One of the earliest authors that acknowledged the difficulty in investigating the influence of health insurance on healthcare utilisation due to self-selection was Waters (1999). He developed methodologies to evaluate publicly-financed health insurance programmes on health care use in Ecuador. The author used both univariate and bivariate probit estimation methods. He looked for and corrected endogeneity caused by selection bias. The tests for endogeneity involve three methods: the significance of rho ρ in the bivariate probit model; the significance of residuals (or predicted) values from an auxiliary equation when inserted in the equation of interest; and comparing univariate and bivariate probit estimated results. The endogeneity test consistently found General Health Insurance (GHI)[7] programme affiliation variable to be endogenous. The study further found a strong positive association between the GHI programme and the use of curative health care after accounting for selection bias but found insignificant influence of GHI on preventive care usage. The study again revealed that individuals with severe illnesses eligible for GHI preferred private health care and self-select out of the GHI programme. However, the Seguro Campesino Social (SSC) programme had a positive but unimportant relationship with curative and preventive care. This finding was arrived at because the coefficients of SSC were positively associated with curative and preventive care but not statistically significant.

China started embarking on a series of health reforms in the mid-1980s. The health reforms aimed at establishing a universal primary health care system capable of providing safe, effective, convenient and affordable health services to its citizens. These reforms resulted in the establishment of three social health insurance schemes targeting different groups. They include Urban Employee Basic Medical Insurance (UEBMI) which serves employed urban residents, New Rural Cooperative Medical Scheme (NRCMS) for rural residents and Urban Resident Basic Medical Insurance (URBMI) for urban residents without formal employment. This reform increased health insurance subscriptions in China to 96.5% by the end of 2015 (Fang, 2017), making China the country with the most comprehensive and vastest insurance coverage in human history. Some studies conducted in China had evaluated the health insurance programmes. For instance, Yip, Wang and Hsiao (2008) assessed the effect of

[7] The Ecuadorian Social Security Institute operates two forms of health insurance programmes, namely the General Health Insurance (GHI) programme and the Seguro Campesino Social (SSC) programme.

NRCMS on access to care in rural China. The authors combined the differences-in-differences (DID) approach with Propensity Score Matching (PSM) and used longitudinal surveys conducted one year before and two years after the intervention. Results of this study revealed an increased likelihood of outpatient visits by 70 per cent and a reduced probability of self-medication by almost 70 per cent. The authors highlighted the success of NRCMS and indicated that the favourable outcome of the programme was ascribable to a mixture of demand-side (cost reduction) and supply-side (induce quality and efficiency enhancements) interventions.

Another study in China by Liu and Zhao (2014) investigated the impact of Urban Resident Basic Medical Insurance (URBMI) on healthcare utilisation and expenditure. A fixed-effects model with an instrumental variable was used to account for the possible endogeneity of individual enrolment status. Data used for the study came from the China Health and Nutrition Survey. Time variation of the programme implementation at the city level was used as the instrument for individual enrolment. The findings revealed that the programme has significantly increased formal medical services, outpatient and inpatient care usage. They also discovered that the programme had increased medical care utilisation for children, low-income households and residents in the comparatively disadvantaged western region. However, there was no evidence indicating that the programme has reduced total out-of-pocket health expenses. A more recent study by Ta, Zhu and Fu (2020) used the China Family Panel Studies dataset to assess the trends in healthcare utilisation, financial protection and satisfaction between 2010 and 2016. The authors applied difference-in-means tests and regression analysis. They observed that since 2009 China has achieved considerable improvements in healthcare services access and financial protection. Part of their findings revealed that between 2010 and 2016, China had a significant increase in both inpatient and outpatient utilisation. For instance, the hospitalisation (i.e., hospital admission) rate almost doubled from 7.4% in 2010 to 13.6% in 2016. The likelihood of persons aged 16 and above seeing a doctor for outpatient care grew from 16.2% in 2010 to 22.7% in 2016. We report findings on financial protection by Ta, Zhu and Fu (2020) in section 4.3.2.

A study in Ghana conducted by Bonfrer, Breebaart and De Poel (2016) evaluated the effects of Ghana's national health insurance scheme on maternal and infant health care use. The researchers use birth data (before and after the intervention) and PSM to reduce bias in health insurance due to self-selection. According to the study, almost 40% of children have a mother who is insured. The scheme increased by seven percentage points the percentage of pregnancies

with at least four prenatal care visits. Again, it had a positive effect on attended births (10 percentage points). The scheme increased caesarean sections by six percentage points but decreased the number of children born from unwanted pregnancy by seven percentage points. The NHIS does not cover family planning services. But the authors argue that because family planning services are provided alongside maternal care, it may reflect potential spill-over effects. Vaccinations for children were essentially unaffected by insurance status. Insurance status had almost no impact on child vaccinations. It must be noted that the NHIS does not cover immunisations for children. The free child vaccination programmes are organised jointly by the Global Alliance for Vaccines and Immunisation and the Government of Ghana. The results were comparable for the effects of the scheme on prenatal care and attended deliveries among the lowest 40% of the sample. However, the scheme effect on caesarean sections was nearly half (3 percentage points), compared to the whole sample. Also, the reduction in undesired pregnancies was higher (10 percentage points). They concluded that the NHIS had a minor impact on the use of prenatal and delivery care in the first few years of operation.

Even though the empirical strand of literature that aims at examining the determinants of health care utilisation in Ghana is limited, several significant studies attempt to explain the impact of health insurance on healthcare utilisation. For example, Mensah, Oppong and Schmidt (2009) evaluated the NHIS to ascertain whether it is achieving its objectives concerning the Millennium Development Goals (MDG) 4 and MDG 5, which deal with women's and children's health. The study solicited data from women of reproductive age (18-49 years) in Ghana's Brong Ahafo and Upper East regions. The researchers employed PSM approaches to balance the data's key background variables and compare the health outcomes of new moms who joined the NHIS to those who did not. Their findings revealed that NHIS participants were more likely than non-participants to obtain prenatal care, deliver in a hospital, have deliveries attended by skilled health workers, and have fewer birth problems. They concluded that NHIS is a useful tool for enhancing access and improving health outcomes.

Another study in Ghana focusing on women's health was carried out by Blanchet, Fink and Osei-Akoto (2012), who investigated the effect of Ghana's NHIS on healthcare utilisation. The authors provided a short history of Ghana's health insurance scheme and discussed general patterns of enrolment. They employed PSM to analyse the effect of insurance coverage on health-seeking behaviour. They discovered that enrolled individuals were more likely to get prescriptions, go to clinics, and seek formal health care when they were unwell. Based on these findings, the authors concluded that the government's goal of increasing formal health care

utilisation access through health insurance had been partially realised, at least among women in the Accra Metropolitan Area.

Studies on the effects of NHIS on healthcare utilisation in Ghana have the benefit of helping researchers and policymakers to comprehend the achievements of Ghana's NHIS and the challenges thereof. However, these studies failed to explore the heterogeneous effects of health insurance on healthcare utilisation across different subpopulations such as locality (urban/rural), type of health care usage (formal/informal), and income groups. For instance, in Ghana, urban and rural areas differ severely in social and economic development. Therefore, separating the dataset in terms of residence status to examine inequity in healthcare utilisation is worthwhile. Besides, investigating utilisation concerning usage of health care type would provide evidence on whether the introduction of Ghana's NHIS could be regarded as welfare-enhancing by increasing formal healthcare utilisation. These are the gaps that the current study sought to fill.

Detailed scrutiny of the previous studies further indicates that each of these studies varies in its operationalisation of healthcare utilisation, methods and variables used. Various authors used different techniques to operationalising healthcare utilisation. Measurement of healthcare utilisation includes outpatient visits or inpatient care (e.g., Ekman, 2007; Liu and Zhao, 2014; Saeed *et al.*, 2015), preventive care (e.g., O'Connor, 2015), number of doctor visits (e.g., Ekman, 2007; Hullegie and Klein, 2010). Other authors used the number of nights spent at a hospital (e.g., Geitona, Zavras and Kyriopoulos, 2007; Saeed *et al.*, 2015; Sengupta and Rooj, 2019) and the number of antenatal care visits (e.g., Sanogo and Yaya, 2020). The mode of measuring intensification of healthcare utilisation includes the number of doctor visits, hospitalisation days and the number of antenatal care visits. Recently, Sisira Kumara and Samaratunge (2019) employed private or public facilities to measure health care utilisation in Sri Lanka. They found that ownership of health insurance decreases the likelihood of using public facilities but increases the probability of using private facilities for non-communicable diseases and acute illnesses. Another recent study by Were *et al.* (2020) in Kenya analysed the influence of social health insurance on obstetric healthcare access among HIV+ pregnant women. Obstetric healthcare includes institutional delivery and skilled birth attendants. The estimated linear and logistic regression models found that enrolment in health insurance improves obstetric health services utilisation. For instance, compared to their uninsured counterparts, HIV+ pregnant women covered by social health insurance were 12.5 per cent and 19 per cent more likely to use institutional delivery and skilled birth attendants, respectively.

Another part of the empirical evidence reveals studies that assumed the health insurance variable to be exogenous. These studies employ either only binary logistic regressions (e.g., O'Connor, 2015) or binary logistic regressions and Poisson regression with its extension in the form of negative binomial model (e.gs., Geitona, Zavras and Kyriopoulos, 2007; Ekman, 2007). These studies, which failed to address the endogeneity problem, leading to selection bias, are likely to overestimate the impact of health insurance on healthcare utilisation. In contrast, some authors recognised the problem of endogeneity when modelling the effect of health insurance on healthcare utilisation. Different authors use various approaches to correct for possible endogeneity of health insurance. These approaches include bivariate probit estimation technique (e.g., Waters, 1999), instrumental variable method (e.gs., Gajate-Garrido and Ahiadeke, 2013; Liu and Zhao, 2014), PSM (e.gs., Blanchet, Fink and Osei-Akoto, 2012; Bonfrer, Breebaart and De Poel, 2016; Gouda *et al.*, 2016), the DID approach (e.g., Idris, Satriawan and Trisnantoro, 2017) and regression discontinuity analysis (e.g., Hullegie and Klein, 2010).

Considering the determinants of utilisation, aside from health insurance, Geitona, Zavras and Kyriopoulos (2007) found age, income, gender (female), and region to have a positive influence on primary health care services. In contrast, self-rated health status had a negative relationship with the frequency of visits for primary health care. On the contrary, Ekman (2007) does not find any significant association of income, insurance, sex and education on the probability of visiting a health service provider. One notable finding of this study was that older people increasingly seek less care. The study further revealed that self-reported worse health persons and chronic illness individuals increase healthcare utilisation significantly. The consensus from the literature shows that health insurance does improve healthcare utilisation. Nevertheless, what does the literature say about insurance as a means for managing financial risk? The subsequent section provides empirical evidence on the impact of health insurance on financial protection.

4.4.2 The impact of health insurance on financial protection

Studies on the impact of health insurance schemes on financial protection are less than those focusing on the effect on access and utilisation, according to Giedion, Alfons and Díaz (2013). The empirical literature suggests that insurance coverage may frequently reduce financial protection indicators such as out-of-pocket expenditures, catastrophic expenditures and prevent poverty. A key finding of the RAND HIE was that increases in cost-sharing harm the utilisation

of medical services, with outpatient care having a relatively higher impact than inpatient treatment (Newhouse, 1974; Manning *et al.*, 1987). For specifics, the result found that coinsurance rates had the most impact on health care use and costs. Individual participants with free care (i.e., a zero per cent coinsurance rate) suffered an annual medical expenditure of $777 per capita. This medical expenditure was 23% higher than for individuals with a 25% coinsurance rate and 46% higher than for individuals with a 95% coinsurance rate (Rice and Morrison, 1994). Similarly, the OHIE found that Medicaid coverage significantly decreased medical debt and almost eradicated the likelihood of incurring catastrophic out-of-pocket medical expenditures (Providence Health & Services, 2020).

Using panel data, Sepehri, Sarma and Simpson (2006) estimated the effect of insurance on out-of-pocket health expenditures. Two competing non-linear models, Tobit and truncated regression models were used to account for zero healthcare expenditure. The former treats limit observations as censored, whereas the latter considers only positive healthcare expenditures. Again, for each of these two models, both random and fixed effects models were employed to analyse the influence of insurance on out-of-pocket spending. The authors discovered that health insurance reduces health spending when unobserved heterogeneity is taken into consideration. They observed that failing to account for unobserved heterogeneity leads to an unexpected result, in line with other cross-sectional research in the literature. Specifically, health insurance was found to cut out-of-pocket spending by 16 to 18%, with the reduction being higher for those with lower incomes. Health insurance reduces health expenditures by 28 to 35 per cent for people with a mean income.

In Georgia, Bauhoff, Hotchkiss and Smith (2011) evaluated the effect of medical insurance on outcomes such as utilisation, financial risk protection, and health behaviour and management for poor people. The study used a regression discontinuity approach. A survey of roughly 3,500 households surrounding the thresholds was created for the beneficiary and non-beneficiary households intended to minimise unobserved heterogeneity. Their research design exploited a sharp discontinuity at two regional eligibility thresholds to estimate local average treatment effects. They discovered that while the programme did not affect healthcare utilisation, it did reduce mean out-of-pocket spending for select groups and reduced the probability of high inpatient spending. Finally, the study could not find any systematic impacts of insurance coverage on health behaviour, management of chronic illnesses, and patient satisfaction.

In Peru, Neelsen and O'donnell (2017) identify the impact of Seguro Integral de Salud (SIS) by comparing the target population's change in healthcare utilisation to that of impoverished adults now employment-based insurance coverage. The SIS program is a fiscal route through which the National Health Service is funded, rather than an independent fund that buys health care on behalf of its beneficiaries. Using the DID method, they found positive effects of SIS on receipt of ambulatory care, medication, and diagnostic tests but no influence on inpatient care and OOP payments.

Erlangga (2018) did an impact evaluation of Indonesia's national health insurance programme. The author employed both the Propensity score matching and the DID methods to assess the causal influence of the NHIS. For persons in the contributing group of the programme, the results revealed an increased likelihood of seeking outpatient and inpatient visits and care volume. The subsidised group likewise had greater utilisation levels, although the effect was significantly smaller than the contributory group. Concerning the financial protection effect of the programme, the results indicate no significant influence of the programme on OOP payments or catastrophic health expenditure.

A recent study by Fang *et al.* (2019) also used the DID method in examining the influence of China's New Cooperative Medical Scheme (NCMS) on medical expenditure. On the contrary, the result revealed that the NCMS increased medical spending by 12.3%. The authors argued that the total effect of the scheme on medical expenditure is dependent on elasticity, suggesting that as the cost of medical services decreases for enrolees, they tend to utilise more medical services, which in turn increase medical demand and price. The results of the heterogeneous impacts of the scheme indicated that self-reported good-health and the high-income group saw a 22.1% and 20.6% increase in medical expenditure, respectively. However, the effect was not significant for those who self-reported poor health and those in low-income categories. The authors concluded that poor and less healthy individuals needed assistance. Another recent study in China by Ta, Zhu and Fu (2020) observed that individuals have better financial protection through health insurance coverage, the chance of incurring catastrophic health spending and the probability of health care poverty. In the case of individuals who face catastrophic health costs and financial hardship resulting from medical expenses, the study noticed a significant reduction. For example, from 14.4% in 2010 to 10.7% in 2016, the percentage of families experiencing catastrophic health expenses decreased. For families in the poorest quartile, the incidence of catastrophic health spending declined from 22.9% to 16.6%.

Finally, the authors found that the percentage of families who suffered from medical impoverishment reduced by almost half from 6.3% to 3.2%.

Mitra *et al.* (2017) were, to the best of our knowledge, the first authors to conduct a comprehensive study of the effect of health insurance on children and their households in low- and middle-income nations. For published studies, the authors found only 13 studies from seven countries between 2000 and 2014. These research articles assessed the impacts of insurance on children after controlling for self-selection and heterogeneity. Their findings revealed that nine out of 10 studies provided consistent evidence supporting health insurance as providing financial protection. However, they obtained mixed results for health utilisation and health outcomes. Van Hees *et al.* (2019) did another systematic review on how social inclusion of health insurance affects equal access to health financing in low- and middle-income countries. The authors looked at how these subpopulations enrolled in health insurance and how they affect their healthcare utilisation, financial protection, and health outcomes. For persons with disabilities, female-headed households, ethnic minorities and migrants, there were limited and inconsistent evidence existing while there were no studies on youth or children with special needs. Enrolment rates for chronically sick people appeared to be relatively high, whereas results for the other groups were mixed or insufficient outcomes. Most studies indicated that insured persons with a disability or chronic sickness and older adults used healthcare more frequently. Generally, health insurance schemes appeared to prevent individuals from catastrophic health payments to some extent.

India has several social health insurance schemes, including the Employee State Insurance Scheme and the Central Government Health Scheme. However, these schemes have minimal coverage. Between 2007 and 2010, several publicly financed health insurance schemes were launched at the Central and State level, and these schemes include the *Rashtriya Swasthya Bima Yojna* (RSBY)–now called *Rashtriya Swasthya Suraksha Yojana* (RSSY) at the central level (Forgia and Nagpal, 2012). Prinja *et al.* (2019) assessed the role of health insurance schemes in general, and particularly the RSBY (i.e. India's National Health Insurance Scheme), in influencing healthcare utilisation, OOP expenditures and financial risk protection. The author computed catastrophic health expenditure, one of the indicators of financial risk protection. Hospitalisation rate, choice of care provider and catastrophic health expenditure were regressed on insurance status and type of insurance scheme to assess their effects after adjusting for other explanatory variables. The results of this research indicated that the mean OOP expenditures for outpatient care and an episode of hospitalisation among insured and

uninsured were USD 16 and USD 14, USD 543 and USD 413, respectively. The incidence of catastrophic health expenditures for hospitalisation was 28 per cent and 26 per cent among the insured and uninsured, respectively. However, there was no significant relationship between hospitalisation rate, choice of care provider or catastrophic health expenditures with insurance status or RSBY, in particular.

The Government of Rwanda established Mutuelles de Sante´ (Mutuelles), a community-based health insurance programme, in 1999 as a national health strategy of delivering universal health care coverage. The programme covers more than 90% of the total population, making Rwanda the country in sub-Saharan Africa with the highest health insurance coverage (Lagomarsino *et al.*, 2012; Chemouni, 2016). Before then, few people in Rwanda had health insurance. The OOP payment was the principal means through which the uninsured population could access health services. Lu *et al.* (2012) and Woldemichael, Gurara and Shimeles (2019) evaluated the effect of Mutuelles on attaining universal coverage of health care services and financial protection. To estimate the effect of Mutuelles on utilisation and the probability of experiencing catastrophic health expenditure at the individual and household levels, the researchers utilised logistic regression models and the Extended Two-Part Model, respectively, on nationally representative surveys. Results from the two researchers reveal that Mutuelles enhanced medical care utilisation and protected families from incurring catastrophic health expenditure. Woldemichael, Gurara and Shimeles (2019) further revealed that the scheme significantly reduces annual per capita OOP expenditure by about 3,600 Rwandan Franc (US$12). However, the impact favoured the rich as compared to the poor. Finally, the scheme significantly decreases the prevalence of catastrophic healthcare expenditure.

Nguyen, Rajkotia and Wang (2011) evaluated the effect of Ghana's NHIS on OOP spending and catastrophic health expenditure of households using data obtained from two rural districts, Nkoranza and Offinso. The study gathered data two years after the commencement of the scheme. The study used a two-part model, and the absolute amount of out-of-pocket spending was estimated to address the skewness of healthcare expenditure data. Part one was a probit model, which assessed the probability of positive healthcare expenditure. Part two was a log-linear model for non-zero spending. Because the data was heavily biased in favour of zeros, a linear model was not appropriate for OOP expenditure. The authors discovered that, even though the insurance provides a substantial benefits package, insured people continue to spend OOP expenditure on uninsured treatment and prescriptions and tests not covered by insurance at health facilities. Some drugs and tests are paid out-of-pocket by the insured because the

scheme does not cover them. Insured persons paid significantly less than their uninsured counterparts did. These findings suggest that insurance protects against the financial burden of healthcare costs by lowering the risk of making catastrophic payments. This effect was most noticeable among the poorest quintile's households. The results, according to the author, support the financial protection effect of health insurance in Ghana. This effect was significantly stronger among the poor than among the general population, which is interesting.

Another study of Ghana's NHIS by Kusi *et al.* (2015) examined its effects on out-of-pocket health expenditures and how the scheme protects households against catastrophic health expenditures. The researchers employed a cross-sectional household dataset of 2,430 households from three districts across the country. OOP health expenditures related to treatment seeking for reported sickness in the household in the last four weeks prior to the survey were examined by comparing insured and uninsured persons. The catastrophic health payment method was used to measure the incidence and intensity of catastrophic health expenditures (CHE) among households. Multiple logistic regression was utilised to analyse the relative influence of NHIS on the incidence of CHE at the household level. Their results show that approximately 36% of households reported at least one ailment during the four week recall period. Compared to their uninsured peers, insured patients had much reduced direct OOP for outpatient and inpatient care. In the area of financial protection, the study further revealed that at the 40% threshold, the incidence of CHE was lower among insured households (2.9%) than among partially insured (3.7%) and uninsured (4.0%). In comparison to the partially insured (10.1%) and uninsured families, the incidence of CHE was much lower among fully insured households (6.0%) who sought healthcare from NHIS recognised health facilities (23.2%). Relative to uninsured households, fully insured and partially insured household members had a 4.2 times lower chance of getting CHE. The scheme, however, does not eradicate out-of-pocket expenses for insured households.

Financial protection is achieved mainly by lowering payments at the point of service. The price subsidy resulting from insurance coverage is anticipated to stimulate demand for health care and improve access and utilisation. For that reason, OOP health expenditures may increase because of an increase in healthcare utilisation. Therefore, the ultimate impact on health spending is determined by the relative importance of these variables. Thus, out-of-pocket spending, the most commonly used indicator of financial protection, is both a cause and an effect of healthcare utilisation, implying a bidirectional relationship that might lead to biased estimators and, at first glance, contradictory outcomes (Giedion, Alfons and Díaz, 2013). After

reviewing China's New Cooperative Medical Scheme, Wagstaff *et al.* (2009) found no indication of a drop in household OOP expenditures, exemplifying this viewpoint. They explained that the scheme " … has increased the likelihood of people seeking outpatient and inpatient care, as well as the volume of care provided [and] partly because of this increase in utilisation, household out-of-pocket spending on health care does not appear to have been reduced by NCMS" (Wagstaff *et al.* 2009, 16).

Empirical literature shows that several variables affect health expenditure. However, there are rare a priori reasons to anticipate how some of these variables affect healthcare payments in any particular direction as these effects are mainly empirical. Generally, empirical evidence suggests that insurance coverage offers financial protection by reducing OOP payments and catastrophic expenditure and preventing impoverishment (Ekman, 2007; Lu *et al.*, 2012; Kusi, Hansen, *et al.*, 2015). Sepehri, Sarma and Simpson (2006) found that income, age, education, marital status, the incidence of sickness, illness days and the number of limited activity days had a significant impact on health expenditure. Except for marital status, all of these factors had a positive influence on OOP health expenditure, demonstrating that married people spend less on health than their single counterparts. On the contrary, Ekman (2007) found no significant relationship between income, age, education, gender (male) and health spending.

Kusi *et al.* (2015) found that sex (female) of the household head, the number of children under five years in the household, household size, health status of household members, longer distance to the nearest health facility, wealth, and health insurance status to be positive predictors of catastrophic health expenditure at the household level. A similar finding was obtained by Ekman (2007) regarding the health insurance variable having a positive effect on health spending for outpatient care. The findings also show that persons with greater earnings, those who live close to a provider and persons with poor health pay more for care than their counterparts. Lu *et al.* (2012) found the presence of disabled household members and under-five children, expenditure quintiles and household size as predictors of catastrophic health spending. Besides, other studies have investigated OOP payments and catastrophic expenditure from the perspective of culture, ethnicity, locality, region and religion, where these variables were found to exert significant influence (Ekman, 2007; Geitona, Zavras and Kyriopoulos, 2007). Income, educational accomplishment, household size, and the number of family members over 65 years old were all predictors of OOP health expenditure in a recent study by Ebaidalla and Ali (2019) in Sudan. The results again show that the presence of the elderly and children raises the risk of a household incurring a catastrophic health expense.

The current study utilises a nationwide representative household-level dataset, allowing for the inclusion of policy-relevant variables and obtaining national level estimates which can be generalised to the entire population. The next section of this review looks at the empirical evidence of the impact of health insurance on health status.

4.4.3 The impact of health insurance on health status

Empirical literature that focuses specifically on the impact of national health insurance systems on health status is limited. Giedion, Alfons and Díaz (2013) identified two main reasons why evidence is scarce in this area of study. First, access, utilisation and financial protection are immediate aims of every insurance scheme, whereas health status is a longer-term indirect outcome (perhaps the ultimate goal) liaised by better access. The second barrier is the methodological challenges in assessing the impact of health insurance schemes on health status. Different authors measure health status differently. Operationalisation of health status includes morbidity and mortality rates, indicators of risk factors (e.g., nutritional status) and self-assessed health (Erlangga *et al.*, 2019). Some evidence suggests health insurance has a positive influence on health status (e.gs., Cheng *et al.*, 2016; Simon, Soni and Cawley, 2017; Fan *et al.*, 2019), with some indicating no effect or inconclusive results (e.g., Giedion *et al.*, 2007).

A study by Levy and Meltzer (2001) divided between "observational studies" on the one hand and "experimental" and "quasi-experimental" studies on the other in a study on whether health insurance influences health. Another study by Wallace and Sommers (2016) also used a similar distinction. Usually, observational studies compare health utilisation and health outcomes among insured and uninsured individuals, adjusting for observed covariates. For example, a study that compared the survival rates of breast cancer patients with private insurance, Medicaid, and no insurance (Ayanian *et al.*, 1993). Levy and Meltzer (2001) argued that observational studies might be confounded by unobserved factors that concurrently influence health, insurance status, and a person's willingness or ability to utilise care. Consequently, they argue that only experimental and quasi-experimental studies can provide accurate inferences about the influence of health insurance on health outcomes. On the contrary, Hadley (2003) claims that observational studies account for the vast majority of research and that excluding them leaves only limited studies from which to conclude the influence of insurance on health.

Wallace and Sommers (2016) mentioned that the ideal method to study the causal effect of health insurance on preventive care and health outcomes is to randomly assign some persons

to receive a particular form of coverage (e.g., publicly or privately funded health insurance) while others stay uninsured or receive an alternative coverage. In this way, researchers can compare the use of preventive care and health outcomes across groups—one or more treatment groups and a control group—while taking care of any selection bias or confounding. Even though randomised control trials (RCTs) provide researchers with valuable findings of the causal influence of health insurance coverage, they are not without flaws. Wallace and Sommers (2016) identify three main limitations on the use of RCTs. The first challenge is time and cost constraints which can limit sample size usage, making it harder to identify effects on rare or long-term outcomes (such as mortality). For example, funding of the RAND HIE cost approximately $295 million (in 2011 dollars), which explains why replication of such an experimental study has become highly impossible (Greenberg and Shroder, 2004). Second, procedures used under RCTs, such as intensive follow-up with patients, may limit the generalisability of the study mainly because they differ from usual patterns of care. Thirdly,

> "RCTs typically impact a small population and may not generalize to larger policy changes that may reshape healthcare markets or alter the behaviour of doctors, hospitals, and insurers" (Wallace and Sommers, 2016: p. S29).

Lastly, in designing RCTs, researchers face a trade-off between finding the preferred treatment effect (e.g., what effect does health insurance expansion have on preventive care?) and differentiating the causal mechanisms [e.g., why does health insurance influence whether or not people seek preventive care?] (Ludwig, Kling and Mullainathan, 2011). Under the right conditions, some of the previously mentioned disadvantages will not occur in quasi-experimental methods, thus allowing researchers to evaluate the causal effect of insurance by utilising larger samples—sometimes even population-level data—in more realistic scenarios (Sommers, Long and Baicker, 2014).

Evidence suggests that having health insurance can improve one's health. However, due to the nature of the schemes, achieving and detecting impact on health status can be difficult. Several studies have shown contradictory or unclear evidence about the effect of insurance coverage on health status. This outcome is owing to unsolved methodological issues, study constraints, and the sometimes dubious relevance of the effect outcome indicators used (Giedion, Alfons and Díaz, 2013).

There have been a few studies that show that having health insurance improves one's health. The literature on the effects of health insurance on health dates back to the pioneering work of

RAND HIE. The health-related findings from the HIE were inconclusive. However, the results revealed that some individuals, particularly those within the lower-income group who reported poor health were more likely to be harmed by the negative impact of cost-sharing. Generally, the study concluded that seeking more medical care was associated with not having cost-sharing but could not find evidence that more medical care resulted in better health outcomes for the average participants. The HIE found that those with no cost-sharing had better health outcomes in only three areas: diastolic blood pressure (i.e., hypertension), the estimated probability of dying for those at high risk, and corrected (U.S. Congress Office of Technology Assessment, 1993). However, two main caveats accompany this finding: first, that the RAND experiment compared plans with varying benefit generosity rather than insurance with no insurance, and second, that health improvements were seen only in vulnerable subgroups. Generally, the RAND experiment provides imperious evidence suggesting that health insurance can enhance one's health. In a similar vein, the OHIE also provided inconclusive findings. The OHIE found that Medicaid coverage improved self-reported health and decreased rates of depression substantially. However, the study did not observe any significant relationship between Medicaid and clinically measured health outcomes, including blood pressure, cholesterol and glycated haemoglobin screenings (Providence Health & Services, 2020).

Levy and Meltzer (2008) did a systematic review to address the question: How does health insurance affect health? After a detailed review, one of the conclusions made was that a shred of convincing evidence validates that health insurance enhances the health of vulnerable subgroups such as infants, children, and persons living with AIDS. Also, insurance can improve peculiar health measures such as high blood pressure control for the adults' population, particularly those with low income.

In the United States of America, Simon, Soni and Cawley (2017) used the DID used the DID to investigate the impact of Medicaid expansions programme on preventive care, risky health behaviours and self-assessed health by comparing states that did and states that did not expand. They discovered that the expansions enhanced insurance coverage and access to care for the low-income childless individuals who were the target group. The Medicaid expansions also improved the usage of certain types of preventative care. However, there was no indication that Medicaid expansions caused moral hazard in the first place (i.e., risky health behaviours response positively to insurance). Finally, the study revealed that the Medicaid expansions enhanced self-reported health by a small margin.

Using panel data and Matching Double Difference, Wagstaff and Pradhan (2005) assessed the effect of Vietnam's health insurance on healthcare utilisation, health outcomes, and nonmedical household consumption. According to their findings, the health insurance programme had a positive effect on both height-for-age and weight-for-age for young school children and body mass index in the case of adults. This result was an intriguing discovery because the applied aggregate health measures were minimally related to access and are more associated with other determinants of health status. Their result also revealed that health insurance reduces annual out-of-pocket expenses while increasing non-medical household consumption, which includes but is primarily non-food consumption.

In Colombia, Giedion *et al.* (2007) examined the influence of subsidised health insurance programme on health outcomes, access and health care utilisation of the poor. The study used the Demographic and Health Survey (DHS) datasets. The PSM was utilised to account for observable differences between people who are not associated with the programme. A matched DID analysis was employed to assess whether unobserved characteristics might result in bias estimates. The findings from both methodologies consistently showed that the subsidised health insurance programme promotes access and utilisation of health care, particularly among rural and poor people. Relative to the uninsured, insured people were 38 per cent more likely to get medical care when they required it and 40 per cent more likely to use ambulatory services. Insurance raises the percentage of women who have professionally attended births by 5%, while subsidised insurance increases the proportion of children who have had all of their vaccinations by 5%. Evidence of the impact of subsidised insurance on self-perceived health status was inconclusive. The researchers attributed this inconclusive outcome to the available survey since the survey contains few health status indicators, and measured were unlikely to be determined by the services incorporated in the insurance benefits package.

In a systematic review, Prinja *et al.* (2017) looked at the effect of publicly financed health insurance schemes on health status and other indicators in India. In this systematic review, the authors emphasised empirical studies in India. They analysed fourteen studies that had a comparator group in their evaluation design. Seven studies on utilisation revealed a positive effect, indicating that health services use increases when people have health insurance. Research studies numbering five, forming 70 per cent, showed a robust evaluations design in evaluating financial risk protection revealed no impact in reducing OOP expenditures. However, the remaining 30 per cent (numbering two) reported a drop in OOP expenditure among insured families. Only one study evaluated the impact of insurance on health outcomes.

The findings of this comprehensive review imply that relative to the uninsured, the insurance schemes lower mortality for the insured.

One key objective of health insurance is to improve health. Most studies on the impact of health insurance on health are quasi-experimental studies (e.gs., Wagstaff and Yu, 2005; Cheng *et al.*, 2016) with very few observational or experimental studies (Newhouse, 1974; Manning *et al.*, 1987). The current research uses an observational study to explore the impact of Ghana's NHIS on health status. We argue that with recent advances in econometrics modelling, it is now possible to use non-experimental techniques to estimate causal effects in the absence of randomisation (Tesfaye and Tirivayi, 2018). The current study employs endogenous switching regression for ordered outcomes to control self-selection bias and endogeneity in health insurance decisions. This model permits further for the distributional effects of health insurance, which is rare in previous studies. The distributional effects enable us to observe the impact of insurance membership at various levels of health status. These are the added advantage that the current research has over previous studies.

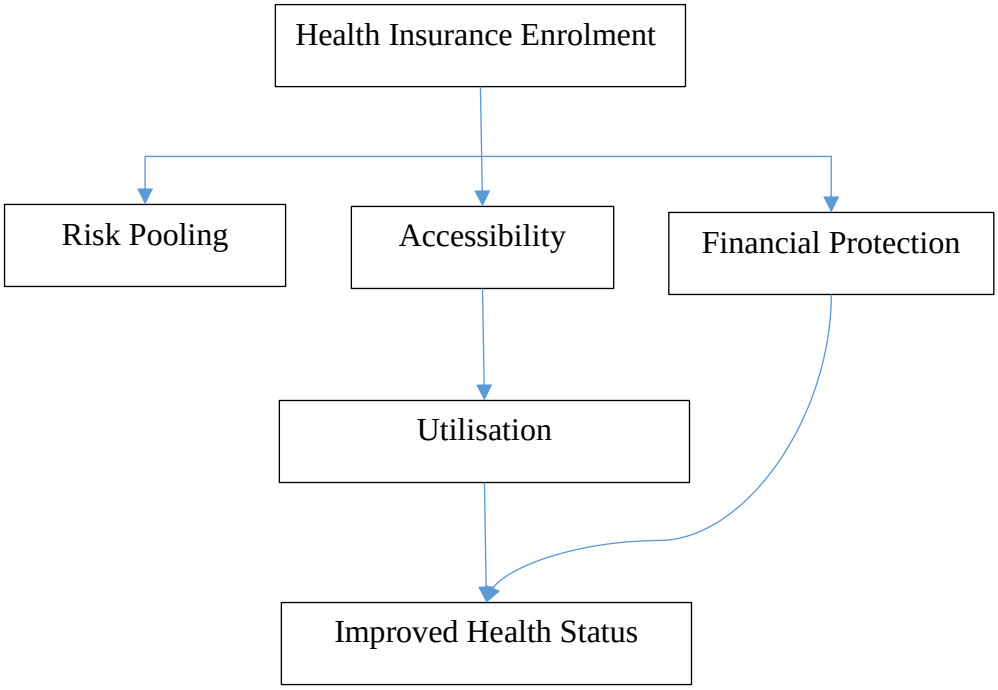
4.5 Conceptual framework

Based on the extensive literature review, a conceptual framework is developed for the study. Figure 4.3 shows three principal roles of health insurance in health financing. First, health insurance is a financial mechanism for mobilising resources to allow members of a scheme to share health risks (Folland, Goodman and Stano, 2004). Second, it elicits revenue needed for health care services which may be utilised to improve the quality and quantity of services, thereby making public health facilities accessible to the people (Sahoo and Madheswaran, 2014). Lastly, health insurance enrolment offers financial protection to households against large out-of-pocket expenditures, catastrophic expenditures and impoverishment resulting from illnesses. The immediate goals of every insurance scheme are to improve access and utilisation of health care services and offer financial protection (Giedion, Alfons and Díaz, 2013).

From figure 4.3, healthcare utilisation measured by visits to the health facility is potentially promoted or hindered by predisposing, enabling, need and external factor factors, as our modified version of the Andersen (1995) behavioural model indicates. We expect that the insurance scheme easing access would help improve health care utilisation. By facilitating

access, improving health care utilisation and offering financial protection, health insurance can achieve its longer-term goal of improving the health status of beneficiaries.

Table 4.3: Health insurance pathways to health care utilisation, financial protection, and health status



Source: Author (2019)

4.6 Summary

The expected utility maximisation theory forms the theoretical basis of demand for health insurance and health care. For an expected utility maximising individual or consumer, the health insurance demand and healthcare utilisation are interdependent. For instance, an individual who anticipates consuming more health care is more likely to purchase health insurance. In the case of utilisation of healthcare services, we identified four theoretical models. These are the Rosenstock model, the Suchman model, the Andersen model, and the Gross model. The Andersen model is used commonly as a theoretical model for studying health services utilisation and hence would guide the multivariate analysis of health services utilisation of this current study.

"Observational" studies, "experimental", and "quasi-experimental" studies are the three main classes of studies identified in the literature. Observational studies may be confounded by unobserved factors that concurrently influence insurance status and other outcomes, while in

"experimental" and "quasi-experimental" studies, health insurance is allowed to vary randomly. The literature reveals that health insurance impacts positively on healthcare utilisation, financial risk protection and health status. However, the results of some studies are mixed. Studies used either logit or probit models to measure any incidence of utilisation or the probability of healthcare utilisation. Count data models such as Poisson and its extension− negative binomial regressions are used to measure the effects of insurance on the number of incidences per person or the number of visits to healthcare providers. For some studies that used longitudinal surveys, authors combined the DID approach with the PSM.

Out-of-pocket expenditures, catastrophic expenditures, and impoverishing effects of out-of-pocket spending are the three main financial risk protection indicators discovered in the literature. In "observational" studies, researchers used the two-part model to examine the effect of insurance on out-of-pocket health expenditures. Part one is a probit model which estimates the probability of positive healthcare expenditure. Part two is a log-linear model to account for non-zero healthcare expenditure highly skewed in favour of zeros. Sepehri, Sarma and Simpson (2006) used panel data to estimate the effect of insurance on out-of-pocket health expenditures. The authors used two competing non-linear models, Tobit and truncated regression models, to account for zero healthcare expenditure. "Experimental" and "quasi-experimental" studies used the DID and regression discontinuity approaches. The majority of studies examining the impact of health insurance on health status are "observational" studies. These studies employ mainly the PSM, DID and regression discontinuity analyses.

4.7 Contribution to the body of literature

This study seeks to assess the effect of the national health insurance scheme on health care utilisation, financial protection and health status. Previous studies in Ghana that assessed the influence of NHIS on health care utilisation focused on either specific geographic areas or subpopulations. Blanchet, Fink and Osei-Akoto (2012), for example, used data from the Women's Health Study of Accra wave II, which was a representative sample of adult women (age 18 and over) only in the Accra Metropolitan Area, to evaluate the effects of Ghana's NHIS on healthcare utilisation. Additionally, Mensah, Oppong and Schmidt (2009) collected data from only women of reproductive age (18-49 years) from two of Ghana's ten administrative regions, namely Brong Ahafo and Upper East regions. Gajate-Garrido and Ahiadeke (2013) looked at the causal influence of NHIS enrolment on maternal and child health-related

behaviours. However, their analysis was based on a limited set of outcomes since they looked at the causal impact of NHIS enrolment on maternal and child health-related behaviours. Even though these studies provide significant contributions to our knowledge about the effects of NHIS on health outcomes, they failed to represent the entire country and analysis was not based on the whole population. The current study seeks to fill this gap by using a nationally representative dataset to study the effects of NHIS on health care utilisation in Ghana. The outcome of this study can be generalised to the entire population since the dataset used is representative of the whole country.

Methodologically, most previous studies on the effect of health insurance on out-of-pocket expenditure employ the two-part model (Ekman, 2007; Nguyen, Rajkotia and Wang, 2011; Zeng, Lannes and Mutasa, 2018; Woldemichael, Gurara and Shimeles, 2019). A handful of studies used the Heckman sample-selection method (Jung and Streeter, 2015). Through the lenses of three models, the two-part model, the Heckman selection model, and the Copula-based Heckman selection model, this study explored the financial protection effect of national health insurance on out-of-pocket health expenditure. This study was the first to employ an instrument-free Copula-based Heckman selection model to look at positive health expenditures and out-of-pocket spending concurrently.

This study further contributes to the current body of literature in health insurance, taking into account the interrelated nature of healthcare decisions, namely health insurance, healthcare utilisation, healthcare expenditure and health status. One prominent issue emanating from the literature on health insurance, healthcare utilisation, healthcare expenditure and health status is the fact that no effort, to the best of our knowledge, has been made to model these four thematic areas systematically. Studies often look at the causal effects of health insurance on healthcare utilisation, healthcare expenditure or other outcomes (e.g., Ekman, 2007). Therefore, it is critical to explore how these four thematic areas interact when seen as a whole. This study attempts to fill this gap by jointly modelling health insurance, health care utilisation, healthcare expenditure and health status within the Conditional Mixed Process (CMP) framework, thereby making a methodological contribution. The application of the CMP to simultaneously modelled healthcare decisions is a novelty.

CHAPTER FIVE: RESEARCH METHODOLOGY

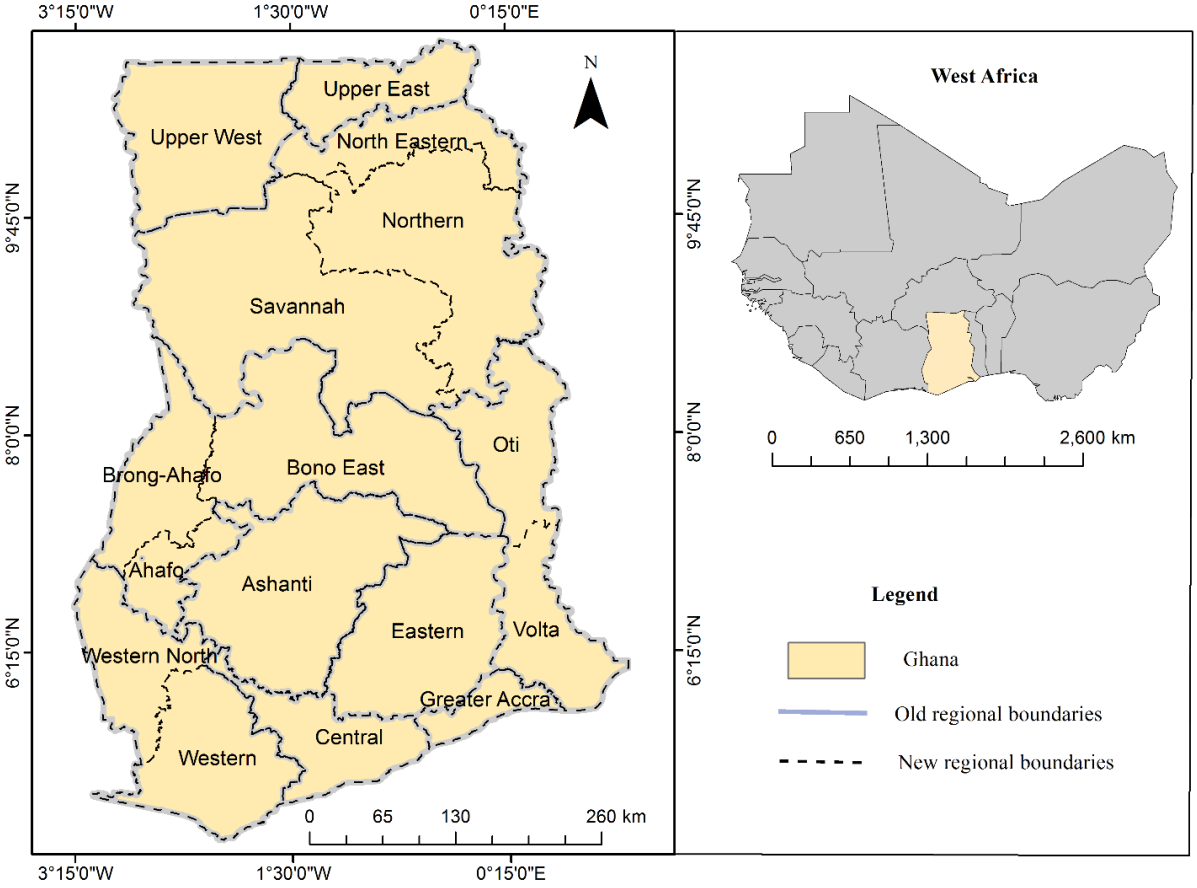
5.1 Introduction

The chapter's objective is to discuss the various methods and to determine the most appropriate model to use. The first section (i.e., Section 5.2) provides a geographic description of the study site. Section 5.3 follows with an explanation of the research design. A discussion on the various econometric models employed in addressing the objectives set for this study and the provision of justifications for their usage followed. Section 5.4 discusses econometric models and presents the variable description and a priori expectations. Notable econometric models considered to address the study objectives include the logistic regression, negative binomial regression, the two-stage residual inclusion (2SRI), Copula-based Heckman selection model, endogenous switching regression for ordered outcomes and Conditional Mixed Process (CMP) model. Section 5.5 provides a detailed description of the data source. The chapter comes to a close with section 5.6 with a chapter summary.

5.2 Location of the study area

The study area of this research is the entire country of Ghana. Ghana, officially known as the Republic of Ghana, is a West African country. The country borders the Gulf of Guinea and the Atlantic Ocean to the south, Ivory Coast to the west, Burkina Faso to the north and Togo to the east. Ghana has a total land size of 238,535 km2 (92,099 sq mi), encompassing a wide range of biomes from coastal savannas to tropical rain forests. From February 2019, Ghana now consists of sixteen administrative regions. These are Upper East, Upper West, North East, Northern, Savannah, Oti, Volta, Ahafo, Bono, Bono East, Ashanti, Central, Eastern, Greater Accra, Western North and Western regions. It must be noted that before the Ghana Socioeconomic Panel Survey (GSPS) datasets were collected Ghana had ten administrative regions, Upper East, Upper West (now Upper West and North East), Northern (now Northern and Savannah), Volta (now Oti and Volta), Bono Ahafo (now Bono, Bono East and Ahafo), Ashanti, Central, Eastern, Western regions (now Western and Western North), and Greater Accra. Ghana is the second-most populous country in West Africa after Nigeria, with about 30.8 million inhabitants (Ghana Statistical Service, 2021). Ghana's economy is built on gold, cocoa, and, more recently, oil, which has fuelled an economic boom. Figure 5.1 shows the map of Ghana showing the study area.

Figure 5.1: A map of the Ghana



5.3 Research design

The purpose of this study is to assess the effects of Ghana's national health insurance scheme on healthcare utilisation, financial protection and health status. The study adopted the quantitative research design, using the quasi-experimental design. The selection of this approach is appropriate as the outcome of our research findings would assist in making generalisations. The study used the first three waves of the Ghana Socioeconomic Panel Survey, a longitudinal data where information emanates from the same households. The econometric models considered appropriate for this study include the logit model, negative binomial regression model, two-stage residual inclusion (2SRI), the two-part model (i.e., probit model and log-linear model), Heckman selection model, Copula-based Heckman selection model, endogenous switching regression for ordered outcomes and Conditional Mixed Process (CMP) model. Stata 14 is the econometric software package used in the analysis.

5.4 Method of data analyses

This section deliberates on econometric models deemed appropriate to address the study objectives. These models include the logit model, negative binomial regression model, two-stage residual inclusion (2SRI), the two-part model (i.e., probit model and log-linear model), Heckman selection model, Copula-based Heckman selection model, endogenous switching regression for ordered outcomes and Conditional Mixed Process (CMP) model.

5.4.1 Evaluating the effects of NHIS on healthcare utilisation

The study utilises logistic regression and a negative binomial regression to assess the influence of the National Health Insurance Scheme on healthcare utilisation in Ghana. We identified two main outcomes for the definition of healthcare utilisation: first, ‘‘any utilisation versus none’’ (yes or no binary analysis) and second, the frequency of hospitalisation (‘‘number of hospitalisation days’’).

Logistic regression – also known as logit– is used to determine significant factors that affect health care utilisation. This model is suitable because the dependent variable, that is, visit to the health facility is a binary outcome. The logit model employs the cumulative distribution function of the logistic distribution, which turns to be convenient mathematically as compared to the probit model that applies the cumulative distribution function of the standard normal distribution. The logistic regression model is widely used in health sciences partly because coefficients can be interpreted in terms of odds ratios. The use of the visit to health care facilities is important because Ghana depends heavily on these facilities to provide even the most basic health care. This model expresses the probability of using health care facilities as a function of a series of explanatory variables. The model can be expressed as follows:

$$\mathrm{E}(Y_i) = \frac{\exp(\beta' x)}{1 + exp(\beta' x)} \qquad (5.1)$$

where Y_i denotes visit to health care facilities, x is the vector of independent variables including NHIS membership, gender, age, education, obesity, self-assessed health, chronic illness, physical activity, wealth index, type of illness suffered (i.e., fever, cold/cough and diarrhoea) and locality (rural). These independent variables have been commonly used in earlier empirical studies (Ekman, 2007; Geitona, Zavras and Kyriopoulos, 2007; Sengupta and Rooj, 2019). $\mathrm{E}(Y_i)$ stands for the likelihood of choosing one of the response outcomes (visit to health care facilities). The parameter vectors β are estimated by the maximum likelihood method. Previous

studies that employed the logistic regression to evaluate the effects of health insurance on health care utilisation include Ekman (2007), Geitona, Zavras and Kyriopoulos (2007), O'Connor (2015), Saeed *et al.* (2015) and Farrell and Gottlieb (2020).

At the second stage of analysis, a negative binomial regression model would be employed to determine significant factors that affect the intensity of health care utilisation. In the current study, the number of hospitalised days is used as a proxy measure for the intensity of utilisation. The Poisson regression model has been applied in the estimation of count outcomes such as the number of primary care visits, prevention visits, and sick visits (Holl *et al.*, 2000; Guindon, 2014). Let y_i represent the number of hospitalised days by a randomly selected individual. The Poisson regression model defines that the number of hospitalised days (y_i) is drawn from a Poisson distribution with parameter λ_i (mean number of hospitalisation), which is associated with a set of regressors X_i and $i = 1, \dots N$, indexes the N observations in a random sample.

$$Prob(Y = y_i|X_i) = \frac{exp^{-\lambda_i}\lambda_i^{y_i}}{y_i!}, \quad y = 0, 1, 2, \dots, n \qquad (5.2)$$

$$\lambda_i = exp(\alpha + X_i{}'\beta), y_i = 0, 1, \dots, i = 1, \dots N$$

Although the basic Poisson model appears appealing for application in empirical studies, it has a crucial flaw: the equi-dispersion assumption, which assumes that the variance of the count-dependent variable and its conditional mean are equal $(i.e., E[y_i|X_i] = Var[y_i|X_i] = \lambda_i)$ (Cameron and Trivedi, 1998; Winkelmann, 2008). However, in practice, count-dependent variables have been observed to exhibit over-dispersion. For instance, measurement of health care utilisation in terms of visits to the health facility would show over dispersion resulting from a substantial fraction of zero observations in the dataset. This situation is typical of most health count data which means that the variance of the count-dependent variable is greater than the conditional mean (Congdon, 2013). The negative binomial regression model, an extension of the Poisson, becomes the most suited regression technique to utilise in such cases.

The negative binomial model permits the variance to vary from the mean such that λ_i is now stated as:

$$ln\ \lambda_i = \beta' X_i + \ \varepsilon \qquad (5.3)$$

where "ε" is a gamma distribution $G(\theta, \theta)$, with mean equals 1, and variance $\frac{1}{\theta} = k$. The X_i is the vector of independent variables which includes NHIS membership, gender, locality (rural), body mass index (BMI), risky behaviour, type of illness suffered, self-assessed health and subjective social status. The subjective social status is individuals' perception about their

socioeconomic standing, as it asks individuals to rank their socioeconomic level in a 10-point ladder. The resulting probability distribution is given as:

$$Prob(Y = y_i|\varepsilon) = \frac{e^{-\lambda_i \exp(\varepsilon)} \lambda_i^{y_i}}{y_i!}, \quad y = 0, 1, 2, \ldots \qquad (5.4)$$

5.4.1.1 Econometric considerations

One major methodological challenge in evaluating the effects of health insurance on healthcare utilisation is endogeneity, accounting for self-selection bias. This is because insurance status is a choice variable for individuals, hence this study would allow for the possibility of endogeneity in the insurance variable. Possible candidates for endogeneity here are that insured persons may differ from the uninsured in terms of sociodemographic, type of employment, risk preferences, health behaviours, propensity to use health care, and baseline health status (Waters, 1999; Meer, Rosen and Rock, 2004; Sengupta and Rooj, 2019). For example, people with greater healthcare demand (e.g., persons with high comorbidity levels) are more likely to obtain health insurance coverage. Also, people with poor health status may decide to obtain health insurance in anticipation for increased healthcare utilisation.

As mentioned earlier, the logit and negative binomial models, which are examples of nonlinear models, were employed to evaluate the effects of the NHIS on healthcare utilisation. Nonlinear models are better appropriate for limited-dependent variables, count variables, and skewed distributions such as healthcare expenses and have been employed frequently in empirical health economics and health services research. In empirical health economics modelling, various nonlinear instrumental variables (IV) methods such as the Generalised Method of Moment (GMM) or the two-stage residual inclusion (2SRI) are used to correct for endogeneity. In this study we use the 2SRI to address the endogeneity problem (Terza, Basu and Rathouz, 2008). Our choice of 2SRI over GMM is appropriate because, in a review of IV methods, Klungel *et al.* (2004) established that employing the GMM estimator in the logistic regression model is inconsistent for causal Odds Ratio (OR) estimation owing to the non-collapsibility of the OR. Additionally, in a simulation study which compared the IV-GMM to the 2SRI, Koladjo, Escolano and Tubert-Bitter (2018) found that the 2SRI is less biased and yields satisfactory confidence intervals than the GMM estimator.

5.4.1.2 The modelling framework for two-stage residual inclusion

Consider a nonlinear modelling framework where the outcome and endogenous variable can be written as follows (Terza, Basu and Rathouz, 2008; Terza, 2017):

$$y = M(x_e\beta_e + x_0\beta_0 + x_u\beta_u) + e \qquad (5.5)$$

where y represents visit to the health facility (or the number of hospitalised days) and $M(\cdot)$ is a known nonlinear function. In the current study, $M(\cdot)$ denotes the logistic distribution or negative binomial functions for the estimation of visits to the health facility and intensity of utilisation, respectively. x_e is the endogenous regressor (i.e., health insurance membership), x_0 represents observable exogenous regressors (observable confounders) and x_u denotes unobservable confounder latent variables (omitted variables) that influence the outcome *y* and are correlated with the endogenous variable. The parameter $\beta = (\beta_e, \beta_0, \beta_u)$ denotes the vector of unknown parameters to be estimated and *e* denotes the error term.

Without the endogenous variable, all observed regressors are exogenous and the true model can be written as (Terza, 2017):

$$y = M(x_e\beta_e + x_0\beta_0) + e \qquad (5.6)$$

In a situation where the true model holds, application of the conventional regression methods is appropriate for estimating the parameters β. However, in the presence of an unobserved confounder, applying the conventional regression methods would lead to biased estimates. In such situations, there would be correlation between x_e and x_u —this is the essence of the endogeneity problem. To reinforce the relationship between x_e and x_u, and thus deliver a way to correct for endogeneity via the use of instrumental variables, we express the following nonlinear auxiliary equation which predicts the endogenous regressor as a function of exogenous regressors x_0, the confounder x_u, and another variable *Z*. This formulation can be expressed as follows (Terza, 2017):

$$E(x_e \mid Z, x_0, x_u) = r(Z\alpha_z + x_0\alpha_0 + x_u) \qquad (5.7)$$

where the function $M(\cdot)$ = r(.) and the variable *Z* represents the instrumental variable (or instrument). The elements in *Z* must meet the following three conditions: first, they cannot be correlated with x_u; second, they must be adequately correlated with x_e (i.e., they must not be weak); and finally, they can neither have a direct influence on y nor be correlated with the error term in (5.5). Besides, the number of elements in Z must equal the number of endogenous regressors in (5.5). Under these assumptions, estimation of 2SRI follows a two-stage

procedure: the first stage involves predicting the endogenous variable using the instruments and other covariables [i.e., estimating equation (5.7)]; the second stage involves including the residuals of the first regression as a regressor. It needs to be mentioned that the actual observed value of the endogenous regressor x_e is retained in the second-stage regression model while the residuals from the auxiliary regressions are replaced by the unobserved confounders x_u. The second-stage model would take the following form:

$$y = M(x_e\beta_e + x_0\beta_0 + \widehat{x_u}\,\beta_u) + e^{2\text{SRI}} \qquad (5.8)$$

where $e^{2\text{SRI}}$ is the regression error term and $\widehat{x_u}$ is estimated residuals. This second-stage estimation renders the standard errors incorrect, but the correct standard errors can be obtained through bootstrapping.

The study identified the following as exogenous regressors (x_0): gender, age, education, obesity, self-assessed health, chronic illness, physical activity, type of illness suffered (i.e., fever, cold/cough and diarrhoea), locality (rural) and wealth index. The study constructed a wealth index that serves as a proxy for household wealth. Data on quality of housing characteristics such as utilities and structure (dwelling characteristics) and ownership of household assets were employed to construct the wealth index, using Multiple Correspondence Analysis (MCA). The MCA is an alternative to principal components analysis for obtaining asset-based scores (Traissac and Martin-Prevel, 2012). The reason is that the MCA was designed originally to deal with categorical variables and is the only such multivariate method employed to examine a combination of binary, categorical, discrete or continuous variables (Greenacre, 2007). The selection of these covariates is deemed appropriate as it was based on previous empirical literature (Ekman, 2007; Galarraga *et al.*, 2010; Sengupta and Rooj, 2019).

Savings, chronic illness and obesity are used as the confounder (x_u). For instance, an individual is likely to draw on his savings upon illness episode. Hence, this makes the saving variable more likely to influence a visit to the health facility. This study used a variable called formal-sector worker as our instrumental variable (*Z*). In Ghana, the law requires all formal-sector workers to contribute to Social Security and National Insurance Trust (SSNIT). Hence, almost all formal-sector workers are Social Security and National Insurance Trust (SSNIT) contributors. The law establishing Ghana's NHIS takes 2.5 per cent of workers' contributions to SSNIT compulsorily to fund the NHIS. Furthermore, the law mandates SSNIT contributors to enrol in the scheme without paying a premium. We believed that our instrument (i.e., formal-sector worker) is likely to predict NHIS membership positively. However, being a formal-

sector worker may not directly influence a visit to the health facility or the number of hospitalised days, making the formal-sector worker variable a valid instrument. Aside savings, chronic illness, obesity and formal-sector variables, other variables that predict the endogenous variable (i.e., NHIS membership) at the first stage include gender, age, education, marriage, household size, physical activity, self-assessed health and wealth index. Tables 5.1 and 5.2 summarise the operational measurement of the dependent variables (visit to health facility and hospitalisation days) and independent variables used in the analysis and a priori expectations.

Table 5.1: Measurement of variables and a priori expectations for visit to health facility

Variable	Measurement	a priori expectations
Dependent variable		
Visits to a health facility	Dummy: 1 = visits to a health facility; 0 = otherwise	
Independent variables		
NHIS enrolment	Dummy: 1 = currently insured; 0 = otherwise	+
Gender	Dummy: 1 = male; 0 = otherwise	-
Age	Continuous: positive whole numbers in years	+
Education	Ordinal: measured on a five-point scale ranging from 0 for no formal education to 4 as the highest educational level attained	+
Locality (rural)	Dummy: 1 = resides in rural area; 0 = otherwise	-
Obesity	Dummy: 1 = if BMI ≥30; 0 = otherwise	+
Type of Illness		
Fever	Dummy: 1 = if suffered Fever; 0 = otherwise	+
Cold or cough	Dummy: 1 = if suffered Cold or Cough; 0 = otherwise	+
Diarrhoea	Dummy: 1 = if suffered diarrhoea; 0 = otherwise	+
Chronic illness	Dummy: 1 = if exposed to chronic illness (sores, irritations and/or numbness); 0 = otherwise	+
Self-assessed health	Ordinal: unhealthy =1, somewhat unhealthy =2, somewhat healthy =3 and Very healthy =4	-
Physical activity	Dummy: 1 = difficulty in participating in physical activities/roles; 0 = otherwise	+
Wealth index	Continuous positive and negative numbers generated from housing and assets characteristics using Multiple Correspondence Analysis	+

Note: Body Mass Index is weight in kg divided by height in centimetres squared multiply by 10,000

Table 5.2: Measurement of variables and a priori expectations for hospitalisation days

Variable	Measurement	a priori expectations
Dependent variable		
Hospitalisation days	Continuous: number of hospitalisation days	
Independent variables		
NHIS enrolment	Dummy: 1 = currently insured; 0 = otherwise	+
Gender	Dummy: 1 = male; 0 = otherwise	-
Age	Continuous: positive whole numbers in years	+
Education	Ordinal: measured on a five-point scale ranging from 0 for no formal education to 4 as the highest educational level attained	-
Locality (rural)	Dummy: 1 = resides in rural area; 0 = otherwise	-
Body mass index (BMI)	Continuous: measured by weight in kg divided by height in centimetres squared multiply by 10,000	+
Risky behaviour	Dummy: 1 = if consume alcoholic beverages and/or smoke or chew tobacco; 0 = otherwise	+
Type of Illness		
Fever	Dummy: 1 = if suffered fever; 0 = otherwise	+/-
Cold or cough	Dummy: 1 = if suffered cold or cough; 0 = otherwise	+/-
Diarrhoea	Dummy: 1 = if suffered diarrhoea; 0 = otherwise	+/-
Self-assessed health	Ordinal: unhealthy =1, somewhat unhealthy =2, somewhat healthy =3 and Very healthy =4	-
Subjective social status	Ordinal: 10-point ladder based	+/-
Savings	Dummy: 1 = if household head saves with banking institutions and others; 0 = otherwise	-

5.4.2 Analysing the effects of NHIS on financial protection

The study cited three financial protection indicators in the literature, namely out-of-pocket expenditures, catastrophic expenditures and impoverishing effects of out-of-pocket spending. Due to data challenges emanating from the datasets, the present study used out-of-pocket spending to analyse the financial protection effects of NHIS on Ghanaians.

To begin with, the study utilises a two-part and a bivariate sample selection model for out-of-pocket expenditures. The study further submits that health insurance influence out-of-pocket health expenditures through two main channels: the first channel connects to the probability that someone utilises health care, computed by a selection equation. The second channel is how much money an individual spends out of pocket if they had utilised health care, calculated using an outcome equation.

If unobserved factors that influence an individual's enrolling decision also influence their level of health spending, the health insurance variable may be endogenous. For example, individuals in greater need of health care have a greater motivation to buy insurance, and they are also more likely to use healthcare facilities, resulting in higher expenses. The coefficient estimates will be inconsistent and perhaps bias if the endogeneity issue is not addressed. The Heckman two-step procedure is used to deal with the endogeneity problem associated with health insurance.

We aim to look at the influence of health insurance on the likelihood of seeking care and, at the same time, the level of healthcare expenditure. The two-part model and the sample selection model are applicable for this type of analysis (Jung and Streeter, 2015). Interestingly, both models have two equations: a selection equation (i.e., a binary equation modelling the likelihood of positive healthcare spending and an outcome equation (i.e., the log of out-of-pocket health spending for persons reporting positive levels of health care expenditures). Jung and Streeter (2015) further submit that splitting the estimate into these two parts allows for a more thorough explanation of the effects of health insurance on out-of-pocket health care expenditure while accounting for the fact that some persons do not utilise health care, thus have zero reported health costs.

These two models differ concerning the specification of the error term correlation between the selection and outcome equations. The two-part model assumes that the errors are independent, meaning there is no correlation between them in the two equations, whereas the selection model does not. After controlling for observed individual characteristics, if the two error errors are uncorrelated, the two equations can be computed individually, and both models are valid. Conversely, if the errors are correlated, the estimates from the two-part model will be biased, and the selection model will be more suitable (Cameron and Trivedi, 2005).

The two-part model's estimation is simple: part one is a probit model, and part two is a linear regression model. The probit model computes the probability of a person incurring the out-of-pocket expenditure. The model can be formally stated as follows:

$$Prob\ (HE > 0)\ = X_i'\beta + \mu_i \quad (5.9)$$

The dependent variable is health care expenditures (HE), which takes the value 1 if health care spending is positive, and 0 otherwise. X is a set of independent variables, including NHIS membership whose direction and magnitude are of interest in this study. Other control variables are gender, age, education, household size, self-assessed health, risky behaviour, obesity, chronic illness, physical activity, type of illness suffered, wealth index and dependency ratio.

Part two is a log-linear model that calculates the amount of out-of-pocket spending based on the utilisation of healthcare services. The rightward skewness of out-of-pocket health expenditures sometimes necessitates a logarithmic transformation to lessen the skewness. Part two of the model can be specified as follows:

$$log(out - of - pocket\ expenditure\ /\ visit\ >\ 0) = X_i'\Phi + \varepsilon_i \quad (5.10)$$

The response variable is total out-of-pocket spending at the point of using health care. This variable includes transportation, medicines, consultations, and any other costs associated with the use of modern health care services and payments made to private providers that are not covered by health insurance. Where X represents a set of individual, household and health-related characteristics including NHIS membership, gender (male), age, education, household size, self-assessed health, risky behaviour, obesity, chronic illness, physical activity, wealth index, type of illness suffered, distance, hospitalisation and the use of public health facility hypothesised to influence utilisation of health care services and health expenditure. See Table 5.3 for the variables, measurement and expected signs.

As stated earlier, in a situation where the errors are correlated, a single equation estimation technique such as the two-part model would produce inconsistent estimates. Besides, individuals self-select themselves into an insured or uninsured category based on expected benefits or utilities, hence, the need to account for selection bias and employ a simultaneous equations estimation technique. The Heckman two-step procedure employs two equations to solve this self-selection bias. The first phase is to estimate a probit model for selection, and the second stage corrects for self-selection by integrating an inverse Mills ratio transformation generated from the probit model. The inverse Mills ratio would enter as an supplementary

independent variable in an ordinary least square regression model of interest (Gujarati and Porter, 2009).

Table 5.3: Measurement of variables and expected signs for positive healthcare spending (PHS) and out-of-pocket expenditure (OOP)

Variable	Measurement	Expected signs	
		PHS	OOP
Dependent variables			
Positive healthcare spending (PHS)	Dummy: 1 = incur healthcare spending; 0 = otherwise		
Log(OOP) health expenditure	Continuous: positive numbers		
Independent variables			
NHIS enrolment	Dummy: 1 = currently insured; 0 = otherwise	+	-
Gender	Dummy: 1 = male; 0 = otherwise	-	-
Age	Continuous: positive whole numbers in years	+	+
Education	Ordinal: measured on a five-point scale ranging from 0 for no formal education to 4 as the highest educational level attained	+	+
Household size	Continuous: positive whole numbers of the number of persons in the household	+/-	+
Dependency ratio	Continuous: number of household members age ≤14 and > 64 to those age 15–64 years old	+/-	
Obesity	Dummy: 1 = if BMI ≥30; 0 = otherwise	+	+
Risky behaviour	Dummy: 1 = if consume alcoholic beverages and/or smoke or chew tobacco; 0 = otherwise	-	+
Type of Illness			
Fever	Dummy: 1 = if suffered fever; 0 = otherwise	+	+
Cold or cough	Dummy: 1 = if suffered cold or cough; 0 = otherwise	+	+
Diarrhoea	Dummy: 1 = if suffered diarrhoea; 0 = otherwise	+	+
Chronic illness	Dummy: 1 = if exposed to chronic illness (sores, irritations and/or numbness); 0 = otherwise	+	+
Physical activity	Dummy: 1 = difficulty in participating in physical activities/roles; 0 = otherwise	+	+
Self-assessed health	Ordinal: unhealthy =1, somewhat unhealthy =2, somewhat healthy =3 and Very healthy =4	-	-
Distance to health facility	Continuous: number of hours it takes to travel to and from the health facility		+
Wealth index	Continuous positive and negative numbers generated from housing and assets characteristics using Multiple Correspondence Analysis	+	
Hospitalisation	Dummy: 1 = if hospitalised; 0 = otherwise		+
Public health facility	Dummy: 1 = if use public health facility; 0 = otherwise		-

Note: Body Mass Index is weight in kg divided by height in centimetres squared multiply by 10,000

Adopting the Heckman selection model, a person's decision to incur health care expenses is influenced by several factors. The equation below illustrates this (Greene, 2000):

$$Z_i^* = \gamma' L_i + u_i \qquad (5.11)$$

Equation (5.11) is the sample selection equation. Z_i^* is a dichotomous variable which is unobservable but instead, we observe the decision of an individual incurring health care expenditures or not. Therefore, $Z_i = 1$ if $Z_i^* > 0$ and $Z_i = 0$ if $Z_i^* \leq 0$. L_i is a vector of exogenous variables that affect Z_i^*.

Closely related to the decision of an individual incurring healthcare expenditure is the incurred out-of-pocket expenditures. Equation (5.12) is the outcome equation. Under the condition that $Z_i = 1$, Y_i represents the log of out-of-pocket expenditures expectedly incurred by the individual, with the assumption that:

$$Y_i = b_i' X_i + v_i \qquad (5.12)$$

where X_i is the vector of independent variable influencing out-of-pocket expenditures. From equations (5.11) and (5.12), u_i and v_i have bivariate normal distributions with zero means, standard deviation δ_u and δ_v, and with a correlation coefficient of ρ. It is assumed that Z_i and L_i are observed for a random sample of individuals, but Y_i is observed only when $Z_i = 1$, that is when the i^{th} individual incurred health care expenditure. Modified from the equation by Heckman (1979), the expected out-of-pocket expenditures may be stated as follows (Puhani, 2000):

$$E(Y_i|Z_i = 1) = E(Y_i|Z_i^* > 0) = E(Y_i|u_i > -\gamma' L_i) = b_i' X + E(v_i|u_i > -\gamma' L_i)$$
$$= b_i' X_i + \rho \sigma_v u_i(\alpha_u) \qquad (5.13)$$

where:

$$u_i(\alpha_u) = \frac{\varphi\,(\alpha_u)}{1 - \phi(\alpha_u)} = \frac{\varphi\,(-\alpha_u)}{\phi(\alpha_u)} = \frac{\varphi\,(\gamma' L_i|\alpha_u)}{\phi(\gamma' L_i|\alpha_u)} \qquad (5.14)$$

and φ and ϕ are the normal density function and normal distribution function, respectively. The function $\mu_i(\alpha_u)$ is called the inverse Mill's ratio which is the ratio of the probability density function over the cumulative distribution function of a distribution. A least squares regression of Y_i on X_i, without the term $\mu_i(\alpha_u)$ would yield inconsistent estimators of b_i. If the expected value of the error were known, it could be included in the regression model as an additional independent variable, eliminating that part of the error correlated with the independent variables and averting inconsistency. However, because the error component cannot be estimated, the inverse Mills ratio must be calculated and added to the estimation of equation (5.13).

A probit model (equation 5.9) is estimated in the first stage of the Heckman model. The inverse Mill's ratio is then derived using this probit model's linear prediction. When the selection equation equals one, that is, individuals have incurred health care expense, the second phase would involve regressing *Y* on the covariates *X*, including the inverse Mill's ratio. Selection bias is present, according to a Wald test showing highly significant inverse Mill's ratio.

As common with maximum likelihood estimators, the Heckman selection model assumes bivariate normality in the models. This joint normality assumption "may be too restrictive for any empirical work" (Sengupta and Rooj, 2019: p. 115), as a violation of this distributional assumptions would result in the inconsistency of a maximum likelihood estimator (Hasebe, 2013). The current study further employed a Copula-based Heckman sample-selection model to simultaneously address the problems of non-random sample selection and non-normal bivariate distribution between the models. This method follows the conventional specification of two equations (i.e., a selection equation and an outcome equation) as expressed in equation 5.11 and 5.12 to manage the sample selection problem.

5.4.3 Exploring the impact of NHIS membership on health status

In addressing the third objective, which seeks to explore the impact of NHIS membership on health status, endogenous switching regression for ordered outcomes was used to estimate the impact of NHIS membership on self-assessed health (henceforth SAH) status. Specifically, this method analyses the effect of endogenous binary choice indicator (treatment i.e., NHIS membership) on an ordinal dependent variable (outcome i.e., SAH). SAH is also referred to as self-rated, self-perceived, or self-reported health. It has been extensively used in social science and epidemiological studies as a complex, comprehensive and dependable measure of population health and a strong predictor of death, morbidity and healthcare utilisation (Geitona, Zavras and Kyriopoulos, 2007; Jylhä, 2009; Au and Johnston, 2014; Fan *et al.*, 2019). It is a simple measurement derived from gathering data and it is a widely used subjective health indicator in empirical research. A SAH question is usually framed simply as: "How is your health in general?" Or "How would you rate your health?" Possible answer choices are: 'very good' (1), 'good' (2), 'neither good nor poor' (3), 'poor' (4) and 'very poor' (5). In the Ghana Socio-Economic Panel Survey dataset, the answer choices were 'Very healthy' (1), somewhat healthy (2), somewhat unhealthy (3) and unhealthy (4). These items were recorded as unhealthy (1), somewhat unhealthy (2), somewhat healthy (3), and 'Very healthy' (4) to obtain an ordinal

outcome/scale. This transformation is necessary since the outcome variable (SAH) needs to be measured on an ordinal scale so that the treatment effect is reported for every level of health among J possible ordered health outcomes.

This method would account for possible endogeneity in insurance status and self-selection bias in the decision to enrol as NHIS member. Since selection into insurance coverage is non-random, some unobservable factors may influence health insurance and SAH simultaneously. Aside from correcting for possible endogeneity in insurance status and self-selection bias, another benefit of using ordered models is that it permits us to study the distribution of treatment effects. For instance, the model allows us to observe the effect of insurance status on reporting lower SAH or higher SAH status. The current study employs an endogenous, latent-factor treatment effects model to understand the causal relationship between health insurance and SAH. The specification and estimation of this model are based on the latent variable structure and maximum likelihood, respectively.

5.4.2.1 Model specification

The endogenous switching regression treatment effects model for ordered outcomes presumes that the treatment (NHIS membership) and the outcome (SAH) are endogenous. As a result, the model splits individuals into two regimes based on the individuals' health status with or without health insurance.

Our outcome of interest is the individual's SAH, which is measured on an ordinal scale with *J* possible ordered outcomes, $j = 1, \dots, J$. Let $M_i \in \{0, 1\}$ be the binary treatment variable that takes the value of one if a person is a member of NHIS and zero otherwise. The selection equation is given as:

$$M_i = \begin{cases} 1 \text{ if } M_i^* = Z_i\gamma + e_i > 0 \\ 0 \text{ if } M_i^* = Z_i\gamma + e_i \leq 0 \end{cases} \tag{5.19}$$

where Z_i is the set of covariates hypothesised to influence NHIS membership and e_i is the error term. For the outcome equation separate regimes for treated and untreated can be written as (Gregory, 2015):

$$SAH_{0i} = \begin{cases} 1 \; if \; -\infty < X_{0i}\beta_0 + u_{0i} \leq \mu_{01} \\ 2 \text{ if } \mu_{01} < X_{0i}\beta_0 + u_{0i} \leq \mu_{02} \\ 3 \text{ if } \mu_{02} < X_{0i}\beta_0 + u_{0i} \leq \mu_{03} \\ 4 \text{ if } \mu_{03} < X_{0i}\beta_0 + u_{0i} \leq \infty \end{cases} \tag{5.20}$$

$$SAH_{1i} = \begin{cases} 1 \text{ if } -\infty < X_{1i}\beta_1 + u_{1i} \leq \mu_{11} \\ 2 \text{ if } \mu_{11} < X_{1i}\beta_1 + u_{1i} \leq \mu_{12} \\ 3 \text{ if } \mu_{12} < X_{1i}\beta_1 + u_{1i} \leq \mu_{13} \\ 4 \text{ if } \mu_{13} < X_{1i}\beta_1 + u_{1i} \leq \infty \end{cases} \quad (5.21)$$

Specification is based on latent variable structure; hence the latent outcome indices are $SAH_{0i}^{*} = X_{0i}\beta_0 + u_{0i}$ and $SAH_{1i}^{*} = X_{1i}\beta_1 + u_{1i}$.

where u_i is the idiosyncratic error term and X_i are the explanatory variables of the outcome equation that include individual, household and health-related characteristics such as gender (male), age, education, obesity, chronic illness, physical activity, wealth index, locality (urban), type of illness suffered, risky behaviour and NHIS membership.

One way to fit such a model using maximum likelihood is to assume that e_i and u_i follow a bivariate normal distribution with correlation rho (ρ). If ρ = 0, then equation (5.19) can be computed by generalised ordered probit. If $\rho \neq 0$, then the unobservable determinants of insurance selection are said to be correlated with the unobservable determinants of SAH, rendering insurance endogenous. This means that people may observe a worsening health status and may select receiving health insurance coverage or may buy health insurance and observe health status. The likelihood of endogeneity necessitates a joint estimation of equations (5.19), (5.20) and (5.21) through maximum-likelihood to ascertain consistent and asymptotically efficient estimates (Bilgel and Karahasan, 2017).

However, working under the assumption of bivariate normal distribution when it is violated can yield inconsistent estimates of model parameters. Another option is to follow a latent-factor approach and reformulate the model of this kind (Gregory, 2015):

$$e_i = \lambda_M \eta_i + \zeta_i$$

$$\mu_i = \lambda_{SAH} \eta_i + \iota_i \quad (5.22)$$

where λ_M and λ_{SAH} are the loading factors describing the dependence of the latent errors for the treatment and the outcome, respectively, then only the marginal distributions of ζ_i and ι_i are assumed to be normal.

Simulating the distribution by taking random draws from its chosen distribution, the likelihood function can be expressed as (Gregory, 2015):

$$L_i = \frac{1}{S}\prod_{i=1}^{N}\sum_{s=1}^{S}\sum_{\ell=0}^{\ell=1}\{I \times (T_i = \ell)\} \times \Phi\{\tau \times (Z_{i\gamma} + \lambda_{\ell T \eta_i})\}$$
$$\times \sum_{\ell=0}^{\ell=1}\{I \times (T_i = \ell)\} \times \sum_{k=1}^{K}\{I \times (Y_i = k)\}\{\Phi(\mu_{\ell k} - X_{\ell i}\beta_i + \lambda_{\ell Y \eta_i})$$
$$- \Phi(\mu_{\ell k-1} - X_{\ell i}\beta_i + \lambda_{\ell Y \eta_{\ell i}})\} \qquad (5.23)$$

Where *S* is the number of simulation draws, Φ is the standard normal distribution, *I* is an indicator function, $\ell \in (0,1)$, $\tau = 2 \times T_i = 1$, $\mu_0 = -\infty$ and $\mu_k = \infty$ and *K* = *J* +1. To implement this estimator, the Halton–based sequence is employed to draw from the distribution of the likelihood function.

The estimated treatment effects that are of particular interest are the average treatment effect (ATE) and the average treatment effect on the treated (ATT). The ATE, by definition, is the effect of treatment on a person chosen at random from the given population relative to the effect on that person had he or she not received the treatment. Specifically, ATE shows the expected effect of healthcare insurance on SAH for a randomly drawn individual from the population for a given level of *J*.

$$ATE_k = \frac{1}{N}\frac{1}{S}\sum_{i=1}^{N}\sum_{s=1}^{S}[\Phi\{\mu_k - (X_{1i}\beta_1 + \lambda_1\eta_{is})\} - \Phi\{\mu_{1k-1} - (X_{1i}\beta_1 + \lambda_1\eta_{is})\}]$$
$$- [\Phi\{\mu_{0k} - (X_{0i}\beta_0 + \lambda_0\eta_{is})\} - \Phi\{\mu_{0k-1} - (X_{0i}\beta_0 + \lambda_0\eta_{is})\}] \qquad (5.24)$$

where *k* =1,…,*K*, *K* = *J* +1, and J is the number of choices. $\mu_0 = -\infty$ and $\mu_k = \infty$, *N* is the number of observations, *S* is the number of simulation draws, and Φ is the standard normal cumulative distribution (Gregory, 2015).

The other measure of interest, the ATT estimates the difference in outcomes for a person who adopted the treatment; that is, it tells us, conditional on the treatment, the difference between the treated and untreated state for a given person. Precisely, the ATT shows the expected effect of healthcare insurance for a randomly drawn individual only from those individuals who purchase healthcare insurance for a given level of *J:*

$$ATT_j = \frac{1}{N}\frac{1}{S}\sum_{i=1}^{N}\frac{1}{E\{\Phi(Z_i\gamma)\}}\left(\sum_{s=1}^{S}\sum_{\iota=0}^{\iota=1}\{I\times(T_i=\ell)\}\,\Phi(Z_i\gamma+\eta_{is})\right.$$
$$\times\left[\Phi\{\mu_{0j}-(X_{1i}\beta_1+\lambda_1\eta_{is})\}-\Phi\{\mu_{1,j-1}-(X_{1i}\beta_1+\lambda_1\eta_{is})\}\right.$$
$$\left.\left.-\Phi\{\mu_{0j-1}-(X_{0i}\beta_0+\lambda_0\eta_{is})\}+\Phi\{\mu_{0,j-1}-(X_{0i}\beta_0+\lambda_0\eta_{is})\}\right]\right) \quad (5.25)$$

$T=\ell$ for $\ell \in (0,1)$ denotes that the treatment indicator has been set to 0 or 1 (Gregory, 2015). The implementation command is the "switchoprobitsim" developed by Gregory (2015). Table 5.4 provides measurement of variables used for the analysis.

Table 5.4: Measurement of variables

Variable	Measurement
Dependent variables	
NHIS enrolment	Dummy: 1 = currently insured; 0 = otherwise
Health status	Ordinal: unhealthy =1, somewhat unhealthy=2, somewhat healthy =3 and Very healthy=4
Independent variables	
Gender	Dummy: 1 = male; 0 = otherwise
Age	Continuous: positive whole numbers in years
Education	Ordinal: measured on a five-point scale ranging from 0 for no formal education to 4 as the highest educational level attained.
Locality (urban)	Dummy: 1 = resides in urban area; 0 = otherwise
Obesity	Dummy: 1 = if BMI ≥30; 0 = otherwise
Risky behaviour	Dummy: 1 = if consume alcoholic beverages and/or smoke or chew tobacco; 0 = otherwise
Type of Illness	
Fever	Dummy: 1 = if suffered fever; 0 = otherwise
Cold or cough	Dummy: 1 = if suffered cold or cough; 0 = otherwise
Diarrhoea	Dummy: 1 = if suffered diarrhoea; 0 = otherwise
Chronic illness	Dummy: 1 = if exposed to chronic illness (sores, irritations and/or numbness); 0 = otherwise
Physical activity	Dummy: 1 = difficulty in participating in physical activities/roles; 0 = otherwise
Wealth index	Continuous positive and negative numbers generated from housing and assets characteristics using Multiple Correspondence Analysis
Household size	Continuous: positive whole numbers of the number of persons in the household
Dependency ratio	Continuous: number of household members age ≤14 and > 64 to those age 15–64 years old
Formal-sector worker	Dummy: 1 = if household head is a formal-sector worker; 0 = otherwise

Note: Body Mass Index is weight in kg divided by height in centimetres squared multiply by 10,000

5.4.3 Examining the interrelationship between health insurance, health care utilisation, financial protection and health status

Healthcare decision-making process by nature could be complicated. In most cases, both patients and doctors are involved in the decision-making process. For example, when a patient becomes ill, the patient must first determine whether or not to seek medical assistance, after the patient and the doctor must mutually decide what therapy the patient should receive. This situation makes such health care decisions interrelated. Previous studies dealt with this two-part decision-making process by using the two-part model as suggested by the RAND Health Insurance Experiment (Manning *et al.*, 1987). As mentioned earlier, the RAND experiment likened plans of differing benefit generosity instead of comparing insured and uninsured. Another shortcomings of the RAND experiment is that it focused on the effects of cost-sharing on healthcare utilisation and health outcome rather than looking at expansion of social health insurance (Newhouse, 1993). The two-part model has been used extensively in the literature (Ekman, 2007; Nguyen, Rajkotia and Wang, 2011; Jung and Streeter, 2015). In a recent study, Woldemichael, Gurara and Shimeles (2019) used an extended two-part model to model the insurance enrolment decision, the decision to spend and the conditional amount of spending simultaneously. To the best of our knowledge, no study has addressed the whole process of insurance choice, healthcare utilisation, healthcare expenditure and health status simultaneously. This study aims to fill this gap.

Interrelationships are observed in the area of insurance, health care utilisation, healthcare expenditure and health status. Insurance coverage can be incorporated in our model mainly because it may influence patients and doctors' combined decisions about treatment procedures or choices. For instance, insured persons are more plausible to accept and undergo more complex medical procedures than their uninsured counterparts. Added to this, there could be an adverse selection problem because less healthy individuals are more likely to purchase insurance. Therefore, this study proposed a model that will account for the interrelationship between insurance, healthcare utilisation, healthcare expenditure, and health status variables. The appropriate econometric technique proposed here is the Conditional Mixed Process (CMP) model as suggested by (Roodman, 2011). The CMP estimation technique deals with both sample selection bias and endogeneity issues.

The CMP model is primarily created as a seemingly unrelated regression (SUR) model, which allows for the construction of disparate models and their blending in a multi-equation approach (Roodman, 2011). Individual equations in the CMP framework do not follow the traditional

regression model with a continuous dependant variable. Also, the CMP framework may allow ordered probit estimation. The invocation of CMP allows for the specification of several equations with each using a different estimation technique and allowing each equation to differ by observation. Estimation under CMP uses the maximum likelihood procedure. The basic supposition underpinning the CMP framework is the joint modelling of two or more equations which allow for cross-equation correlation of the error terms. This provides a justification for its use in this current study. A SUR model of health insurance status (y_1), health care utilisation (y_2), healthcare expenditure (y_3) and health status (y_4) in the design of the CMP is stated as follows:

$$y_1^* = \theta_1 + \varepsilon_1 \quad (5.26)$$

$$y_2^* = \theta_2 + \varepsilon_2 \quad (5.27)$$

$$y_3^* = \theta_3 + \varepsilon_3 \quad (5.28)$$

$$y_4^* = \theta_4 + \varepsilon_4 \quad (5.29)$$

$$\theta_1 = \beta_1 \mathrm{X}, \quad \theta_2 = \beta_2 \mathrm{X}, \quad \theta_3 = \beta_3 \mathrm{X} \quad \theta_4 = \beta_4 \mathrm{X}$$

$$\mathrm{y} = \mathrm{g}(y^*) = (1\{y_1^* > 0\}, 1\{y_2^* > 0\}, 1\{y_3^* > 0\} y_4^*)' \quad (5.30)$$

$$\epsilon = (\varepsilon_1, \varepsilon_2, \varepsilon_3, \varepsilon_4)' \sim N(0, \Sigma)$$

$$\Sigma = \begin{bmatrix} 1 & \sigma_{12} & \sigma_{13} & \sigma_{14} \\ \sigma_{21} & 1 & \sigma_{23} & \sigma_{24} \\ \sigma_{31} & \sigma_{32} & 1 & \sigma_{34} \\ \sigma_{41} & \sigma_{42} & \sigma_{43} & 1 \end{bmatrix}$$

Assuming that $y_i = (0, 0, 0, y_{i4})'$ is observed, then the likelihood function can be stated as:

$$L_i(\beta_1, \beta_2, \beta_3, \beta_4, \Sigma;\ y_i | x_i) = \int_{-\infty}^{-\theta_1} \int_{-\infty}^{-\theta_2} \phi_j \{(\varepsilon_1, \varepsilon_2, \varepsilon_3, y_{i4} - \theta_{i4})'; \Sigma\} d\varepsilon_1 d\varepsilon_2$$

This function is difficult to compute directly using standard statistical software algorithms (Roodman, 2011). To estimate directly, we have to factor $\phi_j\{(\varepsilon_1, \varepsilon_2, \varepsilon_3, y_{i4} - \theta_4); \Sigma\}$ into probability distribution functions, $\varepsilon_1, \varepsilon_2 | \varepsilon_3$ and ε_3[8].

The following are the empirical specifications of the four models based on the above:

$$HI_i = \alpha_0 + \alpha_1 X_i + e_{1i} \quad (5.30)$$

$$HU_i = \beta_0 + \beta_1 X_i + e_{2i} \quad (5.31)$$

[8] See details in Roodman (2011) as the paper extensively treats how to do this.

$$HE_i = \gamma_0 + \gamma_1 X_i + e_{3i} \quad (5.32)$$

$$HS_i = \gamma_0 + \gamma_1 X_i + e_{4i} \quad (5.33)$$

where HI, HU, HE and HS are health insurance status, healthcare utilisation, healthcare expenditure, and health status, respectively; X is the set of independent variables hypothesised to influence HI, HU, HE and HS. These set of variables include gender (male), age, education, obesity, chronic illness, physical activity, wealth index, type of illness suffered, risky behaviour, formal-sector worker, dependency ratio, household size, savings and distance to a health facility. Representing the respective error terms are e_1, e_2, e_3 and e_4. Table 5.5 shows the measurement of variables and their a priori expectations for our four interrelated variables, namely health insurance, healthcare utilisation, financial protection and health status.

Table 5.5: Measurement of variables and a priori expectations for health insurance, healthcare utilisation, financial protection and health status

		A priori expectations			
Variable	Measurement	Enrolment	Utilisation	OOP health expenditure	Health status
Dependent variables					
NHIS enrolment	Dummy: 1 = if currently insured; 0 = otherwise				
Visit to health facility	Dummy: 1 = visit to a health facility; 0 = otherwise				
Hospitalisation days	Continuous: number of hospitalisation days				
Log(OOP) health expenditure	Continuous: positive numbers				
Health status	Ordinal: unhealthy =1, somewhat unhealthy =2, somewhat healthy =3 and Very healthy =4				
Independent variables					
Gender	Dummy: 1 = male; 0 = otherwise	-	-	-	+
Age	Continuous: positive whole numbers in years	+	+	+	-
Education	Ordinal: measured on a five-point scale	+	+	+	+
Married	Dummy: 1 = married; 0 = otherwise	+			
Obesity	Dummy: 1 = if BMI ≥30; 0 = otherwise	+	+	+	-
Risky behaviour	Dummy: 1 = if consume alcoholic beverages and/or smoke or chew tobacco; 0 = otherwise		-	+/-	-
Type of Illness					
Fever	Dummy: 1 = if suffered fever; 0 = otherwise		+	+	-
Cold or cough	Dummy: 1 = if suffered cold or cough; 0 = otherwise		+	+	-

Diarrhoea	Dummy: 1 = if suffered diarrhoea; 0 = otherwise		+	+	-
Chronic illness	Dummy: 1 = if exposed to chronic illness (sores, irritations and/or numbness); 0 = otherwise	+	+	+	-
Physical activity	Dummy: 1 = difficulty in participating in physical activities/roles; 0 = otherwise	+	+	+	-
Wealth index	Continuous positive and negative numbers generated from housing and assets characteristics using Multiple Correspondence Analysis	+	+	+	+
Household size	Continuous: positive whole numbers of the number of persons in the household	-			
Dependency ratio	Continuous: number of household members age ≤14 and > 64 to those age 15–64 years old	+/-			
Distance to a health facility	Continuous: number of hours it takes to travel to and fro to the health facility			+	
Savings	Dummy: 1 = if household head saves with banking institutions and others; 0 = otherwise	+			
Formal-sector worker	Dummy: 1 = if household head is a formal-sector worker; 0 = otherwise	+			

5.5 Source of data

The study used secondary data. The data came from the Ghana Socioeconomic Panel Survey (GSPS), a national household survey. The GSPS is a collaborative work between the Economic Growth Centre at Yale University and the Institute of Statistical, Social and Economic Research (ISSER) at the University of Ghana. This survey aims to address the main barrier to understanding development in low-income nations. One of these limitations is the lack of thorough, multi-level, and long-term scientific data that follows people over time (longitudinal study) and defines the natural and man-made environments in which they live. Most data collection efforts in low-income countries are short-term, cross-sectional and limited in scope typically. Data collection challenges include collecting information on only a few aspects of respondents' lives. Besides, where numerous rounds of data are collected, persons who leave the research region are dropped. In that situation, several mobile individuals are left out of prevailing surveys and research, potentially skewing conclusions regarding who benefits from and bears the cost of the development process. The GSPS dataset has the advantage of following respondents, or a random sample of respondents, through time using a wide range of survey tools to provide new insights on long-term economic growth processes.

The GSPS has three waves (2009/2010, 2014/2015 and 2018/2019). The dataset contains rich information on households' demographic characteristics, assets (both household assets and financial assets), agricultural production, non-farm household enterprise, household health (includes information on insurance status, anthropometry, immunisation, activities of daily living, health in the past two weeks, health in the past 12 months before the survey etc.), women's health, men's health, children's module, psychology/social networking, consumption module and housing characteristics. The information gathered from this survey was intended to assist decision-makers in formulating economic and social policies. These policies include: identifying target groups for government assistance, developing models to simulate the impact of various policy options on individual groups analysing the effect of already-implemented decisions, accessing the economic situation on household living conditions, and providing benchmark data for district assemblies (ISSER, 2015)

The GSPS gives regionally representative data for the ten administrative regions of Ghana. Waves 1, 2, and 3 each have a total sample of 5,010, 4,770, and 5,669 households, respectively. These households were selected from 334 Enumeration Areas (EAs). From each of the EAs, fifteen households were chosen. Based on the predicted population in 2009, the number of EAs

for each region was proportionately allotted. EAs were over-sampled in the Upper East and Upper West regions, which have lesser population sizes, to allow for a realistic number of households for the survey.

The survey employed a two-stage stratified sample design. The administrative regions of Ghana formed the basis of the stratification. Geographic precincts or clusters were chosen in the first stage from a modified master sampling frame based on the 2000 Ghana Population and Housing Census. From the master sampling frame, a total of 334 clusters (census enumeration areas) were chosen. The clusters from the list of EAs in each region were randomly selected using a simple random sampling procedure. In 2009, a comprehensive household listing was conducted in all of the selected clusters to provide a sampling frame for the second step of households' selection. At the second stage, fifteen households were selected from each cluster using a simple random sampling technique. The final stage selection goal was to guarantee sufficient completed individual interviews to provide accurate estimates for critical indicators at the regional level. Additional sampling goals include reducing the impact of intra-class correlation within a sample region on the variance of survey estimates and permitting a manageable interviewer workload within each sample area. The study checked the soundness of the data using multicollinearity and correlation, among others. Sensitivity analyses were conducted to verify the robustness of the study findings.

5.6 Summary

After extensive multi-country literature review, the following variables are captured as dependent variables; visits to the health facility (Visit HF), hospitalisation days, out-of-pocket health expenditure and health status. The independent variables that are assumed to be exogenous include gender, age, marital status, education, household size, dependency ratio, locality (urban/rural), self-assessed health, chronic illness (or chronic health condition), type of illness suffered, physical activity, body mass index (BMI), obesity, distance to a health facility, hospitalisation, use of public health facility, subjective social status, wealth index, whereas NHIS enrolment/membership is assumed to be endogenous. These variables have been shown to have important effects on our dependent variables.

To ascertain whether a policy such as NHIS has brought about the anticipated change (or effects) or not, most preferably, an experimental study should be conducted to allow those randomly exposed to the policy to be compared to a control group. However, such studies are

both costly and challenging to carry out. Therefore, in the absence of a randomised controlled trial, statistical quasi-experimental approaches have been advanced to maximise the use of cross-sectional data. The current study used econometric techniques that account for covariates relating to receiving the so-called 'treatment' (here healthcare insurance), thereby reducing the confounding owing to self-selection bias, thus obtaining efficient results. These econometric techniques are the two-stage residual inclusion, the Heckman two-step procedure, the Copula-based Heckman sample-selection model, endogenous switching regression for ordered outcomes and the Conditional Mixed Process.

The current study makes two methodological contributions. First, this study pioneered the use of an instrument-free Copula regression model to analyse positive health spending and out-of-pocket expenditure simultaneously. This method assists in addressing the endogeneity problem attributed to non-randomness in the insurance variable and non-normal bivariate distribution between positive health spending and out-of-pocket expenditure models. Second, to the best of our knowledge, this study is the first to provide estimates from the Conditional Mixed Process (CMP) framework by jointly analysing health insurance enrolment, healthcare utilisation, healthcare expenditure and health status. This technique allows us to address sample selection bias and endogeneity and provide efficient estimates. The application of these econometric techniques avails itself to the analyses that are discussed in the next chapter.

CHAPTER SIX: EMPIRICAL ANALYSIS AND RESULTS

6.1 Introduction

This chapter aims to present and discuss the empirical findings of the current study. To accomplish our study objectives, we discoursed both theoretical and empirical literature in chapter four and specified the appropriate methodologies in chapter five. The chapter presents and discusses results based on the appropriate econometrics approaches described in chapter five. Prominent econometric models chosen for the analysis were the logistic regression, negative binomial regression, the two-stage residual inclusion (2SRI), Copula-based Heckman selection model, endogenous switching regression for ordered outcomes and Conditional Mixed Process (CMP) model. All the data analyses were performed in STATA version 14.

This chapter is divided into six sections. The descriptive statistics of the variables used in the analysis are discussed in the first section, Section 6.2. Sections 6.3 and 6.4 look at the determinants of healthcare utilisation and out-of-pocket expenditure, respectively. The next section analyses the impact of NHIS membership on health status. Section 6.6 explores the interrelationship between health insurance, healthcare utilisation, financial protection and health status. The final section concludes the chapter.

6.2 Descriptive statistics

The current study merged information on demographic, household and health characteristics from the Ghana Socioeconomic Panel Survey (GSPS) wave 1, 2 and 3 datasets. In all, we obtain a sample of 31,807 (i.e., wave 1, 12,560; wave 2, 9,810; and wave 3, 9,437) observations after excluding observations with missing values. Table 6.1 reveals the NHIS enrolment status by waves. The results show an increasing enrolment level over the years. For instance, those with a valid NHIS card (i.e., NHIS membership) increased significantly from almost 33 per cent during the first wave to 60 per cent in the second wave and then increased slightly to close to 63 per cent in the third wave.

Two things are reported in Tables 6.2 and 6.3: first, the descriptive statistics (i.e., means and standard deviation) of the variables utilised in the entire analysis, and; second, significance tests to check for the difference between NHIS members and non-members for each variable. The choice of the statistical test is contingent on whether the variable is continuous (t-test) or

categorical (Pearson's chi-square test). The discussion of the descriptive statistics is limited to some key variables.

Table 6.1: NHIS enrolment status

Enrolment	Frequency	Percent
	Wave 1 (n= 12,560)	
Those with valid NHIS card	4,134	32.91
Those without valid NHIS card	8,426	67.09
	Wave 2 (n= 9,810)	
Those with valid NHIS card	5,901	60.15
Those without valid NHIS card	3,909	39.85
	Wave 3 (n= 9,437)	
Those with valid NHIS card	5,929	62.83
Those without valid NHIS card	3,508	37.17
	Full sample (n= 31,807)	
Those with valid NHIS card	15,964	50.19
Those without valid NHIS card	15,843	49.81

Source: Author based on GSPS data

Table 6.2: Descriptive statistics of continuous variables used in the models

	NHIS enrolled (n = 15,964)		Without NHIS (n= 15,843)		t-test	Overall sample (n= 31,807)	
Variable	Mean	SD	Mean	SD		Mean	SD
Hospitalisation days	6.691	14.373	5.761	9.730	1.129	6.412	13.156
OOP health expenditure	1.474	31.432	0.853	13.130	2.296**	1.165	24.121
Age	36.040	20.966	33.740	18.807	10.297***	34.895	19.953
Education	0.563	0.092	0.362	0.697	22.157***	0.463	0.812
Household size	4.795	2.583	5.212	2.994	-13.290***	5.00	2.802
Dependency ratio	45.378	59.470	44.967	57.568	0.626	45.174	58.530
BMI	26.084	20.880	24.442	17.565	7.589***	25.266	19.317
Distance (in hours)	1.108	3.627	1.173	2.566	-0.386	1.125	3.366
Wealth index	-0.526	1.279	0.100	1.099	-46.816***	-0.217	1.234
Subjective social status	4.026	2.711	4.004	2.927	0.636	4.015	2.819

Source: Author based on GSPS data
Note: SD is the standard deviation; ** $p<0.05$, *** $p<0.01$.

In all, out of the 31,807 individual observations, 15,964 had enrolled in the NHIS, presenting 50.3% of the overall sample. The results further reveal that the average OOP health expenditure and hospitalisation days were almost GH 1.17 and 6.4 days, respectively (see Table 6.2). The

average age of respondents and household size were nearly 35 years and five persons, respectively. The test of mean differences indicates significant differences between enrolled members and those without NHIS concerning six covariates, namely OOP health expenditure, age, education, household size, BMI and wealth index. The test shows that NHIS members are older, more educated, have higher BMI and OOP health expenditure. But, NHIS members are likely to have a smaller household size and a lower wealth index.

The descriptive statistics for categorical variables are presented in Table 6.3. The results reveal statistically significant differences for insured and uninsured relating to visits to the health facility, positive health spending, self-assessed health, gender, working informally, locality, obesity, risky behaviour, physical activity, chronic illness, type of illness (except diarrhoea), savings, public health facility, and hospitalisation. For instance, the insured were more likely to visit a health facility upon the onset of illness (11.4% vs 5.4%). More than half of respondents were females, with a significant proportion (58 per cent) of them being insured. More than two-thirds of respondents had a rural residence, with a significant proportion (almost 60 per cent) of the insured being rural dwellers.

Table 6.3: Descriptive statistics of categorical variables used in the models

	Without NHIS (n= 15,843)		NHIS enrolled (n = 15,964)		Pearson's χ^2
	n	%	n	%	
Visit to health facility					
No	14,988	94.60	14,144	88.60	372.119***
Yes	855	5.40	1,820	11.40	
Positive health spending					
No	15,477	97.69	14,982	93.85	289.084***
Yes	366	2.31	982	6.15	
Self-assessed health					
Unhealthy	172	1.09	232	1.45	74.498***
Somewhat unhealthy	712	4.49	889	5.57	
Somewhat healthy	2,641	16.67	3,080	19.29	
Very healthy	12,318	77.75	11,763	73.69	
Gender					
Female	7,573	47.80	9,191	57.57	304.681***
Male	8,270	52.20	6,773	42.43	
Marital status					
Not Married	9,434	59.55	9,366	58.67	2.532
Married	6,409	40.45	6,598	41.33	
Formal-sector worker					
No	15,164	95.71	13,979	91.95	687.987***
Yes	679	4.29	1,985	8.05	

Locality					
Rural	11,152	70.40	9,547	59.80	392.189***
Urban	4,691	29.60	6,417	40.20	
Obesity					
Not obese	14,601	92.16	14,049	88	153.646***
Obese	1,242	7.84	1,915	12	
Risky behaviour					
Not Smoke or Drink	13,342	84.21	13,643	83.81	9.617***
Smoke or Drink	2,501	15.79	2,321	16.19	
Physical activity					
No	14,162	89.39	13,380	83.81	212.932***
Yes	1,681	10.61	2,584	16.19	
Chronic illness					
No	11,545	72.87	11,287	70.70	18.460***
Yes	4,298	27.13	4,677	29.30	
Fever					
No	15,399	97.20	15,254	95.55	61.540***
Yes	444	2.80	710	4.45	
Cold or cough					
No	15,757	99.46	15,768	98.77	42.452***
Yes	86	0.54	196	1.23	
Diarrhoea					
No	15,795	99.70	15,904	99.62	1.247
Yes	48	0.30	60	0.38	
Other illnesses					
No	15,624	98.62	15,487	97.01	95.782***
Yes	219	1.38	477	2.99	
Savings					
No	12,884	81.32	11,178	70.02	551.482***
Yes	2,959	18.68	4,786	29.98	
Public health facility					
No	15,544	98.11	15,100	94.59	280.461***
Yes	299	1.89	864	5.41	
Hospitalisation					
No	11,750	74.17	12,965	81.21	228.032***
Yes	4,093	25.83	2,999	18.79	

Source: Author based on GSPS data
Note: ** $p<0.05$, *** $p<0.01$.

6.3 Evaluating the effects of NHIS on healthcare utilisation

This section presents results on the factors influencing healthcare utilisation. The study used visits to a health facility and hospitalisation days to measure healthcare utilisation, and the estimation techniques were logistic regression and a negative binomial regression, respectively.

The study used the two-stage residual inclusion (2SRI) estimation procedure to correct for the endogeneity of the NHIS membership variable. Following Palmer *et al.* (2017), the correct standard errors for the second-stage estimations were obtained via bootstrapping. Using simulations and real-data examples, Palmer *et al.* (2017) compared different forms of standard errors from 2SRI estimates. They found that modified standard errors such as Newey, Terza and bootstrap standard errors from 2SRI estimators correct type I error. The authors concluded that researchers employing this method should report the modified standard errors instead of the unadjusted or heteroscedasticity-robust standard errors. All the estimations were bootstrapped up to 1,000 replications. The study checked for multicollinearity using the variance inflation factor (VIF) test. The result reveals a mean value of 7.65, which is below the rule of thumb value of not more than 10 (see Table A1). As a result, we are confident that the models do not violate multicollinearity rules.

6.3.1 The determinants of healthcare utilisation (visits to a health facility)

The estimated results from the two-stage residual inclusion (2SRI) regression are presented in Table 6.4. The starting point in discussing the empirical results was to do diagnostics of the estimated model. The Wald chi-square test of the hypothesis that all regression coefficients are jointly equal to zero is rejected at the 1% significance level, indicating that the model fits the data reasonably well. Again, approximately 92 per cent of visits to a health facility outcome are correctly predicted. The second diagnostic was the assessment of the estimated residual. The residual coefficient for the full sample is negative and statistically significant. This result demonstrates the presence of endogeneity in our data. The negative coefficient reveals that latent factors that increase the probability that an individual has NHIS membership decrease the probability of visiting a health facility.

Several factors were found to predict individual healthcare utilisation. The full sample results reveal that NHIS membership, gender, age, education, obesity, self-assessed health, chronic illness, type of illness suffered and locality (rural) were significant determinants of healthcare utilisation. The estimated coefficients meet their expected signs. The coefficient of our variable of interest that is NHIS membership in the estimated outcome equation (visits to a health facility) is positive and statistically significant at the 1% level of significance. This finding suggests that persons covered under the NHIS are more likely to seek care when ill relative to those without insurance coverage. The estimated marginal effect indicates that NHIS members are 7.6% more likely to visit a health facility when ill compared to non-members.

Table 6.4: Two-stage residual inclusion estimates for healthcare utilisation (visits to a health facility)

Variable	Coefficient	Marginal effects
NHIS membership	1.337***	0.076***
	(0.285)	(0.018)
Gender (male)	-0.258***	-0.0143***
	(0.054)	(0.003)
Age	0.006***	0.0003***
	(0.001)	(0.0001)
Education	0.106***	0.006***
	(0.029)	(0.002)
Obesity	0.165***	0.010***
	(0.063)	(0.004)
Self-assessed health	-0.690***	-0.038***
	(0.033)	(0.002)
Chronic illness	0.449***	0.027***
	(0.050)	(0.003)
Physical activity	0.049	0.003
	(0.072)	(0.004)
Wealth index	0.006	0.0003
	(0.033)	(0.002)
Fever	1.989***	0.241***
	(0.075)	(0.015)
Cold or cough	1.703***	0.193***
	(0.144)	(0.027)
Diarrhoea	2.063***	0.267***
	(0.245)	(0.053)
Locality (rural)	-0.129**	-0.007**
	(0.052)	(0.003)
Residuals	-0.356***	-0.019***
	(0.135)	(0.007)
Constant	-1.228***	
	(0.212)	
Observations	31,807	
Wald χ^2	2,581***	
Log likelihood	-7683.116	
Pseudo R^2	0.1632	
Model classification	91.65%	

Source: Author based on GSPS data

Notes: Bootstrapped standard errors in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$

This result is expected because NHIS membership can ease access barriers created by out-of-pocket payments leading to increased healthcare utilisation. This pattern of result is in line with the literature, and it reinforces the previous findings that health insurance improves the utilisation of health services (Ekman, 2007; Liu and Zhao, 2014; O'Connor, 2015; Madyaningrum, Ying-Chih and Chuang, 2018). For instance, in a study in China, Liu and Zhao (2014) found that enrolment in health insurance increases individuals probability of utilising

formal care by 7.4 percentage points. People with health insurance were 1.38 times more plausible than their counterparts to seek outpatient services in Indonesia, according to Madyaningrum, Ying-Chih and Chuang (2018).

Males have a lower likelihood of attending a health facility when they are sick than females. The marginal effect shows that males are 1.4% less likely to visits a health facility when ill compared to their female counterparts. Men by nature are risk loving. Upon the onset of illness, they are more likely to procrastinate in seeking care by adopting a wait and see attitude hence reducing their visitation to a health facility. This finding reinforces studies conducted in Korea (Han-Kim and Lee, 2016) and China (Ye *et al.*, 2019) in terms of the sign, but is in contrast with a study from the USA (O'Connor, 2015).

Age is a positive determinant of healthcare utilisation. This result means that ageing is directly associated with visits to a health facility. A possible reason for this result is that ageing is linked to deteriorating health conditions occasioning in increased healthcare utilisation. This finding is consistent with previous studies (Li *et al.*, 2016; Awoke *et al.*, 2017; Grustam *et al.*, 2020). However, this result goes contrarily to the works of Cameron *et al.* (1988), Ekman (2007), O'Connor (2015) and Han-Kim and Lee (2016), who found age to be associated with less utilisation of health service. For example, O'Connor (2015) supported his finding by claiming that older people may encounter additional difficulties accessing health care due to a lack of motivation and understanding.

The education variable is positively related to visits to a health facility. This result suggests that for each additional education attained, a person's chances of visiting a health facility when ill increased by 0.6 percentage points. Undoubtedly, education creates awareness related to health matters such as disease causation, preventive and curative cure resulting in increased healthcare utilisation. Besides, education enables individuals to assess healthcare information better and even outwits or handles any complex health care system. This result corroborates evidence emerging from the literature (Masiye and Kaonga, 2016; Awoke *et al.*, 2017; Gotsadze *et al.*, 2017; Ye *et al.*, 2019; Grustam *et al.*, 2020). Our result somewhat contradicts the works of Li *et al.* (2016) and Lotfi *et al.* (2017). For instance, Lotfi *et al.* (2017) argued that the more educated person pays more attention to health-related issues and frequently use preventive measures resulting in better health outcomes hence reducing utilisation of healthcare services.

Obesity is a positive predictor of healthcare utilisation. This result indicates that obesity increases the likelihood of visiting a health facility. The marginal effect suggests that being obese increases the probability of health facility visits when ill by one percentage point. Obesity increases the risk for many serious health difficulties such as type 2 diabetes, stroke, high blood pressure, liver disease, gallbladder disease, certain cancers, depression and the like. All of these serious health complications associated with obesity increase healthcare utilisation. In a study in Estonia by Vals, Kiivet and Leinsalu (2013), the authors found obesity to be strongly associated with primary care use. Another study in the United States found excess utilisation for obese persons and attributed it to chronic conditions and poor health status (Musich *et al.*, 2016).

Self-assessed health is a negative determinant of healthcare utilisation. The more individuals rate their health status as being very good the lower the probability of healthcare utilisation. The marginal effect submits that self-assessing better health decreases the probability of visiting a health facility when ill by about 3.8 percentage points. This observation is consistent with the findings of other studies (Ekman, 2007; Geitona, Zavras and Kyriopoulos, 2007; Gotsadze *et al.*, 2017; Madyaningrum, Ying-Chih and Chuang, 2018; Grustam *et al.*, 2020). In the Republic of Serbia, Grustam *et al.* (2020) observed increased utilisation of both primary and specialist care for persons who self-reported poor health. In Georgia, Gotsadze *et al.* (2017) found that the likelihood of persons who perceived their health as either 'poor/very poor' or 'fair' were using more outpatient care relative to no care or self-treatment. Among the elderly in Indonesia, Madyaningrum, Ying-Chih and Chuang (2018) found that persons who self-reported somewhat unhealthy and very unhealthy were more likely to visit outpatient care relative to their healthy counterparts.

Chronic illness which captures individual health care needs is positively associated with visits to a health facility. The marginal effect submits that individuals exposed to chronic health problem are 2.7% more likely to visit a health facility when ill. This finding indicates that visits to a health facility increased for people with observed healthcare needs. Previous studies had observed an increased probability of outpatient utilisation for people with chronic illness (Ekman, 2007; Isaac *et al.*, 2015; Han-Kim and Lee, 2016; Li *et al.*, 2016).

The three dummy variables capturing the type of illnesses suffered are positive determinants of visits to a health facility. These results show that the probability of visiting a health facility increases when an individual suffers from either fever, cold/cough or diarrhoea relative to other

illnesses. The estimated marginal effects suggest that individuals who suffer from either fever, cold/cough or diarrhoea were 24.1%, 19.3% and 26.7%, respectively, more likely to visit a health facility relative to other illnesses. In the Ghanaian context, there has been significant progress in the area of physical infrastructure expansion (i.e., the number of health facilities), thereby bringing health care closer to the citizens (University of Ghana, 2018). The introduction of the Community-based Health Planning and Services (CHPS) aimed at delivering essential community-based health services. The CHPS concept has increased access to basic health services, as there are over 3,217 functional health facilities pointed across the country (Kweku *et al.*, 2020). It is therefore not surprising that individuals who suffered from fever, cold/cough or diarrhoea increased their probability of visiting a health facility. This result is in line with Sekyi and Domanban (2012) work. However, in a study in Zambia, Masiye and Kaonga (2016) found that having a headache, diarrhoea, or "other disease" was related to a lower likelihood of seeking formal treatment than reporting malaria or fever.

Locality (rural) negatively influences healthcare utilisation, suggesting that the likelihood of rural residents visiting a health facility when sick is reduced by 0.7 percentage points when compared to urban people. This result implies that vulnerable groups like people residing in rural have low healthcare consumption compared to their urban counterparts. Substantial disparities exist in healthcare facilities on a residential basis in terms of distribution, accessibility and availability. For instance, many urban dwellers can choose between public and private healthcare providers, while rural dwellers choices are limited (Barik and Thorat, 2015). Despite the gains made in improving access to basic health services through the CHPS concept, rural-urban and regional disparities continue to exist with more health professionals working in urban areas and southern Ghana (University of Ghana, 2018). Disparities in rural-urban health workers may partly explain the reduced probability of visiting a health facility by rural residents. Masiye and Kaonga (2016) found a reduced likelihood for rural residence in seeking formal care. Another study conducted in Indonesia revealed that urban regions are related to the use of outpatient services (Madyaningrum, Ying-Chih and Chuang, 2018). This outcome is consistent with previous research, such as Sengupta and Rooj (2019), who found a lower probability of hospitalisation for urban residents. However, in Kenya, Mwami and Oleche (2017) found that urban inhabitants are more likely to practise self-treatment due to busy schedules and only seek medical help for serious ailments. Furthermore, Ta, Zhu and Fu (2020) found that urban residents utilise less outpatient care relative to their rural counterparts in China.

6.3.1.1 Test for the instrumental variable

Our instrumental variable (i.e., formal-sector worker) must meet three conditions, as previously stated: first, the instrument must be uncorrelated with the error term. Regrettably, this condition is untestable since the error terms are unobserved. Second, even after correcting for endogenous regressors, the instrument should have a high correlation with the endogenous regressor (i.e., health insurance membership). The relevance of the instruments is tested in the first-stage regression. For a single instrumental variable and a single endogenous regressor, the rule of thumb requires that the t-value for the instrumental variable should be higher than $\sqrt{10} \approx 3.2$ or the analogous p-value below 0.0016. Appendix Table A2 shows the first-stage regression results predicting NHIS membership. With a t-value of 12.5 above the rule of thumb value of at least 3.2, our instrumental variable, a formal-sector worker, is a significant predictor of NHIS membership or enrolment. This result reveals that formal-sector worker is a valid instrument for NHIS membership. Finally, the instrumental variable (i.e., a formal-sector worker) should have no direct impact on healthcare visits. To verify this hypothesis, we used second-stage regression to include the formal-sector worker variable and then assessed its significance. The results presented in Appendix Table A3 shows that our instrument is statistically insignificant. This result indicates that formal-sector worker does not directly influence health facility visitation, thereby satisfying the third condition for instrument validity. From the above discussion, we may infer that our instrument is valid and appropriate for resolving the biasedness caused by the insurance variable's endogeneity.

6.3.1.1 Heterogeneity effects of healthcare utilisation

We re-estimated our model to understand the healthcare utilisation discrepancy based on location (i.e., residence), income and age. The full sample was subdivided based on residence income and age subpopulation. We aim to explore the heterogeneous effects of health insurance on healthcare utilisation across these subpopulations. The regression results of these subpopulations are presented in Table 6.5 and Table 6.6. Specifically, columns (2) and (3) of Table 6.5 present results of healthcare utilisation based on location, while columns (4) and (5) presents findings based on income. The wealth index serves as a proxy measure for income. To ascertain the differences in healthcare utilisation based on income, the poor are represented by the first quintile, whereas the rich are represented by the fifth quintile of the wealth index.

Concerning location and income subpopulations, the effect of NHIS membership on healthcare utilisation is significant, except for the fifth wealth quintile subsample though having the

correct sign. These findings mean that the likelihood of health facility visits increases for urban and rural residents who are NHIS members relative to their uninsured counterparts. In other words, NHIS members are more likely to seek care, irrespective of their location. The outcome of the urban subsample is unsurprising, given that healthcare facilities are frequently skewed in favour of city dwellers. The CHPS concept may be a possible reason for increased visitation of health facilities for NHIS members when ill. The CHPS concept has improved access to basic health services in rural Ghana. Therefore, rural residents who hold NHIS membership can easily access care when ill. With this finding, we cannot confirm differences in healthcare utilisation by NHIS members based on location. This finding reveals the importance of disaggregation of data. As noted in the full sample, locality (rural) decreases the probability of healthcare utilisation. Now with the rural subsample, we have been able to isolate the rural effect of NHIS membership on healthcare utilisation, revealing increased utilisation for NHIS members. The results further reveal that the poor who hold NHIS membership are more likely to visit health facilities when ill relative to their uninsured counterparts. With this finding, we can confirm differences in healthcare utilisation by NHIS members based on income or wealth. These findings look promising as it indicates that increasing NHIS enrolment in the rural areas and among the poor can ease health care access for these vulnerable groups.

The effect of gender on healthcare utilisation is significant for location and income subpopulations, except for the fifth wealth quintile subsample having the correct sign. These findings mean that males who reside in rural and urban areas and those classified as poor are less likely to visit health facilities when ill compared to their female counterparts. Interestingly, self-assessed health and chronic illness variables are statistically significant in all specifications. The negative coefficient of self-assessed health implies that the more individuals rate their health status as very good irrespective of location or wealth the less likely they would utilise healthcare services. Similarly, the positive coefficient of chronic illness variable suggests increased visitation of health facilities for persons with chronic health conditions irrespective of location or wealth. Besides, our findings reveal an increased probability of visiting a health facility for sufferers of fever, cold/cough or diarrhoea relative to other illnesses among the rural-urban residents and the rich-poor persons.

Table 6.5: Two-stage residual inclusion estimates for healthcare utilisation (visit to a health facility) for residence and income subpopulation

Variable	Urban=1		Rural=1		Wealth index Quintile 1		Wealth index Quintile 5	
	Coefficient	ME	Coefficient	ME	Coefficient	ME	Coefficient	ME
NHIS membership	0.996**	0.062**	1.408***	0.077***	0.602*	0.033**	0.383	0.015
	(0.427)	(0.026)	(0.352)	(0.022)	(0.343)	(0.017)	(0.235)	(0.010)
Gender (male)	-0.284***	-0.018***	-0.264***	-0.013***	-0.349***	-0.021***	-0.247*	-0.009**
	(0.084)	(0.005)	(0.069)	(0.003)	(0.111)	(0.007)	(0.126)	(0.005)
Age	0.009***	0.001***	0.005***	0.0002***	0.010***	0.001***	-0.001	-0.000
	(0.002)	(0.0001)	(0.002)	(0.0001)	(0.003)	(0.0002)	(0.003)	(0.000)
Education	0.038	0.002	0.220***	0.011***	0.149***	0.009***	0.307***	0.011**
	(0.040)	(0.003)	(0.046)	(0.002)	(0.041)	(0.002)	(0.136)	(0.005)
Obesity	0.275***	0.019***	0.013	0.001	0.329***	0.022***	0.294	0.012
	(0.090)	(0.007)	(0.099)	(0.005)	(0.121)	(0.009)	(0.254)	(0.012)
Self-assessed health	-0.686***	-0.044***	-0.696***	-0.034***	-0.721***	-0.044***	-0.687***	-0.025***
	(0.057)	(0.004)	(0.042)	(0.002)	(0.082)	(0.005)	(0.080)	(0.003)
Chronic illness	0.419***	0.030***	0.460***	0.025***	0.440***	0.029***	0.531***	0.022***
	(0.080)	(0.006)	(0.061)	(0.004)	(0.109)	(0.008)	(0.134)	(0.006)
Physical activity	0.150	0.010	-0.008	-0.001	0.126	0.008	0.053	0.002
	(0.105)	(0.007)	(0.092)	(0.005)	(0.153)	(0.010)	(0.183)	(0.007)
Wealth index	0.033	0.002	-0.011	-0.001	–	–	–	–
	(0.046)	(0.003)	(0.048)	(0.002)	–	–	–	–
Fever	2.043***	0.284***	1.960***	0.218***	2.328***	0.332***	1.798***	0.147***
	(0.125)	(0.027)	(0.091)	(0.017)	(0.145)	(0.033)	(0.209)	(0.030)
Cold or cough	1.665***	0.211***	1.739***	0.184***	1.924***	0.256***	2.070***	0.195***
	(0.245)	(0.049)	(0.189)	(0.034)	(0.310)	(0.067)	(0.367)	(0.064)
Diarrhoea	1.856***	0.253***	2.128***	0.263***	1.612***	0.194***	2.337***	0.247***
	(0.597)	(0.130)	(0.261)	(0.056)	(0.562)	(0.108)	(0.619)	(0.125)
Locality (rural)	–	–	–	–	0.058	0.004	-0.911***	-0.049***
	–	–	–	–	(0.111)	(0.007)	(0.249)	(0.019)
Residuals	-0.229	-0.015	-0.376**	-0.019**	-0.080	-0.005	0.122	0.004
	(0.202)	(0.013)	(0.166)	(0.008)	(0.142)	(0.009)	(0.104)	(0.004)
Constant	-1.068***		-1.342***		-1.053**		-0.102	
	(0.340)		(0.256)		(0.473)		(0.425)	
Observations	11,108		20,699		6,363		6,355	
Wald χ^2	1,032.02***		1,607.69***		630.18***		372.35***	
Log likelihood	-2,953.760		-4,708.913		-1,633.084		-1,144.361	
Pseudo R^2	0.1583		0.1677		0.1811		0.1372	
Model classification	90.54%		92.21%		90.76%		94.65%	

Source: Author based on GSPS data

Notes: ME is marginal effects; Bootstrapped standard errors in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$

Table 6.6: Two-stage residual inclusion estimates for healthcare utilisation (visit to a health facility) for age subpopulation

	Children (below 15 years)		Working-class (ages 15 to 59)		Elderly (60 and above)	
Variable	Coefficient	ME	Coefficient	ME	Coefficient	ME
NHIS membership	1.424***	0.040***	0.951***	0.055***	2.654***	0.256***
	(0.510)	(0.016)	(0.215)	(0.013)	(0.496)	(0.047)
Gender (male)	0.040	0.001	-0.368***	-0.020***	0.065	0.007
	(0.159)	(0.004)	(0.066)	(0.004)	(0.104)	(0.011)
Education	0.198	0.005	0.086**	0.005**	-0.021	-0.002
	(0.278)	(0.007)	(0.034)	(0.002)	(0.067)	(0.007)
Obesity	-0.002	-0.0001	0.220***	0.013***	-0.162	-0.016
	(0.418)	(0.011)	(0.077)	(0.005)	(0.142)	(0.014)
Self-assessed health	-0.528***	-0.014***	-0.772***	-0.043***	-0.546***	-0.057***
	(0.176)	(0.005)	(0.042)	(0.002)	(0.056)	(0.006)
Chronic illness	0.414*	0.013*	0.486***	0.030***	0.293***	0.031***
	(0.213)	(0.008)	(0.059)	(0.004)	(0.091)	(0.010)
Physical activity	-0.149	-0.004	0.393***	0.026***	0.273**	0.029**
	(0.175)	(0.004)	(0.117)	(0.009)	(0.115)	(0.012)
Wealth index	0.117	0.003	-0.025	-0.001	0.071	0.007
	(0.087)	(0.002)	(0.031)	(0.002)	(0.068)	(0.007)
Fever	2.320***	0.188***	2.004***	0.245***	1.775***	0.312***
	(0.268)	(0.043)	(0.089)	(0.018)	(0.160)	(0.038)
Cold or cough	2.083***	0.155***	1.866***	0.226***	1.129***	0.174***
	(0.563)	(0.083)	(0.170)	(0.034)	(0.310)	(0.064)
Diarrhoea	2.345***	0.197***	2.386***	0.344***	1.230**	0.197**
	(0.575)	(0.098)	(0.295)	(0.071)	(0.588)	(0.127)
Locality (rural)	-0.203	-0.006	-0.059	-0.003	-0.315***	-0.035***
	(0.203)	(0.006)	(0.066)	(0.004)	(0.105)	().012)
Residuals	-0.418*	-0.011*	-0.217**	-0.012**	-0.735***	-0.077***
	(0.223)	(0.006)	(0.098)	(0.005)	(0.218)	(0.023)
Constant	-2.186***		-0.468**		-2.113***	
	(0.778)		(0.203)		(0.376)	
Observations	5,753		21,679		4,375	
Wald χ^2	154.70***		1,778.98***		504.50***	
Log likelihood	-773.223		-5,201.026		-1,642.022	
Pseudo R^2	0.0849		0.1506		0.1572	
Model classification	96.61%		91.86%		84.05%	

Source: Author based on GSPS data

Notes: ME is marginal effects; Bootstrapped standard errors in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$

Table 6.6 displays the regression estimates of the heterogeneous effects of health insurance on healthcare utilisation by age subpopulations. The results reveal a positive influence of NHIS membership on healthcare utilisation for all age categories. These findings imply that the probability of visiting a health facility when sick increases for all age groups who are NHIS members relative to their uninsured counterparts. Put differently, NHIS members are more likely to seek care when ill, irrespective of their ages. The marginal effect estimates show increasing probabilities of healthcare utilisation for insured persons of all ages with children,

working-class and elderly showing, 4 per cent, 5.5 per cent and 25.6 per cent, respectively. These findings reveal that increasing age is associated with a greater probability of health facility visitations for NHIS members. A possible explanation for this finding, particularly for the elderly, is that the NHIS law exempts the elderly (≥ 70 years) from paying premiums to enrol, resulting in increasing enrolment for the elderly. Another interesting finding is that in addition to NHIS membership, self-assessed health, chronic illness and type of illness variables statistically influence visits to a health facility for all age groups.

6.3.2 Sensitivity analysis for healthcare utilisation

This section explores the heterogeneous effects of health insurance on healthcare utilisation with particular reference to formal healthcare utilisation. In the preceding analysis, the question: *"During the last 2 weeks, has [Name] consulted any health care facility*" was used to create the dependent variable (i.e., visits to a health facility). The Ghana Socioeconomic Panel Survey datasets have a follow-up question in the form: *"On the most recent visit, who did [Name] consult"*. We used this follow-up question to create a dummy variable for formal care utilisation. Formal care users include those who consulted doctors, dentists, nurses, medical assistants and midwives for their most recent visit.

Table 6.7: Descriptive statistics for the type of health care used

	Frequency	Percent
Formal care	2,032	6.39
Informal care	576	1.81
No care	29,199	91.80
Total	31,807	100

Source: Author based on GSPS data

Table 6.7 shows the descriptive statistics for the type of health care used. The results indicate that almost 6.4% of the respondents seek formal sources for their most recent visit. However, when consideration is given to only those who seek care during the recall period than close to 78% utilise formal care.

The study tested the validity, relevance and strength of the instrument, as well as endogeneity using serial diagnostics technique. First, we looked at the residual coefficient. The results show that the estimated residual is statistically significant, indicating that our data has endogeneity.

Table 6.8: Two-stage residual inclusion estimates for formal healthcare utilisation

Variable	Coefficient	Marginal effects
NHIS membership	2.247***	0.095***
	(0.323)	(0.017)
Gender (male)	-0.360***	-0.013***
	(0.061)	(0.002)
Age	0.006***	0.0002***
	(0.001)	(0.0001)
Education	0.129***	0.005***
	(0.033)	(0.001)
Obesity	0.115	0.004
	(0.074)	(0.003)
Self-assessed health	-0.728***	-0.026***
	(0.037)	(0.001)
Chronic illness	0.354***	0.014***
	(0.057)	(0.002)
Physical activity	0.043	0.002
	(0.080)	(0.003)
Wealth index	0.051	0.002
	(0.036)	(0.001)
Fever	1.935***	0.167***
	(0.080)	(0.012)
Cold or cough	1.588***	0.122***
	(0.161)	(0.021)
Diarrhoea	2.111***	0.206***
	(0.279)	(0.051)
Locality (rural)	-0.086	-0.003
	(0.060)	(0.002)
Residuals	-0.587***	-0.021***
	(0.151)	(0.005)
Constant	-1.943***	
	(0.245)	
Observations	31,807	
Wald χ^2	2,250.64	
Log likelihood	-6,135.139	
Pseudo R^2	0.1879	
Model classification	93.61%	

Source: Author based on GSPS data

Notes: Bootstrapped standard errors in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$

The negative coefficient indicates that latent factors that raise the likelihood of NHIS membership reduce the probability of seeking formal care (see Table 6.8). Second, the t-value

for our instrumental variable (i.e., a formal-sector worker) is 12.5, well above the rule of thumb value of at least 3.2, demonstrating the relevance and strength of our instrument. Lastly, the formal-sector worker variable is statistically insignificant in the second-stage regression, showing that it does not influence formal care utilisation. Appendix Table A2 and A4 present these results. As a result, we may conclude that our instrument is valid and acceptable for addressing the biasedness generated by the endogeneity of the insurance variable.

The estimated results of the two-stage residual inclusion for formal healthcare utilisation for the full sample are presented in Table 6.8. Our variable of interest that is NHIS membership is a positive determinant of formal care. This result suggests that the likelihood of using formal care increases for NHIS members relative to their uninsured counterparts. The marginal effect suggests that NHIS members are 9.5% more likely to seek formal care for their most recent visit compared to non-members. Our finding highlights that the NHIS has achieved one of the objectives of introducing health insurance schemes, promoting formal healthcare utilisation. This finding confirms previous qualitative studies conducted in Ghana (National Development Planning Commission, 2009; Blanchet, Fink and Osei-Akoto, 2012). In a similar study in China, Liu and Zhao (2014) found that enrolment in health insurance increases the likelihood of utilising formal care by 7.4 percentage points.

Table 6.9 and Table 6.10 show the regression estimates of the heterogeneous effects of health insurance on formal care usage by location, income and age subpopulations. Regarding location and income subsamples, the effect of NHIS membership on formal healthcare utilisation is statistically significant. These results have their expected signs. The findings imply that the probability of using formal care increases for both rural and urban residents who belong to the NHIS membership relative to their uninsured counterparts. Also, both the rich and the poor who are NHIS members are more likely to use formal care relative to their uninsured counterparts. We further found that wealthy NHIS members used formal healthcare more frequently. For example, the marginal effects show that wealthy NHIS members are 15 percentage points more likely to use formal care than lower-income NHIS members, who are 4.3 percentage points more likely. Generally, our findings reveal that NHIS members are more likely to seek formal care, irrespective of their location and income/wealth status. Except for the rich, these findings support our earlier findings on visits to a health facility, demonstrating that NHIS participation helps to reduce disparities in healthcare utilisation based on location and income.

Table 6.9: Two-stage residual inclusion estimates for formal care utilisation for residence and income subpopulation

Variable	Urban=1		Rural=1		Wealth index Quintile 1		Wealth index Quintile 5	
	Coefficient	ME	Coefficient	ME	Coefficient	ME	Coefficient	ME
NHIS membership	2.286***	0.098***	1.895***	0.075***	1.132***	0.043***	0.653**	0.015**
	(0.494)	(0.023)	(0.405)	(0.020)	(0.361)	(0.012)	(0.272)	(0.007)
Gender (male)	-0.376***	-0.016***	-0.386***	-0.013***	-0.495***	-0.023***	-0.444***	-0.009***
	(0.098)	(0.004)	(0.082)	(0.003)	(0.125)	(0.006)	(0.157)	(0.003)
Age	0.010***	0.0004***	0.005***	0.0002***	0.012***	0.001***	-0.008*	-0.0002*
	(0.002)	(0.0001)	(0.002)	(0.0001)	(0.003)	(0.0002)	(0.004)	(0.0001)
Education	0.085**	0.004**	0.212***	0.007***	0.191***	0.009***	0.237	0.005
	(0.041)	(0.002)	(0.053)	(0.002)	(0.047)	(0.002)	(0.174)	(0.003)
Obesity	0.214**	0.010**	-0.029	-0.001	0.260**	0.013*	0.187	0.004
	(0.101)	(0.005)	(0.110)	(0.004)	(0.125)	(0.007)	(0.317)	(0.007)
Self-assessed health	-0.717***	-0.031***	-0.737***	-0.024***	-0.783***	-0.036***	-0.835***	-0.016***
	(0.063)	(0.003)	(0.044)	(0.002)	(0.092)	(0.004)	(0.092)	(0.002)
Chronic illness	0.329***	0.015***	0.360***	0.013***	0.337***	0.017***	0.333**	0.007*
	(0.090)	(0.005)	(0.071)	(0.003)	(0.117)	(0.006)	(0.160)	(0.004)
Physical activity	0.154	0.007	0.002	0.0001	0.219	0.011	0.225	0.005
	(0.121)	(0.006)	(0.105)	(0.003)	(0.166)	(0.009)	(0.211)	(0.005)
Wealth index	0.083	0.004	0.008	0.0003	–	–	–	–
	(0.050)	(0.002)	(0.054)	(0.002)	–	–	–	–
Fever	1.853***	0.179***	1.982***	0.160***	2.045***	0.219***	1.959***	0.102***
	(0.137)	(0.022)	(0.102)	(0.015)	(0.160)	(0.029)	(0.221)	(0.023)
Cold or cough	1.532***	0.133***	1.643***	0.119***	1.658***	0.161***	2.024***	0.113***
	(0.262)	(0.038)	(0.199)	(0.026)	(0.307)	(0.050)	(0.396)	(0.045)
Diarrhoea	2.221***	0.258***	2.087***	0.186***	1.839***	0.193	2.816***	0.233*
	(0.645)	(0.136)	(0.304)	(0.052)	(0.646)	(0.118)	(0.679)	(0.129)
Locality (rural)	–	–	–	–	0.054	0.002	-0.469	-0.011
	–	–	–	–	(0.125)	(0.006)	(0.359)	(0.011)
Residuals	-0.613***	-0.026***	-0.418**	-0.014**	-0.178	-0.008	0.248*	0.005*
	(0.231)	(0.010)	(0.188)	(0.006)	(0.144)	(0.007)	(0.131)	(0.003)
Constant	-2.072***		-1.765***		-1.509***		-0.324	
	(0.395)		(0.280)		(0.515)		(0.522)	
Observations	11,108		20,699		6,363		6,355	
Wald χ^2	931.73***		1,588.86***		568.51***		349.81	
Log likelihood	-2,381.699		-3,740.791		-1,403.941		-792.978	
Pseudo R^2	0.1832		0.1914		0.1859		0.1792	
Model classification	92.64%		94.09%		92.28%		96.52%	

Source: Author based on GSPS data

Notes: ME is marginal effects; Bootstrapped standard errors in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$

Table 6.10: Two-stage residual inclusion estimates for formal care utilisation for age subpopulation

	Children (below 15 years)		Working-class (ages 15 to 59)		Elderly (60 and above)	
Variable	Coefficient	ME	Coefficient	ME	Coefficient	ME
NHIS membership	2.093***	0.038***	1.760***	0.073***	3.720***	0.281***
	(0.625)	(0.014)	(0.247)	(0.012)	(0.545)	(0.045)
Gender (male)	-0.021	-0.0003	-0.524***	-0.019***	0.033	0.003
	(0.186)	(0.003)	(0.077)	(0.003)	(0.109)	(0.008)
Education	0.271	0.004	0.117***	0.004***	-0.037	-0.003
	(0.300)	(0.005)	(0.040)	(0.001)	(0.071)	(0.005)
Obesity	-0.659	-0.008	0.177**	0.007***	-0.174	-0.013
	(0.595)	(0.005)	(0.086)	(0.004)	(0.148)	(0.010)
Self-assessed health	-0.687***	-0.011***	-0.810***	-0.029***	-0.570***	-0.044***
	(0.187)	(0.003)	(0.047)	(0.002)	(0.059)	(0.005)
Chronic illness	0.307	0.005	0.383***	0.015***	0.195*	0.015*
	(0.262)	(0.005)	(0.064)	(0.003)	(0.100)	(0.008)
Physical activity	0.003	0.000	0.378***	0.016***	0.231*	0.018*
	(0.210)	(0.003)	(0.124)	(0.006)	(0.125)	(0.010)
Wealth index	0.207*	0.003*	0.029	0.001	0.059	0.005
	(0.110)	(0.002)	(0.035)	(0.001)	(0.070)	(0.005)
Fever	2.256***	0.115***	1.934***	0.166***	1.828***	0.264***
	(0.288)	(0.031)	(0.093)	(0.014)	(0.163)	(0.035)
Cold or cough	2.206***	0.112***	1.726***	0.141***	1.085***	0.128***
	(0.650)	(0.072)	(0.183)	(0.027)	(0.308)	(0.051)
Diarrhoea	2.732***	0.183***	2.539***	0.293***	0.842	0.091
	(0.581)	(0.091)	(0.325)	(0.071)	(0.655)	(0.095)
Locality (rural)	-0.320	-0.005	0.011	0.0004	-0.290**	-0.023**
	(0.235)	(0.004)	(0.076)	(0.003)	(0.117)	(0.010)
Residuals	-0.491*	-0.008*	-0.413***	-0.015***	-0.994***	-0.076***
	(0.268)	(0.004)	(0.112)	(0.004)	(0.232)	(0.017)
Constant	-2.319***		-1.113***		-2.998***	
	(0.870)		(0.222)		(0.406)	
Observations	5,753		21,679		4,375	
Wald χ^2	169.27***		1,495.59***		432.36***	
Log likelihood	-555.128		-4,089.013		-1,416.699	
Pseudo R^2	0.1171		0.1705		0.1865	
Model classification	97.69%		93.91%		86.74%	

Source: Author based on GSPS data

Notes: ME is marginal effects; Bootstrapped standard errors in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$

Table 6.10 shows the estimates of the heterogeneous effects of health insurance on formal care utilisation by age subpopulations. The findings are similar to those of a healthcare facility visit. The results indicate a positive influence of NHIS membership on formal care for all age categories. These findings imply that the probability of visiting a formal healthcare facility when sick increases for all age groups who are NHIS members relative to their uninsured

counterparts. In other words, NHIS members are more likely to seek medical assistance from formal healthcare facilities when they are sick, regardless of their age.

6.3.3 The determinants of intensity of healthcare utilisation

The study used hospitalisation days as a proxy measure for the intensity of healthcare utilisation. The variables used in the analysis comprises sociodemographic (gender, age), socioeconomic status (education, subjective social status and savings), health behaviour and risk factors (body mass index, risky behaviour, type of illness suffered, self-assessed health) and access to healthcare (NHIS membership, locality) indicators. The correlation matrix of variables used in the estimation is presented in Table A5. All in all, the correlation coefficients are less than the recommended value of 0.5, with education and rural having the highest value of 0.238. These results show that the individual coefficient estimates of the remaining exogenous variables are not affected by the collinearity problem.

The current study estimated both the Poisson regression model and the negative binomial regression model to ascertain which statistical model is most appropriate for our data. The diagnostics comparison has two aims. First, to find out whether the variance of our outcome variable (hospitalisation days) exceeds its mean (i.e., over-dispersion state). Second, which of these models best predict our outcome variable. The estimated results of both the Poisson and the negative binomial regression models are presented in Table 6.11.

In all, 1,091 persons were hospitalised. The parameter alpha in the negative binomial estimation is positive and statistically significant, indicating the presence of over-dispersion. The Likelihood-ratio test of alpha further supports the presence of over-dispersion. Over-dispersion makes the application of the basic Poisson model inappropriate, thereby making the negative binomial regression model a suitable alternative.

A cursory observation of the estimates reveals that the Poisson regression standard errors are smaller than those of negative binomial regression. The relatively smaller standard errors of the Poisson regression render most parameters significant. This result reveals that the Poisson regression overstates the significance of the regression estimates in the presence of over-dispersion. Furthermore, we employed the two traditional selection criteria, namely the Akaike Information Criteria (AIC) and the Bayesian Information Criteria (BIC) to assess the predictive performance of the two models. The results indicate that the negative binomial regression

model has the smallest values of the AIC and BIC, suggesting it to be the better-fitted model for our data.

Table 6.11: Poisson and negative binomial regressions estimates for the intensity of healthcare utilisation

	Poisson	Negative binomial	
Variable	Coefficient	Coefficient	Marginal effects
NHIS membership	0.092***	0.087	0.514
	(0.027)	(0.068)	(0.398)
Gender (male)	0.458***	0.408***	2.640***
	(0.026)	(0.068)	(0.480)
Age	0.001	0.001	0.009
	(0.001)	(0.002)	(0.011)
Education	0.041***	0.042	0.254
	(0.015)	(0.038)	(0.227)
Body mass index	-0.002***	-0.002	-0.014
	(0.001)	(0.002)	(0.013)
Self-assessed health	-0.280***	-0.293***	-1.766***
	(0.014)	(0.042)	(0.256)
Risky behaviour	0.196***	0.162**	1.028*
	(0.029)	(0.081)	(0.541)
Fever	-0.148***	-0.118	-0.679
	(0.044)	(0.109)	(0.595)
Cold or cough	-0.532***	-0.555**	-2.590***
	(0.125)	(0.253)	(0.895)
Diarrhoea	1.405***	1.447***	19.411**
	(0.083)	(0.390)	(9.878)
Locality (rural)	-0.008	0.017	0.100
	(0.026)	(0.066)	(0.393)
Subjective social status	0.032***	0.035***	0.210***
	(0.005)	(0.012)	(0.072)
Savings	-0.088***	-0.156**	-0.910**
	(0.028)	(0.071)	(0.402)
Constant	2.344***	2.386***	–
	(0.075)	(0.206)	–
Lnalpha	–	-0.188***	–
	–	(0.047)	–
Alpha	–	0.829***	–
	–	(0.039)	–
Observations	1,091	1,091	
LR χ^2	1,335.62***	177.66***	
Log likelihood	-6,439.133	-3,133.344	
Pseudo R^2	0.0940	0.0276	
AIC	12,906.27	6,296.689	
BIC	12,976.19	6,371.612	

Source: Author based on GSPS data
Notes: Standard errors in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.
Likelihood-ratio test of alpha=0: chibar2(01) = 6,611.58 Prob>=chibar2 = 0.000

We checked for the endogeneity of the health insurance variable before deciding whether to apply the two-stage residual inclusion (2SRI) estimation technique to estimate the intensity of healthcare utilisation. After running a two-stage residual inclusion (2SRI) estimation, the results show that the estimated residual is statistically insignificant, signifying that endogeneity

is absent in the intensity of healthcare utilisation data (see Appendix Table A6). Therefore, we used the negative binomial regression model without endogeneity correction in the absence of endogeneity. The estimated results demonstrate that the variable of interest, NHIS membership, does not significantly predict the hospitalisation days (see Table 6.11). Gender, self-assessed health, risky behaviour, a dummy for cold or cough and diarrhoea, subjective social status and savings strongly influence the intensity of healthcare utilisation. Except for the male gender, all the other variable meets prior expectations.

The gender variable has an unexpected positive sign. This finding means that the likelihood of hospitalisation care usage increases intensively for males relative to their female counterparts. The marginal effect suggests that hospitalised males spend almost three more days in the hospital than their female counterparts. The risk-loving nature of men and their traditional roles may probably explain this finding. Men are relatively more adventurous. Also, traditional roles of men such as providing for the family make them engage in risky activities which expose them to health hazards including injuries resulting in higher hospitalisation. This result reinforces the findings of Dutta and Husain (2013) and Han-Kim and Lee (2016), but contradict the findings of Cameron *et al.* (1988), Saeed *et al.* (2015) and Li *et al.* (2016).

Self-assessed health is a negative determinant of the intensity of healthcare utilisation measured by hospitalisation days. This result implies that the likelihood of intensifying hospitalisation usage decreases with self-reporting good health. In other words, the use of hospitalisation services is associated with poorly rated health status. Our findings confirm those found in the literature, which show self-assessed health as a significant determinant of hospitalisation (Isaac *et al.*, 2015; Tamayo-Fonseca *et al.*, 2015; Cislaghi and Cislaghi, 2019).

The intensity of healthcare utilisation, as measured by hospitalisation days, is positively correlated with risky behaviour. This result implies that persons who engage in risky behaviour have a higher probability of using hospitalisation care. The marginal effect suggests that individuals who participate in risky behaviour spend at least one day more in the hospital than those who do not smoke or drink. Our result corroborates studies by Hvidtfeldt *et al.* (2010) and Daya *et al.* (2020), who found that smokers and drinkers have higher hospitalisation durations. The dummy for cold or cough is negatively associated with hospitalisation days. The result means that sufferers of cold or cough have a lower probability of using hospitalisation care. The result further reveals that people who have diarrhoea have a greater chance of using hospitalisation care.

Subjective social status serving as a proxy for socioeconomic status is a positive determinant of the intensity of healthcare utilisation. This finding means that increased perceived social status is associated with increased hospitalisation duration. In other words, the more individuals perceive their social status as high the more likely they would use hospitalisation care intensively. However, our finding contradicts studies reported by Tang (2017) and Tang *et al.* (2018). For instance, Tang (2017) found low subjective social status to be related to increased risk of hospital readmissions.

Finally, the coefficient of savings is a negative predictor of the intensity of healthcare utilisation. This result indicates that individuals who come from a household whose head saves have lower hospitalisation services use. A possible explanation for this finding is that household heads that do save are likely to draw on their savings upon onset of illness episode, thereby reducing delays in seeking care resulting in decline hospitalisation care.

6.4 Analysing the effects of health insurance on financial protection

In analysing financial protection effects of health insurance, three main models, namely the two-part model, the Heckman selection model and the Copula-based Heckman selection model, were employed. The motive for this assessment is to find out which of these models is most appropriate and best fit our data structure. The study looks for multicollinearity in the variables that estimated determinants of out-of-pocket health spending. The VIF mean value is 1.19, well below the recommended limit of no more than ten (see Table A7). Therefore, we may be confident that the models do not violate multicollinearity rules. The regression estimates for the two-part model are presented in Table 6.12.

The estimated results from the Heckman selection model are presented in Table 6.13. Models that account for exclusion restrictions tend to be superior to models without exclusion restrictions as they provide an explicitly causal approach to the selection bias problem and ease the problematic correlation inserted by Heckman's correction factor (Bushway, Johnson and Slocum, 2007). To satisfy exclusion restrictions, the dependency ratio was excluded from the equation of interest (out-of-pocket expenditure equation). A comparison to determine whether the Heckman selection model is better than the two-part model depends on the significance of the inverse mills ratio (IMR). The estimated selection bias control factor that is IMR is statistically significant at the 1 percent level, indicating the importance of selection effects. This result shows that the selectivity bias would have resulted had the probability of incurring

out-of-pocket expenditure been estimated without regard to the probability of incurring positive health spending.

Table 6.12: The two-part model regression results

Variable	Part-I (probit model): probability of positive OOP expenditure	Part-II (log linear model): OOP expenditure
NHIS membership	–	-0.485***
	–	(0.083)
Gender (male)	-0.095***	0.097
	(0.006)	(0.080)
Age	0.001***	-0.000
	(0.000)	(0.002)
Education	0.035***	0.073
	(0.004)	(0.045)
Household size	-0.004***	0.019
	(0.001)	(0.015)
Self-assessed health	-0.009	-0.137***
	(0.006)	(0.051)
Risky behaviour	-0.022**	0.218**
	(0.009)	(0.088)
Obesity	0.030***	0.147
	(0.010)	(0.103)
Chronic illness	-0.010	-0.199***
	(0.007)	(0.074)
Physical activity	0.110***	0.081
	(0.009)	(0.100)
Fever	0.091***	0.129
	(0.015)	(0.083)
Cold or cough	0.197***	-0.137
	(0.028)	(0.165)
Diarrhoea	0.054	0.450**
	(0.049)	(0.225)
Wealth index	-0.103***	0.070**
	(0.003)	(0.031)
Dependency ratio	0.000***	–
	(0.000)	–
Distance	–	0.030***
	–	(0.011)
Hospitalisation	–	-0.183*
	–	(0.094)
Public health facility	–	-0.214***
	–	(0.073)
Constant	–	3.003***
	–	(0.257)
Observations	31,807	1,281
LR χ^2/ F-statistics	2,952.89***	6.70***
Pseudo R^2/R^2	0.0670	0.0828

Source: Author based on GSPS data

Notes: Standard errors in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

Table 6.13: Estimated results of the Heckman selection model

Variable	Selection (probit model): Positive health spending	Outcome (OLS model): Log OOP
NHIS membership	0.364***	-1.116***
	(0.032)	(0.252)
Gender (male)	-0.165***	0.391***
	(0.032)	(0.145)
Age	0.003***	-0.005
	(0.001)	(0.003)
Education	0.052***	-0.024
	(0.018)	(0.066)
Household size	-0.015**	0.058***
	(0.006)	(0.023)
Self-assessed health	-0.344***	0.450**
	(0.022)	(0.226)
Risky behaviour	0.094***	0.044
	(0.038)	(0.127)
Obesity	0.049	0.054
	(0.044)	(0.133)
Chronic illness	0.243***	-0.632***
	(0.031)	(0.183)
Physical activity	0.052	0.014
	(0.043)	(0.126)
Fever	1.175***	-1.883**
	(0.044)	(0.742)
Cold or cough	1.020***	-1.937***
	(0.087)	(0.692)
Diarrhoea	1.323***	-1.832**
	(0.130)	(0.892)
Wealth index	-0.069***	0.192***
	(0.013)	(0.058)
Dependency ratio	-0.001***	–
	(0.000)	–
Distance	–	0.030***
	–	(0.011)
Hospitalisation	–	-0.195**
	–	(0.092)
Public health facility	–	-0.204***
	–	(0.073)
Constant	-1.017***	6.446***
	(0.104)	(1.279)
Inverse Mills Ratio		-2.167***
		(0.784)
Observations	31,740	
Wald χ^2	91.64***	

Source: Author based on GSPS data

Notes: Standard errors in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

However, a key weakness of the Heckman selection model is that it depends on the strong assumption that the error terms are normally distributed. A violation of this assumption would result in inconsistent estimates. The study employed a Copula-based Heckman sample-selection model to address the problems of non-normal bivariate distribution in the models. We followed the estimation procedure suggested by Hasebe (2013). The first stage involves the estimation of the Heckman selection model under the joint normality assumption. However, this estimation has additional information. For clarity of presentation, we report only the additional information which is useful for comparison purpose (see Table 6.14).

Table 6.14: Diagnostic for the benchmark results of the Heckman sample-selection

Parameter	Coefficient	Standard error
lnsigma constant	0.250***	0.042
Atheta constant	-0.270	0.176
theta	-0.264	0.164
tau	0.170	0.108
Number of observations	31,740	
Wald χ^2	2,000.40***	
Log likelihood	-6,358.186	
LR test of independence	Test statistic 1.915 with p-value 0.1664	

Source: Author based on GSPS data
Notes: *** $p < 0.01$

This first stage estimation is equivalent to using the usual Heckman sample-selection command, and it represents the benchmark result. For the entire results see Appendix, Table A8. The LR test of independence result fails to reject the null hypothesis of independence of the error terms.

To observe whether the Copula approach improves our benchmark result, a copula function must be specified. Since we have no idea about the dependence structure the selection of the best-fitting copula is based on the one with the smallest value of the Akaike or (Schwarz) Bayesian information criterion (AIC or BIC). Therefore, selecting the minimum of the information criteria is alike to picking the largest log-likelihood. This estimation technique allows for the specification of various Copula functions. The families of Copulae considered in our estimation were Gaussian, Farlie–Gumbel–Morgenstern (FGM), Plackett, Ali–Mikhail–Haq (AMH), Frank, Clayton, Gumbel and Joe. Estimated results of the Copula-based Heckman sample-selection model is shown in Table 6.15.

Table 6.15: Estimated results of the Copula-based Heckman sample-selection model

Variable	Selection (probit model) Positive health spending	Outcome (OLS model) Log OOP
NHIS membership	0.369***	-0.272***
	(0.032)	(0.086)
Gender (male)	-0.163***	0.027
	(0.032)	(0.077)
Age	0.003***	0.001
	(0.001)	(0.002)
Education	0.052***	0.080*
	(0.018)	(0.043)
Household size	-0.014**	0.012
	(0.006)	(0.015)
Self-assessed health	-0.346***	-0.265***
	(0.022)	(0.057)
Risky behaviour	0.095**	0.218***
	(0.038)	(0.083)
Obesity	0.041	0.153
	(0.044)	(0.098)
Chronic illness	0.243***	-0.092
	(0.031)	(0.074)
Physical activity	0.042	0.054
	(0.042)	(0.096)
Fever	1.169***	0.715***
	(0.043)	(0.140)
Cold or cough	1.003***	0.321*
	(0.086)	(0.183)
Diarrhoea	1.335***	1.072***
	(0.127)	(0.261)
Wealth index	-0.072***	0.053*
	(0.012)	(0.031)
Dependency ratio	-0.001***	–
	(0.0003)	–
Distance	–	0.014
	–	(0.009)
Hospitalisation	–	-0.255***
	–	(0.090)
Public health facility	–	-0.177*
	–	(0.069)
Constant	-1.028*** (0.103)	1.067*** (0.352)
lnsigma constant	0.590 (0.065)	theta 4.362*** (1.133)
lndf constant	3.607 (0.767)	df 36.84 (28.27)
atheta constant	1.473 (0.260)	tau -0.686*** (0.056)
Observations	31,740	
Wald χ^2	2,006.10	
Log likelihood	-6,333.158	
LR test of independence	Test statistic 43.606 with p-value 0.0000	

Source: Author (2021) based on GSPS data

Notes: Standard errors in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

The results reveal that the most appropriate copula that supports our data structure is the Clayton. The result further reveals that theta (θ) is positive and significant, indicating a significant positive association between the marginals for our data structure. This finding

means that some relationship exists between the unstructured terms of our models, that is probability of incurring positive health spending and probability of incurring out-of-pocket expenditure that are most probable due to the presence of unobserved confounders. Together with a strong Kendall's τ of almost -0.69 revealing a negative dependence, our findings submit the presence of unmeasured confounding leading to endogeneity due to selection bias. The parameter log of degrees of freedom (lndf) is an ancillary parameter transformed into the degrees of freedom [df] (Hasebe, 2013). The df value of 36.84 shows that the distribution has much thicker tails compared to the normal distribution. The estimated coefficients of the Heckman selection model and the Copula-based Heckman selection model compare to some extent. However, the Copula-based Heckman sample-selection model seems more efficient, as self-assessed health and dummies for types of illness now have their expected signs. A significant difference of the Copula-based Heckman sample-selection model from the Heckman sample-selection model is its rejection of the null of independent errors. This rejection is indicated by the LR test value of 43.61 at a 1% significance level. We observe also a much-improved log-likelihood value (from -6,358.186 to -6,333.158). To conclude whether the Copula model is preferred a statistical test was conducted using the Vuong test. The result of the Vuong test is presented in Appendix Table A9. The regression shows that the model with the Clayton Copula is statistically favoured to the joint normal model at a 1% level of significance.

After a critical assessment of the three models, namely the two-part model, Heckman selection model and Copula-based Heckman selection model, the Copula-based Heckman selection model seems more superior. Consequently, the discussions on the probability of incurring positive health spending and the probability of incurring out-of-pocket expenditure are based on the Copula-based Heckman selection model estimates. All the variables that entered into the probability of positive health spending equation were significant, except for obesity and physical activity covariates. For instance, NHIS membership predicts the probability of positive health spending positively. This finding backs up the conclusions of the previous study by Jung and Streeter (2015). Jung and Streeter (2015) advanced four aim reasons for the positive association between health insurance and the probability of health spending. First and foremost, persons who frequently need health care are more likely to take up health insurance cover (Cutler and Zeckhauser, 1998). The second reason may be risk aversion, as risk-averse persons are more likely to take up health insurance coverage and increase doctor visitations via regular check-ups. The third reason is the issue of moral hazard. Economic theory postulates

that insured persons are more likely to take risks (less careful about their health) for part or entire costs will be borne by insurance. Lastly, some insured persons may want to utilise health care as a justification for paying insurance premium. The results also indicate being a male, larger household size, better self-assessed health and higher wealth index decrease the probability of positive health spending. On the other hand, age, education, being exposed to chronic illness, sufferers of fever, cold/cough and diarrhoea and engaging in risky behaviours increase the probability of positive health spending.

Concentrating on the determinants of out-of-pocket payments, the set of independent predictors for out-of-pocket expenditure were NHIS membership, education, self-assessed health, risky behaviour, type of illness suffered, wealth index, hospitalisation and use of public health facilities. For example, NHIS membership is a negative predictor of out-of-pocket expenditure. Generally, the result suggests that health insurance significantly reduces health spending by 27.2 percent. Similar to our result, several studies found out that health insurance significantly reduces out-of-pocket health spending (Sepehri, Sarma and Simpson, 2006; Ekman, 2007; Sahoo and Madheswaran, 2014; Du *et al.*, 2019; Woldemichael, Gurara and Shimeles, 2019; Ta, Zhu and Fu, 2020). For instance, Sepehri, Sarma and Simpson (2006) found that having health insurance reduces out-of-pocket health expenditures by 18.5 percentage points. In other words, on average health insurance holders spend 18.5% less than their counterparts without insurance coverage regarding out-of-pocket health expenditure. This result contradicts the findings of Liu and Zhao (2014), who showed that health insurance membership instead increases out-of-pocket health expenditures but had insignificant coefficients. Similarly, in Indonesia, Sparrow, Suryahadi and Widyanti (2013) found that subsidised social health insurance directed at the informal sector and the poor increased out-of-pocket expenditure for urban residents. Other few studies found no evidence of health insurance reducing out-of-pocket expenditure (Wagstaff and Lindelow, 2008; Wagstaff *et al.*, 2009; Cheng *et al.*, 2016).

The coefficient of education is positive and statistically significant in predicting out-of-pocket health spending. This result indicates that the higher the level of education attended the higher the tendency to spend more on health. One of the likely reasons for this finding is that the more people become educated, they are more inclined to seek high-quality care for themselves and their dependents, resulting in more out-of-pocket health expenditure. This finding is comparable to the works of Sepehri, Sarma and Simpson (2006), Sahoo and Madheswaran (2014), Jung and Streeter (2015) and Ebaidalla and Ali (2019), who found education to be positively related to out-of-pocket health expenditure. Du *et al.* (2019) opinionated that highly

educated persons have better health awareness and can fully utilise healthcare and treatment alternatives, resulting in higher out-of-pocket health spending.

Self-assessed health has a negative influence on out-of-pocket health expenditure. This result indicates that the percentage of people paying out-of-pocket health expenditure decreases for those who self-reported good health. The coefficient on self-assessed health suggests that out-of-pocket health decreases by 26.5 per cent for individuals who self-reported good health. This finding validates a study in Jordan by Ekman (2007), who found that those with worse health pay more for care compared to their counterparts with better health. Similarly, in Ghana, Aryeetey *et al.* (2016) found that individuals with good health status pay less for out-of-pocket health expenditure compared to their counterparts with worse health. In China, Jung and Streeter (2015) found that people who self-reported worse health were more likely to access care and spend more out-of-pocket compared to those who self-reported excellent health. Again, Du *et al.* (2019) reported that individuals who self-reported 'good' and 'fair' health pay less for out-of-pocket health expenditure for inpatient services in China.

The risky behaviour variable has a positive influence on out-of-pocket health expenditure. This result means that smokers and drinkers have a 22 per cent higher out-of-pocket spending than non-smokers and non-drinkers. One possible explanation for this observation is that persons who engage in unhealthy behaviours such as smoking and drinking are relatively less health-conscious. A similar finding was obtained by Rezayatmand, Pavlova and Groot (2017), who observed that current smoking was related to higher out-of-pocket payments in Germany. This result supports the findings of Du *et al.* (2019), who found that drinkers paid more out-of-pocket health expenditure for inpatient services.

The influence of fever, cold/cough and diarrhoea dummies on out-of-pocket health expenditure is positive and statically significant. These findings suggest that the likelihood of paying more out-of-pocket health expenditure increases for sufferers of fever, cold/cough and diarrhoea relative to other illnesses. Mahumud *et al.* (2017) obtained a related finding in the case of diarrhoea. These findings confirm a study by Yang, Xie and Sarr (2018), who found that sufferers of fever, sore throat and cough were more likely to pay more out-of-pocket health spending compared to other ailments.

The effect of the wealth index is positive and statistically significant. This result means that for persons in the higher income bracket, the likelihood of experiencing out-of-pocket health expenses increases by 5.3 per cent. In the Ghana context, there exist geographical inequalities

in the distribution of healthcare facilities and personnel. This imbalance heightened health services disparities between urban and rural communities and between the wealthy and the poor (Peprah *et al.*, 2020). The imbalance in healthcare services delivery creates accessibility mainly for the rich because they can pay. Thus, any increase in household wealth tends to increase demand for high-quality health services leading to higher out-of-pocket health expenditures. Our findings are consistent with existing literature (Mahumud *et al.*, 2017; Zeng, Lannes and Mutasa, 2018; Nakovics *et al.*, 2020). This result disagrees with the findings of Aregbeshola and Khan (2020), who suggested that better-off households can afford health insurance plans, hence lowering their out-of-pocket health expenditure.

As expected, our study found the use of public health facilities to be negatively related to out-of-pocket health expenditure. Generally, the use of private facilities is associated with high out-of-pocket health expenditures. In the context of Ghana, most public health facilities are NHIS accredited. These NHIS accredited health facilities render services to NHIS members with minimal charges. The NHIS benefits package covers more than 95 per cent of all diseases that afflict Ghanaians (National Health Insurance Scheme, 2019), thereby reducing out-of-pocket health spending for the insured. This finding is in line with earlier research (Saksena *et al.*, 2012; Sriram and Khan, 2020). For instance, a study in Ghana revealed that the incidence of catastrophic health expenditures was lower for the insured households who sought care from NHIS accredited health facilities compared to the uninsured households (Kusi, Hansen, *et al.*, 2015). Contrarily, Aregbeshola and Khan (2020) found increased out-of-pocket health spending with the use of public health facilities in Nigeria. The authors suggested that user fees and informal payments collected from individuals might have explained this situation.

Interestingly, hospitalisation serving as a proxy for the severity of illness is a negative predictor of out-of-pocket health expenditure. The result reveals that the probability of incurring out-of-pocket health spending reduced by 25.5 per cent for hospitalised persons. Probably patients in hospitals pay a fixed sum for some charges regardless of the length of stay, but those who visit the outpatients' department pay the same rates each time. This finding is inconsistent with previous studies (Alam and Mahal, 2014; Nakovics *et al.*, 2020; Sriram and Khan, 2020). For example, in Malawi, Nakovics *et al.* (2020) speculated that high out-of-pocket health care costs for hospitalisations could be linked to prescription and equipment shortages, compelling patients to purchase necessities from private pharmacies.

6.5 Exploring the impact of NHIS membership on health status

The discussion of this section starts with descriptive statistics of our dependent variable that is self-assessed health. This is immediately followed by the results from the endogenous switching regression for the ordered outcome. We also look at the causal effect of the NHIS membership on health status and finally check the robustness of our results.

6.5.1 Descriptive statistics of self-assessed health

Descriptive statistics of self-assessed health are presented in Table 6.16. The results reveal that the majority (76%) of the respondents described their health as very healthy, however, very few of the respondents constituting almost 1.3% self-reported unhealthy.

Table 6.16: Descriptive statistics for self-assessed health

Self-assessed health	Frequency	Percent
Unhealthy	404	1.27
Somewhat unhealthy	1,601	5.03
Somewhat healthy	5,721	17.99
Very healthy	24,081	75.71
Total	31,807	100

Source: Author based on GSPS data

6.5.2 Estimated results of the endogenous switching regression for ordered outcome

The results from the endogenous switching regression for the ordered outcome are presented in Table 6.17. The lambda parameters measuring the relationship between the NHIS enrolment and health status models are statistically significant at the 1% level of significance. This result means that addressing the issue of endogeneity is key to making statistical inference about the causal effect of NHIS enrolment on health. The finding further suggests that separate estimation of the two models is most likely to yield estimates that are both biased and inconsistent. The Wald test reveals that our model fits the data reasonably well, achieving this at a 1% significance level. Moreover, the test of distinct regimes reveals that there is not enough evidence against the support of two identical regimes. The test proves the presence of heterogeneity in the sample. This result demonstrates the need to split the sample into distinct regimes, thereby confirming the appropriateness of choosing the endogenous switching regression model.

Table 6.17: Results of the endogenous switching regression for ordered outcome

		Health status	
Variable	NHIS enrolment	Without NHIS	With NHIS
Gender (male)	-0.366***	0.341***	0.271***
	(0.022)	(0.031)	(0.026)
Age	0.004***	-0.029***	-0.025***
	(0.001)	(0.001)	(0.001)
Education	0.090***	0.046*	0.038***
	(0.016)	(0.025)	(0.015)
Obesity	0.107***	-0.050	-0.019
	(0.037)	(0.053)	(0.033)
Chronic illness	-0.014	-0.538***	-0.463***
	(0.025)	(0.032)	(0.024)
Physical activity	0.446***	-1.065***	-0.816***
	(0.034)	(0.041)	(0.029)
Wealth index	-0.352***	0.037**	0.006
	(0.010)	(0.017)	(0.011)
Household size	-0.015***	–	–
	(0.004)	–	–
Dependency ratio	0.001***	–	–
	(0.0002)	–	–
Formal-sector worker	0.587***	–	–
	(0.0425)	–	–
Locality (Urban)	–	0.039	0.108***
	–	(0.038)	(0.027)
Risky behaviour	–	-0.073**	-0.093***
	–	(0.037)	(0.030)
Fever	–	-0.687***	-0.584***
	–	(0.065)	(0.044)
Cold or cough	–	-0.749***	-0.340***
	–	(0.144)	(0.099)
Diarrhoea	–	-0.545***	-0.642***
	–	(0.185)	(0.137)
Constant	-0.154***	–	–
	(0.037)	–	–
Lambda	–	-0.841***	-0.169***
	–	(0.020)	(0.033)
Observations	31,807		
Wald χ^2	2,811.35***		
Log pseudolikelihood	-38,858.527		
Test of independent treatment and outcome, treated group = 26.5. Probability = 0.			
Test of independent treatment and outcome, untreated group = 1761.09. Probability = 0.			
Test of distinct regimes = 306.03. Probability of identical treatment regimes=0.			

Source: Author based on GSPS data

Note: Robust standard errors in parentheses; *p < .1, **p < .05, ***p < .01.

The results reveal that the statistically significant determinants of NHIS enrolment are gender, age, education, obesity, physical activity, wealth index, household size, dependency ratio and formal-sector worker (see Table 6.17). The directional effects of these variables meet *a priori*

expectations, except for the wealth index. The results show that being male, having a larger household size and higher wealth index decrease the probability of NHIS enrolment. On the other hand, the increased probability of NHIS enrolment is associated with increasing age, higher education, being obese, having difficulties in engaging in physical activities, higher dependency ratio and working in the formal sector.

Directing attention to the determinants of self-assessed health, the third column of Table 6.17 presents two groups of estimates. Thus, estimates with homogeneous behaviour and heterogeneous behaviour between NHIS members and non-members. Homogenous behaviour is where the estimates for the two regimes have the same sign and are statistically significant. Concerning this gender, age, education, chronic illness, physical activity, risky behaviour and type of illness suffered are homogenous determinants of self-assessed health. Interestingly all these variables agree with theoretical expectations. Since the SAH variable is measured on an ordinal scale ranging from unhealthy (1) to very healthy (4), a positive coefficient submits that a person has a higher value of latent health and is more likely to report a higher category of SAH and vice versa.

Gender is a positive determinant of SAH. This finding implies that for both NHIS members and non-members males are more likely to report very healthily relative to their female counterparts. Generally, women consider several factors in rating their health. These factors may include psychological and emotional factors and even non-threatening ailments. This finding corroborates previous studies (Asfar *et al.*, 2007; Darviri *et al.*, 2012; Todorova *et al.*, 2013; Fan *et al.*, 2019; Sedefoğlu and Soytaş, 2019; Baidin, Gerry and Kaneva, 2021). For instance, Asfar *et al.* (2007) maintained that mental distress, anxiety and depression are more prevalent in women than men, hence women without social support are more likely to self-report poor health relative to their men counterparts.

Age has a negative influence on SAH, achieving this at a 1% significance level. This result implies that the aged are less likely to report being in good health. Understandably, common health conditions linked to ageing include hearing loss, general body pains and osteoarthritis, depression and dementia, among others. All of these health conditions make them rate their health low. This finding corroborates previous studies (Darviri *et al.*, 2012; Charonis *et al.*, 2017; Sedefoğlu and Soytaş, 2019; Baidin, Gerry and Kaneva, 2021). For instance, Charonis *et al.* (2017) maintained that the incidence of multiple disease symptoms common among older persons explained their low self-assessed health.

Education marginally predicts SAH positively. The result implies that higher educational attainment is associated with reporting good health for insured and uninsured individuals relative to their counterparts with lower educational attainment. A plausible explanation is that education improves people's analytical skills in handling complex problems and help traverse the complexity of the modern health system. This finding agrees with studies undertaken in Russia (Baidin, Gerry and Kaneva, 2021), Nigeria (Ogunyemi, Olatona and Odeyemi, 2018), Ghana and Uruguay (Lankarani, Shah and Assari, 2017), Puerto Rico (Todorova *et al.*, 2013), Greece (Darviri *et al.*, 2012), and Poland (Kaleta *et al.*, 2009). However, our finding contradicts a study conducted in Turkey (Sedefoğlu and Soytaş, 2019).

In line with empirics, chronic illness and physical activity are negatively and significantly associated with the SAH. The statistical association between the SAH and chronic illness and physical activity are well documented (Asfar *et al.*, 2007; Campos *et al.*, 2015; Bilgel and Karahasan, 2017; Charonis *et al.*, 2017). These findings show that people who have a chronic health condition or have difficulty participating in physical activities are less likely to report good health than people who do not have chronic illnesses or are inactive.

Risky behaviour variable controlling for individual's health behaviours is a negative predictor of SAH. This finding suggests that the likelihood of self-reporting good health decreases for insured and uninsured who either smoke or drink or both. Heart disease, stroke, cancer, lung diseases, diabetes and immune system problems and the like are some of the health risks associated with smoking. On the other hand, health risks linked to drinking are cardiovascular disease, chronic liver disease, cancers, acute alcohol poisoning (i.e., alcohol toxicity) and fetal alcohol syndrome, among others. All these health risks associated with smoking and drinking can make persons engaging in these risky behaviours to be more pessimistic in describing their health status. Our finding confirms the works of Fan *et al.* (2019), who found that smokers and drinkers were less likely to report good health. Similarly, Kaleta *et al.* (2009) observed that current and former smokers reported worse health compared to their non-smokers' counterparts.

All the dummies that capture the type of illness suffered determine SAH negatively. These results indicate that the probability of reporting good health decreases for sufferers of fever, cold/cough or diarrhoea for both insured and uninsured. Plausibly the agony for individuals going through these illnesses is likely to influence their health status, making them less optimistic in describing their health.

Regarding heterogeneous behaviours, wealth index affects individuals without NHIS while locality influences NHIS members self-assessed health status. The wealth index positively determines SAH for persons without NHIS. This finding implies that increasing wealth is associated with better self-assessing health for persons without NHIS. A possible explanation is that health can be considered as a 'normal good'. The wealthy has the purchasing power to demand health through nutritious diets, high-quality health care, proper hygiene and sanitation, among others. Evidence points to the fact that individuals with a higher wealth self-report better health than those with lower wealth (Asfar *et al.*, 2007).

The variable locality (urban) positively influences SAH for persons with NHIS. This result means that NHIS members residing in urban communities are more likely to report good health. Generally, urban residents have more access to health information and healthcare services, possibly giving NHIS members describe their health as better. This result is compatible with studies undertaken by Sedefoğlu and Soytaş (2019) and Bilgel and Karahasan (2017). However, our finding contrasts the works of Fan *et al.* (2019), who found urban residents to be less likely to report better health.

6.5.3 Effect of NHIS enrolment on health status

The implemented command "*switchoprobitsim*" provides an opportunity to estimate the causal effect of the NHIS membership on health status. As the outcome variable (i.e., self-assessed health) is measured on an ordinal scale, estimates of the average treatment effect on the treated (ATT) are shown for all health levels among the J possible ordered health outcomes. The results of the treatment effects for our four regimes of self-assessed health are presented in Table 6.18.

Table 6.18: Estimates of the effect of NHIS enrolment on health status

Effect	Definition	Estimate	Standard error
ATT1	Unhealthy	-0.0558***	0.0053
ATT2	Somewhat unhealthy	-0.0753***	0.0082
ATT3	Somewhat healthy	-0.0979***	0.0115
ATT4	Very healthy	0.229***	0.0161
Observations	15,964		

Source: Author based on GSPS data
Notes: *** $p < 0.01$

The ATT results indicate that NHIS membership increases the probability of reporting good health. The estimated coefficient shows that the probability of reporting good health increases by 22.9%. But NHIS membership is associated with decreasing the probability of self-reporting unhealthy, somewhat unhealthy and somewhat healthy by 5.6, 7.5 and 9.8 percent, respectively. These findings suggest that NHIS membership improves health status while decreasing poor self-assessed health. Our finding corroborates earlier studies such as Cheng *et al.* (2016), Simon, Soni and Cawley (2017) and Fan *et al.* (2019) on the impact of health insurance on health outcomes. Fan *et al.* (2019) provided four possible mechanisms through which China's public health insurance could impact health status. First, that health insurance has an overall effect of increasing health service utilisation; second, improving health-related behaviours such as the use of preventive health services; third, decreasing financial risk via reducing out-of-pocket payments; and finally, reducing individual stress as a result of a reduction in out-of-pocket payments. The authors asserted that all these possible mechanisms would positively affect health.

6.5.4 Robustness check of the effect of NHIS enrolment on health status

We assume homogeneity in the sample where the outcomes for treated and untreated are commonly handled with a motive to check for the robustness of our results. In other words, the study assumes that individuals with or without NHIS have common characteristics related to self-assessed health status. The study employed the treatment-effects model for an ordered outcome, implementing it with the help of the STATA user-written command "treatoprobitsim" developed by Gregory (2015).

The estimated results from the treatment effects for the ordered outcome are presented in Table 6.19. This model has the advantage of combining the treatment (NHIS membership) with the outcome (SAH) and testing its significance. The result reveals that NHIS membership predicts SAH positively. This finding means that the likelihood of self-assessing better health increases with NHIS membership.

The ATT results show that the probability of reporting good health increases with NHIS membership. The estimated coefficient from the treatment effects for the ordered outcome shows that the likelihood of reporting health status as very healthy increases by 10.4% (see Table 6.20). Generally, the results are robust to alternative specification. These findings present a shred of overwhelming evidence that NHIS enrolment improves health status.

Table 6.19: Results of the treatment effects for ordered outcome

Variable	NHIS enrolment	Health status
Gender (male)	-0.484***	0.257***
	(0.029)	(0.022)
Age	0.005***	-0.024***
	(0.001)	(0.001)
Education	0.125***	0.041***
	(0.021)	(0.012)
Obesity	0.145***	-0.028
	(0.049)	(0.027)
Chronic illness	-0.019	-0.457***
	(0.033)	(0.019)
Physical activity	0.574***	-0.830***
	(0.044)	(0.031)
Wealth index	-0.466***	0.003
	(0.014)	(0.013)
Household size	-0.023***	–
	(0.006)	–
Dependency ratio	0.002***	–
	(0.0003)	–
Formal-sector worker	0.813***	–
	(0.059)	–
Locality (Urban)	–	0.078***
	–	(0.021)
Risky behaviour	–	-0.074***
	–	(0.022)
Fever	–	-0.581***
	–	(0.035)
Cold or cough	–	-0.425***
	–	(0.077)
Diarrhoea	–	-0.556***
	–	(0.103)
NHIS membership	–	0.398***
	–	(0.110)
Constant	-0.188***	–
	(0.049)	–
Lambda	–	-0.161***
	–	(0.045)
Observations	31,807	
Wald χ^2	2,583.70***	
Log pseudolikelihood	-38,884.263	
Test of independent equations = 13.02. Probability of independent equations 0.		

Source: Author based on GSPS data

Note: Robust standard errors in parentheses; *p < .1, **p < .05, ***p < .01.

Table 6.20: Estimates of treatment effects on health status

Effect	Definition	Estimate	Standard error
ATT1	Unhealthy	-0.0149***	0.0030
ATT2	Somewhat unhealthy	-0.0293***	0.0057
ATT3	Somewhat healthy	-0.0659***	0.0160
ATT4	Very healthy	0.104***	0.0234
Observations	15,964		

Source: Author based on GSPS data
Notes: *** $p < 0.01$

6.6 Examining the interrelationship between health insurance, healthcare utilisation, financial protection and health status

The final section of the data analysis examines the interrelationship between health insurance, healthcare utilisation, financial protection and health status. Since the study identified two outcomes for healthcare utilisation, namely visits to a healthcare facility and the number of hospitalisation days, our estimation considered this distinction. Variables included in the CMP estimations were carefully selected to avoid collinearity and ensure convergence. Appendix Tables A10 and A11 show the baseline regression results.

Tables 6.21 and 6.22 present the CMP estimates in which issues of sample selection bias and endogeneity are addressed. The rho (ρ) parameters measure the association between our four models. In Table 6.21 where healthcare utilisation is measured by visits to a health facility, the results show a significant relationship between health insurance and healthcare utilisation, health insurance and health expenditure, and healthcare utilisation and health status.

Table 6.21: Conditional Mixed Process estimates of health insurance, healthcare utilisation (visit to health facility), health expenditure and health status

	Enrolment		Healthcare utilisation (Visit to health facility)		Health expenditure	Health status
Variable	Coefficient	Marginal effects	Coefficient	Marginal effects	Coefficient	Coefficient
Gender (male)	-0.250***	-0.091***	-0.209***	-0.049***	0.175**	0.212***
	(0.015)	(0.005)	(0.023)	(0.006)	(0.088)	(0.017)
Age	0.003***	0.001***	0.009***	0.002***	-0.001	-0.023***
	(0.000)	(0.0002)	(0.001)	(0.0001)	(0.003)	(0.000)
Education	0.044***	0.016***	0.065***	0.015***	0.043	0.056***
	(0.010)	(0.004)	(0.014)	(0.003)	(0.047)	(0.012)
Obesity	0.063**	0.023**	0.099***	0.023***	0.120	-0.009
	(0.025)	(0.009)	(0.033)	(0.008)	(0.104)	(0.026)
Chronic illness	0.001	0.0004	0.319***	0.075***	-0.244***	-0.453***
	(0.017)	(0.006)	(0.023)	(0.006)	(0.092)	(0.017)
Physical activity	0.298***	0.108***	0.304***	0.071***	0.038	-0.758***
	(0.023)	(0.008)	(0.030)	(0.007)	(0.108)	(0.022)
Wealth index	-0.229***	-0.083***	-0.055***	-0.013***	0.139***	-0.049***
	(0.007)	(0.002)	(0.009)	(0.002)	(0.031)	(0.007)
Risky behaviour	–	–	-0.113***	-0.027***	0.253***	-0.081***
	–	–	(0.031)	(0.007)	(0.089)	(0.022)
Fever	–	–	1.190***	0.279***	-0.051	-0.579***
	–	–	(0.039)	(0.009)	(0.219)	(0.035)
Cold or cough	–	–	0.996***	0.234***	-0.280	-0.426***
	–	–	(0.078)	(0.019)	(0.240)	(0.072)
Diarrhoea	–	–	1.202***	0.282***	0.272	-0.564***
	–	–	(0.123)	(0.029)	(0.304)	(0.115)
Formal-sector worker	0.374***	0.136***	–	–	–	–
	(0.029)	(0.011)	–	–	–	–
Dependency ratio	0.001***	0.0003***	–	–	–	–
	(0.000)	(0.0001)	–	–	–	–

Household size	-0.011***	-0.004***	–	–	–	–
	(0.003)	(0.001)	–	–	–	–
Savings	0.259***	0.094***	–	–	–	–
	(0.017)	(0.006)	–	–	–	–
Distance	–	–	–	–	0.029***	–
	–	–	–	–	(0.011)	–
Constant	-0.162***	–	-1.947***	–	2.765***	–
	(0.025)	–	(0.027)	–	(0.521)	–
rho_12	0.164***					
	(0.014)					
rho_13	-0.258***					
	(0.039)					
rho_14	-0.006					
	(0.011)					
rho_23	-0.209					
	(0.167)					
rho_24	-0.305***					
	(0.013)					
rho_34	-0.045					
	(0.053)					
Observations	31,807					
Wald χ^2	12,950.05***					
Log likelihood	-4,8524.195					

Source: Author based on GSPS data

Notes: Standard errors in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

Table 6.22: Conditional Mixed Process estimates of health insurance, healthcare utilisation (Hospitalisation days), health expenditure and health status

	Enrolment		Healthcare utilisation (Hospitalisation days)	Health expenditure	Health status
Variable	Coefficient	Marginal effects	Coefficient	Coefficient	Coefficient
Gender (male)	-0.250***	-0.091***	2.771***	0.134*	0.212***
	(0.015)	(0.005)	(0.809)	(0.079)	(0.017)
Age	0.003***	0.001***	0.028	0.001	-0.023***
	(0.0004)	(0.0002)	(0.022)	(0.002)	(0.0004)
Education	0.043***	0.016***	0.190	0.057	0.056***
	(0.011)	(0.004)	(0.485)	(0.045)	(0.012)
Obesity	0.061**	0.022**	-0.695	0.137	-0.008
	(0.025)	(0.009)	(1.098)	(0.102)	(0.026)
Chronic illness	0.001	0.0004	0.294	-0.181**	-0.451***
	(0.017)	(0.006)	(0.780)	(0.073)	(0.017)
Physical activity	0.297***	0.108***	2.627***	0.094	-0.761***
	(0.023)	(0.008)	(1.000)	(0.094)	(0.022)
Wealth index	-0.229***	-0.083***	-0.599*	0.130***	-0.048***
	(0.007)	(0.002)	(0.329)	(0.030)	(0.007)
Risky behaviour	–	–	1.521	0.227***	-0.080***
	–	–	(0.989)	(0.087)	(0.022)
Fever	–	–	-0.405	0.191**	-0.568***
	–	–	(1.373)	(0.083)	(0.035)
Cold or cough	–	–	-2.346	-0.070	-0.413***
	–	–	(2.821)	(0.164)	(0.072)
Diarrhoea	–	–	20.727***	0.517**	-0.552***
	–	–	(5.270)	(0.224)	(0.115)
Formal-sector worker	0.375***	0.136***	–	–	–
	(0.029)	(0.011)	–	–	–
Dependency ratio	0.001***	0.0003***	–	–	–
	(0.0001)	(0.0001)	–	–	–

Household size	-0.012***	-0.004***	–	–	–
	(0.003)	(0.001)	–	–	–
Savings	0.264***	0.096***	–	–	–
	(0.017)	(0.006)	–	–	–
Distance	–	–	–	0.028***	–
	–	–	–	(0.011)	–
Constant	-0.151***	–	2.283**	2.168***	–
	(0.025)	–	(0.972)	(0.109)	–
rho_12	0.029				
	(0.045)				
rho_13	-0.241***				
	(0.038)				
rho_14	-0.008				
	(0.011)				
rho_23	0.022				
	(0.070)				
rho_24	-0.118***				
	(0.028)				
rho_34	-0.099***				
	(0.031)				
Observations	31,807				
LR χ^2	12,674.79***				
Log likelihood	-45,700.937				

Source: Author based on GSPS data

Notes: Standard errors in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

In the case of Table 6.22 where healthcare utilisation is measured by hospitalisation days, the results reveal a significant relationship between health insurance and health expenditure, healthcare utilisation and health status, and health expenditure and health status. These findings imply that estimating these models separately is most likely to yield biased and inconsistent estimates. Therefore, the CMP estimates are superior to single equations estimates. As a result, CMP joint estimates form the basis of the discussion of our results.

A diagnostic assessment of our models shows that the models reasonably fit the data well as revealed by the Wald and likelihood-ratio tests which are significant at 1 per cent level. Column 2 of Table 6.21 presents the probit estimates for the factors influencing NHIS enrolment or membership. We found gender, age, education, obesity, physical activity, wealth index, household size, dependency ratio, formal-sector worker and savings to be significant in explaining NHIS enrolment. Except for the wealth index, other variables have the expected sign.

The male gender negatively determines NHIS enrolment at a one per cent level, meaning that males have a lower likelihood of enrolling in the NHIS than females. The marginal effect submits that the likelihood of males enrolling in the NHIS decreases by 9.1 percentage points. Generally, males are more risk-loving and are less likely to take precautionary measures such as the purchase of health insurance against future illness episode. Besides, females have consistently higher morbidity rates, resulting in increased healthcare utilisation. As a result, women are much more likely than their male counterparts to have health insurance coverage. The present finding is consistent with the works of Sekyi, Aglobitse and Addai-asante (2015) and Ghosh and Gupta (2017). This finding somewhat contradicts the research of Duku (2018), who found a positive relationship between gender (male=1) and NHIS enrolment in a study that sought to examine the differences in the enrolment determinants between persons living in the Greater Accra and Western regions of Ghana.

The age variable significantly influences NHIS membership positively. This finding supports economic theory proposing that ageing depreciates health stock which intends to make individuals buy health insurance as a health investment to decrease the rate of depreciation and to overcome catastrophic health expenditure upon illness episodes (Grossman, 1972). This result corroborates the findings of Sekyi, Aglobitse and Addai-asante (2015), Duku (2018), and Van Der Wielen, Falkingham and Channon (2018).

Education is a positive determinant of NHIS membership. The results suggest that education improves the likelihood of individuals enrolling in the scheme by 1.6 percentage points. Education tends to increase people's knowledge, conceptual prowess, receptiveness and awareness. Therefore, education makes the highly educated individuals better informed, hence increasing their likelihood of enrolment. This finding concurs with previous studies (Ayitey, Nketiah-Amponsah and Barimah, 2013; Sekyi, Aglobitse and Addai-Asante, 2015; Dake, 2018; Duku, 2018; Salari *et al.*, 2019). For instance, Dake (2018) argued that aside from their ability to purchase health insurance the more educated appreciate the value of having insurance.

The obesity variable is a positive determinant of NHIS membership at 1 per cent levels. This result means that the probability of an obese person enrolling in the NHIS increases by 2.3 percentage points. A likely reason for this finding is that obesity is often linked to many health risks such as diabetes, heart disease, stroke, and some types of cancer and its associated health care cost. Health insurance scheme provides a safety net in terms of financial protection against health cost, hence increased enrolment for obese persons who are likely to have higher healthcare cost compared to their non-obese counterparts.

The variable that captures people's difficulty in participating in physical activities/roles (i.e., physical activity) is a positive determinant of NHIS membership. The marginal effect indicates that the probability of an individual having difficulty in participating in physical activities enrolling in the scheme increases by 10.8 percentage points. By implication, many of these persons have underlying health conditions, hence would like to take up health insurance to cover future healthcare cost and improve their health status.

Surprisingly, the wealth index is negatively associated with NHIS membership. This result suggests that as the household wealth index increases, the likelihood of individuals enrolling on the scheme decreases by 8.3 percentage points. This conclusion could be explained by the fact that wealthy people can afford out-of-pocket payments and private health insurance, which appears to be more convenient, reducing their likelihood of enrolling in the NHIS. Besides, some aspects of Ghana's NHIS and the health system may partly explain the above findings in terms of enrolment. The NHIS and the health system is plagued with a lot of challenges including, longer waiting times, patient dissatisfaction with the quality of care rendered by NHIS-accredited health facilities, differential treatment against NHIS cardholders and quality of drugs covered by the scheme, among other (Ghana Health Service, 2011; Alhassan, Nketiah-Amponsah and Arhinful, 2016). All these challenges may discourage the rich from enrolling

on the scheme. This result contradicts findings from earlier studies by Jehu-appiah *et al.* (2011), Kotoh and Van Der Geest (2016), Dake (2018), Salari *et al.* (2019) and Nsiah-Boateng, Prah and Nonvignon (2019).

Household size is a negative predictor of NHIS membership. Larger households tend to have fewer financial resources to pay the insurance premium, thereby reducing their enrolment. This finding confirms earlier studies (Kusi *et al.*, 2015; Sekyi, Aglobitse and Addai-asante, 2015; Woldemichael, Gurara and Shimeles, 2019). For instance, Sekyi, Aglobitse and Addai-asante (2015) intuitively explained that any increase in the household size potentially reduces per capita income, holding household income constant, hence decreasing their likelihood of enrolment. This result goes contrary to studies conducted by Sarpong *et al.* (2010), Lu *et al.* (2012), Dake (2018) and Nsiah-Boateng, Prah and Nonvignon (2019). Nsiah-Boateng, Prah and Nonvignon (2019) suggested that risk aversion may be associated with larger households. Therefore, larger households would seek financial protection against healthcare costs and dodge catastrophic health spending by enrolling. The dependency ratio is positively related to NHIS membership. This result implies that there are more dependents per productive person enrolled in the NHIS.

As expected, the formal-sector worker variable positively predicts NHIS membership. The marginal effect suggests that persons from formal sector headed households are 13.6% more likely to enrol in the NHIS. In the context of Ghana, this finding is understandable because formal-sector workers are required to enrol in the scheme without paying a premium for being SSNIT contributors. This result is in line with Wielen, Channon and Falkingham (2018), who found that older adults who live in households headed by formal sector employees were more likely to be enrolled in Ghana's NHIS. Kimani *et al.* (2012) also obtained a similar finding in Kenya. The authors found that working in the formal employment sector increases the likelihood of enrolment into the public health insurance programme.

Savings is positively and significantly associated with NHIS membership. The marginal effect suggests that households whose head saves with banking institutions and others are 9.4% more likely to be members of NHIS. The plausible reason for this result is that savings increase households' ability to pay a premium. Our finding agrees with Kimani *et al.* (2012), who found that saving schemes and community-based saving groups were key determinants of participation in public health insurance in Kenya.

The third columns of Tables 6.21 and 6.22 present the determinants of healthcare utilisation using visits to a health facility and hospitalisation days, respectively. All the variables that entered into this model were significantly related to visits to a health facility. Regarding hospitalisation days, only four variables statistically influence it. These variables are gender, physical activity, wealth index and diarrhoea.

The gender variable negatively influences healthcare utilisation, suggesting that males are less likely to visit a health facility when ill compared to their female counterparts. The estimated marginal effect indicates that the probability of males visiting a health facility when sick decreases by 4.9 percentage points. Even though evidence suggests higher longevity for women relative to men, women tend to have a higher frequency of morbidity leading to increased healthcare utilisation (Wingard *et al.*, 1989). This finding is comparable to the work of Han-Kim and Lee (2016). However, our finding contradicts the work of O'Connor (2015). O'Connor (2015) found that males are more likely than females to arrange preventive health service appointments. The author suggested that males are more likely to use preventive services because their health conditions necessitate frequent monitoring (e.g., glucose checks, electrocardiogram, etc.).

Age has a significant positive effect on healthcare utilisation. Expectedly, older persons are faced with deteriorating health conditions making them more likely to utilise care. This finding supports the works of Awoke *et al.* (2017) and Grustam *et al.* (2020). However, this finding contradicts the works of Cameron *et al.* (1988), Ekman (2007), O'Connor (2015) and Han-Kim and Lee (2016), who found age to be associated with less health service utilisation. O'Connor (2015), for example, backed up his conclusion by saying that older persons may have more difficulty getting health treatment due to a loss of motivation and knowledge.

Education is positive and statistically significant in explaining the probability of utilising healthcare services. This result implies that for each additional educational level attained the likelihood of an individual visiting a health facility when ill increases by 1.5 percentage points. A probable explanation for this finding is that generally, education creates health awareness, particularly the need to seek care when ill and its related benefits, thereby making the highly educated more likely to utilise healthcare services. This finding supports evidence emerging from the literature (Masiye and Kaonga, 2016; Awoke *et al.*, 2017; Gotsadze *et al.*, 2017; Grustam *et al.*, 2020). Lotfi *et al.* (2017), however, obtained a contrary finding. The authors contended that the highly educated pay more attention to health-related issues and use

preventive measures more frequently, leading to better health status and reduction in health services utilisation.

Obesity is a positive predictor of healthcare utilisation. This result implies that obesity significantly increases the probability of visiting a health facility when ill. The marginal effect suggests that the probability of obese persons visiting a health facility when ill increase by 2.1 percentage points. A probable explanation for this finding is that obesity is associated with many health risks leading to increased healthcare utilisation. This finding confirms an earlier study in Estonia by Vals, Kiivet and Leinsalu (2013).

Health-related variables that capture individual health care needs mainly chronic illness and physical activity are positive determinants of healthcare utilisation. The marginal effect suggests that the probabilities of utilising healthcare increase by 7.5 and 7.2 percentage points for individuals exposed to chronic health problem and those who have difficulty in participating in physical activities, respectively. These findings reveal that utilisation of healthcare services increased for persons with observed healthcare needs. Studies by Ekman (2007) and Han-Kim and Lee (2016) observed an increased probability of outpatient usage for persons with chronic illness. Our finding on physical activity is in line with a study by Grustam *et al.* (2020), who found increased utilisation of primary care for persons with daily activities impairment.

The coefficient of wealth index is negative and statistically significant in influencing the probability of visiting a health facility. This result implies that increasing wealth is associated with a lesser likelihood of health facility visitation. A likely reason for this finding is that the opportunity cost of illness is high for wealthy people. Since they have the means, they invest in health-enhancing measures. These measures may include eating good nutritious foods and maintaining preventive care. All these measures may lower their susceptibility to illnesses leading to a reduction in health facility visitation. This finding supports the works of Zhang, Salm and van Soest (2018) and Ta, Zhu and Fu (2020). For instance, Zhang, Salm and van Soest (2018) argued that the opportunity cost of time for visiting a doctor is high for the wealthier persons. Similarly, Mwami and Oleche (2017) suggested that the poor are exposed to health hazards (i.e., malnutrition and insanitary conditions), making them prone to diseases leading to increased utilisation of healthcare service. This finding, however, contrasts the findings of Awoke *et al.* (2017), who reported increased utilisation, particularly private health facility visits for wealthy persons.

The dummy that captures risky behaviour is negatively associated with healthcare utilisation.

The marginal effect suggests that individuals who engage in risky behaviour are 2.7% less likely to visit a health facility when ill. Expectedly, individuals who engage in risky behaviour (i.e., consuming alcoholic beverages and/or smoke or chew tobacco) often care less about life and are relatively less conscious about their health needs, resulting in lower healthcare utilisation. Previous studies have also revealed a lower healthcare utilisation for smokers and drinkers (Vals, Kiivet and Leinsalu, 2013; Rezayatmand, Pavlova and Groot, 2017). For instance, Rezayatmand, Pavlova and Groot (2017) argued that smokers and drinkers are less concerned about their health status or they delay in seeking health services resulting in lower healthcare usage.

All the dummies that capture the type of illness suffered are positive determinants of healthcare utilisation. These findings imply that the probability of visiting a health facility when ill increases for sufferers of either fever, cold/cough or diarrhoea relative to other illnesses. The marginal effect suggests that having either fever, cold/cough or diarrhoea increase the probability of visiting a health facility by 28, 23.4 and 28.2 percentage points, respectively. These findings reveal that Ghanaians are highly conscious about their health. This attitude of seeking formal care when ill reduces multiple health risks and monetary cost associated with delays in seeking care. The present findings are consistent with the work of Sekyi and Domanban (2012). However, our findings contradict the work of Masiye and Kaonga (2016), who reported that persons who had diarrhoea reduced their likelihood of seeking formal healthcare, but instead had a higher likelihood for self-medication.

Regarding the determinants of hospitalisation four variables namely gender, physical activity, the wealth index and the dummy variable for diarrhoea, are the main predictors. Contrary to our expectation, the gender variable has a significant positive coefficient with healthcare utilisation (measured by hospitalisation days). This result means that males have higher hospitalisation care compared to their female counterparts. An intuitive explanation for this finding is that societal pressures and demands make males engage in risky activities, exposing them to health hazards such as injuries and sickness, resulting in higher hospitalisation. This finding agrees with the work of Han-Kim and Lee (2016), who found increased utilisation of inpatient services for men than women in Korea. Similarly, Dutta and Husain (2013) found a lower likelihood of hospitalisation for women than men in India. However, a different finding was obtained by Saeed *et al.* (2015), who observed a higher hospitalisation rate for women in Ghana. An earlier study by Cameron *et al.* (1988) in Australia found reduced hospital admissions and hospitalisation days for females.

Physical activity has a positive association with hospitalisation duration. Two possible explanations may be given for this finding: first, persons who have difficulty in participating in physical activities may have underlying health conditions which make them prone to hospitalisation and; second, physical inactivity is shown to be a risk factor for cardiovascular disease and other ailments which increase hospitalisation intensity. For example, Marashi *et al.* (2019) maintained that in the hospital context, physical activity reduces both the rate of hospitalisation and the length of stay, allowing for a faster recovery.

The wealth index is a negative predictor of hospitalisation care. This result shows that higher wealth is significantly related to shorter hospitalisation duration. One of the likely reasons for this finding is that wealthy individuals can afford alternative healthcare options through expensive private providers particularly home care, hence reducing their hospitalisation rate.

The dummy variable that captures diarrhoea is positively associated with hospitalisation duration. One possible reason for this finding is that individuals who contracted the disease might have been severe diarrhoea which needed immediate attention from a doctor leading to increased hospitalisation. Besides, ineffective home management of the disease might have contributed to the increase in hospitalisation.

The determinants of out-of-pocket payments using a visit to a health facility and hospitalisation days in the estimations are presented in the fourth columns of Tables 6.19 and 6.20, respectively. When a visit to a health facility is used in the estimation, predictors of out-of-pocket payments were gender, chronic illness, wealth index, risky behaviour and distance to a health facility. Aside from the five variables (i.e., gender, chronic illness, wealth index, risky behaviour and distance to a health facility), two additional variables, namely fever and diarrhoea dummies also influence out-of-pocket payments when estimation is done with hospitalisation days.

Gender is a positive determinant of out-of-pocket health expenditures, suggesting that male pay more health services than their female counterparts. Our finding is partly supported by a study in China by Du *et al.* (2019), who found that women pay fewer amounts for inpatient care but pay more for outpatient services relative to men. This result contradicts the findings of Malik and Syed (2012) in Pakistan, Masiye and Kaonga (2016) in Zambia, Mahumud *et al.* (2017) in Bangladesh, Zeng, Lannes and Mutasa (2018) in Zimbabwe and Aregbeshola and Khan (2020) in Nigeria.

Contrary to expectations, chronic illness is a negative determinant of out-of-pocket health expenditures. This result means that individuals suffering from chronic illness pay significantly less out-of-pocket health expenditures compared to those without chronic illness. This result rejects the notion that individuals with chronic illness have observed healthcare needs that increase their utilisation of health care. A latent reason for this finding is that individuals with chronic sickness might have lost interest in formal care and may resort to self-treatments leading to lower out-of-pocket health expenditure. This surprising result is compatible with a study in Burkina Faso by Su *et al.* (2006), where people were less likely to spend money on chronic sickness. However, this finding is inconsistent with preceding studies (Ekman, 2007; Du *et al.*, 2019; Aregbeshola and Khan, 2020; Nakovics *et al.*, 2020). For instance, Du *et al.* (2019) observed that individuals with multiple chronic diseases pay more for outpatient and inpatient services and self-medication. The authors suggested strengthening strategies for preventing and controlling chronic illness to reduce out-of-pocket expenditure. Additionally, policy efforts should focus on increasing welfare subsidies and optimizing benefit packages of health insurance schemes to alleviate the burden of out-of-pocket spending among chronic illness patients.

The effect of wealth index on out-of-pocket health expenditure is positive and statistically significant. This result means that the wealthy spend more on healthcare relative to the poor. Geographical inequalities in terms of distribution of healthcare facilities and personnel continue to exist in Ghana. The imbalance in the delivery of healthcare services creates access difficulties for the poor since they cannot afford it. Therefore, any additional wealth increases demand for high-quality health services resulting in higher out-of-pocket health expenditures. Our result complies with previous findings such as Zeng, Lannes and Mutasa (2018) in Zimbabwe and Nakovics *et al.* (2020) in Malawi, but contradicts the findings of Aregbeshola and Khan (2020) in Nigeria.

The risky behaviour variable is a positive determinant of out-of-pocket health expenditure. This finding implies that individuals who engage in risky behaviour pay more when they use health care services. At first glance, the result may seem counterintuitive as we found that individuals who engage in risky behaviour are less likely to visit a health facility. The present finding suggests that though they could use less care, once they do, they pay more out-of-pocket health expenditure. This observation is likely due to their relatively less health consciousness. So, whenever they demand health care their illness may be severe resulting in increased out-of-pocket payment. This result agrees with the findings of Rezayatmand, Pavlova and Groot

(2017) and Du *et al.* (2019). For example, Du *et al.* (2019) discovered that alcoholics spent much more out-of-pocket for inpatient services than non-drinkers.

The variable distance to a health facility is a positive determinant of out-of-pocket health expenditure. This finding suggests that the likelihood of paying out-of-pocket health expenditure increases by 2.7 percentage points for every hour travelled to a health facility. This finding goes to confirm studies conducted by Malik and Syed (2012) and Masiye and Kaonga (2016).

Expectedly, the effects of fever and diarrhoea dummies are positive and significant, suggesting that sufferers of either fever or diarrhoea pay more out-of-pocket health expenditure relative to other illnesses. These findings corroborate Yang, Xie and Sarr (2018) findings, which show that those with fever, sore throat, and cough had higher out-of-pocket health costs than people with other illnesses in China. In Bangladesh, a similar finding was obtained by Mahumud *et al.* (2017) in the case of diarrhoea.

The determinants of health status measured by self-assessed health (SAH) are presented in the final column in Tables 6.21 and 6.22. The parameter estimates are obtained from an ordered probit model. Of the ten variables, namely gender, age, education, chronic illness, physical activity, wealth index, risky behaviour, and dummies for sufferers of fever, cold/cough and diarrhoea that significantly predict SAH, only the wealth index failed to meet our expectation. For example, the coefficient on gender is positive and statistically significant at a 1% level. This result implies that males are more likely to report good health relative to their female counterparts. Males are relatively more optimistic about their health relative to females. This finding corroborates previous studies such as Todorova *et al.* (2013), Fan *et al.* (2019) and Baidin, Gerry and Kaneva (2021).

The coefficient on age is negative and statistically significant at a 1% level. This finding means that as individuals' age, they are less likely to report being very healthy. The aged are more likely to experience several health conditions simultaneously, making them rate their health low. This result validates past studies such as Fan *et al.* (2019) in China, Sedefoğlu and Soytaş (2019) in Turkey and Baidin, Gerry and Kaneva (2021) in Russia. The aged are exposed to multiple health problems and illnesses linked to ageing, thereby making them more pessimistic when self-reporting health (Franks, Gold and Fiscella, 2003; Bilgel and Karahasan, 2017).

Education is a positive determinant of SAH. The positive coefficient of education implies that individuals with higher educational attainment are more likely to report good health relative to

their counterparts with lower educational attainment. Education enables individuals to have better jobs and higher wealth resulting in better access and utilisation of high-quality health care, all connected to better health reporting. This result is consistent with earlier studies (Darviri *et al.*, 2012; Todorova *et al.*, 2013; Sedefoğlu and Soytaş, 2019; Baidin, Gerry and Kaneva, 2021). Darviri *et al.* (2012) and Todorova *et al.* (2013) used multinomial regression analysis whereas, Sedefoğlu and Soytaş (2019) and Baidin, Gerry and Kaneva (2021) used a generalised ordered logit model, and they discovered that increasing education increases the likelihood of reporting good health.

Expectedly, chronic illness and physical activity are both negatively and significantly associated with the SAH. These findings mean that the likelihood of reporting good health decreases for individuals with a chronic health condition or those having difficulties in participating in physical activities/roles. Individuals exposed to a chronic health condition or having physical difficulties often have several underlying health conditions making them less optimistic in describing their health status. These findings are consistent with previous studies (Asfar *et al.*, 2007; Campos *et al.*, 2015; Bilgel and Karahasan, 2017). For instance, Asfar *et al.* (2007) reported that low physical activity for men was associated with poor health.

Contrary to expectation, the wealth index predicts SAH negatively. Generally, individuals with a higher economic status self-report better health than those with lower economic levels. A plausible explanation for this outcome is that wealthy people are often prone to lifestyle diseases, such as heart disease, atherosclerosis, stroke, obesity and type 2 diabetes and the like. In the Ghanaian context, social and economic status is associated with body size. Hence, wealthy people prefer to become overweight and obese to merit their social status. All these attitudes expose the rich to lifestyle diseases, resulting in their reporting of poor health. This finding goes contrary to a study by Asfar *et al.* (2007).

The variable which controlled for individual's health behaviours that is risky behaviour is a negative predictor of health. This result means that individuals who either smoke or drink or both are less likely to describe their health as good health. Health risks linked to smoking and drinking include heart disease, stroke, cancer, lung diseases, diabetes, cardiovascular disease, chronic liver disease, cancers, acute alcohol poisoning, among others. All these health risks can make individuals who smoke and drink to be less optimistic about their health. This finding agrees with previous studies such as Kaleta *et al.* (2009), Todorova *et al.* (2013) and Fan *et al.*

(2019). For instance, Todorova *et al.* (2013) found that heavy alcohol users and smokers were more likely to report their health as poor.

All the dummies that capture the type of illness suffered negatively determine SAH. These results imply that sufferers of fever, cold/cough or diarrhoea reported low values of self-assessed health status. These results are understandable because some people who had these ailments were just about getting over them or were still suffering from them during the survey's memory period. All of these can make them less optimistic in describing their health.

6.7 Summary

The general objective of this study is to assess the effect of the NHIS on healthcare utilisation, financial protection and health status of Ghanaians. The chapter reported the estimated results obtained from various econometric models adopted for this study to ascertain this broad objective. The study corrected for the endogeneity of the NHIS membership variable in the visits to a health facility and formal care utilisation data by employing the two-stage residual inclusion (2SRI) estimation technique. Our empirical findings reveal that our variable of interest that is NHIS membership improves healthcare utilisation through increased visitation of health facilities. These findings suggest that persons covered under the NHIS are more likely to seek healthcare services, mainly visits to a health facility and formal care when ill relative to those without insurance coverage. However, the study failed to detect NHIS membership endogeneity in the intensity of healthcare utilisation data. Consequently, we estimated the negative binomial regression without correcting for endogeneity. In estimating out-of-pocket payments, the Copula-based Heckman selection model appears to be preferable after a critical evaluation of the three models, including the two-part model, Heckman selection model, and Copula-based Heckman selection model. The study found that health insurance significantly decreases health spending by reducing out-of-pocket payments, thereby giving financial protection for members. The study employs the endogenous switching regression for the ordered outcome to examine health insurance effect on health status. The study discovered that membership in the NHIS enhances health outcomes as the scheme is associated with better health status. Finally, the association between health insurance, healthcare utilisation, financial protection, and health status was investigated using Conditional Mixed Process. The discussion of how the interpretation of results in this chapter aids in reaching the specific objectives stated for this study will be given enough consideration in the next chapter.

CHAPTER SEVEN: CONCLUSION AND RECOMMENDATIONS

7.1 Introduction

This study assesses the effects of the national health insurance scheme on healthcare utilisation, financial protection and health status of Ghanaians. To realise our study goal, we applied various econometrics approaches and presented the results in chapter six. The final chapter of this thesis provides conclusions in connection with the research questions and objectives as presented in the first chapter. The section 7.3 offers policy recommendations that are useful for policymakers, NGOs in health financing, persons in academia and other interested persons. Section 7.4 looks at few limitations of this study, while the final section offers suggestions for further research.

7.2 Conclusion

This study sought to assess the effects of Ghana's NHIS on healthcare utilisation, financial protection and health status. The study applied rigorous quantitative methods to a nationally representative sample from the Ghana Socioeconomic Panel Survey which provided household-level data. The empirical methodologies adopted accounted for endogeneity of the treatment variable (NHIS membership) and outcome variables (healthcare utilisation, healthcare expenditure and health status). The study used logistic regression, negative binomial regression, the two-stage residual inclusion (2SRI), Copula-based Heckman selection model, endogenous switching regression for ordered outcomes and Conditional Mixed Process (CMP) model to address the research questions and achieve the four specific objectives.

The estimated results of our findings have contributed significantly towards the achievement of the study objectives. First and foremost, the results on the effects of NHIS on healthcare utilisation reveals that individuals covered under the scheme are more likely to seek healthcare services when ill relative to persons without insurance coverage. By implication, the NHIS reduces access barriers and improve healthcare utilisation for beneficiaries. The study provides quantitative empirical evidence on the heterogeneous influence of health insurance on healthcare utilisation. The findings indicate that NHIS membership increases the chance of seeking formal care irrespective of residential status and income. Regarding health facilities visits when ill, the study finds increased visitations for the insured residing in rural areas relative to their uninsured counterparts. The findings further reveal that the probability of

visiting a health facility when sick increases irrespective of age for NHIS members. The results also show that for the poorest NHIS members, the likelihood of visiting a health facility increases. Based on these findings, we can conclude that Ghana's NHIS provides equitable health care access and utilisation for its vulnerable populations.

The current study contributes to the existing literature by analysing the effects of NHIS on financial protection comprehensively. After a series of assessments of various models, the favoured model for studying the determining factors of out-of-pocket health spending was the Copula-based Heckman sample-selection model. Our finding reveals that NHIS enrolment significantly reduces out-of-pocket health spending, hence offering financial protection for its beneficiaries. This result implies that Ghana's NHIS provides healthcare services to beneficiaries by decreasing out-of-pocket payments at the point of using healthcare services. From this observation, we can conclude that the Government of Ghana vision for introducing the NHIS is on course. The Government vision includes providing a more equitable quality of health care for individuals domiciled in Ghana without making out-of-pocket payments at the point of service utilisation. Hence, the financial barrier to healthcare access is gradually being removed through the NHIS.

The study explores the impact of NHIS membership on the health status of beneficiaries. Advanced econometrics modelling was employed to estimate the causal impact of NHIS membership on beneficiaries' health status. The findings reveal that NHIS membership is associated with decreasing the probability of self-reporting lower health (i.e., unhealthy, somewhat unhealthy and somewhat healthy), but boosts the likelihood of self-reporting excellent health. These findings suggest that NHIS membership improves the health status of beneficiaries while preventing poor health. This study has proven that with advances in econometrics modelling, it is promising to use non-experimental techniques to estimate causal effects in the absence of randomisation (Tesfaye and Tirivayi, 2018).

As a novelty, the study examines the interrelationship between four healthcare decisions, specifically health insurance coverage, healthcare utilisation, healthcare expenditures and health status, simultaneously. The results reveal a significant association between these healthcare decisions variables. By implication, these findings suggest that estimating these models separately would yield biased and inconsistent estimates, thus making the CMP estimates more superior to single equations estimates.

Finally, this research adds to the increasing corpus of knowledge on the effects of national health insurance schemes on healthcare utilisation, financial protection and health status. The results from this study have the potential benefit of providing guidance and a comprehensive understanding of the added value of national health insurance scheme as financial risk management tool for researchers, stakeholders and practitioners in the area of healthcare financing. Our findings have given further supporting evidence on the national health insurance scheme as a tool to achieve universal health coverage and offer financial risks protection against health shock. Expectations are that future studies will learn from and build upon this study to create a better understanding of the effects of national health insurance schemes on healthcare utilisation, financial protection and health status.

7.3 Recommendations

The following recommendations are made based on the findings of this study: First, the outcome of this study reveals that NHIS membership is a strong predictor of healthcare utilisation, specifically health facility visitations and formal care usage. These outcomes may result from the financial assistance that persons covered by insurance receive for using healthcare. Generally, when analysing the positive effects of insurance coverage, caution is advised. From one point of view, it lowers the cost of using healthcare services and, as a result, encourages more frequent usage of care. But, continuous use of insurance might threaten the scheme's financial sustainability, utilising insurance when it is not needed. To discourage "window shopping", where beneficiaries of NHIS move from one healthcare facility to another, the study recommend strengthen the capitation system. This system tends to limit the number of the facility a member can visits.

The study recommends enhanced public education due to the positive influence of education on health insurance enrolment and healthcare utilisation. Even though enrolment in NHIS has increased over the years, for Ghana to achieve universal health coverage as enshrined in the Sustainable Development Goals, concerted efforts are needed to educate the populace about why they should enrol in the scheme. Continues education should be embarked upon by organisations such as the Information Services Department (ISD), National Commission on Civic Education (NCCE), and the national service broadcaster that is Ghana Broadcasting Corporation (GBC) to encourage many households to enrol in the scheme. Moreover, the various public relations officers in the districts should intensify public education and

sensitisation drives on the scheme benefits, particularly in rural areas. These educational activities will help minimise the negative reportage which tends to derail the gain check so far.

Health insurance enrolment is not free and needs a minimum income, which poor people frequently lack. As a result, government, donors and other policymakers should be mindful that reaching the poorest members of the population when promoting enrolment may be difficult, if not impossible. The government and other benevolent organisations would have to subsidise premiums to reach the poorest segments of society. If the indigents benefit from this targeted demand-side subsidy, it will help the country achieve one of the health-related SDGs of universal health coverage. Although the NHIS laws exempt indigents or the very impoverished from paying premiums, identifying them has become exceedingly challenging. The study recommends the assistance of chiefs, opinion leaders, assembly members and other concerned community members in identifying the vulnerable group to exempt them from paying premiums to offer insurance coverage to them.

The study recommends that people boost their savings culture. This recommendation is based on the discovery that savings impact negatively on hospitalisation days. Personal saving habits not only help individuals accumulate wealth over time, but they also assist them in meeting precautionary demands such as healthcare costs. Financial literacy should be encouraged at the primary level of our education system. Evidence suggests that once savings habits are established, they are more likely to be maintained and that savings habits created in infancy are carried over into adulthood and become self-reinforcing. The promotion of a savings culture could help sustain the scheme as individuals who save could draw on their savings when ill reducing delays in seeking care resulting in decline hospitalisation rates and costs.

7.4 Limitation of the study

Our research has limitations, but these do not undermine our findings because estimates are critical in healthcare financing research. First, there are a few issues with the dataset. The initial intention was to use out-of-pocket health expenses, catastrophic health expenditures, and impoverishing impacts of out-of-pocket spending to measure financial protection. The study could not use catastrophic health expenditures and impoverishing effects of out-of-pocket health expenditures to measure financial protection due to data challenges. These two measures require total household expenditure and household weight when using the STATA user-written commands (i.e., fpcata & fpimpov). However, the Ghana Socioeconomic Panel Survey (GSPS)

had some challenges in generating the total expenditure and household weight variables. With these limitations, the study used only out-of-pocket health spending to measure financial protection.

As usual with secondary cross-sectional data, the design of the questionnaire, the method of data collection, and recall bias owing to self-reported information could have influenced our estimates of visits to the health facility, out-of-pocket health spending and self-assessed health status. However, the GSPS dataset is the most current socioeconomic panel dataset and continue to be useful for policy.

7.5 Suggestions for further research

The outcome of this study suggests some areas for future research. Future research should go beyond investigating the effects of health insurance on curative care (outpatient and inpatient care), as measured in this study by visits to a health facility, formal care, and hospitalisation, to gain a comprehensive understanding of the effects of NHIS on healthcare in general. But take a look at maternal health care (i.e., prenatal care and delivery care) as well.

Our research found that the NHIS improves members' economic and social well-being by increasing healthcare utilisation, lowering out-of-pocket health spending, and enhancing self-reported good health. Further research should determine the extent to which health insurance, or the lack thereof, influences the insured's labour supply and productivity. Our findings must be viewed with caution. The incorporation of datasets from other nations should aid future studies' capacity to generalise their findings. Future research should work to address these topics.

Some households in Africa, particularly in Ghana, rely on remittances from relatives working outside the country, and these remittances provide another source of income for NHIS. While it is outside the scope of this study to model the possible impact of remittances on NHIS membership and healthcare utilisation, future research may want to look into it.

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Appendix: Supplementary tables

Table A1: Multicollinearity test results

Variable	VIF	Tolerance
NHIS membership	46.60	0.0215
Gender (male)	1.46	0.6872
Age	1.40	0.7129
Education	1.36	0.7333
Obesity	1.07	0.9369
Self-assessed health	1.46	0.6852
Chronic illness	1.14	0.8745
Physical activity	1.49	0.6709
Wealth index	4.02	0.2487
Fever	1.02	0.9771
Cold or cough	1.01	0.9948
Diarrhoea	1.00	0.9981
Locality (rural)	1.41	0.7076
Residuals	42.67	0.0234
Mean VIF	7.65	

Table A2: Predictors of NHIS membership or enrolment

Variable	Coefficient	p-value
Gender (male)	-0.405***	0.000
	(0.024)	
Age	0.003***	0.000
	(0.001)	
Education	0.064***	0.000
	(0.017)	
Marriage	-0.009	0.763
	(0.028)	
Household size	-0.014***	0.002
	(0.005)	
Obesity	0.101**	0.015
	(0.041)	
Self-assessed health	-0.070***	0.002
	(0.023)	
Chronic illness	-0.017	0.553
	(0.028)	
Physical activity	0.482***	0.000
	(0.039)	
Wealth index	-0.373***	0.000
	(0.011)	
Formal-sector worker	0.625***	0.000
	(0.050)	
Savings	0.429***	0.000
	(0.029)	
Constant	0.091	0.369
	(0.101)	
Observations	31,807	
LR χ^2	3,270.09***	
Log likelihood	-20,411.658	
Pseudo R^2	0.0742	
Model classification	63.68%	

Source: Author based on GSPS data

Notes: Standard errors in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$

Table A3: Second-stage regression results for visit to a health facility

Variable	Coefficient
NHIS membership	0.597***
	(0.050)
Gender (male)	-0.329***
	(0.047)
Age	0.007***
	(0.001)
Education	0.134***
	(0.027)
Obesity	0.181***
	(0.067)
Self-assessed health	-0.698***
	(0.033)
Chronic illness	0.444***
	(0.050)
Physical activity	0.131**
	(0.063)
Wealth index	-0.064***
	(0.021)
Fever	1.991***
	(0.070)
Cold or cough	1.711***
	(0.148)
Diarrhoea	2.059***
	(0.238)
Locality (rural)	-0.143***
	(0.053)
Formal-sector worker	-0.088
	(0.081)
Constant	-0.834***
	(0.155)
Observations	31,807
Wald χ^2	2,755.63***
Log likelihood	-7,685.696
Pseudo R^2	0.1629
Model classification	91.66%

Source: Author based on GSPS data

Notes: Bootstrapped standard errors in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$

Table A4: Second-stage regression results for formal healthcare utilisation

Variable	Coefficient
NHIS membership	1.023***
	(0.060)
Gender (male)	-0.474***
	(0.054)
Age	0.007***
	(0.001)
Education	0.165***
	(0.031)
Obesity	0.142*
	(0.074)
Self-assessed health	-0.740***
	(0.037)
Chronic illness	0.346***
	(0.057)
Physical activity	0.175**
	(0.072)
Wealth index	-0.055**
	(0.024)
Fever	1.938***
	(0.077)
Cold or cough	1.600***
	(0.158)
Diarrhoea	2.101***
	(0.278)
Locality (rural)	-0.108*
	(0.059)
Formal-sector worker	-0.011
	(0.085)
Constant	-1.294***
	(0.177)
Observations	31,807
Wald χ^2	2,644.73***
Log likelihood	-6,141.720
Pseudo R^2	0.1871
Model classification	93.61%

Source: Author based on GSPS data

Notes: Bootstrapped standard errors in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

Table A5: Correlation matrix for variables used to estimate the intensity of healthcare utilisation

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) NHIS	1.000												
(2) Gender	-0.105	1.000											
(3) Age	0.044	-0.014	1.000										
(4) Education	0.122	0.139	-0.013	1.000									
(5) BMI	0.033	-0.050	0.055	0.053	1.000								
(6) SAH	-0.047	0.088	-0.445	0.097	-0.015	1.000							
(7) Risk behaviour	-0.031	0.205	0.220	0.009	-0.002	-0.089	1.000						
(8) Fever	0.041	-0.030	0.051	-0.015	-0.007	-0.123	0.078	1.000					
(9) Cold & Cough	0.034	-0.008	0.021	-0.008	-0.010	-0.038	0.016	-0.021	1.000				
(10) Diarrhoea	0.005	0.000	0.006	-0.004	0.004	-0.030	0.020	-0.012	-0.006	1.000			
(11) Locality	-0.111	0.028	0.021	-0.298	-0.047	-0.055	0.075	0.013	0.008	0.012	1.000		
(12) SSS	0.004	0.018	-0.008	0.050	0.018	0.062	-0.058	-0.053	-0.028	-0.006	-0.034	1.000	
(13) Savings	0.135	0.025	-0.076	0.190	0.028	0.091	-0.062	-0.009	0.025	-0.014	-0.181	0.040	1.000

NOTE: SSS is Subjective social status

Table A6: Test for endogeneity the case of intensity of healthcare utilisation

Variable	Coefficient
NHIS membership	0.686
	(0.460)
Gender (male)	0.465***
	(0.125)
Age	0.001
	(0.003)
Education	0.008
	(0.062)
Body mass index	-0.003
	(0.002)
Self-assessed health	-0.274***
	(0.053)
Risky behaviour	0.155
	(0.122)
Fever	-0.117
	(0.142)
Cold or cough	-0.551***
	(0.202)
Diarrhoea	1.408
	(0.952)
Locality (rural)	0.075
	(0.108)
Subjective social status	0.033
	(0.020)
Savings	-0.202*
	(0.113)
Residual	-0.302
	(0.212)
Constant	2.010***
	(0.409)
Lnalpha	-0.193***
	(0.073)
Alpha	0.824***
	(0.060)
Observations	1,091
Log likelihood	-3,130.946
Wald χ^2	70.98***
Pseudo R^2	0.0283

Source: Author based on GSPS data

Notes: Bootstrapped standard errors in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

Likelihood-ratio test of alpha=0: chibar2(01) = 6540.59 Prob>=chibar2 = 0.000

Table A7: Multicollinearity test results for out of-pocket health expenditure

Variable	VIF	Tolerance
NHIS membership	1.10	0.9120
Gender (male)	1.15	0.8664
Age	1.63	0.6142
Education	1.24	0.8032
Household size	1.13	0.8831
Self-assessed health	1.47	0.6785
Risky behaviour	1.12	0.8892
Obesity	1.07	0.9350
Chronic illness	1.10	0.9111
Physical activity	1.53	0.6535
Fever	1.07	0.9345
Cold or cough	1.04	0.9606
Diarrhoea	1.02	0.9774
Wealth index	1.26	0.7914
Distance	1.04	0.9649
Hospitalisation	1.11	0.9008
Public health facility	1.08	0.9293
Mean VIF	1.19	

Table A8: The benchmark results of the Heckman sample-selection model

Variable	Selection (probit model) Positive health spending	Outcome (OLS model) Log OOP
NHIS membership	0.364***	-0.583***
	(0.032)	(0.105)
Gender (male)	-0.165***	0.143*
	(0.032)	(0.085)
Age	0.003***	-0.001
	(0.001)	(0.002)
Education	0.052***	0.058
	(0.018)	(0.046)
Household size	-0.015**	0.025
	(0.006)	(0.016)
Self-assessed health	-0.345***	-0.046
	(0.022)	(0.079)
Risky behaviour	0.094**	0.191**
	(0.038)	(0.089)
Obesity	0.048	0.132
	(0.044)	(0.103)
Chronic illness	0.243***	-0.267***
	(0.031)	(0.086)
Physical activity	0.053	0.071
	(0.043)	(0.100)
Fever	1.175***	-0.185
	(0.044)	(0.223)
Cold or cough	1.019***	-0.419*
	(0.087)	(0.249)
Diarrhoea	1.325***	0.094
	(0.130)	(0.325)
Wealth index	-0.069***	0.089***
	(0.013)	(0.033)
Dependency ratio	-0.001***	–
	(0.000)	–
Distance	–	0.030***
	–	(0.011)
Hospitalisation	–	-0.186**
	–	(0.093)
Public health facility	–	-0.213***
	–	(0.073)
Constant	-1.016*** (0.104)	3.543*** (0.439)
lnsigma constant	0.250*** (0.042)	Atheta constant -0.270 (0.176)
theta	-0.264 (0.164)	tau 0.170 (0.108)
Observations	31,740	
Wald χ^2	2,000.40***	
Log likelihood	-6,358.186	
LR test of independence	Test statistic 1.915 with p-value 0.1664	

Source: Author based on GSPS data

Notes: Standard errors in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

Table A9: Estimated results from the Vuong test

	Coefficient	Standard error	P-value
Constant	0.00004	5.49e-06	0.000

Source: Author based on GSPS data

Table A10: Baseline regression results for health insurance, healthcare utilisation (visit to health facility), health expenditure and health status

	Enrolment	Utilisation (Visit to health facility)	Health expenditure	Health status
Variable	Coefficient	Coefficient	Coefficient	Coefficient
Gender (male)	-0.250*** (0.015)	-0.208*** (0.023)	0.145* (0.081)	0.212***(0.017)
Age	0.003*** (0.0004)	0.009*** (0.001)	-0.001 (0.002)	-0.023*** (0.0004)
Education	0.043*** (0.010)	0.066*** (0.014)	0.060 (0.046)	0.056*** (0.012)
Obesity	0.061** (0.025)	0.085** (0.041)	-0.038 (0.126)	-0.011 (0.032)
Chronic illness	0.001 (0.017)	0.312*** (0.023)	-0.175** (0.074)	-0.451*** (0.017)
Physical activity	0.297*** (0.023)	0.308*** (0.030)	0.127 (0.096)	-0.761*** (0.022)
Wealth index	-0.229*** (0.007)	-0.055*** (0.010)	0.111*** (0.030)	-0.048*** (0.007)
Body mass index	–	0.0004 (0.001)	0.006***(0.002)	0.0001(0.001)
Risky behaviour	–	-0.124*** (0.031)	0.255***(0.089)	-0.080*** (0.022)
Fever	–	1.209***(0.040)	0.173**(0.084)	-0.569*** (0.035)
Cold or cough	–	1.038***(0.079)	-0.176 (0.167)	-0.415***(0.072)
Diarrhoea	–	1.208***(0.125)	0.509** (0.228)	-0.552*** (0.115)
Formal-sector worker	0.374*** (0.029)	–	–	–
Dependency ratio	0.001*** (0.0001)	–	–	–
Household size	-0.012*** (0.003)	–	–	–
Savings	0.262*** (0.017)	–	–	–
Constant	-0.149 (0.025)	-1.955*** (0.030)	2.068*** (0.117)	–
Observations	31,807	31,807	1,281	31,807
Log likelihood	-20,401.006	-7,968.974	–	-18,385.685
F-statistics /LR χ^2	3,291.39***	2,425.69***	4.95***	9,358.30***
Pseudo R^2/R^2	0.0746	0.1321	0.0484	0.2029

Source: Author based on GSPS data

Notes: Standard errors in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

Table A11: Baseline regression results for health insurance, healthcare utilisation (hospitalisation days), health expenditure and health status

	Enrolment	Utilisation (Hospitalisation days)	Health expenditure	Health status
Variable	Coefficient	Coefficient	Coefficient	Coefficient
Gender (male)	-0.250*** (0.015)	2.820*** (0.816)	0.145* (0.081)	0.212*** (0.017)
Age	0.003***(0.0004)	0.029 (0.022)	-0.001 (0.002)	-0.023*** (0.0004)
Education	0.043*** (0.010)	0.176 (0.490)	0.060 (0.045)	0.056*** (0.012)
Obesity	0.061** (0.025)	-0.027 (1.319)	-0.038 (0.126)	-0.011 (0.001)
Chronic illness	0.001 (0.017)	0.154 (0.788)	-0.175** (0.074)	-0.451*** (0.032)
Physical activity	0.297*** (0.023)	2.695*** (1.011)	0.127 (0.096)	-0.761*** (0.017)
Wealth index	-0.229*** (0.007)	-0.555* (0.332)	0.111*** (0.030)	-0.048*** (0.022)
Body mass index	–	-0.017 (0.025)	0.006 (0.0021)	0.0001 (0.001)
Risky behaviour	–	1.495 (0.999)	0.255*** (0.089)	-0.080*** (0.007)
Fever	–	-0.835 (1.384)	0.173** (.084)	-0.569*** (0.035)
Cold or cough	–	-2.696 (2.853)	-0.176 (0.167)	-0.415*** (0.072)
Diarrhoea	–	20.542***(5.332)	0.509** (0.228)	-0.552*** (0.115)
Formal-sector worker	0.374*** (0.374)	–	–	–
Dependency ratio	0.001*** (0.0001)	–	–	–
Household size	-0.012*** (0.003)	–	–	–
Savings	0.262*** (0.017)	–	–	–
Constant	-0.149*** (0.025)	3.355***(1.102)	2.068***(0.117)	–
Observations	31,807	1,213	1,281	31,807
Log likelihood	-20,401.006	–	–	-18,385.685
F-statistics/ LR χ^2	3,291.39***	4.67***	4.95***	9,358.30***
Pseudo R^2/R^2	0.0746	0.0446	0.0484	0.2029

Source: Author based on GSPS data

Notes: Standard errors in parentheses. *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$