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Financial development, health care system financing and health outcomes: Evidence from sub-Saharan Africa

By

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Submitted in Fulfilment of the Requirements for the Degree of

PhD in Economics

In the

Department of Economics

Faculty of Economic and Management Sciences

University of the Western Cape

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November 2018

ABSTRACT

This thesis purposes to examine the impact of financial development on health outcomes, health care expenditure and financial protection in health in 46 selected sub-Saharan African (SSA) countries from 1995 to 2014. It also estimates the impact of health care expenditure on health outcomes. The thesis is premised on the hypothesis that health care expenditure is a critical transmission mechanism through which financial development leads to better health outcomes. The health care expenditure channel is conspicuously absent in the literature on financial development and health outcomes; hence the need for this study to fill the gap in the literature. The thesis explores the effects of both depth and access dimensions of financial development on health outcomes, expenditure and financial protection. Throughout the study, financial access is measured by the number of automated teller machines (ATMs) and commercial bank branches per 100 000 people, while financial depth is measured by the proportion of broad money and bank credit to the private sector, to Gross Domestic Product (GDP). The study uses fixed and random effects and the Two-Stage Least Squares estimation approaches. The Generalised Method of Moments (GMM) is also used to estimate the impact of health care expenditure and health outcomes given the absence of valid instrumental variables. The results of the regression analyses show that financial development leads to increased health care expenditure and health outcomes. The analysis also shows that health care expenditure leads to better health outcomes. Additionally, the study indicates that financial development leads to financial protection in health care by reducing out-of-pocket health care expenditure. Well-developed financial systems provide financial protection from the risk of catastrophic health care expenditure and impoverishment resulting from illness. The study shows that health care systems financed through prepaid mechanisms reduce neonatal, infant and under-five mortality rates and increase life expectancy, while those relying on out-of-pocket expenditure have adverse effects on health outcomes.

Keywords

Financial Development, Health Outcomes, Health Care Systems Financing, Health Care Expenditure, Financial Protection in Health.

DECLARATION

I declare that *Financial development, health care system financing and health outcomes: Evidence from sub-Saharan Africa* is my own work and that it has not been submitted before for examination for any degree at any university. All the sources that I have used or quoted have been duly acknowledged as references.

Jaison Chireshe November 2018

Signed: _____

ACKNOWLEDGEMENTS

I want to acknowledge the support that I got from different people and institutions that I interacted with during the conception and writing of this thesis. I cannot mention all of them by name but will single out the following.

I am greatly indebted to my supervisor Professor Matthew K Ocran for his meticulous guidance, patience during the process of writing this thesis and the confidence he showed in me when I approached him while at the Nelson Mandela Metropolitan University. The interaction greatly impacted on the growth of my academic abilities.

I am also grateful for the unparallelled administrative support that I got from Ms Chrystal Dilgee, Administrator (Postgraduate) in the Department of Economics. She helped me to avert many moments that I could have slackened or given up.

I want to express my gratitude to Prof Nick Vink of the University of Stellenbosch, Dr Ushehwedu Kufarinane of the University of Zimbabwe and Dr Placedes Chinamasa. The discussions that I had with them in the formative stages of my PhD journey proved to be useful. I am also grateful for their motivation to get me started on this journey.

I also want to thank the participants and organisers of various conferences for their feedback and comments on the papers that I presented. The comments and feedback from these conferences informed parts of this thesis. The relevant papers that I presented in conferences were:

- 'Financial Development and Health Expenditure in sub-Saharan African Countries'. African Finance Journal Conference, 18–19 April 2018, Nairobi, Kenya. This paper was extracted from Chapter 6 of the thesis.

- 'Financial Development and Financial Protection in Health in sub-Saharan Africa'. YSI Africa Convening, 16–18 August 2018, Harare, Zimbabwe, University of Zimbabwe. This paper was based on Chapter 7 of the thesis.

- 'Financial Development and Health Outcomes in sub-Saharan African Countries'. The African Review of Economics and Finance, 22–23 August 2018, Wits Business School, Johannesburg, South Africa. This paper was based on Chapter 5 of the thesis.

The aforementioned papers and an additional one entitled ‘Health Expenditure and Financial Development in sub-Saharan African countries’, based on Chapter 6 of the thesis, were submitted for publication to different journals.

Above all, I thank the Creator and Almighty for His boundless provision in many spheres of my life that enabled me to complete my studies.

DEDICATION

I dedicate this thesis to my brother and friend, Venganai Chireshe, who played an immeasurable role in ensuring that I had access to education in the formative years of my life.

ACRONYMS

2SLS	Two-Stage Least Squares
AR	Autoregressive
ATMs	Automated Teller Machines
BRVM	Bourse Régionale des Valeurs Mobilières
CBI	Community-Based Insurance
CDC	Centre for Disease Control
DAH	Development Assistance for Health
DRC	Democratic Republic of Congo
EIB	European Investment Bank
FE	Fixed Effects
GDP	Gross Domestic Product
GGE	General Government Expenditure
GMM	Generalised Method of Moments
HDI	Human Development Index
HIV/AIDS	Human Immune Deficiency/Acquired Immune Deficiency Syndrome
ICT	Information and Communication Technology
IFC	International Finance Corporation
IMF	International Monetary Fund
MDGs	Millennium Development Goals
MENA	Middle East and North Africa
NGOs	Non-Governmental Organisations

ODA	Overseas Development Assistance
OECD	Organisation for Economic Cooperation and Development
OLS	Ordinary Least Squares
OOP	Out-of-Pocket
PHI	Private Health Insurance
POS	Point of Sale
RE	Random Effects
SHI	Social Health Insurance
SSA	sub-Saharan Africa
THE	Total Health care expenditure
US	United States
USA	United States of America
USAID	United States Agency for International Development
WHO	World Health Organization

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Chapter 1 Introduction

1.1 Background

The acknowledgement of the role of finance in the process of capital accumulation and economic growth dates back to Bagehot (1873) and Schumpeter (1911), being the early proponents of the importance of finance in the process of economic growth. This became known as the finance-led growth theory, which argues that bankers help to identify entrepreneurs with good growth prospects and therefore help to reallocate resources to their most productive uses. The finance-led growth theory was empirically tested almost a century later by King and Levine (1993) and the results showed that higher levels of financial development are positively associated with faster rates of economic growth, physical capital accumulation and economic efficiency improvements, both before and after controlling for numerous country and policy characteristics. The findings also confirm earlier thinking by Gerschenkron (1962), McKinnon (1973) and Shaw (1973) on the role financial development plays in economic growth. Developed financial systems perform a number of functions which facilitate capital accumulation and economic growth. These functions include facilitating the trading, hedging, diversifying and pooling of risk; allocating resources; monitoring managers and exerting corporate control; mobilising savings; and facilitating the exchange of goods and services (Levine, 1997).

Economic growth has been attributed to improvements in human capital (through formal education and on-the-job training), in addition to physical capital accumulation and technological improvements, among other factors (Lucas, 1988; Barro & Sala-I-Martin, 1992; Mankiw, Romer & Weil, 1992). According to Barro & Sala-I-Martin (1992), countries with initially high levels of educational attainment have higher economic growth rates for a given level of initial per capita GDP and for given values of policy-related variables. The channels of growth involve the positive effect of human capital on physical investment, the negative effect of human capital on fertility and an additional positive effect on growth for given values of investment and fertility.

Endogenous financial development is crucial for economic growth as well as physical and human capital accumulation as it bridges the gap between surpluses/saving and deficit units.

Physical and human capital accumulation occur when three conditions are met: households, firms and governments must be willing to invest, savings must be available and these savings must be channelled to those who plan to invest in the most attractive opportunities. The financial structure and institutions of an economy can support or disrupt this process, calling for the need for a well-developed financial system which is in a better position to identify investment opportunities, mobilise savings and reduce investment in liquid and unproductive assets (Dornbusch & Reynoso, 1989).

Mushkin (1962) postulates that human capital formation through education and health services rests on the notion that people are improved as productive agents by investment in these services. The outlays made by both individuals and governments yield a continuous return in the future. Health, like education, becomes a part of the individual, a part of his or her effectiveness in the field and factory. In addition, expenditure on health and expansion of the health sector affect a variety of health outcomes and health-related factors, including life expectancy, mortality, reduced morbidity, labour market participation and labour productivity, individual earnings, fertility decisions and demographic structure (Van Zon & Muysken, 2001; Agénor, 2009). In the same fashion, expenditure by governments on infrastructure leads to improvements in human welfare (Barro, 1990; Agénor & Moreno-Dodson, 2006; Agénor, 2008). Outlays by both government and the private sector require a well-developed financial system that mobilises resources to finance these expenditures. In addition to increasing the rate of capital accumulation, financial development improves the efficiency with which economies use capital. As such, financial development is critical not only to improving health outcomes through boosting investment in human capital, but also through the efficient use of the health production system (health care financing through efficiency gains), which is not possible in underdeveloped financial markets (King & Levine, 1993).

The United Nations Third International Conference on Finance for Development held in 2015 recognised the existence of funding gaps in the development sectors of many countries. For example, it was estimated that, in 2014, sub-Saharan Africa's[1] health sector alone required an investment of US$25–30 billion to meet the health demands of its population (IFC, 2013a). There are renewed efforts globally to harness finance for development and meet outstanding infrastructure and human capital development needs. Africa's policy makers have not been left

[1] The study followed the World Bank classification of countries. See https://data.worldbank.org/region/sub-saharan-africa

out in these efforts and are seized with debate in terms of how development activities on the continent should be financed, with an infrastructure development finance gap standing at US$170 billion per year in 2017[2]. The large development finance gap is mainly attributed to low levels of financial development, which is required for long-term finance that is needed to fund long-term development goals. According to the World Bank (2015), if long-term finance is not available to deserving firms, they become exposed to rollover risks and may become reluctant to undertake longer-term fixed investments, resulting in adverse effects on economic growth and welfare. At the household level, the absence of long-term finance prevents households from smoothing income over their life cycle by investing in housing, health and education and they may not benefit from higher long-term returns on their savings.

In the search for finance for development, health remains one of the most pressing development finance issues given the growth in the prevalence rates of both communicable and non-communicable diseases, which has put greater pressure on the health care system delivery of many African countries. Populations in sub-Saharan Africa (SSA) are disproportionally affected by malaria, HIV/AIDS, TB, as well as maternal and infant mortality, compared to the rest of the world. The region bears the highest burden of malaria, with 80 percent of the estimated 207 million cases and 90 percent of the estimated 627 000 malaria deaths worldwide occurring in this region in 2012 (WHO, 2013). In terms of HIV/AIDS, SSA alone has more than 60 percent of the people living with HIV/AIDS globally, with a prevalence rate of 23 percent (USAID, 2012). Disease burden, child mortality and infant mortality remain too high in SSA countries compared to global levels. In 2014, for example, the Democratic Republic of Congo (DRC) experienced infant mortality rates as high as 234 deaths per 1 000 live births and child mortality as high as 308 deaths per 1 000 live births (World Development Indicators, 2016).

Total expenditures on health care, which constitute part of the outlays in human capital investment, have not grown to combat the huge disease burden, with economies in SSA spending a mere 4 percent of their GDPs on health care as of 2014 (WHO, 2014b). Low levels of child vaccination in SSA reflect how constrained governments are in their fight to reduce the disease burden to save millions of lives. Inasmuch as Africa has halted the spread of HIV/AIDS, tuberculosis and malaria, according to the Global Burden of Disease Study 2013 (Murray et al., 2014), HIV/AIDS is still a major cause of child and maternal deaths. According

[2]African Development Bank (AfDB). 2018.

to Berthélemy (2013), the continual heavy burden of disease in the most vulnerable countries is further exacerbated by low levels of national income, the informal nature of the economies and a restricted domestic revenue base that limits the capacity of countries to improve major health conditions as well as reduce risk factors.

For many countries in SSA, health care expenditure per capita is very low and well below the World Health Organisation (WHO) Africa region average which stood at US$97.00 in 2014. Countries like Malawi, Mozambique, DRC and Madagascar have health care expenditure levels below the regional average. Total health care expenditure (THE) as a percentage of GDP and government expenditure on health are also low in these countries and lie below regional and global averages. In addition to low per capita health care expenditure and health care expenditure to GDP ratios, out-of-pocket (OOP) payments are very high, indicating prevailing low levels of financial protection and access to health services.

It is against this background of high mortality, catastrophic OOP health care financing and low expenditure on health care that innovative health funding mechanisms are required to bridge the funding gap. Governments and the private sector need to access non-traditional revenue sources as well as intensify resource mobilisation of traditional sources to boost current spending and ensure sustainability.

1.2 Research Problem

Health care systems financing in sub-Saharan Africa is crippled by the scarcity and high cost of finance, which limit expenditure and investment in the health sector. Although financial institutions endeavour to offer a wide range of financing instruments – from loans to equity stakes – a large number of obstacles to health care systems financing still exists, both on the supply and the demand side (Renault & Rousselot, 2013). In addition to the scarcity and high cost of finance, the health sector in SSA suffers from poor revenue structures due to underdeveloped and non-existent health insurance systems and reliance on cash payments to access health services. Government expenditure on health services is low in the majority of SSA countries due to constrained capacity to collect tax revenue, inefficient tax systems and the existence of a large informal sector which cannot easily be taxed.

The low coverage of prepaid health care financing schemes and low government expenditure in the SSA region is mirrored in high OOP expenditure as a proportion of total health care expenditure, which stood at 34.5 percent in 2014. The high level of OOP expenditure on health

is catastrophic as it leads to further impoverishment. Catastrophic health care expenditure occurs when out-of-pocket spending on health care exceeds a certain proportion of a household's income with the consequence that households suffer the burden of disease (Li et al., 2012). Among a host of damaging coping strategies, households dispose of their productive assets, reduce expenditure on basic necessities like food, and children drop out of school and are drawn into child labour. There is also reduced demand for health services simply because people cannot afford either direct costs such as consultation fees, medicines and laboratory tests, or indirect costs such as transport and special food.

In addition to limited resources for investment and recurrent expenditure, SSA health care systems face human resources constraints. The region only has 0.2 doctors and 1.2 nurses and midwives per 1 000 people, compared to 1.5 doctors and 3.3 nurses and midwives per 1 000 people at the global level (WHO, 2014b). Health workers in the SSA region constitute only 2 percent of the world health workforce. The problem is so serious that in many countries, there is not enough human capacity to efficiently use the substantial additional funds that are considered necessary to improve health in these countries (WHO, 2009). The region is also ill-equipped to adequately address its health problems due to low per capita income and lack of basic infrastructure like roads, electricity, water supply and sanitation services. Physical infrastructure for water supply and power increases the effectiveness of expenditure on health by both government and private players. Constant availability of electricity ensures the full functioning of hospitals and the delivery of health services. Additionally, clean water supply and energy reduce the incidence of diseases such as diarrhoea and acute respiratory infections (Agénor, 2008). In 2015, only 29.7 percent and 67.6 percent of the people in SSA had access to improved sanitation facilities and improved sources of water respectively (World Development Indicators, 2016). The low level of access to improved sanitation and water dampens the impact of health care expenditure and public health programmes such as mass vaccination campaigns and efforts to reduce the incidence of diarrhoeal diseases (diarrhoeal diseases include cholera, gastroenteritis, typhoid fever, campylobacteriosis and amoebic dysentery).

SSA countries have extensively relied on official development assistance (ODA) as a vehicle for financing health care systems in the wake of low levels of domestic government revenues and savings as well as limited access to private capital flows. However, there are concerns that ODA has not been a very stable and reliable source of financing (UN, 2012). ODA highly

fluctuates and is targeted at certain diseases as opposed to the entire health care system. In the light of the challenges described above, a number of research questions require investigation.

1.3 Research Questions

1. What are the trends in financial development, health care expenditure and health outcomes in sub-Saharan Africa?
2. Does financial development affect national health outcomes?
3. Does health care expenditure affect health outcomes?
4. What are the determinants of health care expenditure?
5. What are the effects of financial development on financial protection on health?

1.4 Objectives of the Study

The study broadly seeks to determine the effect of financial growth on health care expenditure and health care systems performance in selected sub-Saharan African countries from 1995 to 2014.

The specific objectives are to:

1. Review the trends in health care expenditure, health outcomes and the state of financial development in sub-Saharan Africa.
2. Determine the effect of financial development on national health outcomes (infant, child mortality and adult life expectancy) in sub-Saharan Africa.
3. Determine the effect of health care expenditure on health outcomes in sub-Saharan Africa.
4. Establish the determinants of health care expenditure in sub-Saharan Africa.
5. Determine the effect of financial development on health-related financial protection in sub-Saharan Africa.

1.5 Relevance of the Study

The role of financial development is conspicuously absent in the health care system financing literature despite the fact that financial markets play a key role in mobilising resources for health care expenditure and investment at both household and national levels. Existing literature on health care financing seems to overlook the role of financial development in health care financing, health care expenditure and health outcomes. The more developed debate on health care financing has dwelt on:

- models of health care financing and their impact on equity, quality and efficiency;
- innovative mobilisation of resources for health care financing with the focus on taxation and foreign aid;
- the impact of health care expenditure on health outcomes;
- the impact of microfinance on child health outcomes.

A review of the literature on the impact of financial development on health outcomes at national level revealed only three studies done to date (Claessens & Feijen, 2006a; Bhatta, 2013; Rewilak, 2013). The pioneering work by Claessens and Feijen (2006a) explores the relationship between health outcomes and financial development. They argue that financial development will lead to income growth (income effect) which will reduce poverty and ultimately enhance health outcomes. Bhatta (2013) and Rewilak (2013) focus on the impact of financial development and health capital accumulation proxied by life expectancy, infant mortality and low birth weight. Unfortunately, these pioneering works do not explore the impact of financial development on health care expenditure by the public and private players in the health sector as they explore the impact of financial development on health outcomes through the income growth and education channels.

Studies on health outcomes at national level do not consider financial development as a determinant of health outcomes (Anyanwu & Erhijakpor, 2007; Akinkugbe & Mohanoe, 2009; Kim & Lane, 2013). Studies at household level on the determinants of child health outcomes acknowledge that the presence of a microfinance institution in a community or belonging to a microfinance group is critical for improved health outcomes (Foster, 1995; DeLoach & Lamanna, 2011). However, microfinance is just one element of financial development and there is a need to understand how the development of the entire financial sector contributes towards improved health outcomes.

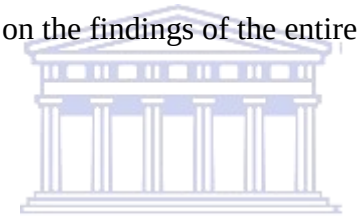
This research sought to address these gaps in the literature on health care financing and financial development. Financial development is crucial in health care financing as it provides avenues for resource mobilisation by both the private sector and government to finance health-related expenditure.

The study will contribute towards policy formulation in the area of health care system financing as the findings provide insights for policy makers developing policies to stimulate financial development in a manner that supports increased access to health services for the majority of

the region's population. Policy makers and stakeholders in the health sector will also benefit from understanding how new avenues that are provided for financial development can be accessed to finance investment in health care service provision.

1.6 Organisation of the Thesis

The thesis is organised into eight chapters. Chapter 1 constitutes the introduction. The rest of the thesis is structured as follows. Chapter 2 provides an overview of financial development, health care expenditure and health outcomes in SSA. The chapter discusses the patterns of financial development and health outcomes over a period of 50 years from 1965 to 2015. It also discusses the trends in health outcomes from 1995 to 2015. Chapter 3 reviews the literature on financial development, health care financing and health outcomes. Issues relating to methodology are discussed in Chapter 4. Chapters 5, 6 and 7 discuss the main findings on financial development and health outcomes, health care expenditure and health outcomes, financial development and catastrophic health care expenditure. Chapter 8 provides the summary and conclusions based on the findings of the entire study.



Chapter 2 Financial Development and Health in sub-Saharan Africa: Selected Stylised Facts

2. Introduction

This chapter provides an overview of financial development, health care expenditure and health outcomes in selected sub-Saharan African (SSA) countries. The overview looks at long-term trends and current states of financial development, health care financing and health outcomes as measured by different indicators. The chapter also provides a comparison with other regions of the world to contextualise the discussion rather than looking at the SSA patterns in isolation. The first section looks at the development status of the financial sectors of SSA countries from 1965 to 2015, the second section looks at health care expenditure and the last section focuses on health outcomes from 1995 to 2015. Despite funding constraints, SSA improved the health status of the population over these periods. The financial and health sectors registered significant growth in many countries across the region.

2.1 Financial Development in sub-Saharan Africa: An Overview

Financial development can be measured by a number of dimensions including the depth, access to and soundness of the financial system. It can be measured by examining the performance and activities of the financial markets, banks, bond markets and financial institutions (Adnan, 2011). Financial depth captures the size of the financial sector relative to the economy. It is the size of banks, non-banking institutions and financial markets in a country, taken together and compared to a measure of economic output (World Bank, 2016). Indicators measuring the depth of a country's financial sector include private credit to GDP ratio, broad money supply to GDP ratio and central bank assets to GDP ratio, among other indicators. Levels of credit to GDP also reflect the extent of intermediation in a country's financial sector. Financial breadth or access to finance is mainly measured by the commercial bank branches and automated teller machine (ATM) density. These demographic indicators measure the number of commercial bank branches and ATMs per 100 000 people in a population (World Bank, n.d.). Financial access is also measured by determining the number of people having access to accounts and loans with financial institutions.

The financial systems in SSA are made up of banking and non-banking institutions which include microfinance institutions (MFIs), pension funds, insurance companies, stock and

insurance markets. The systems are very diverse across the 48[3] countries which make up the SSA region. Despite this diversity, the banking sector constitutes the bulk of the financial systems because stock markets and insurance sectors in the region are still underdeveloped (Ncube, 2007). The financial systems in the region are characterised by lack of depth and limited access by both firms and individuals to financial services like loans, ATMs and bank accounts. The stock markets are illiquid, under-capitalised and have a small number of firms listed on the local stock exchanges. A snapshot view of the state of financial sector development in the SSA region in 2014 shows that the sector was less developed compared to other regions of the world. Domestic credit to private sector (as a percentage of GDP) stood at 46.4 percent as compared to the world average of 125 percent. Access to financial services by households as measured by ATMs per 100 000 people stood at 5.3, compared to the world average of 44.0. The turnover ratio of domestic shares (%) traded in the region stood at 24.6%, while the world average was 112.1%. Table 2.1 provides a snapshot view of the state of financial development in SSA as at 2014.

Table 2.1 Financial Development in SSA in 2014

Indicator	SSA	World
Domestic credit to private sector (% of GDP)	46.4	125.0
Domestic credit to private sector by banks (% of GDP)	28.5	100.6
Domestic credit provided by financial sector (% of GDP)	58.2	173.0
Broad money (% of GDP)	36.4	118.8
Bank deposits to GDP (%)	23.5	48.3
Interest rate spread (lending rate minus deposit rate, %)	8.4	6.1
Stocks traded, turnover ratio of domestic shares (%)	24.6	112.1
Account at a financial institution (% age 15+)	34.2	61.5
Automated teller machines (ATMs per 100 000 people)	5.3	44.0
Bank accounts per 1 000 adults	157.7	653.5
Bank branches per 100 000 adults	4.1	15.5

Source: World Development Indicators, 2016

The insurance sector is also absolutely and comparatively less developed as insurance penetration was less than the global average (2.8 percent as compared to 6.2 percent at world level). Populations in SSA have very limited access to life and non-life insurance services. Across the various sub-regions in SSA, Southern Africa has the most developed financial system when compared to Central, Western and Eastern Africa, even after excluding the

[3] The study follows the World Bank classification of world regions and countries.

contribution of South Africa (Swiss Re, 2015). Table 2.2 below shows a comparison of financial depth and access in SSA sub-regions in 2014.

Table 2.2 Financial Depth for SSA Sub-regions excluding South Africa, 2014

Financial Development Indicators	SSA Sub-Regions[4]			
	West Africa	East Africa	Central Africa	Southern Africa
Domestic credit to private sector (% of GDP)	22.47	17.57	12.2	44.34
Domestic credit to private sector by banks (% of GDP)	21.83	17.45	11.8	36.17
Broad money (% of GDP)	35.7	31.9	22.88	45.89
Account at a financial institution (% age 15+)	17.26	24.71	13.75	44.0
Bank branches per 100 000 people	4.11	8.83	2.4	10.6

Source: Author calculations based on World Development Indicators, 2016

Countries in Central Africa have the shallowest financial sectors and their populations have the least access to financial services, compared to other sub-regions in SSA.

Since the 1980s, middle-income countries (Mauritius, Namibia, Seychelles and South Africa) have seen rapid financial development, although progress has been slower in other countries of the SSA region. However, in some countries (Cameroon, Central African Republic, Chad and Sierra Leone), the current financial sector development levels are lower than in the 1980s, partly reflecting the impact of civil wars and conflicts (International Monetary Fund, 2015). In addition to civil wars and conflicts, the growth in the financial sector is hampered by low income, limited credit information, financial illiteracy, lack of infrastructure and unconducive regulatory environments.

2.2 The Banking Sector in SSA

The banking system in SSA consists of central banks and deposit-taking institutions. The deposit-taking institutions are made up of local banks and branches or subsidiaries of foreign banks. Foreign banks have played an important role in banking sector development in Africa and their share of total African banking has increased significantly. The increase is attributed to financial sector reforms carried out by many African countries which have led to the opening up of the markets in Africa and the subsequent entry of foreign banks (Allen, Otchere & Senbet, 2011). The advent of structural adjustment programmes in the 1980s led to the liberalisation of

[4] African Development Bank's country classification.

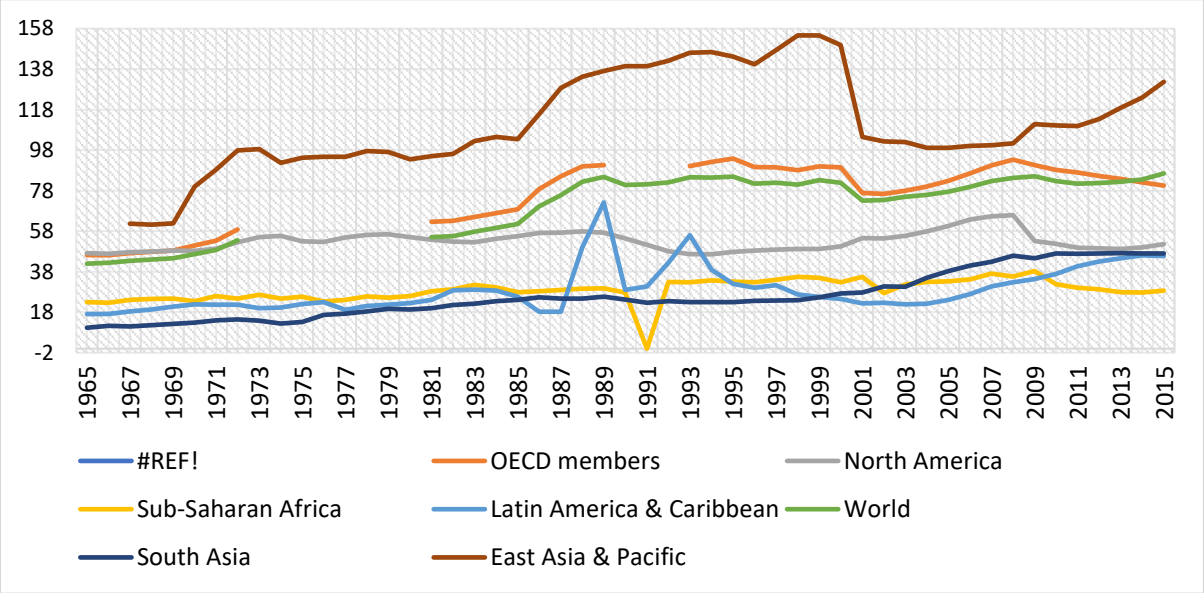
the financial sectors and restructuring of the state-owned commercial banks in many SSA countries. The process created a conducive environment for increased foreign bank entry and acquisition of foreign assets by domestic financial firms (Moyo et al., 2014). The entry of foreign banks was augmented by the expansion of cross-border banking activities, which resulted in the rapid development of pan-African banking group networks. The deregulation significantly changed the African banking and financial landscape which was previously dominated by state-owned institutions distorted in their operations by restrictive regulations (EIB, 2015). However, the post-2008 global financial crisis period witnessed the withdrawal of international banks and the growth of pan-Africanist banks. The number of cross-border subsidiaries of African banks has almost tripled since 2002 with ten pan-African banks having a presence in at least ten SSA countries (IMF, 2014; PricewaterhouseCoopers, 2017). The growth of pan-African banks has enhanced the growth of the banking sector and unlocked additional credit for the region.

Market structures are typically oligopolistic, as measured by a high share of total assets accounted for by the few largest banks, which constrains the intensity of competition (Mlachila, Park & Yabara, 2013). In Zambia in 2013, for example, four banks held about two-thirds of the total banking assets (Simpasa, 2013). Oligopolistic market structures have also led to comparatively higher interest rate spreads for the banking sector in the region. Soundness in the banking sector, as measured by the proportion of non-performing loans to total gross loans, has improved over the years. However, the region remains relatively unsound when compared to other regions of the world. In 2014, non-performing loans as a percentage of total gross loans in SSA stood at 6.4, compared to North America (1.1), Latin America and the Caribbean (2.1) and OECD members (3.0).

In terms of the depth of the domestic banking sector, domestic credit to the private sector by banks for the SSA region is low in both absolute and comparative terms as it only constituted about one-third of OECD and world levels in 2014. The ratio of domestic credit to the private sector by banks to GDP for SSA reached a peak of 38.9 percent in 2009 and declined since then, reaching 28.2 percent in 2014. From 1965 to 2009, the level of bank credit to GDP in SSA was comparable with other developing regions such as the Middle East and North Africa (MENA), and Latin America and the Caribbean. However, these regions have continued to experience significant growth, unlike the SSA region which, as a whole, is experiencing a decline. The decline comes against a background of sluggish growth for the past 13 years (2002–2014) in which the ratio of domestic credit to the private sector by banks to GDP grew

by a mere 2.6 percent. Domestic credit to the private sector by banks as a percentage of GDP for other regions of the world experienced significant growth over the same period. For example, Latin America and the Caribbean (103 percent) and the OECD countries (33 percent) registered marked growth. Figure 2.1 below shows the trend of domestic credit to the private sector by banks as a percentage of GDP for selected regions of the world.

Figure 2.1 Domestic Credit to the Private Sector by Banks as % of GDP



Source: World Development Indicators, 2016

At the country level, DRC, Guinea-Bissau, Liberia and Congo experienced growth rates of more than 300 percent from 2002 to 2014 despite the bank credit to GDP ratios being absolutely and relatively small. Burundi, Nigeria and Seychelles experienced the least growth over the same period. Insufficient information on borrowers (such as credit history and credit risk), lack of collateral registries and difficulties of contract enforcement constrain bank lending to the private sector in many SSA countries. According to Sacerdoti (2005), deepening of bank intermediation requires that financial information on borrowers be of good quality and controllable, collateral is sufficiently available to borrowers and enforceable by lenders, creditor rights are adequately protected through an effective judicial system and that there are instruments of conflict resolution. Most of these features are limited in SSA. For example in 2015, only 5.8 percent of the population was on the public credit bureau as compared to a world average of 12 percent. The low number of individuals and firms listed in public credit registries means that the bulk of the firms and individuals do not have documented information on repayment history, unpaid debts or outstanding credit, limiting their access to formal credit.

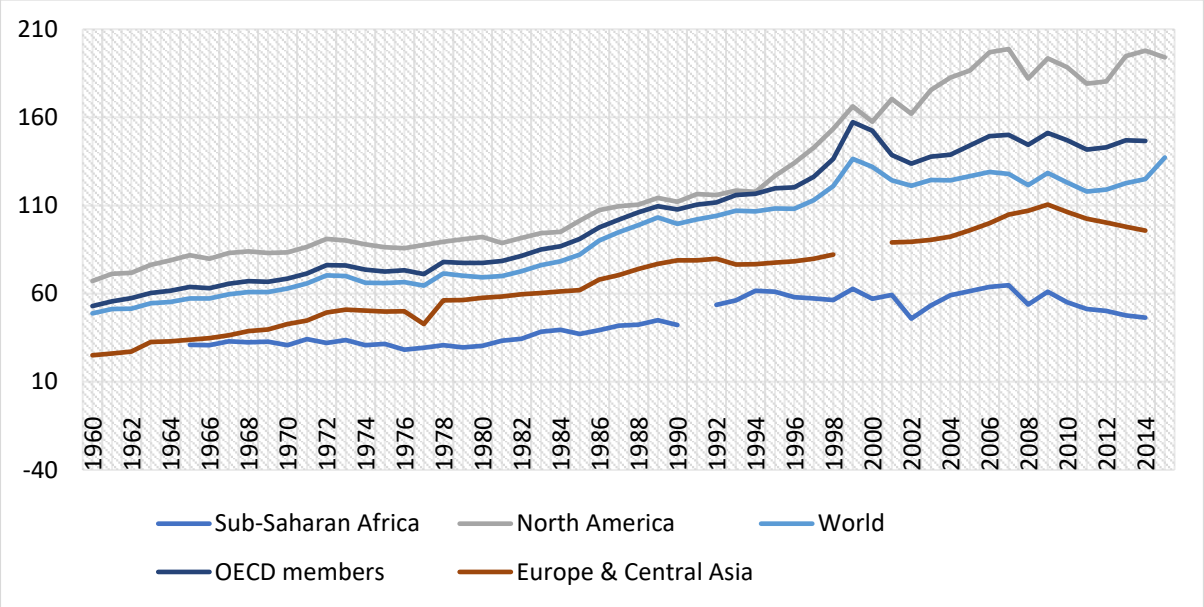
According to the IFC (2014), only two countries, Ghana and Sierra Leone, had comprehensive and up-to-date collateral registries in 2014.

2.2.1 Private Credit to GDP (Financial Sector, Bank Credit to GDP ratios)

Domestic credit to the private sector refers to financial resources provided to the private sector by financial corporations that establish a claim for repayment, such as loans, purchases of non-equity securities and trade credits and other accounts receivable (World Development Indicators, 2016). Credit provision to the private sector provides finance for production, consumption and capital formation that positively affects the welfare of a country's population. The private credit indicator excludes credit issued to governments, government agencies and public enterprises as well as credit issued by a country's central bank.

During the past five decades, the financial sectors of SSA countries were very shallow as measured by the private sector credit to GDP ratio, despite experiencing a significant increase in the depth during the same period (Beck & Cull, 2013). From 1965 to 1990, the private sector credit to GDP ratio never exceeded 50 percent, while other regions like North America and the OECD had financial sector depth levels well above 50 percent. However, SSA had higher ratios compared to other developing regions of the world like the MENA, Latin America and the Caribbean and the Low-Income countries group. A review of data from the World Development Indicators shows that the private sector credit to GDP ratio passed the 50 percent mark in 1992 and the sector experienced sustained growth in the two decades that followed, despite a decline experienced in 2002. However, the level of intermediation plummeted in the past seven years, declining by 28.9 percent from 64.8 percent in 1997 to 46 percent in 2014. Figure 2.2 below shows a comparison of private sector credit to GDP ratios for selected regions of the world.

Figure 2.2 Private Sector Credit to GDP ratios in SSA (1960–2014)



Source: World Development Indicators, 2016

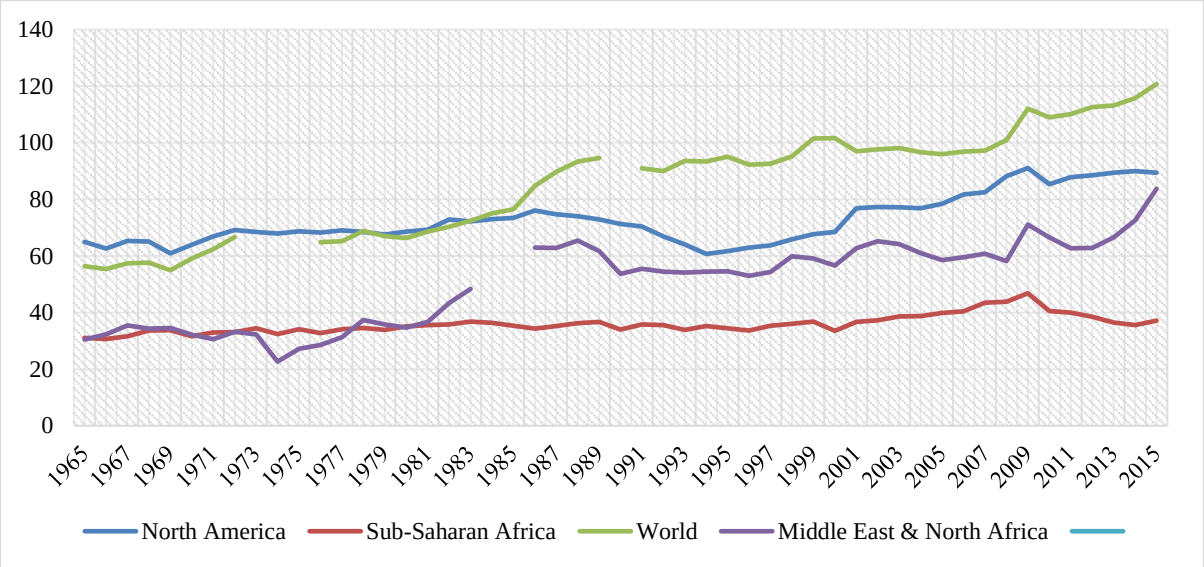
Analysis of financial depth at country level in the SSA shows that Cape Verde (60.5 percent), Mauritius (104.3 percent), Namibia (53.5 percent) and South Africa (150 percent) have high levels of bank intermediation with private sector credit to GDP ratio exceeding 50 percent, while Cameroon, Chad and the Democratic Republic of Congo had ratios below 15 percent in 2013 and 2014. In terms of growth at country level, Ghana (311.3 percent), Botswana (260.7 percent), Seychelles (229.3 percent and Cape Verde (191.9 percent) experienced the highest growth between 1990 and 2015. However, despite the massive growth, the financial sector in Ghana remains very shallow with a private sector to GDP ratio of only 20.3 percent in 2015. Benin, Equatorial Guinea and Malawi experienced the least growth over the same period. Other countries like Guinea-Bissau, Equatorial Guinea, Ivory Coast and Madagascar experienced a major decline in the financial sector depth.

2.2.2 Broad Money to GDP (M3/GDP)

Broad money measures the level of financial savings in an economy. The level of financial savings is measured by the sum of currency and deposits in the central bank (M0), plus transferable deposits and electronic currency (M1), plus time and savings deposits, foreign currency transferable deposits, certificates of deposit and securities repurchase agreements (M2), plus traveller's cheques, foreign currency time deposits, commercial paper and shares of mutual funds or market funds held by residents as a proportion of the country's GDP (World Bank, 2016).

The ratio of broad money to GDP in SSA countries' financial institutions has remained very low compared to other regions of the world. The broad money to GDP ratio for SSA reached a peak of 47 percent in 2009 over a 55-year period. The peak is quite low when compared to other regions – North America (90.7 percent), OECD (122.5 percent) and the MENA (84.8 percent). The growth rate of broad money supply to GDP was sluggish between 1965 and 1999 and experienced its greatest growth of 41.3 percent between 2000 and 2009. The 2010–2014 period showed a decline by 11.2 percent in the broad money to GDP ratio of the SSA region over the five-year period. Figure 2.3 below shows the pattern of broad money to GDP ratio between 1965 and 2015 for selected regions of the world.

Figure 2.3 Comparative Percentage of Broad Money to GDP in SSA (1965–2015)



Source: World Development Indicators, 2016

At country level, South Africa (75.5 percent), Mauritius (108.5 percent), Seychelles (63.2 percent) and Cape Verde (96.8 percent) have high ratios of broad money to GDP which are comparable to other regions of the world. By contrast, Chad (15.9 percent) and the Democratic Republic of Congo (13.2 percent) had ratios that were below 20 percent of GDP in 2015.

2.2.3 Banking Financial Sector Breadth (Access)

According to the IMF (2008), access to finance can expand opportunities for those with higher levels of access. Additionally, the use of banking services is associated with lower financing obstacles for both people and businesses. Access to financial services by the SSA population is both relatively and absolutely limited. The SSA region has populations with the least access to financial services compared to populations of other regions of the world, as measured by

access to automated teller machines (ATMs) and point of sale (POS) machines, loans and accounts with financial institutions. Lack of access to finance is a key constraint on the growth of small and medium enterprises in SSA, and thus also an important limitation on employment, economic growth and shared prosperity (IFC, 2013a).

Automated Teller Machines (ATMs) per 100 000 people

Automated teller and point of sale machines are among the technological innovations that promote financial inclusion. Globally, the ratio of ATMs per 100 000 people experienced a steep growth since 2005 and the SSA region experienced a growth rate of 416.7 percent between 2005 and 2014. Despite the five-fold growth in ATMs per 100 000 people, the ratio remains absolutely and comparative low with only 5.3 ATMs per 100 000 people in 2014. The global average stands at 44 ATMs per 100 000 people while some regions of the world have higher ratios, like the MENA with a ratio of 64.8 and OECD, where the ratio stands at 77 ATMs per 100 000 people. A snapshot view of individual countries in the SSA region shows that some countries, like South Africa (66.2), Seychelles (66.0), Namibia (53.8) and Cape Verde (47.7), have comparatively high ratios of ATMs per 100 000 people while other countries, like Chad, South Sudan, Burundi and the DRC, have a much lower average of one ATM per 100 000 people.

Commercial Bank Branches per 100 000 people

The coverage of SSA populations by commercial banks remains very low with only 3.9 commercial banks branches per 100 000 people in the region, compared to a world average of 13.5. North America, OECD, Europe and Central Asia have more than 20 commercial branches per 100 000 people (World Development Indicators, 2016). Inasmuch as the ratio in SSA more than doubled between 2004 and 2014, coverage is still low. Focusing on individual countries in terms of commercial bank branches density, Seychelles (54.8), Cape Verde (34) and Mauritius (24.2) have the highest density of commercial bank branches in the region. SSA countries with populations that have the least access to financial services in terms of commercial bank branches density include Chad (0.96) and the Democratic Republic of Congo (0.82) (World Development Indicators, 2016).

Account Penetration

Financial access also allows people to manage risks by providing a safe place to save money for emergencies and access to credit when needed. Account ownership is the first step towards

financial inclusion (World Bank, 2016). In terms of account penetration for populations aged 15 years and above, the SSA region has the lowest percentage of people with access to an account with a financial institution, although it has the highest proportion of people with mobile money accounts. According to the Global Financial Index (2014), 34 percent of adults in SSA had an account (mobile and financial institutions) in 2014, up from 24 percent in 2011. The region leads the world in mobile money accounts with 12 percent of adults having a mobile account, compared to just 2 percent of adults worldwide who have a mobile money account. Table 2.3 below shows the comparison between access to financial services in SSA and the rest of the world in 2014.

Table 2.3 Access to Financial Services, 2014

Indicator	SSA	World
Account (% age 15+)	34.2	61.5
Financial institution account (% age 15+)	28.9	60.7
Mobile account (% age 15+)	11.5	2.0
Savings in the past year (% age 15+): saved at a financial institution	15.9	27.4
Credit in the past year (% age 15+): borrowed from a financial institution	6.3	10.7

Source: World Bank. 2015. The Little Databank on Financial Inclusion.

Access to formal financial services in SSA countries remains low, as the share of the population having an account at, or borrowing from, a financial institution is low compared with other regions. Consequently, households and small to medium firms in SSA rely extensively on informal financial systems to meet their financial service needs.

2.3 Capital Markets in SSA

Stock markets, like banks and insurance firms, are critical for capital accumulation and growth as they encourage savings by providing individuals with additional financial instruments that may better meet their risk preferences and liquidity needs. Liquid capital markets enable savers to hold assets like equity and bonds that they can sell quickly and easily if they need access to their savings. Capital markets transform these liquid financial instruments into long-term capital investments in illiquid production processes (Levine, 1997; Levine & Zervos, 1998). Stock market development is mainly measured by market capitalisation, turnover and the number of listed firms.

SSA stock markets are still very shallow in terms of market capitalisation and listing. Except for South Africa, SSA stock markets remain the smallest compared to any region of the world,

both in terms of the number of listed companies and market capitalisation. In addition to limited sizes, SSA stock markets, with the exception of South Africa, are characterised by a high degree of illiquidity. Shares are rarely traded and turnover ratios are low by international standards. Activity is impeded by outdated trading, clearing and settlement systems, which can take months to complete a single transaction. Trading is often limited to a few stocks which represent the majority of market capitalisation (Masset & Mihr, 2013). The stock markets in Africa experienced some growth after 1989 when the number of stock exchanges grew from just five stock markets in SSA and three in North Africa prior to 1989, to 29 stock exchanges on the continent today (Yartey & Adjasi, 2007).

African bond markets are also in their infant stages of development and debt markets are dominated by government securities, mostly of short duration, with activity focused on the domestic primary market and limited activity in the secondary market. Corporate debt markets are largely non-existent in Africa, with the exception of South Africa and, to a limited extent, some North African markets (Saffron Wealth, 2018).

2.3.1 Stock market capitalisation

Market capitalisation refers to the market value of outstanding shares of listed domestic companies. SSA countries' stock exchanges, with the exception of South Africa and Mauritius, have very low levels of stock market capitalisation to GDP ratios compared to countries in regions such as North America, MENA and Europe. Ghana, Malawi and Nigeria had a market capitalisation to GDP ratio of less than 20 percent in 2011. In 2006, SSA listed firms had a market capitalisation of $769 billion, which is 65 times lower than that of the world level. Table 2.3 shows the comparison of stock market capitalisation for selected[5] SSA countries.

[5] The selection of countries and the time period were based on data availability.

Table 2.4 Market Capitalisation of Listed Firms as a % of GDP (2005–2011)

Country Name	2005	2006	2007	2008	2009	2010	2011
Ghana	10.0	3.7	9.7	10.0	9.3	9.2	7.8
Kenya	9.9	44.1	41.8	30.2	29.6	36.2	24.3
Malawi	-	14.7	-	33.3	22.3	19.6	17.3
Mauritius	27.1	73.7	101.6	48.4	74.5	79.8	69.7
Namibia	7.8	2.0	2.0	0.6	0.4	0.0	0.0
Nigeria	-	22.6	51.0	23.1	19.0	13.7	9.5
South Africa	149.8	261.8	276.6	168.3	270.0	246.4	189.4
Uganda	-	1.2	-	21.6	20.9	8.9	38.1
World	104.1	107.0	114.8	56.5	83.0	86.8	67.4

Source: World Development Indicators, 2016

2.3.2 Stock Market Turnover

Stock markets in sub-Saharan Africa are very illiquid, except for South Africa's Johannesburg Stock Exchange. Trading is infrequent and is limited to a few firms. The value of shares traded constitutes a very small proportion of the countries' GDPs. Table 2.5 below shows the stock market turnover for selected SSA countries.

Table 2.5 Stocks traded (total value) as % of GDP (2005–2013)

Country	2005	2006	2007	2008	2009	2010	2011	2012	2013
Cape Verde	4.58	3.9	-	0.05	-	-	-	-	-
Botswana	25.3	28.4	39.9	30.3	-	-	25.0	23.8	34.3
BRVM[6]	-	10.5	9.6	11.5	15	13	-	-	-
Tanzania	0.11	-	15.0	21.6	17.9	14.6	30.2	33.4	
Cameroon	30.0	25.0	23.8	-	-	-	-	-	-
Ghana	189.1	-	-	-	109	73.7	136.5	120.3	99.7
Zambia	28.6	40.0	54.6	37.8	38.7	48.0	63.5	52.7	3.4
Malawi	14.7	35.4	48.6	44.8	38.4	36.9	30.9	19.6	28.5
Mozambique	10.3	1.79	1.72	1.53	3.37	3.81	4.66	7.39	7.64
Kenya	31.6	69.3	0	31.81	36.5	0	34.4	34.5	55.8
Namibian	0	0	0	27.7	14.6	0	0	0	0
Nigerian	19.5	28.2	84	41.9	29.5	40.0	30.2	21.8	40
Rwanda	12.18	21	26	-	2.97	24.3	47.7	-	-
Sierra Leone	5.26	5.1	5.48	-	-	-	-	-	-
Mauritius	43.1	56.9	96.5	56	75.7	84.3	70.9	63.6	73.3
Uganda	22.3	22.3	30.0	24.8	30.1	30.1	30.16	26.5	38.2
Zimbabwe	-	-	-	64.9	58.4	45.6	42.8	-	-

Source: World Development Indicators, 2016

The stock turnover GDP ratios for SSA countries were well below the world ratio of 169.6 percent in 2015 or ratios for other regions of the world. Over the 9-year period shown in Table 2.5 above, stock market liquidity has been improving since 2001, albeit at a very slow rate. In addition to low turnover and market capitalisation, the numbers of listed firms are also absolutely and comparatively small. Uganda and Malawi had 10 and 14 firms respectively listed on their stock exchanges in 2012, while in 2014, Seychelles and Namibia had only 3 and 8 firms listed on their stock exchanges respectively.

2.4 Insurance Sector in SSA

The insurance market is an integral component of a country's financial system as it plays a pivotal role in mobilising savings and underwriting business risks. According to Akinlo and Apanisile (2014), insurers are similar to banks and capital markets as they serve the needs of business units and households in financial intermediation. Unlike other financial institutions,

[6] The Bourse Regionale des Valeurs Mobilieres (BRVM) is a regional stock exchange serving Ivory Coast, Mali, Senegal, Togo, Burkina Faso and Niger.

by collecting premiums from many small individuals in the economy, insurance is able to pull together a large pool of funds that can be invested for both short and long-term periods.

The insurance market in the SSA region is mainly made up of life and non-life insurance. The SSA insurance markets are in a typical early phase of development where the main focus lies on commercial lines of business in non-life and group business in life. SSA's insurance sector accounts for only 0.2 percent of the total global premiums written (Karl, 2012). In 2014, Africa had an insurance penetration of only 2.9 percent of GDP, compared to the world average of 6.2 percent. Insurance density (insurance premiums to total population) was US$61, compared to the world average of US$662. Table 2.6 below shows the insurance penetration and density in selected regions and countries of the world in 2014.

Table 2.6 Overview of Insurance Sector Development in 2014

Region/Country	Share in the World Market (%)			Penetration (%)		
	All	Life	Non-Life	Total	Life	Non-Life
World	100	55.6	44.4	6.2	3.4	2.7
North America	29.42	41.3	58.7	7.3	3.0	4.3
Latin America and Caribbean	3.94	40.0	60	3.1	1.2	1.8
Europe	35.53	59.1	40.9	7.5	4.4	3.1
Asia Pacific	29.67	67.0	33.0	5.3	3.5	1.7
Africa	1.44	66.4	33.6	2.8	1.9	0.9
Angola	0.02	2.7	97.2	0.8	0.0	0.8
Kenya	0.04	35.4	64.6	2.9	1.0	1.9
Namibia	0.02	69.6	30.4	7.2	5.0	2.2
Nigeria	0.04	25.5	74.4	0.3	0.1	0.2
South Africa	1.03	80.9	19.1	14.0	11.3	2.7

Source: Swiss Re, 2015

SSA countries have an average penetration rate of 1 percent, except for South Africa, Nigeria, Kenya, Namibia and Botswana. Penetration and density in South Africa are comparable with levels attained by high-income countries outside Africa. Inasmuch as SSA constitutes the growing market globally, the growth of insurance in SSA is dampened by low levels of income, weak insurance regulatory frameworks and political instability. However, in the medium to long-term, strengthening economies, increasing disposable incomes and favourable demographics will lead to increased insurance penetration. Even in South Africa and Nigeria,

where insurance penetration is high, there is still a large coverage gap for certain population segments and this should boost premium growth in the future.

2.5 Health care systems Objectives

The fundamental objectives of any functional health care system are to improve a population's health status, ensure equity and access to health care as well as to improve quality of care and consumer satisfaction. Additionally, the health care system seeks to ensure microeconomic and macroeconomic efficiency in the use of resources, enhancing clinical effectiveness and assuring the system's long-run financial sustainability (Schieber & Maeda, 1997; WHO, 2000). These objectives are elaborated below.

Health Status: Improving a population's health status is the defining objective of the health care system. This means making the entire population as healthy as possible over people's whole life cycles, taking account of both premature mortality and disability (WHO, 2000). Health status is measured through indicators such as maternal, child and neonatal mortality. An effective health care system must significantly curtail the occurrence of these deaths.

Equity: Equity in financing in health care systems means that the risks each household experiences due to the costs of the health care system are distributed according to the ability to pay rather than to the risk of illness and as such, a fairly financed system ensures financial protection for everyone. A health care system in which individuals or households are sometimes forced into poverty through their purchase of needed care, or forced to do without it because of the cost, is unfair (WHO, 2000). Financial protection occurs when people are cushioned from impoverishment as a result of using health care or from being forced to choose between their health and their economic well-being.

Responsiveness: Responsiveness measure how the system performs relative to non-health aspects, meeting or not meeting a population's expectations of how it should be treated by providers of prevention, care or non-personal health services.

Stewardship: This is a role played by the government in overseeing a nation's health care system. People entrust both their bodies and their money to a health care system, which has a responsibility to protect the former and use the latter wisely and well. The government is called on to play the role of a steward because it spends revenues that people contribute through taxes and social insurance, and because it makes many of the rules that are followed in private and voluntary transactions (WHO, 2000). The participation of governments in health care systems

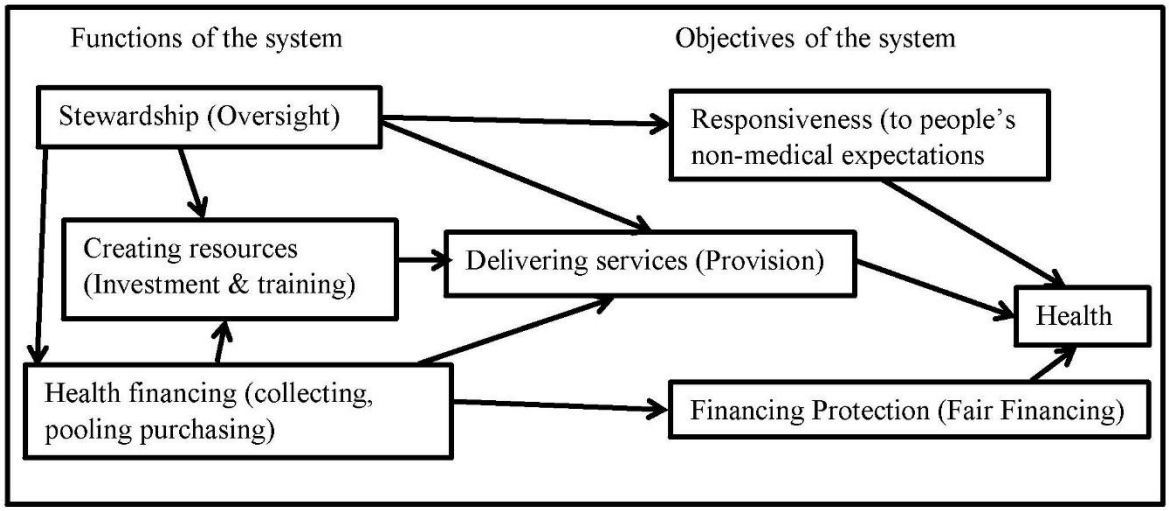
has its roots in theories of market failure and externalities. Health is a public good with large positive and negative externalities. The existence of externalities means that there is market failure warranting public interventions (Coase, 1960). According to Musgrove (1996), government intervention in the health care system may be justified under three conditions of market failure: incomplete information, externalities and the failure of adults to act as appropriate agents for children.

2.6 Organisation of Health care systems: A Functional Approach

A health care system performs several functions to achieve the objectives outlined above and chief among these functions is health care financing. The health care financing function plays a pivotal role in achieving these health care system objectives through collection and pooling of funds as well as purchasing and providing health services (Hsiao, 2003; Kutzin, 2010). A number of health frameworks have been put forward to explain the link between health care system functions (including health care financing), external environments and health care system objectives (WHO, 2000, 2007; Hurst & Jee-Hughes, 2001; Arah et al., 2006; Commonwealth Fund Commission on a High Performance Health care system, 2006; Atun & Menabde, 2008; International Health Partnership and Related Initiatives, 2008). These frameworks provide policy makers with instruments that they can use to attain the desired health care system's objectives. The different frameworks also provide strategies for measuring the performance of a health care system in meeting health care system objectives. The extent to which each of these frameworks meets the above objectives is subject to debate as the purposes of these frameworks differ. As they put into context the importance of health care financing in attaining better health outcomes, the next section reviews the WHO (2000), Hsiao (2003) and Kutzin (2010) health frameworks.

The WHO (2000) presents a conceptual framework showing the relationships between the functions and objectives of a health care system. The framework categorises health care systems as having four principal functions (stewardship, resource creation, service delivery and financing) and three principle objectives (health, fair financial contribution and responsiveness to people's non-medical expectations). Figure 2.4 below shows the links between the functions and objectives of a health care system.

Figure 2.4 Relations between Functions and Objectives of a Health Care System

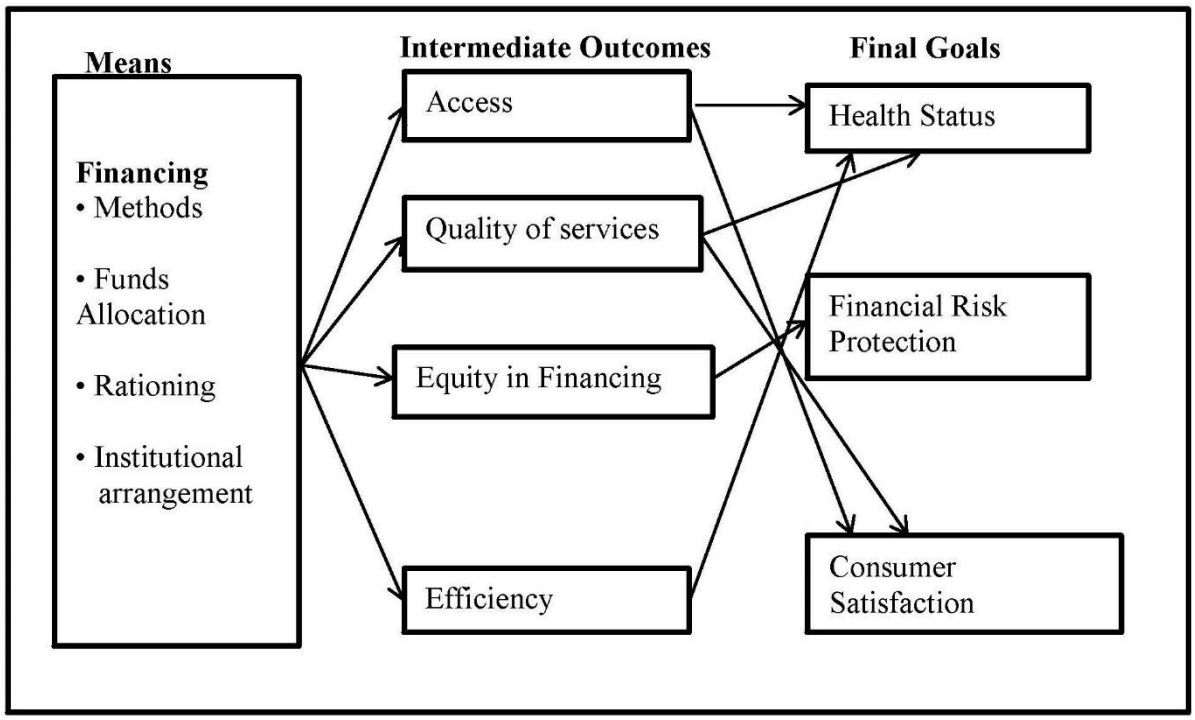


Source: World Health Organization, 2000

The implementation of the four principal functions in the framework leads to the achievement of the health care system objectives. Health care financing underpins the achievement of the health care system's objectives as it provides resources for investment, training and service provision. However, the framework has been criticised for its lack of clarity on relationships between the principle functions and health care system performance. It does not explain why a particular system yields a given outcome, what features of that system contributed the most to produce the outcome, or how the system could be restructured to achieve a preferable outcome (Hsiao, 2003).

Hsiao (2003) conceptualises a health care system as a set of relationships in which the structural components (means) and their interactions are associated and connected to the goals that the system desires to achieve (ends). In this framework, Hsiao identifies four financing means (methods, funds allocation, rationing and institutional arrangements) that yield intermediate ends (access, quality of services, equity in financing and efficiency). Figure 2.5 below shows how health care financing instruments and health care system goals are linked.

Figure 2.5 Relationships between Financing Instruments and Goals

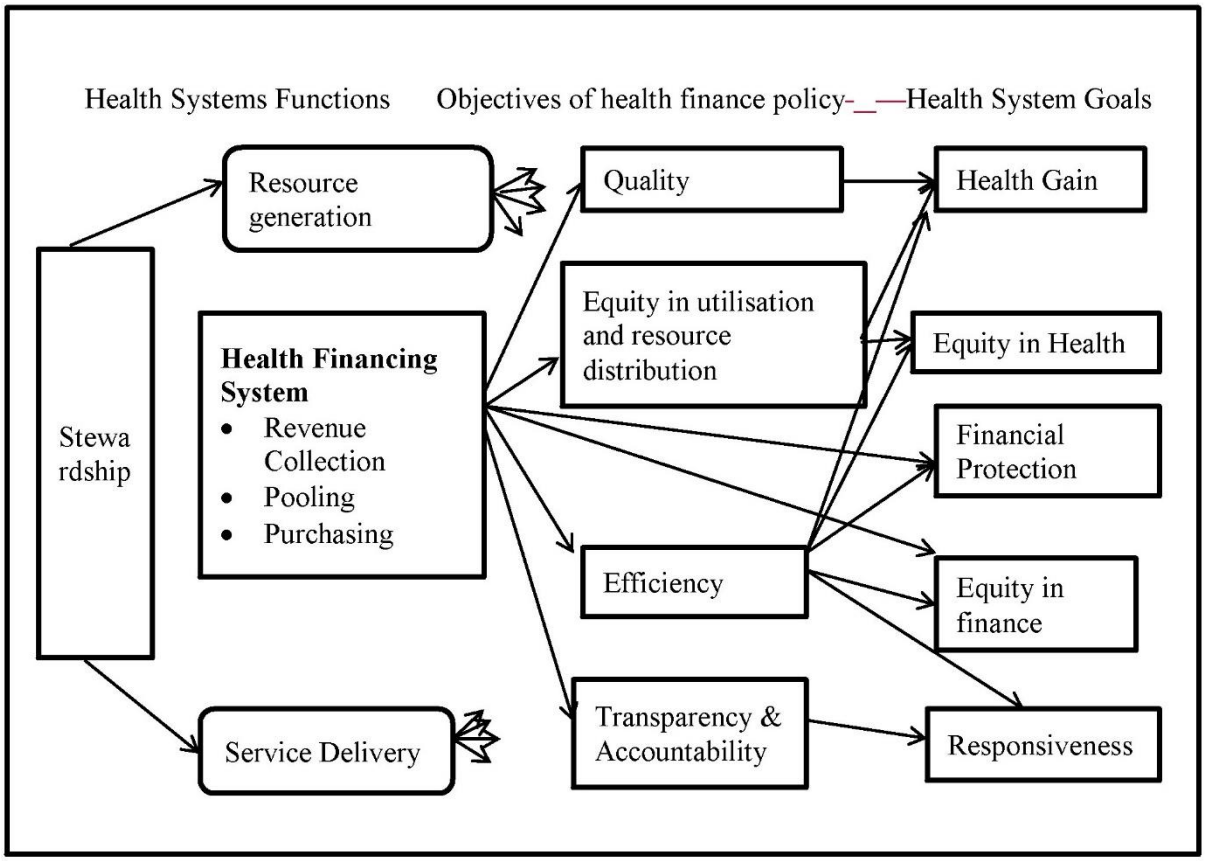


Source: Hsiao, 2003

The means and intermediate outcomes are expected to yield the broad health care system goals of improved health status, financial protection and consumer satisfaction. Like the one proposed by the WHO (2000), the framework suffers the drawback of not showing the role of the external environment in influencing health outcomes.

Kutzin (2010) explores the links between health care system objectives and health care system financing. He identifies three health care financing system functions (pooling, revenue collection and purchasing) that are connected to intermediate policy objectives (quality, equity in utilisation and resource distribution, efficiency, transparency and accountability) that are instrumental to the achievement of broad health care system goals (health gain, equity in health, financing protection, equity in finance and responsiveness). Figure 2.6 below summarises the relationships between health care financing, intermediate policy objectives and health outcomes.

Figure 2.6 Health Care Financing System, Health Policy Objectives and Health Care System Goals



Source: Kutzin, 2010

The frameworks by Hsiao (2003) and Kutzin (2010) provide a mechanism for identifying the key financing components and their places within the health care system but they are not explicit about the links between health care financing policies, mechanisms and performance (Hort et al., 2010). These types of frameworks only provide a basic description of the health care system and its constituent components, but do not explain why any particular health care system would perform better than another (Papanicolas, 2013). The next section focuses on how health care systems can be financed to achieve health care system objectives.

2.7 Health care financing

Health care financing involves the basic functions of collecting revenue, pooling resources and purchasing goods and services (WHO, 2000). Revenue collection is the process by which the health care system receives money from households and organisations or companies, as well as from donors. Health care systems have various ways of collecting revenue, such as general taxation, mandated social health insurance contributions (usually salary-related and almost

never risk-related), voluntary private health insurance contributions (usually risk-related), out-of-pocket (OOP) payments and donations (WHO, 2000). Pooling is the accumulation and management of revenues in such a way as to ensure that the risk of having to pay for health care is borne by all the members of the pool and not by each contributor individually (insurance function). This function seeks to spread the financial risk associated with sickness across many people. Purchasing is the process by which pooled funds are paid to providers to deliver a specified or unspecified set of health interventions.

Theoretically, there are five health care financing options that countries can adopt to finance their health care systems, namely tax-based, wage-based (social health insurance), private voluntary health insurance, community-based health insurance and user fees (OOP payments), (WHO, 2000; Hsiao, 2003; Gottret & Schieber, 2006; Wagstaff & Bank, 2009; World Bank, 2016). While health can also be financed through other models (discussed below) like private health insurance, community-based insurance and user fees/OOP payments (World Bank, 2016), health care financing has its roots in the Beveridge and Bismarck models of health care financing. In the Beveridge model of health care financing, health care expenditure is funded through general taxation while health services are provided by public providers. In the Bismarck model, health is financed through social health insurance schemes while health services are provided by both public and private providers. In both the Beveridge and Bismarck health care financing models, governments plays a major role in resource mobilisation and service provision, compared to other models of health care financing like private voluntary or community-based health insurance and user fees (OOP payments). The World Bank (2016) provides a comprehensive discussion of the pros and cons of these two health care financing models and these are summarised below.

2.7.1 Beveridge Model (tax-based health care financing)

The model is a universal pooling arrangement through which the entire population has access to publicly provided services financed through general revenues (Gottret & Scheiber, 2006). General tax revenue financing is often tied to the national health service type of health care delivery system of government-owned and operated health facilities. National health service systems are usually characterised by three features: their funding comes primarily from general revenues, they provide medical coverage to the whole population, and they usually deliver health care through a network of public providers (World Bank, 2016). The Beveridge model is preferable to other models mainly for its covering of the entire population and reliance on

general taxation, which may be the fairest way to generate the required funds. This financing model also ensures a high degree of political accountability in democratic political systems through regular legislated budgeting and leads to increased health resources over time as the economy grows. The major drawback of this funding mechanism is that the health sector has to compete with other sectors for funds and revenues can be unpredictable, as they fluctuate depending on the types of taxes and economic conditions. This funding approach can also be inequitable depending on the type of taxes used and the level at which they are collected. In countries with weak governance and accountability, control of general revenues by a few individuals can lead to favouritism and corruption.

According to Chemouni (2018), countries with a relatively large coverage of the population by national health insurance schemes in SSA include Gabon (45 percent), Ghana (38 percent), Kenya (17 percent) and Nigeria (3 percent). In 2018, South Africa was designing a national health insurance system with a series of white papers released for public debate. However, limited government revenue constrains the implementation of this insurance scheme. Economies in the SSA are characterised by large informal sectors whose workers cannot contribute to social health insurance schemes. Governments also have weak capacity to collect tax revenue which further limits the amount available for funding national health insurance (Bokosi, 2015).

2.7.2 Bismarck Health care financing Model (social insurance-based)

The Bismarck health care financing model takes the form of social insurance. In this model, health services are paid through contributions to a health fund. The most common basis for contributions is the payroll, with both employer and employee paying a percentage of salary (Bennett & Gilson, 2001). Social insurance schemes have great potential for providing effective risk protection, particularly in high-income countries. The major disadvantages of social health insurance models stem from the fact that schemes do not cover everyone, particularly in low-income countries where the schemes mostly cover workers in the formal sector and only pool the health risks of the schemes' members. Social health insurance requires both adequate fiscal capacity of the government and popular acceptance and, like taxes, they suffer from some of the problems which reduce the effectiveness of tax collection. Additionally, contributions to social health insurance by employers increase the cost of labour and may lead to increases in unemployment levels (World Bank, 2016). Tanzania (17 percent) and Kenya (11 percent) are among the countries with the largest coverage of social health

insurance schemes (Fenny, Yates & Thompson, 2018). Like national health insurance schemes, social health insurance schemes in SSA suffer from limited subscription bases as the formal sector is small.

2.7.3 Private insurance

Private health insurance involves the voluntary employer-based or individual purchase of private health insurance products and private ownership of health sector inputs. Private insurance offers less risk pooling than social health insurance or general revenue financing as groups with the highest risks and costs are typically excluded by insurers, who favour enrolling the healthier groups in a population, leaving those more likely to be sick and incur higher health care expenditures to have their needs met in other ways. In SSA, private health insurance is not common, except for Botswana (17 percent coverage), South Africa (16 percent), Namibia (15 percent) and Zimbabwe (10 percent) (Brockmeyer, 2012; Oxford Policy Management, 2012; Chemouni, 2018).

2.7.4 Community-Based Financing

In community-based financing or insurance schemes, local communities operate and control the financing of their health care, typically through locally based prepayment schemes. Under these community-based health insurance (CBI) schemes, financing and delivery of primary care can be separated or integrated, but higher-level care is usually purchased by the scheme. Providers may be individuals hired by the community or non-profit or non-governmental organisations (World Bank, 2016). These schemes usually have shallow risk pools as membership is limited to the local community members. CBI schemes called *Mutuelles* are widespread in Burundi, Rwanda, Kenya and Burkina Faso, among other SSA countries. The community-based *Mutuelles* are the largest CBI schemes in Burundi, Rwanda, Kenya and Burkina Faso with 81.6 percent of the population covered as of 2016 (Chemouni, 2018). However, CBIs in other SSA countries suffer from the lack of a sound framework to guide the implementation of such schemes (Odeyemi, 2014).

2.7.5 Out-of-Pocket Expenditure

Patients make direct payments for medical care and these expenditures are not reimbursable by insurers or other third parties. Out-of-pocket (OOP) payments include official user fees (charges for services), co-payments and deductibles for doctor visits and prescription medications, unofficial or informal payments and expenditures imposed on service users for

supplies and tests which may not be available in health facilities. OOP payments are often the largest type of health care financing in low-income countries, often at a level larger than government spending. However, the level of OOP tends to decline as a share of the total expenditure as country income rises, new types of financing mechanisms become feasible – such as social and private insurance – and increased government spending obviates the need for OOP spending. OOP payments are widely agreed to be a less than ideal way to finance health care. They fall disproportionately on the sick (no risk pooling) at their time of greatest need and have the worst impact on the poor. Household impoverishment resulting from OOP health spending is widely reported as a major cause of overall impoverishment (World Bank, 2016). In SSA, reliance on OOP spending to finance health care expenditure is highly prevalent in countries like Sudan, Cameroon and Somalia due to the absence of prepayment mechanisms for health care financing.

2.7.6 External Financing Sources

Development assistance for health (DAH) consists of official development assistance (ODA) as well as aid from unofficial sources such as non-governmental organisations (NGOs) and private foundations. Many poor countries rely on foreign aid to varying degrees as a financing source for their health sectors.

In terms of implementation of health care financing options, most health care systems combine different financing options, which result in the existence of parallel and fragmented risk pools (Onoka, 2014). The nature of the mix of health care financing models adopted by a country is determined by a number of factors that include administrative capacity (corruption, decentralisation, policy process, stability of political institutions), economic activities (labour market participation, informal economy, public deficits, corruption, unemployment, unionisation, labour market structure), demographic profile (urbanisation, aging population, household structure), support for a welfare state (rule of law, informal payments, social values) and external influence from donors (e.g. IMF and the World Bank).

2.8 Health care financing in sub-Saharan Africa

The early years of SSA countries' independence saw the new governments implementing 'free health for all' programmes but, due to low and unstable tax revenues and cutbacks in public budgets, universal access to health care was never achieved (Wiesmann & Jütting, 2000). In

the aftermath of the health-for-all programmes, SSA countries have tried different modes of health care financing under the health sector reforms that followed. Currently, health care expenditure in SSA is being financed through a combination of several mechanisms that include general taxation, health insurance (private health insurance, social health insurance, community-based insurance), DAH and OOP payments at the point of use. According to Schieber et al. (2006), as countries move to different stages of the income spectrum, their health care financing profiles transition as well.

In SSA, almost half of health spending is private, mainly out-of-pocket, and usually in the form of payments for privately provided health services and pharmaceuticals. Given the small size of formal sector employment, social insurance is limited, except perhaps for government employees. Community-based health insurance is available mostly in East and West African countries and plays a limited role from a national level perspective. Private health insurance is also limited because of people's inability to pay and institutional constraints on the industry's development, including the lack of well-developed financial markets and regulatory environments. Table 2.7 shows the dominant health care financing mechanisms in SSA in 2014.

Table 2.7 Health Care Financing Mechanisms in selected SSA in 2014[7]

Health care financing Mechanism	Criteria	No. of countries
General taxation	>42.6% of THE is funded by GGE	33
User fees (OOP at point of use)	>40% of THE is funded by OOP	17
Development assistance for health (DAH)	>40% of THE is funded by DAH	10
Health insurance	>10% of GGE is from social security contribution	7

Source: Author compilation based on WHO statistics, 2014

As shown in Table 2.7 above, no country relies on a single funding mechanism although some mechanisms, like general taxation and OOP, are more used than others. The use of health insurance as discussed earlier is still limited in SSA.

[7] Selection was based on availability of data

2.8.1 Overview of Health Care Expenditure in SSA

Health care systems in SSA are largely underfunded due to resource constraints resulting from low government revenue bases, income per capita and health insurance penetration. Countries like Angola, Equatorial Guinea and Chad, that relied mostly on revenue from oil and other primary commodities to fund their health care systems have cut back expenditure on health due to the current decline in the prices of such commodities on the world market. Over the 1995 to 2015 period, total health care expenditure per capita and total health care expenditure to GDP for the SSA region remained stagnant while OOP expenditure had an upward trend. Health care expenditure financed by external resources (DAH) has been on the increase since 1995, albeit with wide fluctuations.

In 2014, total health care expenditure in SSA was mainly driven by public health care expenditure, OOP health care expenditure and development assistance for health. During the same period, expenditure levels on health as a proportion of GDP (total health care expenditure as a percentage of GDP and public health care expenditure as a percentage of GDP) for the SSA region were almost half of the world expenditure levels. Per capita health care expenditure in SSA was also absolutely and comparatively low in 2014. Table 2.8 below provides an overview of health care expenditure indicators for SSA compared to the rest of the world in 2014.

Table 2.8 Overview of Health Care Expenditure in SSA in 2014

Indicator	SSA	World
Health care expenditure per capita (current US$)	97.7	1061.0
Health care expenditure per capita, PPP (constant 2011 international $)	199.9	1275.7
Health care expenditure, private (% of GDP)	3.1	4.0
Health care expenditure, total (% of GDP)	5.5	10.0
Health care expenditure, public (% of GDP)	2.3	6.0
Health care expenditure, public (% of total health care expenditure)	42.6	60.1
Out-of-pocket health care expenditure (% of private expenditure on health)	60.2	45.5
Out-of-pocket health care expenditure (% of total expenditure on health)	34.5	18.2
External resources for health (% of total expenditure on health)	11.2	1.2

Source: World Development Indicators, 2016

Analysis of sub-regional data on health care expenditure in 2014 shows that expenditure on health is highest in the Southern Africa sub-region as measured by per capita expenditure and government expenditure on health. OOP expenditure is highest in West Africa. East Africa

relied more on DAH to finance their health care expenditure than the other SSA sub-regions. Table 2.9 show health care expenditure indicators for SSA sub-regions in 2014.

Table 2.9 Health Care Expenditure for SSA Sub-regions in 2014

Health care expenditure Indicators	SSA Sub-Regions			
	West Africa	East Africa	Central Africa	Southern Africa
Health care expenditure per capita (current US$)	59.75	92.57	161.26	237.45
Health care expenditure, private (% of GDP)	3.54	3.24	1.76	3.17
Health care expenditure, public (% of government expenditure)	9.24	10.22	8.96	11.61
Health care expenditure, total (% of GDP)	5.97	5.73	3.96	7.02
Health care expenditure, public (% of GDP)	2.42	2.49	2.19	4.45
Health care expenditure, public (% of total health care expenditure)	42.99	46.89	54.88	56.54
Out-of-pocket health care expenditure (% of private expenditure on health)	73.01	65.37	82.1	41.85
Out-of-pocket health care expenditure (% of total expenditure on health)	41.25	36.63	36.41	17.76
External resources for health (% of total health care expenditure on health)	24.55	31.01	19.88	26.95

Sources: Author calculations based on World Development Indicators, 2016

Total Health Care Expenditure to GDP

Total health care expenditure (THE) is the sum of public and private health care expenditure. It covers expenditure on the provision of health services (preventive and curative), family planning activities, nutrition activities and emergency aid designated for health (World Bank, 2016). Total health care expenditure as a percentage of GDP for SSA countries remained static from 1990 to 2010 and has been on the decline in the post-2010 period. Inasmuch as it is comparatively higher than South Asia and MENA, THE in SSA is below the world, OECD and North American levels. Total health care expenditure to GDP in SSA was at 6.1 percent in 1995 and stood at 5.5 percent in 2014. A comparison of total health care expenditure to GDP in 1995 and 2014 shows that 15 countries in SSA experienced a decline in the percentage of total health care expenditure to GDP and the countries that experienced severe declines included Angola (48.8 percent), Chad (37.4 percent) and Seychelles (32.2 percent). Angola, Chad and Equatorial Guinea were among the countries severely affected by the decline in

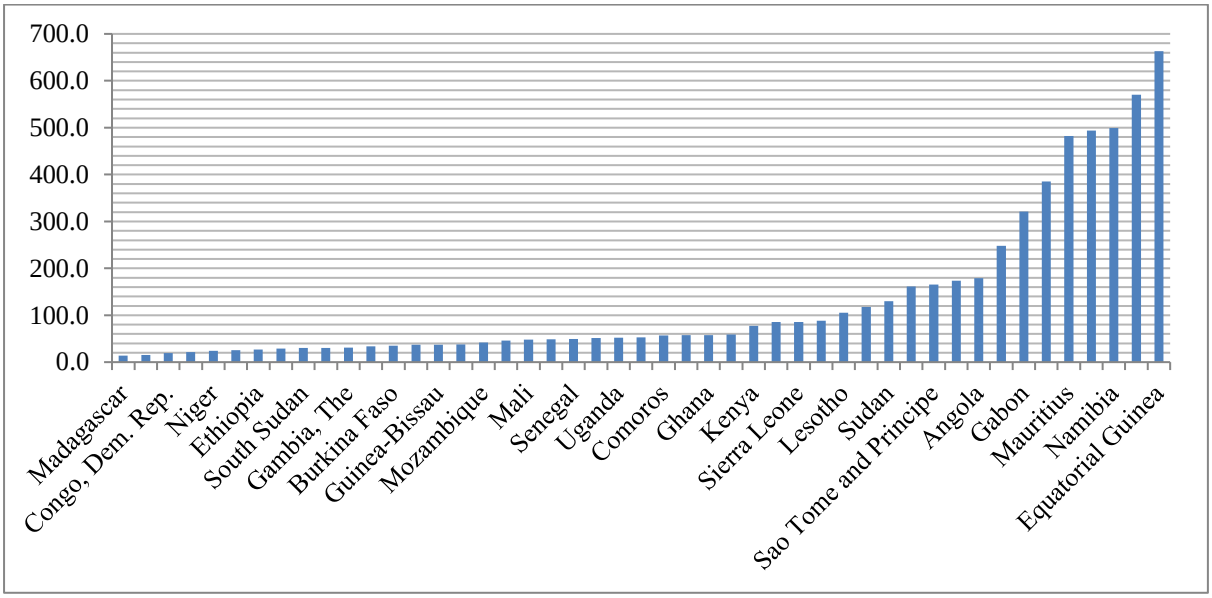
prices of commodities such as oil while Seychelles suffered a decline in tourism receipts. Statistics for 2014 show that total health care expenditure to GDP for Malawi, Sierra Leone, Liberia, Lesotho and Swaziland was on par with the world average. However, the bulk of the countries in the SSA region, including South Sudan, Madagascar and Angola, had expenditure below 5% of GDP.

Total Health Care Expenditure per Capita

In the past 20 years, health care expenditure per capita in SSA countries has never exceeded world average expenditure levels. In 2014, SSA had an average per capita health care expenditure of US$200, compared to the world average of US$1,276 (PPP, constant 2011 international $). While developed countries are battling to contain expenditure, SSA countries are struggling to increase health care expenditure per capita to improve health service delivery. The total health care expenditure per capita does not match the levels of disease burden in the region. According to the World Bank (2005), Africa accounts for 25 percent of the global disease burden and 60 percent of the people living with HIV/AIDS but, in terms of health care expenditure, it accounts for less than 1 percent of global health spending.

Expenditure on health for SSA countries ranged from US$13.70 to US$663.10 per capita in 2014, with Madagascar, Central African Republic, Republic of Congo and the DRC among the lowest spenders, while Equatorial Guinea, South Africa, Namibia and Mauritius were the top spenders. Figure 2.7 shows health care expenditure per capita for selected SSA countries in 2014.

Figure 2.7 Health Care Expenditure per Capita (US$) for selected SSA countries in 2014



Source: World Development Indicators, 2016

According to the WHO (2014), health care expenditure per capita must be at a minimum of US$44.00 per year to provide basic lifesaving health services. However, some SSA countries, like Madagascar, Central African Republic, the DRC and Burundi, spend far below the minimum threshold required to deliver basic health services.

In addition to having the lowest health care expenditure per capita in the world, SSA has the lowest health care expenditure per capita growth rate, compared to other regions of the world. Per capita total health care expenditure in SSA grew by 116.9 percent between 1995 and 2014. Globally, health care expenditure per capita grew by 165 percent during the same period. Twenty-eight countries (58 percent) in SSA more than doubled growth in health care expenditure per capita. Only the Republic of the Congo and the DRC experienced a decline in per capita health care expenditure during the period under consideration.

Government Expenditure on Health

Health care financing around the world draws much of its funding from government expenditure through general taxes, social health insurance schemes and related health funds, except in the USA, where there is much reliance on private health insurance. Health care financing by governments consists of recurrent and capital spending from (central and local) government budgets, external borrowings and grants (including donations from international agencies and NGOs), and social (or compulsory) health insurance funds (World Bank, 2016). In 2011, governments around the world spent 16 percent of their total expenditure on health

care provision and this constituted 60.1 percent of the total health care expenditure in that year. In addition to being a major funder of health services, governments are also involved in services provision, resource mobilisation and pooling, as well as regulation of the health sector.

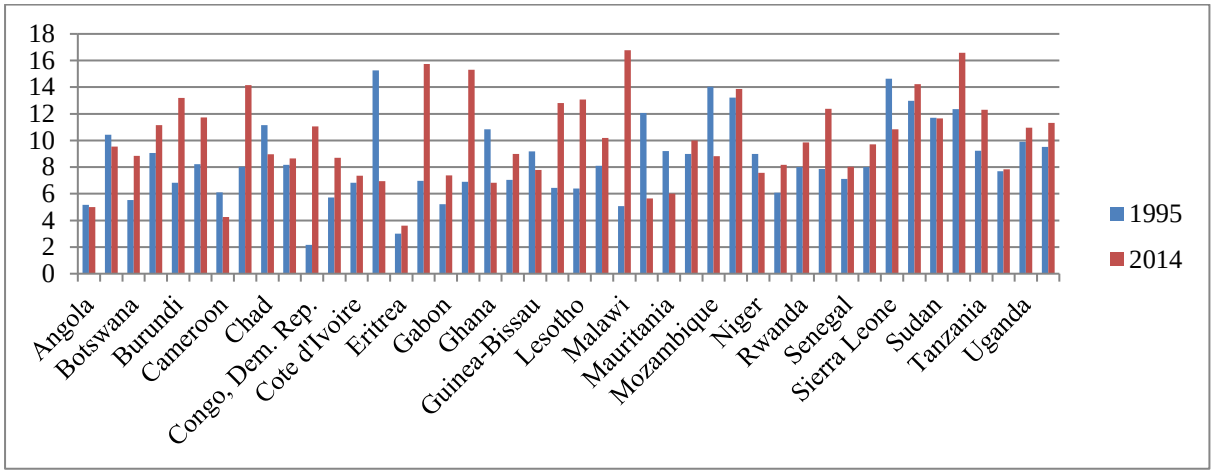
In 2001, heads of state of the African Union countries met in Abuja and pledged to allocate at least 15 percent of their annual budgets to improving the health sector. The agreement became known as the Abuja Declaration. According to Ocampo (2013), as of 2011, only six countries have been able to meet and surpass the 15% target. These include Rwanda (23.8 percent), Liberia (18.9 percent), Malawi (18.5 percent), Zambia (16 percent), Togo (15.4 percent) and Madagascar (15.3 percent). Four countries were clearly on their way to meeting the Abuja target: Swaziland (14.9 percent), Ethiopia (14.6 percent), Lesotho (14.6 percent) and Djibouti (14.2 percent). Generally, African Union governments managed to increase expenditure on health during the 2001–2011 period.

The pattern of increased government expenditure is also captured by other indicators such as the ratio of general government expenditure on health to total government expenditure, ratio of government expenditure on health to total health care expenditure and ratio of government expenditure on health to GDP.

Government Expenditure on Health compared to Total Government Expenditure

The proportion of government expenditure that was directed towards health significantly increased for the majority of countries in the SSA region between 1995 and 2014. The DRC government increased expenditure on health by more than five times from a paltry 2.2 percent in 1995 to 11 percent in 2014. Major increases were also achieved by Malawi (231.2 percent), Ethiopia (125.8 percent) and the Gambia (122.3 percent). Figure 2.8 below shows a comparison of government expenditure on health as a percentage of total government expenditure in 1995 and 2014.

Figure 2.8 Government Expenditure on Health to Total Government Expenditure



Source: World Development Indicators, 2016

A comparison of the 1995 and 2014 expenditure shows that 31 countries increased the proportion of expenditure on health in their annual expenditures. However, some countries, like Equatorial Guinea, Mali, Mozambique, Ghana and Sierra Leone, actually reduced the proportion of expenditure on the health sector. Government expenditure on health is greatly constrained by shallow tax bases and inefficient tax administration systems. SSA countries are characterised by huge informal sectors which evade paying taxes. Tax authorities also have limited human and technical capacity to collect taxes from the existing formal sector of the economy.

Government Expenditure on Health compared to GDP

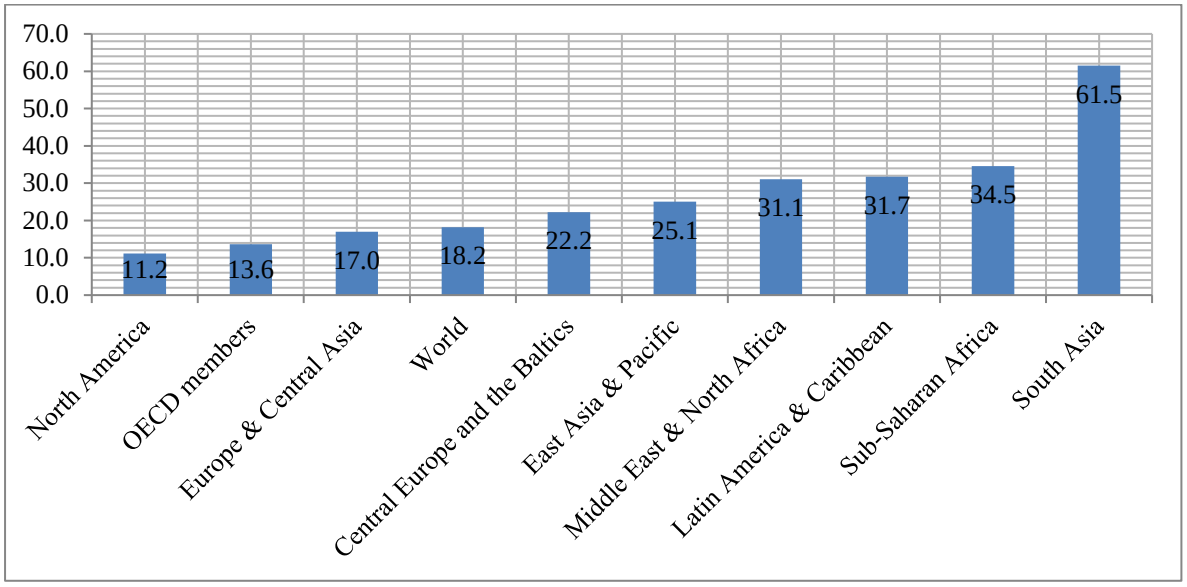
Government expenditure on health as a percentage of GDP for SSA has been growing slowly, ranging from 11.5 percent to 12.2 percent between 2003 and 2011. In addition to growing at a slow rate, government expenditure as a proportion of GDP is low compared to all other regions of the world save for South Asia. In 2014, at country level, government health care expenditure in Eritrea (3.6 percent), South Sudan (4 percent), Cameroon (4.3 percent) and Angola (5 percent) had the lowest percentage of GDP. Government health care expenditure in Malawi, Swaziland, Ethiopia and the Gambia had among the highest percentages of GDP in 2014. Government expenditure on health as a proportion of GDP by Malawi, Swaziland, Ethiopia and the Gambia are comparable to expenditure at world levels and regions of the world like Europe and Central Asia. The high level of government health care expenditure in Malawi, Swaziland and the Gambia is mainly driven by external development assistance to the health sector.

Out-of-Pocket Expenditure

Out-of-pocket (OOP) expenditure occurs when households have to pay upfront to receive health care services. This kind of expenditure becomes a financial catastrophe when expenditure is too high in relation to income. High OOP health care expenditure can mean that people have to cut down on necessities such as food and clothing or are unable to pay for their children's education. According to the Li et al. (2005), approximately 44 million households, or more than 150 million individuals throughout the world, face catastrophic expenditure and about 25 million households, or more than 100 million individuals, are pushed into poverty by the need to pay for health services every year. As a result of catastrophic health care expenditures, many people may decide not to use services because they cannot afford either the direct costs, such as for consultations, medicines and laboratory tests, or the indirect costs, such as for transport and special food. Poor households are likely to sink even further into poverty because of the adverse effects of illness on their earnings and general welfare.

In 2014 alone, OOP expenditure constituted 34.5 percent of total expenditure on health in SSA. The region is among those with the highest levels of OOP expenditure by households to access health services. The high level of OOP expenditure is a result of the general lack of health insurance schemes (private and social) in many SSA countries and low levels of government expenditure on health. Public or private health insurance schemes and high levels of government expenditure on health provide financial protection by reducing the amount that people pay directly for medical care. According to World Bank data, SSA is second only to South Asia in terms of high levels of OOP expenditure (World Bank, 2016). Figure 2.9 below shows OOP expenditure as a percentage of total health care expenditure in 2014 for selected regions of the world.

Figure 2.9 OOP as a % of Total Health Care Expenditure in 2014



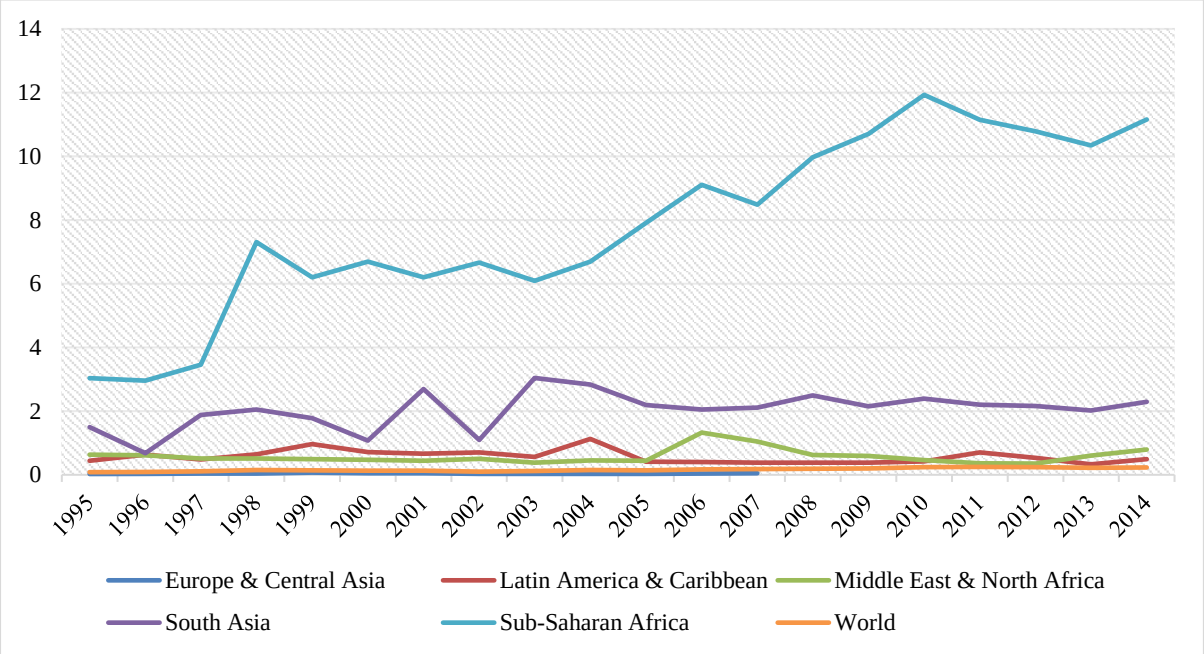
Source: World Development Indicators, 2016

High OOP expenditure on health in SSA is exposing people of the region to the risk of catastrophic health care expenditures and poor health outcomes. Except for cyclical fluctuations, over the past 19 years, OOP expenditure has not declined. Major short-term declines were experienced in 2000, 2004 and 2011, when OOP expenditure declined to 29.7 percent, 30.1 percent and 29.2 percent respectively before going back to peak levels. In 2014, Sudan (75.5 percent), Nigeria (71.7 percent) and Cameroon (66.3 percent) were among the countries with the highest levels of OOP in SSA. Seychelles (2.3 percent), Botswana (5.2 percent), South Africa (6.5 percent) and Namibia (7.2 percent) had the lowest proportion of OOP to total health care expenditure. Reliance on private expenditure to finance health services, especially out-of-pocket expenditure, has negative implications for equity and access to health care by poor people, who are prevented from seeking health care and who bear the full burden of getting sick (Schieber et al., 2006).

External resources for health (DAH)

Development assistance for health (DAH) refers to the flow of aid directed specifically towards the health sectors of low-income countries. According to Moon and Omole (2013), governments of high-income countries remain by far the largest source of DAH, accounting for about 70 percent of the total, although private sources of funding (including foundations, NGOs and corporations) have also grown in importance. From 1995 to 2014, the SSA region was the biggest beneficiary of DAH, compared to other regions. Figure 2.10 shows the contribution of DAH compared to total health care expenditure in SSA from 1995 to 2014.

Figure 2.10 External Resources for Health (% of total expenditure on health)



Source: World Development Indicators, 2016

The contribution of DAH to total health care expenditure in SSA grew from 3 percent in 1995 to 11.6% in 2014 with some mild fluctuation during this period. A review of the contribution of DAH to individual countries' total health care expenditure shows that SSA countries like Malawi, the Gambia, Lesotho and Burundi had more than 50% of their total health care expenditure financed by development assistance. Equatorial Guinea, Gabon and South Africa were among the countries that were the lowest recipients of DAH. Individual countries have benefited diversely from DAH, depending on their relationships with the donor countries and agencies. Furthermore, DAH is not necessarily targeted at countries with the highest needs for resources for health funding and is channelled towards certain diseases and not the entire health care system.

2.9 Overview of Health Outcomes in sub-Saharan Africa

Populations in SSA are exposed to a number of health risk factors that negatively affect health outcomes. The major risks faced by these populations are associated with poverty, such as undernutrition, unsafe water, poor sanitation and hygiene and indoor smoke from solid fuels. In 2014, 66.5 percent and 29.28 percent of the populations in SSA respectively had access to potable water and improved sanitation facilities. The absence of these facilities leads to increased outbreaks of diarrhoeal diseases which lead to increased child mortality in the region. According to the WHO (2015), diarrhoeal diseases accounted for 9 percent of global child

deaths (neonatal, infant and under-five child mortality) in 2015. Table 2.10 shows some of the risk factors affecting child mortality.

Table 2.10 Mortality Risk Factors, 2014

Indicator	SSA	World
Improved water source (% of the population with access)	66.5	90.6
Prevalence of HIV, total (% of population ages 15–49)	4.5	0.8
Improved sanitation facilities (% of the population with access)	29.3	67.0
Prevalence of undernourishment (% of population)	18.8	11.0

Source: World Development Indicators, 2016

Populations in SSA have limited access to health care as health service delivery is inadequate, with limited health infrastructure like hospitals, clinics and medical warehouses, the absence of drugs and vaccines as well as shortages of skilled health personnel. In 2012 alone, only 50 percent of births were attended by skilled personnel, whereas over 90 percent of births were attended by skilled personnel in other regions of the world. According to Naicker et al. (2009), there is a deficit of skilled personnel amounting to 2.4 million doctors and nurses in SSA. There are only 2 doctors and 11 nursing/midwifery personnel per 10 000 people, compared with 19 doctors and 49 nursing/midwifery personnel per 10 000 for the Americas, and 32 doctors and 78 nursing/midwifery personnel per 10 000 for Europe. The critical shortage of staff leads to unnecessary loss of life during childbirth.

These risk factors are compounded by low government expenditure on health, lack of health insurance and high OOP expenditure which adversely affect the performance of the health care systems in SSA. Low levels of income and financial development also discourage investment in health by households and private players. A combination of these factors yields very poor health outcomes characterised by high mortality rates, morbidity and disease burden. Infant (57.9), maternal (29.2) and child mortality (86.1) in the SSA region in 2014 were absolutely and comparative high. Table 2.11 below provides a comparison of health outcomes for SSA, SSA sub-regional and world levels.

Table 2.11 Overview of Health Outcomes: Mortality and Life Expectancy, 2014

Indicator(s)	SSA	World	SSA Sub-Regions			
			West Africa	East Africa	Central Africa	Southern Africa
Mortality rate, infant (per 1 000 live births)	57.9	32.6	60.96	45.41	61.75	46.8
Mortality rate, neonatal (per 1 000 live births)	29.2	19.7	30.89	26	29.51	22.45
Mortality rate, under 5 years (per 1 000 live births)	86.1	43.9	91.00	66.35	89.68	66.6
Maternal mortality ratio (modelled estimate, per 100 000 live births)	57.9	32.6	609.38	498.18	568.25	328.5
Life expectancy at birth (in years)	58.6	71.5	58.7	62	58.2	59.42

Source: World Development Indicators, 2016

In 2014, West Africa had the highest levels of infant, under-five, neonatal and maternal mortality of all sub-regions in SSA. East Africa had the highest life expectancy at birth as well as the lowest under-five and infant mortality. Southern Africa had the lowest, maternal and neonatal mortality rates. Central Africa had the lowest life expectancy at birth.

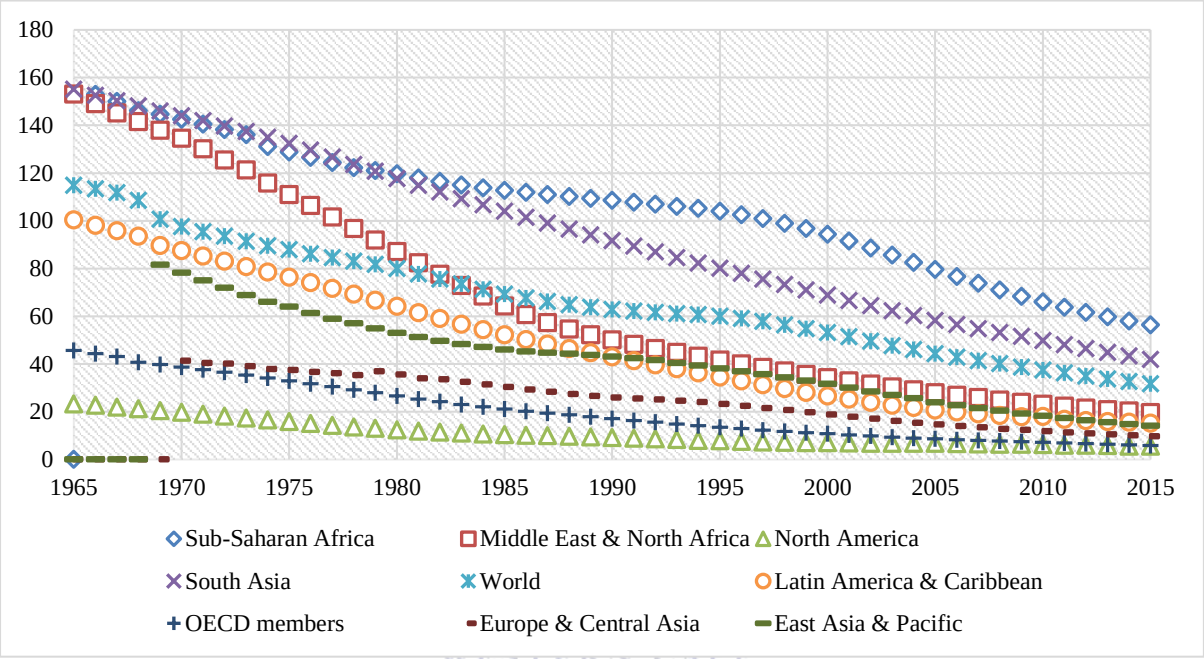
2.9.1 Infant mortality

Infant mortality refers to the number of deaths of infants less than a year old per 1 000 live births in a given time period. According to the CDC[8] , infant mortality is an important indicator of the health of a nation because it is associated with a variety of factors such as maternal health, quality and access to medical care, socioeconomic conditions and public health practice. According to USAID (2016), millions of children die in Africa from diseases that can be prevented by vaccines. It is estimated that 20 percent of the approximately two million under-five deaths annually could be prevented with existing vaccines. However, immunisation coverage in SSA remains low despite significant progress made in the past decades. In 2011, African immunisation coverage was estimated to be at 77 percent with the uncovered 23 percent at risk of death. Statistics released by the WHO (2015) show that there are only six countries globally that have not reached 50 percent immunisation coverage for three essential vaccines. Five of these countries are in SSA – Central African Republic, Chad, Equatorial Guinea, Somalia and South Sudan.

[8] Centre for Disease Control, 2010. http://www.cdc.gov/nchs/data/nvsr/nvsr63/nvsr63_05.pdf

Over the past 50 years, SSA experienced the highest number of infant mortalities in the world, despite the fact that, over that period, infant mortality steadily declined. SSA experienced a decline of 63.2 percent in infant mortality ratio between 1965 and 2015. Mauritius (82 percent), Seychelles (81.7 percent) and Malawi (79.6 percent) were among countries that recorded significant declines in infant mortality in that period. Figure 2.11 below shows the infant mortality rate for selected regions of the world.

Figure 2.11 Infant Mortality Rate (Number of deaths per 1 000 live births)



Source: World Development Indicators, 2016

At the country level, Angola (96 percent), Central Africa Republic (91.5 percent), Sierra Leone (87.1%), Somalia (85 percent) and Chad (85 percent) experienced the highest levels of infant mortality in SSA in 2015. Seychelles (11.7), Mauritius (11.8 percent) and Cape Verde (20.7 percent) had the lowest infant death rates in 2015.

2.9.2 Under-five mortality

Under-five mortality refers to the number of deaths for every 1 000 live births of children aged below five years. Deaths in children below five years are mainly attributed to lack of access to adequate health care. It is estimated that between 41 percent and 72 percent of newborn deaths can be avoided through adequate coverage of current health care interventions (Rutherford, Mulholland & Hill, 2010). However, children in SSA are more than 14 times more likely to die before the age of five than children in developed regions, due to the lack of adequate health care.

According to the WHO[9] (2011), most of the 25 000 children under five years that die each day are concentrated in the world's poorest countries in SSA and South Asia. The child mortality rate in SSA is second only to South Asia. The global under-five mortality rate has fallen by 53 percent, from 91 deaths per 1 000 live births in 1990 to an estimated 43 deaths per 1 000 live births in 2015. Over this period, SSA experienced a 54 percent decline, with the number of deaths per 1 000 live births declining from 180.9 in 1990 to 83.2 in 2015. Despite these significant strides, SSA has the highest number of deaths per 1 000 live births when compared with the rest of the world.

Focusing on individual countries, Seychelles (13.6 percent), Mauritius (13.5 percent) and Cape Verde (24.5 percent) are among the countries that had low under-five mortality rates in 2015. Angola (156.9), Chad (138.7), Somalia (136.8) and Central African Republic (130.1) had high under-five mortality ratios in 2015. Several countries made significant progress in reducing child mortality over the 1990–2015 period, reducing child mortality by over 70 percent. These countries included Malawi (73.6 percent), Liberia (72.6 percent) and Rwanda (72.5 percent). However, Lesotho experienced a surge in child mortality from 1990, although the ratio has shown signs of decline since 2007.

2.9.3 Maternal Mortality

Maternal mortality refers to the number of women who die from pregnancy-related causes while pregnant or within 42 days of pregnancy termination, per 100 000 live births. In 2015, SSA accounted for 66 percent of the world's maternal deaths with countries like Nigeria contributing approximately a third of the maternal deaths in the region (WHO, 2015). The high mortality rate is driven by inadequate health infrastructure, insufficient human resources and the high prevalence of HIV/AIDS. According to Say et al. (2014), HIV/AIDS accounts for 6.8 percent of the maternal deaths in SSA.

The maternal mortality ratio stood at 547 deaths per 100 000 live births in 2015 for the SSA region, compared to 987 deaths per 100 000 in 1990. While the ratio has almost been halved it remains too high when compared to other regions of the world such as North America (13), OECD (14) and South Asia (182). A review of maternal mortality ratios for individual SSA countries in 2015 shows that Sierra Leone (1 360), Central African Republic (882) and Chad (856) were among the countries with high maternal mortality ratios. Relative to the region,

[9] http://www.who.int/pmnch/media/press_materials/fs/fs_mdg4_childmortality/en/

Cape Verde (42), Mauritius (53) and Botswana (129) were among the countries with low maternal mortality ratios.

Over the past 15 years, the maternal mortality rate has been declining at an increasing rate in SSA and other regions of the world, except in North America. The SSA region experienced a decline of 44.6 percent between 1990 and 2015. Countries that experienced a decline above the region's average include Cape Verde (83.6 percent), Rwanda (77.7 percent) and Equatorial Guinea (73.9 percent). South Africa, Zimbabwe and Ivory Coast experienced an increase in maternal mortality ratios over the 15-year period. The growth in maternal mortality in South Africa has been largely driven by HIV/AIDS while Zimbabwe and Ivory Coast suffered political and macroeconomic instability which increased poverty levels. Inasmuch as the maternal mortality rate is declining regionally it remains comparatively high as it is still double that of the world level.

2.9.4 Life expectancy

Life expectancy at birth indicates the number of years a new-born infant would live if socioeconomic and physical environmental conditions prevailing at the time of its birth were to stay the same throughout its life. Life expectancy is a proxy indicator of a population's access to primary health care and environmental factors such as clean water, air and sanitation. In 2014, life expectancy at birth in SSA was 58.6 years, which is 13 years below the world average. Life expectancy in the region is the lowest of the regions of the world and the 2015 life expectancy in SSA is only comparable to what other regions already attained in the early 1980s.

According to 2015 World Bank data on life expectancy (World Development Indicators, 2016), Mauritius (74.2 years), Seychelles (73.2 years) and Cape Verde (73.1 years) had a level of life expectancy higher than the world average (71.6 years). However, other SSA countries lag behind despite improvements experienced in the past 15 years. Swaziland (48.9 years), Lesotho (49.7 years) and Central African Republic (50.7 years) are among the countries whose life expectancies are half of what has been attained by countries in OECD, Europe and Central Asia.

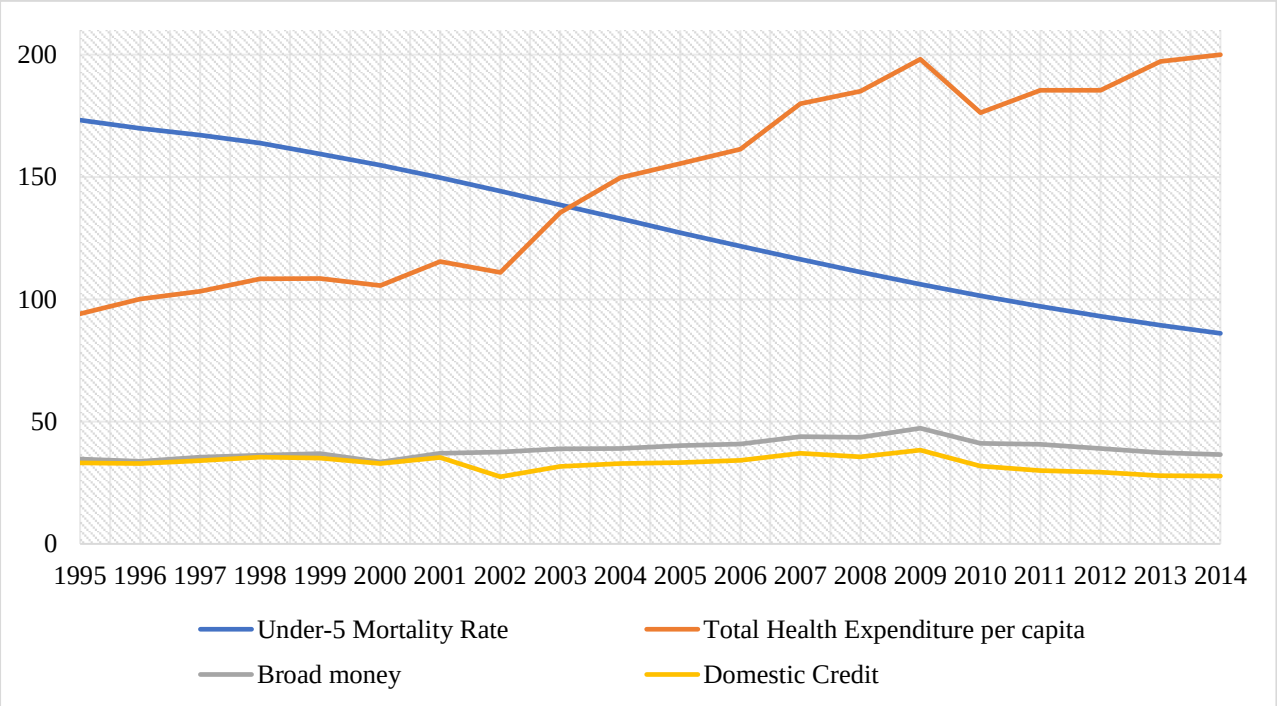
Life expectancy in the SSA region increased by 45.8% over the 1960–1994 period. While growth stagnated from 1990 to 2010, the rate has been rising again over the past five years. During the 1990–2010 period, 30 countries in SSA experienced a decline in life expectancy.

This decline in life expectancy has been attributed largely to AIDS-related deaths which have severely affected the countries along the AIDS belt. The AIDS belt consists of the 16 contiguous countries stretching from Djibouti down East Africa through to South Africa. These countries constitute little more than 4 percent of the world's population but account for more than 50 percent of HIV infections worldwide (Goliber, 2012). The increased availability of life-prolonging antiretroviral drugs and intensive health education have contributed to a rise in the regional life expectancy in the last five years.

2.9.5 Financial Development, Health Expenditure and Health Outcomes

This period from 1995 to 2014 witnessed sustained growth in total health expenditure per capita and a decline in under-five mortality in SSA. The same period was accompanied by an increased financial development in as measured by broad money to GDP and domestic credit to GDP as well. Figure below juxtaposes these variables showing how financing development indicators trended in the same direction with health expenditure, health expenditure moving in the opposite direction with health outcome. Financing development also moved in the opposite direction with health outcomes.

Figure 2.12 Financial Development, Health Expenditure and Health Outcomes (1995-2014)



2.10 Conclusion

The chapter provided an overview of financial development, health care financing and health outcomes in SSA from 1965 to 2015. Sub-Saharan Africa has the least developed financial sector compared to the other regions of the world. The sector has been on a growth path for the past three decades despite a decline experienced in the past five years. Health care financing in SSA is dominated by government and OOP expenditure and some countries have immensely benefited from development assistance for health. Health care expenditure in this region, however, is very low as measured by indicators such as total health care expenditure per capita and total health care expenditure to GDP. Low health care expenditure patterns have led to poor health outcomes in the region in terms of maternal, infant, child and adult mortality. Inasmuch as SSA has made significant progress in reducing mortality and morbidity, absolute and comparative prevalence rates for mortality remain too high. SSA health care systems also lack adequate resources to combat the high levels of disease burden in the region. Consequently, millions of children die every year from preventable diseases due to the low immunisation coverage in the region.

Chapter 3 Literature Review

3. Introduction

The 2008 global financial crisis brought to the fore the importance of macro-economic variables in determining health care systems' performance. The reduction of public spending on health in European countries in the aftermath of the crisis in response to fiscal constraints induced by the financial crisis undermined the performance of the health care systems by reducing financial protection, creating inequities and worsening health outcomes (Mladovsky et al., 2012). Health care financing, which is one of the major functions of any health care system, greatly depends on macro-economic environmental factors like the financial system to perform roles that include pooling of revenue, risk pooling and purchasing/payments.

This chapter provides a review of the theoretical and empirical literature on health care system organisation, models of health care financing and financial development. The theoretical review explores financial development, endogenous growth and health care financing models. The empirical review discusses findings from previous studies on the determinants of aggregate health care expenditure, health outcomes and catastrophic health care expenditure.

The chapter begins by examining the role of health in economic growth as well as models of health demand. This is followed by a review of the theoretical and empirical literature on financial development, health outcomes, health care expenditure and financial protection.

3.1 Health and Economic Growth

Economic growth is a central concept in economic literature and several theories have been put forward to explain economic growth. These theories include classical, neoclassical and endogenous growth theories. In classical theories of growth, quantities of land, capital and labour determine the growth of an economy (Smith, 1776; Ricardo, 1817). Growth is only induced by increasing the quantities of these factors' production as well as improving the quality of land and specialisation by labour. In classical Keynesian models, economic growth is predicted by the level of saving and physical capital (Harrod, 1939; Domar, 1946). In the Harrod-Domar model, capital and labour cannot be substituted for each other and capital is the limiting factor. Growth can only be spurred by capital accumulation. In a neoclassical model developed separately by Solow (1956) and Swan (1956), the authors argue that long-term growth requires an increase in productivity in addition to increasing the quantities of labour

and capital. In the Solow-Swan model, differences in economic growth across countries are explained by the difference in technology-induced productivity growth. The neoclassical Solow-Swan model has been criticised for failing to explain the difference in income per capita across countries (Knight, Loayza & Villanueva, 1993).

A common feature of both the classical and neoclassical growth theories is recognition of the role played by labour in economic growth. However, these theories are silent on the role of human capital in the form of health and education. Human capital is central to economic growth theory in explaining the differences in economic growth levels of different countries over time (Schultz, 1961; Weisbrod, 1962; Lucas, 1988). According to Mushkin (1962), human capital formation through education and health services rests on the twin notions that people as productive agents are improved by investment in these services and that the outlays made yield a continuing return in the future. Health, like education, becomes a part of the individual, a part of his or her effectiveness in field and factory. Human capital development takes the form of education and health and these two forms of capital affect economic growth differently.

Human capital development through education plays a central role in economic growth as it directly influences the productivity of physical capital, determining the capacity of nations to innovate technologies suited to domestic production and the speed of technological catch-up and diffusion (Becker, 1962; Mushkin, 1962; Nelson & Phelps, 1966; Lucas, 1990; Romer, 1990; Benhabib & Spiegel, 1994). Lucas (1988) suggested that physical capital fails to flow to poor countries because of their relatively poor endowments of complementary human capital which hinders growth.

Human capital development in the form of health spending reduces mortality and increases lifespans, thereby enhancing economic growth through the promotion of savings and physical investment. According to Chakraborty (2004), health spending plays a unique role that is unlike other human capital investments. Health spending alters an individual's lifespan and reduces mortality risks. This fosters the incentive to invest in assets, especially those that realise returns later in life. Countries with high life expectancy and low risks of mortality grow faster than those experiencing short lifespans and disease burdens (Fogel, 1997; De la Croix & Licandro, 1999). Empirical studies by Bloom, Canning and Sevilla (2004) and Sala-i-Martin, Doppelhofer and Miller (2004) confirmed that longevity is positively related to growth while high levels of disease burdens like malaria and HIV/AIDS retard the process of economic growth.

The recognition of the role of health as an important and unique component of human capital and an engine of economic growth led to the rise of theories on the demand for health and health investment. Theories on the demand for health and health investment identify the theoretical factors that drive individuals and households to pursue good health, spend on medical care and related products as well as practice healthy lifestyles.

3.2 Demand for Health and Health Investment

The seminal work by Grossman (1972) on the demand for health brought a new dimension to the theory of human capital and the demand for health. Prior to the work by Grossman (1972), health human capital was considered to be the same as education human capital (Schultz, 1961; Becker, 1962). Health is demanded as an investment and as a consumption good. Health as a consumption good is demanded to reduce the number of sick days in individuals' lives to enable them to enjoy leisure, since sick days are a source of disutility (Grossman, 1972; Rosenzweig & Schultz, 1983; Ehrlich & Chuma, 1990; Mwabu, 2007).

According to Grossman (1972), health as a capital good is demanded to produce an output of healthy time. He puts across two approaches to model the demand for health, namely the stock approach and the pure capital investment model. In the stock approach model, an individual's stock of health capital determines the total amount of time available for market and non-market activities; an increase in the stock of health increases the time available for these activities. In this model, health can be viewed as a durable capital stock that produces an output of healthy time. The endowed capital depreciates over time and needs to be augmented with additional investments. Expenditure on medical care and related goods and services which augment health stock is considered to be an investment in health capital in anticipation of a long and healthy life (reduced sick days). An individual's health status then depends on a vector of inputs into the health production function. These inputs include medical and non-medical care inputs. Non-medical care inputs include income, consumption of public goods, education, initial individual endowments like genetic makeup, and community endowments such as the environment. In this model, these inputs are projected to be the major determinants of health even at the population level.

However, according to Ehrlich and Chuma (1990), the work of Grossman is subject to two limitations. They argue that although Grossman recognises the link between health and longevity by identifying the terminal period of life as the age at which a person's stock of health deteriorates to its minimal subsistence level, his analysis does not develop the required terminal

conditions needed to assure the consistency of any solutions for the life cycle path of health capital and longevity. Also, his key assumption that health investment is produced through a constant returns to scale technology introduces a type of indeterminacy problem with respect to optimal investment and health maintenance choices.

Ehrlich and Chuma (1990) extended the model of Grossman (1972) to address the weaknesses in the latter's model. In their model of demand for longevity and life extension, Ehrlich and Chuma (1990) concur with Grossman that health is a demanded-for lengthening of life (demand for longevity), reduction in the amount of sick time or increase in healthy time in one's life.

Cropper (1977), like Grossman, also adopted a two-pronged approach to model the demand for health. The first approach postulates that individuals invest in health capital to decrease the probability of illness and in the second model, individuals invest in health through their choice of occupation. The former model is reviewed in this study as it goes beyond one's occupation. The model assumes that at any instant of time, an individual receives income which he or she spends between consumption goods and investment in health capital. Expenditure on consumption increases the individual's utility, provided that he or she is healthy, while investment in health increases the stock of health capital.

Additionally, Rosenzweig and Schultz (1983) presented a model of a mother's demand for her child's health. In the model, a family is assumed to derive utility from the child's health, consumer goods with an effect on a child's health and consumer goods with no effect on health. The important features of this model are that health cannot be purchased directly. Rather, other goods must be bought or utilised to influence health and the family does not maximise child health but looks at child health as a utility-augmenting good for which it must sacrifice other goods.

Other models for the demand for health by Joyce (1986) on birth weight outcomes, and Mwabu (2007) on women's demand for reproductive health, are very similar to the Grossman and Rosenzweig and Schultz models as they all concur that health is demanded for the extension of life, reduced sick days and better market outcomes (productivity and higher wages). They also agree that the production of health capital is a function of medical, non-medical and environmental factors.

3.3 Financial Development and Health Outcomes

Financial development leads to better health outcomes by increasing expenditure on health, financial protection (reducing catastrophic OOP expenditure), infrastructure development, income growth and increased investment in education. This section reviews the literature on the effect of financial development on health outcomes and also on the effect of financial development on selected transmission channels (health care expenditure and financial protection).

The relationship between financial development and economic growth received tremendous attention in the past two decades following the study by King and Levine (1993), although the debate was ignited in the 19th century already by Bagehot (1873). In the 20th century, the debate gained some momentum in the work of Schumpeter (1911), Robinson (1952), Patrick (1966) and Goldsmith (1969). However, the debate has been shifting to focus on other aspects of economic prosperity such as poverty alleviation, inequality, education and health outcomes. Several studies have been carried out on the relationships between financial development and education human capital, health human capital and overall human welfare (Honohan, 2004; Jeanneney & Kpodar, 2008; Rosner, 2011; Besong, 2016).The link between financial development and health outcomes has received the least attention in the burgeoning literature on finance and growth. This is surprising, given that financial development is critical in promoting better health outcomes in the same manner that it promotes private sector investment, human capital investment through education and ultimately economic growth. Financial development leads to improved health outcomes through a number of channels that include income, education, infrastructure and risk management (Claessens & Feijen, 2006a, 2006b; Hakeem & Oluitan, 2012; Bhatta, 2013). There is also greater interaction among these channels to yield better health outcomes.

This section reviews the literature on how financial development works through these channels at both micro and macro-levels to yield better health outcomes. Existing literature has identified four channels through which financial development leads to improved health outcomes: income growth, infrastructure development, education and risk management channels. Each of the channels is reviewed below.

3.3.1 Income Growth Channel

Financial development leads to economic growth and reduction in poverty and inequality (Greenwood & Jovanovic, 1990). Finance-led growth comes as a result of the key functions played by the financial systems in the saving-investment-growth nexus. Levine (1997) points out a number of functions performed by the financial system through which financial development fosters investment and economic growth. Financial institutions play an important role in economic development by performing five basic functions which include: produce information *ex ante* about possible investments and allocate capital; monitor investments and exert corporate governance after providing finance; facilitate the trading, diversification and management of risk; mobilise and pool savings; and ease the exchange of goods and services.

Empirical evidence has shown that financial development has positive effects on various aspects of the economy including investment, employment and productivity growth (Levine & Zervos, 1998; Ndikumana, 2003). Income growth through access to employment opportunities and productivity growth leads to better health outcomes as a higher household income level increases access to nutritious food, education and better health services (Claessens & Feijen, 2006a, 2006b). However, economic growth only is not sufficient to reduce poverty and increase health outcomes (Holden & Prokopenko, 2001). Additional channels through which financial development leads to better health outcomes are examined below.

3.3.2 Infrastructure Development Effect

Development of the financial sector leads to the development of infrastructure that includes hospitals, roads, electricity, water and sanitation, which are vital for better health outcomes. According to Agénor (2009), infrastructure development leads to better health. For instance, access to safe water and sanitation helps to improve health outcomes as this reduces malnutrition and infant mortality through the reduction of outbreaks of diarrhoeal diseases. Availability of electricity is essential for the functioning of hospitals and the delivery of health services (for example, vaccines require continuous and reliable refrigeration to retain their effectiveness). Acute respiratory infections (ARI) are among the major drivers of both child and adult mortality. Getting access to clean energy for cooking in people's homes (as opposed to smoky traditional fuels such as wood, crop residues and charcoal) improves health outcomes by reducing indoor air pollution and the incidence of respiratory illnesses. In addition to accessing water sanitation, electricity and clean energy, better transportation networks also

contribute to better health outcomes by making it easier for households to physically access health care facilities like hospitals and clinics, particularly in rural areas.

Well-developed financial development systems are able to mobilise savings, pool risks and exert corporate control on managers (King & Levine, 1993; Levine, 1993) to facilitate the development of important infrastructure. Most importantly, financial institutions are better placed than individual investors to mobilise savings from disparate savers to finance infrastructure investment. Mobilising savings of many disparate savers is costly since it involves overcoming the transaction costs of collecting savings from different individuals and information asymmetries associated with making savers feel comfortable in relinquishing control of their savings. Well-developed financial systems are in a position to mitigate these frictions, making them effective at pooling the savings of individuals availing the funds for infrastructure development (Sirri & Tufano, 1998).

Individual savers may not have the time, capacity or means to collect and process information on a wide array of enterprises, managers and economic conditions so savers will be reluctant to invest in activities which have little reliable information. As a result, high information costs may keep capital from flowing to its highest value use. However, financial markets are in a position to economise on the costs of acquiring and processing information about investment opportunities, thereby improving resource allocation (Diamond & Verrecchia, 1982).

Infrastructure development requires the long-term commitment of capital but savers do not like to relinquish control of their savings for long periods because of liquidity and idiosyncratic risks. The existence of such risks implies that agents who are risk averse tend to hold their wealth in non-risk liquid assets that are unproductive (Levine 1991, 1997, 2004). However, financial intermediaries provide insurance to savers against liquidity risk while simultaneously facilitating long-term investment in high-return projects. Financial intermediaries can also mitigate the effects of the premature withdrawal of capital from investment projects by providing access to credit during the production process. The function fosters investment in longer-gestation, higher-return projects. Stock markets can also mitigate liquidity risk since equity holders can readily sell their shares while firms have permanent access to capital invested by initial shareholders. By reducing both liquidity and idiosyncratic risks, well-developed stock markets and financial intermediaries can promote infrastructure development which is critical for better health outcomes.

3.3.3 Education Effect

Financial development leads to increased investment in human capital as measured by mean years of schooling as households are able to borrow and finance children's education. Investment in education is expected to yield future returns in the form of improved income (Becker, 1962; Mushkin, 1962). In economies where the financial sector is underdeveloped, households face credit constraints which inhibit investment in education (Hakeem & Oluitan, 2012; Lochner & Monge-Naranjo, 2012; Abubakar, Kassim & Yusoff, 2015). Education is a key determinant of household health outcomes as empirical research has shown that households with better education enjoy better health (Joyce, 1986; Mwabu, 2009). Educated households value health more and adjust their nutrition and lifestyles, and/or are able to make better use of health information and the health care system. The education level of mothers and child carers has a significant impact on child mortality as women are mostly responsible for domestic hygiene, preparation of meals, feeding and taking care of children and looking after the sick (UNICEF, 1990; Claessens & Feijen, 2006a).

3.3.4 Risk Management Effect

At the household level, financial development leads to better health and long life by providing savings opportunities, access to credit in times of crisis and insurance to mitigate future risks. Financial instruments provide households with strategies to manage various shocks, including health shocks and attendant medical expenses (Klapper, El-Zoghbi & Hess, 2016). A well-developed financial system provides diversified financial instruments which households can use to manage risks and to maintain and improve their health status.

Despite well-developed literature on the finance and growth nexus, there are dissenting voices regarding the role of financial development in economic growth and human welfare. Financial development is considered to disrupt the process of economic growth as financial deepening could cause macroeconomic instability (Minsky, 1974). Disrupting economic growth and investment negatively affects health outcomes. According to Cihak et al. (2012), financial development may harm economic growth when financial institutions create complicated financial instruments and sell them to unsophisticated investors. These instruments may only raise the profits of their engineers and those associated with marketing the products, while distorting society's savings, leading to inefficiency in bank lending. In addition to causing inefficiency in bank lending, overly sophisticated financial instruments lead to financial fragility which can lead to economic meltdown (Rajan, 2005; Gennaioli, Shleifer & Vishny,

2012) as empirical studies have shown contraction of growth in the aftermath of banking crises and in the presence of 'too much finance' (Arcand, Berkes & Panizza, 2015; Reinhart & Reinhart, 2015; Sahay et al., 2015).

Tobin (1984) indicates that the financial sector attracts resources away from the real sector leading to inefficiency and impediment of the process of economic growth. A recent study by Dabla-Norris and Narapong (2013) similarly argues that, before the 2008 global financial crisis, resources in advanced economies were being diverted toward the financial sector away from more productive sectors.

In addition to these contrary views on the role of financial development in economic growth, the debate on the direction of causality remains unsettled. The demand-following hypothesis by Robinson (1952) and Patrick (1966) argues that where enterprise leads, finance follows, because economic growth creates demands for financial services and the financial system responds to these demands. The creation of financial systems and new instruments is a response to the demand for these services by investors and savers in the real economy. Empirical studies on the direction of causality have been inconclusive, with findings showing mixed results and bi-directional causality (Kyophilavong, Salah Uddin & Shahbaz, 2014.)

Other scholars view finance as a neutral factor in the process of economic growth, with Lucas (1988) arguing that the role of finance in economic growth has been overemphasised. Arguments by De Gregorio and Guidotti (1995) and Arcand, Berkes and Panizza (2015) suggest that financial development does not always lead to economic growth. Arcand, Berkes and Panizza (2015) argue that when finance reaches a certain threshold its positive effects on economic growth may disappear. De Gregorio and Guidotti (1995) suggest that high-income countries may have reached the point at which financial depth no longer contributes to increasing the efficiency of investment and ultimately to economic growth. This study contributes to the debate by empirically establishing the effect of financial development on health outcomes and health care expenditure domains that have not been widely explored by scholars from both the finance and health disciplines.

3.4 Financial Development and Health Outcomes: Empirical Literature Review

The recognition of the fundamental role played by health in economic growth led to a plethora of studies seeking to establish the determinants of health as well as providing explanations for the different health statuses of populations of different countries. Medical, lifestyle,

socioeconomic (income, education, population demographics) and environmental factors have been identified as major determinants of health status at individual and population levels. Medical factors include the volume of health inputs as measured by health care expenditure and related factors such as access to health services, doctor to patient ratios and immunisation levels. Lifestyle factors refer to variables over which individuals have some control, such as alcohol and tobacco consumption, physical exercise and personal hygiene (Or, 2000). Environmental factors relate to access to water and sanitation services and pollution. There is also increased recognition of the role of governance issues like corruption and transparency in determining health outcomes (Gupta, Davoodi & Tiongson, 2000).

This section reviews past studies that have been conducted on the effect of financial development on health outcomes. Empirical literature in this area is still in its infancy with the majority and first generation of studies focusing on financial development, investment and economic growth. The second generation of literature focused on the effect of financial development on education, poverty as well as overall human welfare as measured by the United Nations Human Development Index (HDI) (Pascucci, 2012; Besong, 2016). The later studies are also reviewed as the HDI encompasses a component of health status (life expectancy), although the HDI is a weak indicator of a population's health status.

Claessens and Feijen (2006a) carried out a seminal study on the impact of financial development on health outcomes using data from 1980 to 2004 for a minimum of 54 countries. They found a very strong positive relationship between private credit to GDP and life expectancy. They also found a positive relationship between private credit to GDP and the rate of mortality of children under five years of age. The study analysed the relationship between private credit to GDP and health infrastructure indicators and found a statistically significant relationship between the growth rate of sanitation facilities and private credit to GDP, as well as a positive association between private credit to GDP and the number of physicians per 1 000 persons. The study identified income effect as the major transmission mechanism through which financial development leads to improved health outcomes. However, the findings were not robust and the study did not establish causality.

In another study, Claessens and Feijen (2006b) explore the impact of financial development on malnutrition using data from a sample of 49 countries for the period 1980 to 2003 in which they used a cross-country OLS, instrumental variables and panel regressions. The results show a causal relationship between financial sector development and reduced undernourishment.

The study reveals that private sector credit leads to reduced malnutrition through improved access to agricultural equipment and machinery, which improves income and productivity. They found that a 1 percent increase in private credit to GDP reduces the prevalence of undernourishment by 0.22 to 2.45 percent. The limitation of this study is the omission of the role played by health care expenditure, education of carers/females and access to sanitation in improving the nutrition of children and reducing malnutrition.

Following Claessens and Feijen, Rosner (2011) studied the effect of financial development on a number of the Millennium Development Goals, which included health outcomes. The study uses data from 1980 to 2007 sourced from developing countries and analyses the data using OLS and instrumental variable approaches. The study shows that financial development improves education, gender equality and health by increasing the availability of private credit, money and deposits in the economy. Financial development, as measured by private credit, M3 and deposits (value of all cheque, savings and time deposits) are negatively related to health outcomes that include infant, child and maternal mortality. The study controls for confounding variables like GDP, inflation and population density. However, it does not recognise how health capital is formed (health production function), by omitting factors like environment (water and sanitation), expenditure on health, education and immunisation coverage.

Focusing on both developed and developing countries, Bhatta (2013) examines the impact of financial development and health outcomes in the context of the high-income OECD countries and low-income Asian countries. The study uses OLS, fixed effect estimates and instrumental variable approaches and the results reveal that financial development positively contributes to health outcomes such as higher life expectancy and lower infant mortality. The coefficients for the financial development variable are higher for developing countries than developed countries, showing that financial development plays a more significant role in yielding better health outcomes in developing countries than developed countries. Bhatta's study is a possible reflection of the findings of Cecchetti and Kharroubi (2012), who assert that the level of financial development is good only up to a point, after which it becomes a drag on the rest of the economy. Their study establishes education as a transmission mechanism in OECD countries through which financial development leads to improved health outcomes but, for Asian countries, income was identified as a transmission mechanism.

Reliwak (2013) contributed to the budding literature on financial development and health outcomes by studying the effect of financial development on health outcomes using micro and

macro data sets. The study shows that deep financial systems, as measured by bank deposits as a ratio of GDP, are negatively associated with infant and child mortality. The study also shows that on average, a 10 percent growth in financial deepening may lead to a reduction in infant mortality by 1 percent. Other variables which were negatively related to health outcomes include education levels, GDP per capita, government expenditure and sanitation.

In addition to the country studies, Hakeem and Oluitan (2012) also studied the direction of causality between financial development and human capital (health and education) in South Africa, using time series data from 1965 to 2005. The study reveals a weak relationship between financial development and all the proxies of human capital except life expectancy at birth and secondary school enrolment. However, the study does not explore the channels through which financial development leads to increased life expectancy at birth. The study treats health and education capital in a similar manner by excluding health inputs in the regression model for health.

Studies by Pascucci (2012) and Besong (2016) do not measure health outcomes directly but use the human development index (HDI), which is a composite indicator made up of different measures of human welfare that include health (life expectancy), education (average years of schooling) and income (GDP per capita). Pascucci (2012) examines the role of the financial system in promoting human development, using data on 68 countries from across the world over the 1990 to 2005 period. The study reveals that financial sector development, as measured by stock market capitalisation to GDP, is positively related with human welfare as measured by HDI, even after controlling for confounding variables like GDP volatility, trade openness, governance, education and health care expenditures.

Besong (2016), using data from 29 SSA countries covering the 1990 to 2010 period, studied the relationship between human welfare measured by the human development index, and financial development. The study used the Vector Error Correction Model (VECM) methodology to correct for biases arising from the presence of unit roots, serial correlation and endogeneity. The results suggest that financial sector development yields a disproportionately higher and significant robust effect on human welfare in SSA in long and short-run time periods. As alluded earlier, the weakness of this and similar studies is the use of the HDI as a measure of both health outcomes and human welfare.

At a household level, financial institutions provide an opportunity for financial inclusion as savings and credit instruments provide an important tool for smoothing household consumption

in the wake of unexpected shocks (Gertler, Levine & Moretti, 2009). Loans and savings are also critical for the financing of health care expenditure which is imperative for improved health outcomes. Microfinance institutions have also been used as launch pads for micro-health insurance for poor communities in addition to providing opportunities for saving and lending.

In a study by DeLoach and Lamanna (2011) on the impact of the presence of microfinance in a community on child health outcomes, using data from the Indonesian Family Life Survey (IFLS) 1993–2000, they find that children in communities that gained or maintained access to microfinance institutions had improved health outcomes as compared with children whose households lost access to microfinance institutions. Loss of microfinance institutions in a local community had devastating effects on child health outcomes.

Similarly, Foster (1995) studied the impact of microfinance on health outcomes in Bangladesh and finds that households with access to credit were better able to smooth household consumption following the floods of 1988, compared to households without access to credit. In addition, the study shows that small-scale lending programmes such as microcredit are able to positively affect child health outcomes in the face of these kinds of macroeconomic shocks. The studies by Foster (1995) and DeLoach and Lamanna (2011) are especially critical in understanding the role of financial inclusion in attaining not only economic growth but also in improving the performance of health care systems as measured by health status and financial protection.

However, a major gap in both theoretical and empirical literature on financial development and health outcomes is the lack of focus on the role that financial development plays directly on health care expenditure through the unlocking of health care financing resources, health sector efficiency and technological advancement through research and development. King and Levine (1993) reveal that financial development stimulates economic growth not only by increasing the rate of capital accumulation but also by improving the efficiency with which economies use that capital. As such, financial development is critical not only in improving health outcomes through boosting infrastructure development, education and income growth, but also through the efficient use of health production inputs (health care financing through efficiency gains), something which cannot be fully attained in underdeveloped financial systems. This study extends the literature on financial development and health outcomes by exploring financial development's effect on health care expenditure and financial protection (catastrophic health care expenditure).

3.5 Health Care Expenditure and Health Outcomes: Theoretical Framework

Health is produced from goods and services which include medical care, food and nutrition, which have a direct influence on health. The level of health as measured by health outcomes depends on these variables as they constitute health inputs. Government and private expenditures on health constitute health capital investment because they are direct inputs into the health sector. In line with the health demand theories of Grossman (1972) and Rosenzweig and Schultz (1983), an increase in health capital investment must lead to an increase in health status as measured by life expectancy and child mortality indicators. The role of health care expenditure in promoting better health outcomes has been modelled in several endogenous growth theories (Barro, 1990; Blackburn & Cipriani, 2002; Chakraborty, 2004; Agénor, 2008; Gupta & Vermeulen, 2010). Endogenous theories and models relevant to this study are summarised below.

Endogenous growth theories postulate that expenditure by governments on infrastructure and human capital leads to improvements in human welfare (Barro, 1990; Agénor and Moreno-Dodson, 2006). The level of health investment as postulated by Grossman (1972) and Ehrlich and Chuma (1990) is endogenously influenced by government and individual players. Investments in health by individuals and expansion of the health sector by government and the private sector affect a variety of health outcomes and health-related factors, including life expectancy, mortality, labour market participation and labour productivity, human capital accumulation, fertility decisions and demographic structure (Van Zon & Muysken, 2001; Agénor, 2009). The endogenous growth theories' incorporation of investment in health led to the emergence of overlapping generation models in which health outcomes are endogenously determined in the models. The work of Blackburn and Cipriani (2002), Chakraborty (2004), Finlay (2006) and Bhattacharya and Qiao (2007) present such models in which economic and health outcomes (fertility, mortality, longevity) are jointly determined. Selected models are summarised below.

Chakraborty (2004) pioneered the overlapping generation model in which economic and health outcomes are endogenously determined. The model by Chakraborty incorporates mortality with production in a standard overlapping generation model in which the probability of a young agent surviving to old age is determined by private expenditure funded by income from wages and savings and public health care expenditures funded by income taxes on labour income.

Bhattacharya and Qiao (2007) extend the model of Chakraborty (2004) in which an agent may increase the length of his/her old age or reduce the probability of mortality by incurring investments in his/her own health funded from his/her wage income. Their model focuses on the dynamics of interaction between private and public expenditure on health. In the model, agents influence their longevity by undertaking private investments in their own health using income from wages. Bhattacharya and Qiao (2007) argue that health investments by private agents are more productive when accompanied by complementary tax-financed public health programmes. The model assumes: that longevity and youthful savings are both normal goods; the existence of tax-financed public health programmes whose main purpose is to complement private investments to improve health and longevity; and the marginal impact on longevity of a marginal increase in private health investment rises with more public expenditure on health. Based on these assumptions, Bhattacharya and Qiao (2007) conclude that the elasticity of longevity with respect to private investment in longevity is itself influenced by public expenditures in the health sector. The better and larger the public health care system, the larger is the impact of additional private investment on agents' longevity.

A weakness of these models is that neither recognises that health status may depend on a variety of factors, including time allocated to one's health and access to public services, which is a critical issue in developing countries (Agénor, 2009). In response to this gap, Agénor (2009) developed a three-period overlapping generation model in which the relationship between expenditure in infrastructure by government and health outcomes is examined. The model also analyses the implications of infrastructure on the allocation of time, and the relationship between health statuses in childhood on health in adulthood.

The models in the foregoing discussion omit the role played by the financial sector in providing resources to individual, private and public investments in health. Gupta and Vermeulen (2010) developed a monetary endogenous growth version of the model designed by Bhattacharya and Qiao (2007). The model, in addition to endogenising longevity which depends on the complementarity of private and public health care expenditures, incorporates money by assuming that banks operating in a perfectly competitive environment are obligated by governments to hold a fraction of the deposits as cash reserve requirements. Private agents are also assumed to have savings in the bank as deposits. The existence of banks implies that young agents can save their money through bank deposits to finance health care expenditure in future periods. The banks take deposits and make loans to private firms.

The inclusion of banks into overlapping generational models allows for the analysis of the effect of financial development on health care expenditure/investment, which can be summarised as follows.

Financial development leads to increased health care expenditure through the following channels:

- Households save to finance health care expenditure in old age.
- Firms can also borrow to finance physical investment, which generates employment and increased income for households, leading to increased expenditure on health. Private health firms (medical care industry players) can borrow to invest in research and development and health infrastructure like hospitals.
- Governments can borrow to finance public health infrastructure or rely on seigniorage to fund public health projects. Inasmuch as seigniorage impedes financial development (McKinnon, 1973; Shaw, 1973), it ensures that governments do not rely on taxes only to finance health care expenditure as in Bhattacharya and Qiao (2007).
- Increased health care expenditure by these households is expected to lead to improved health outcomes as measured by increased longevity.

3.6 Health Care Expenditure and Health Outcomes: An empirical review

Empirical studies on the impact of health care expenditure on health outcomes largely adopted the health production function approach, whereby health care spending is an input into the production of health. These studies explored both the effects of private and public health care expenditures on health outcomes that include mortality (neonatal, infant and child) and life expectancy at birth. The results of these studies are mixed and contradictory, with some authors finding a significantly negative relationship between health care expenditure and health outcomes (Akinkugbe & Mohanoe, 2009; Kim & Lane, 2013), a second group of studies finding a positive relationship (Le Grand, 1987; Rad et al., 2013) and a third group not finding any relationship (Filmer & Pritchett, 1999; Deolalikar, 2005). Selected studies on health outcomes are discussed below.

Kim and Moody (1992) studied the impact of health expenditure on infant mortality rate using data from 117 developed and developing countries. The results showed that health expenditure have an insignificant impact of infant mortality. Similarly, a study by Musgrove (1996) found that the effect of public spending on health status, as measured by the health outcome variables

infant and child mortality rates, is statistically insignificant. Another study by Filmer and Pritchett (1999) used cross-national data to examine the impact of public spending on both health and non-health factors (economic, educational, cultural) in determining child (under-five) and infant mortality. They find that the impact of public spending on health is quite small, with a coefficient that is typically both numerically small and statistically insignificant at conventional levels.

Gupta, Verhoeven and Tiongson (2001) studied the effect of private and public health care expenditure on health status using data generated from 70 developing and transitioning countries across the globe. The study uses data from the 1990 to 1999 period and analysis was done using the OLS approach. Contrary to findings from earlier literature, the study shows that public and private spending on health have a significant positive effect on health outcomes (child and infant mortality rates) as a 1% increase in public spending in health leads to a 2% decline in child and infant mortality rates. The study, however, suffers from methodological challenges as its use of only simple ordinary least squares (OLS) regressions will probably identify only correlations in the data and makes it difficult for the analysis to rule out the influence of reverse causality and unobserved factors.

Focusing on Africa, Anyanwu and Erhijakpor (2007) examined the relationship between health care expenditure (per capita total and government health care expenditures) and health outcomes (infant mortality and under-five mortality). The study uses data from 47 African countries for the 1999 to 2004 period. The study adopts a robust ordinary least squares (ROLS), two-stage least squares (2SLS) to control for endogeneity and reverse causality, as well as the fixed-effect estimator to control for measurement error and autocorrelation. The study reveals that health care expenditures have a statistically significant positive effect on infant mortality and under-five mortality and found that total health care expenditures are a significant contributor to health outcomes, with a 10% increase in total health care expenditure per capita resulting in a 21% and 22% decrease in under-five and infant mortality rates respectively. The study also shows that ethnolinguistic fractionalisation and female literacy have significant positive effects on both under-five and infant mortality rates in Africa.

In a country-level study, Akinkugbe and Mohanoe (2009) used time series data from 1980–1991 to study the effect of public health care expenditure on health outcomes in Lesotho. Using an error correction model approach, the study finds that public health care expenditure, the availability of physicians, female literacy and child immunisation have a significant positive

effect on health outcomes (life expectancy at birth, the infant mortality rate and the under-five mortality rate). However, per capita income was insignificant despite showing a positive relationship.

Gani (2009) studied the relationship between per capita public health care expenditure and health outcomes using cross-country data from seven Pacific Island countries for selected years between 1990 and 2002. The results show that health spending has a significantly positive effect on health outcomes (infant and under-five mortality rate and crude death rate).

In a study by Novignon, Olakojo and Nonvignon (2012), the authors use random and fixed effects models to analyse panel data from 1995 to 2010 for 44 countries in SSA and find that total health care expenditure (public or private) significantly reduces the number of deaths per 1 000 people and the infant mortality rate per 1 000 live births in SSA countries. In addition, the results show that public health care expenditure has a higher impact on all the three measures of health outcomes (life expectancy at birth, death rate and infant mortality rate), compared to private health care expenditure. These findings emphasise the important role played by government expenditure in improving the health status of a country's population.

Kim and Lane (2013) analysed the effect of health care expenditure and health outcomes using panel data between 1973 and 2000 collected from 17 OECD countries. The cross-country panel data is analysed using a mixed-effect model with infant mortality rate and life expectancy at birth as dependent variables. A negative relationship between government health care expenditure and infant mortality rate and a positive relationship between government health care expenditure and life expectancy at birth are found.

Akinci et al. (2014), using data from 1990–2010, estimated pooled ordinary least regression, random effects and Hausman-Taylor instrumental variable models to study the effect of health care expenditures on selected health outcomes in 19 countries in the MENA region. The results show that both government and private spending on health care significantly reduce infant, under-five and maternal mortality in the MENA region even after controlling for confounding variables.

A study by Rad et al. (2013) on the impact of public and private health spending on health outcomes, using panel data from 1995 to 2010 from the East Mediterranean Region (EMR) countries, shows that public health care expenditures have a strong negative relationship with the infant mortality rate, implying that government expenditure improves health outcomes. A

positive relationship is found between private health care expenditures and the infant mortality rate but it is not significant. A similar study by Moreno-Serra and Smith (2001) also distinguished between public and private health care expenditure as well as OOP health care expenditure. The study uses panel data for the 1995 to 2008 period sourced from 153 developing and developed countries. The results show that higher levels of government health care expenditure per capita lead to better health outcomes and private voluntary insurance and OOP health care expenditure had no effect on health outcomes as measured by under-five mortality. In a way, these two studies capture how different health care financing mechanisms affect health outcomes. The findings are critical to countries choosing whether they should adopt mandatory or voluntary health insurance and tax-based financing.

Since the findings on health care expenditure and health outcomes are inconclusive, this study explored the effect of health care expenditure on health outcomes in sub-Saharan Africa. The study also examined whether health care expenditure is one of the transmission mechanisms through which financial development leads to better health outcomes.

3.7 Financial Development and Health care expenditure: Theoretical Review

The health status of an individual is determined in part by his/her stock of health capital and the consumption of health care services and other health inputs. However, the stock of health capital depreciates over time and needs to be augmented by health inputs. Individuals and households in pursuit of good health demand health inputs in the form of medical care, nutrition and better living conditions, among other inputs, to augment their existing stock of health capital. Theoretically, the demand for health inputs is determined by factors that include income, prices, level of education, price of other goods and other household/individual characteristics (Grossman, 1972; Cropper, 1977; Wagstaff, 1986). Health care expenditure represents the demand for health inputs used in the health production function.

Empirical studies have shown that health care expenditure is largely driven by five major factors: rising income, changes in medical technology and practices, demography, higher prices and changes in the financing and management of health care (Gerdtham et al., 1992; Xu, Saksena & Holly, 2011; Samadi & Rada, 2013; Fan & Savedoff, 2014). An increase in national income leads to an increase in the demand for health and consequently an increase in the expenditure on health by both governments and households. Health care systems financing also

plays a major role in determining health care expenditure as health care systems with pooled health funds, like social insurance and general taxation, yield more expenditure on health compared to health care systems that rely on OOP expenditure to finance health. Additionally, countries with an ageing population experience increased health care expenditure as older people generally consume more health care services than younger people.

Despite the increased recognition of the role of financial development in yielding better health outcomes, existing theoretical and empirical literature do not recognise financial development as an important driver of the demand for health inputs. Financial development leads to increased health care expenditure by households, private firms and government through improved access to credit, savings and the expansion of the revenue base. The following discussion develops the hypothesis of how financial development leads to increased expenditure in the health sector by both institutions and households.

3.7.1 Financial Development and Health care expenditure: Institutional Level

Financial development eases credit constraints, enabling private firms and governments to borrow to finance investment and expenditure in the health sector. Private players in the health sectors are mainly affected by the scarcity of loans to finance their investment projects. However, once the credit becomes available at affordable prices, they are able to increase their expenditure. In underdeveloped markets, long-term credit is not available, which means investments which are profitable in the long term cannot be undertaken.

Developed financial systems facilitate the mobilisation of resources by the health care financing systems towards investment and expenditure in the health sector. Small domestic and poor financial markets imply a relatively high cost of financing while countries with better developed financial systems can provide opportunities for their health care financing systems to tap resources for channelling towards health care expenditure and investment. On the global stage, the GAVI Alliance[10] has raised US$5.3 billion from capital markets for child immunisation since the international financing facility was launched in 2006. The proceeds of vaccine bonds help ensure predictable funding and have nearly doubled GAVI Alliance spending on immunisation programmes (GAVI, 2009).

Construction of hospitals and related medical facilities often requires long-term funding during the period of construction. The need for long-term funding also relates to research and

[10] Global Alliance for Vaccines and Immunisation.

development of new drugs and innovations in medical technology. The purchase of new sophisticated medical equipment or replacing expensive outdated equipment may require a loan to be repaid after several years (Reliwak, 2013). Health care providers can make use of financial instruments to manage the risks associated with such long-term borrowing. The use of such instruments has gained momentum in the health care industry in the USA in the past years as a result of financial development. Stewart and Ohwoso (2004) surveyed the use of financial derivatives by US health care providers and found that 8 percent of New Jersey's non-profit health providers utilised interest rate derivatives with an aggregate principal value of $229 million. These derivative users combine interest rate swaps and caps to lower the effective interest costs of their long-term debt while limiting their exposure to future interest rate increases.

Countries with underdeveloped financial systems have large informal sectors which narrow their tax bases (Catão, Pagés & Rosales, 2009; Blackburn, Bose & Capasso, 2012). Limited government revenue results in constrained government expenditure, including in the health sector. However, in economies where bank credit is widely available at lower cost, firms are more likely to incur formalisation costs, thereby expanding government tax revenue bases. As more firms formalise their operations, the government tax base and revenue expand, facilitating the release of additional resources towards government health care expenditure. According to Musgrove (1996), as government revenue increases, the share of government expenditure in total health care expenditure also increases, displacing OOP expenditure with either tax-financed care or social security contributions. Increased government expenditure therefore yields better health outcomes. In addition, employers in the formal sector can easily contribute to health insurance schemes (private, social or mandatory), thereby improving health sector revenue structures and reducing OOP payments.

3.7.2 Financial Development and Health care expenditure: Household Level

Financial innovation, which comes about as a result of financial development, widens the array of financial products available on the market. The existence of diverse financial products enhances improved financial access by poor households previously excluded from the financial system. This implies that more households can save and borrow to finance health care expenditure, among other household expenditures. In instances where households cannot save or borrow they are likely to shun health services, which will be reflected in low health care expenditure at both household and national levels. The results of randomised control trials in

Kenya on the impact of financial inclusion showed that access to informal saving facilities like rotational savings and credit schemes (ROSCAs) increased household savings towards expenditure on preventative health products (Dupas & Robinson, 2009). In another experimental study in Nepal, Prina (2012) found that financial access increases health care expenditures in the form of medicines and traditional remedies by more than 45%. The findings from these field experiments show that financial access is critical in increasing health care expenditure and ultimately health outcomes irrespective of income levels.

Microcredit schemes and innovative payment systems like mobile money also provide an opportunity to embed health insurance schemes that are within the reach of poor people. Anecdotal evidence from a study by Haas and Nagarajan (2011) on the role of mobile money services (M-Pesa) in facilitating access to health services in Kenya showed that the M-Pesa system increased patient access to health care by providing a means of saving towards health care expenses as well as accessing credit to finance medical services.

3.7.3 Determinants of Health care expenditure: Empirical Review

The debate on the determinants of health care expenditure has been focused on estimating the income elasticity of health care expenditure. Studies aimed at establishing whether health care expenditure is a luxury or basic good (Di Matteo, 2003; Sen, 2005; Baltagi & Moscone, 2010). However, recent debate has been driven by the ballooning health care expenditure in developed countries and very low levels of expenditure in less developed countries as researchers attempt to establish the factors behind these phenomena. The major factors that have been identified by the various studies as drivers of health care expenditure include income, population age structure and epidemiological needs, technological progress and variation in medical practice as well as health care system characteristics (Newhouse, 1977; Xu, Saksena & Holly, 2011; Samadi & Rada, 2013). This section discusses the findings of empirical studies on the determinants of health care expenditure.

Xu, Saksena and Holly (2011) studied the determinants of health care expenditure using panel data from 143 countries over the 14 years from 1995 to 2008. The study utilises both standard fixed effects and dynamic models to explore the factors associated with the growth of total health care expenditure. The findings reveal that national income (GDP), demographic structure and government health care expenditure were positively related to total health care expenditure.

Gerdtham et al. (1992) carried out an empirical examination on the determinants of aggregate health care expenditure across 19 OECD countries. The study reveals that aggregate income, institutional and socio-demographic factors contribute significantly to the explanation of the health care expenditure variations across countries. A similar study on OECD countries was done by De Mello-Sampayo and De Sousa-Vale (2014) using annual data from 1990 to 2009 on 30 OECD countries. The study explores short and long-run relationships between health care expenditure and a set of regressors which include share of health care expenditure financed privately and by the government, income per capita and the dependency rates for old and young age structures. The study reveals that the source of health funding and the percentage of young and elderly people have a significant and positive impact on health care expenditures. Another study of 20 OECD countries by Baltagi and Moscone (2010), on the determinants of health care expenditure, shows that income, dependency ratios and government expenditure are key determinants of health care expenditure.

Wagstaff (2008) studied the effects of different health care financing mechanisms on health care expenditure in OECD countries. The study sought to establish whether the transition from one health care financing system to another – such as from social health insurance to tax-based health care financing systems – has any effect on health care expenditure. Using panel data from 29 OECD countries over the 1960–2006 period, the study shows that social health insurance raises per capita total health spending by 3–4%, compared to tax-based health care financing systems. The transition from social health insurance to tax-based health care financing did not lead to better health outcomes.

In a cross-country study by Samadi and Rada (2013) on determinants of health care expenditures in Economic Cooperation Organisation (ECO) countries, using panel data, they find a long-term relationship between the health care expenditures per capita and GDP per capita, the proportion of the population below 15 and above 65 years old, the number of physicians and urbanisation.

In a similar study using panel data, Olaniyan, Onisanwa and Oyinlola (2013) studied the relationship between national income (GDP) and health care expenditure for 32 SSA countries over the 1995–2009 period. The study reveals that GDP and demographic factors are the major variables driving health care expenditure.

Other country-level studies used time-series data to understand the determinants of health care expenditure. Angko (2013), using time series data from 1970–2006, studied the determinants

of health care expenditure in Ghana and finds that per capita income (per capita GDP), the health status of the population and age structure of the population are major drivers of health care expenditure in the country.

Similarly, Dhoro et al. (2011) researched the determinants of public health care expenditure in Zimbabwe using yearly time-series data for the 1975 to 2005 period. The study uses the Engle-Granger cointegration approach to explain the main factors that affect public health care expenditure in Zimbabwe. The study shows that the key determinants of public health care expenditure are real GDP per capita income, the literacy rate, inflation and foreign health aid per capita, while population and life expectancy were statistically insignificant.

The literature on health care expenditure is also characterised by a lack of consideration of the role of financial development in influencing levels of health care expenditure. Studies in hospital financing have been focused on understanding the motivation for using derivatives and bonds, the type of instruments used and the type of users (Stewart & Ohwoso, 2004; Stewart & Trussel, 2006). These studies, despite highlighting the importance of financing systems in health care financing, do not focus on how the financial systems of various countries have affected the ability of health sectors to raise capital, health care expenditure and health outcomes.

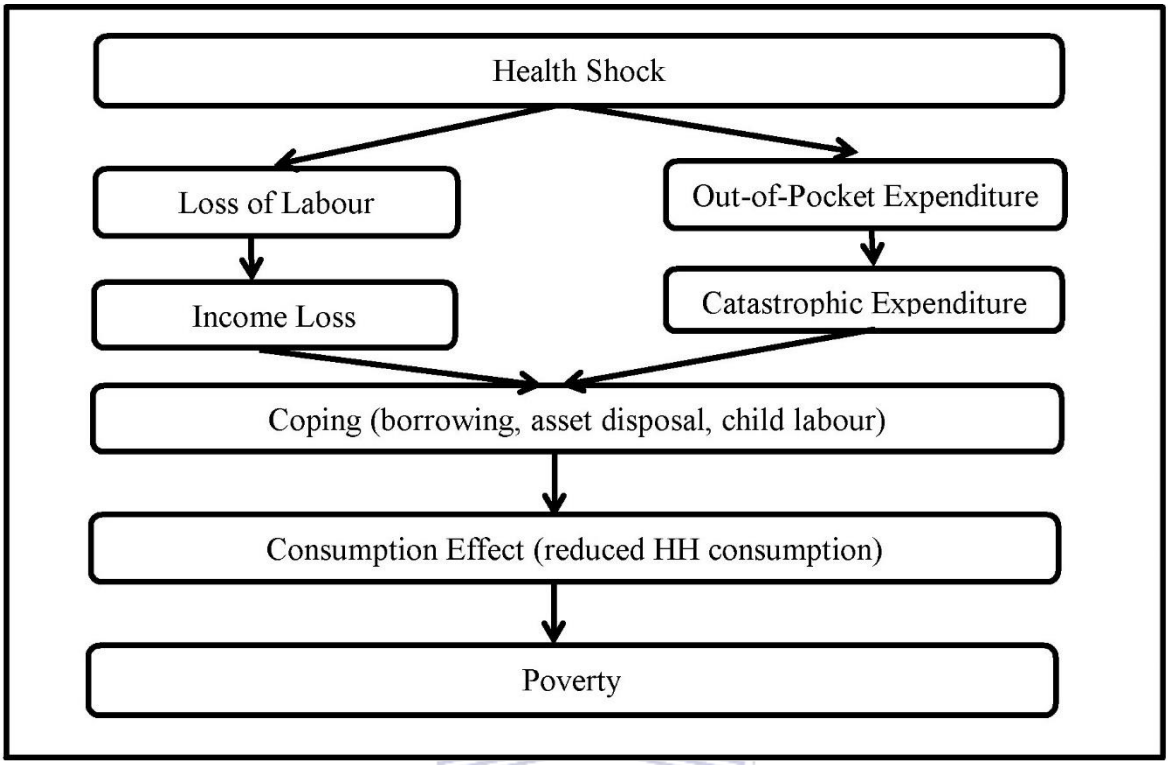
3.8 Health Shocks and Financial Protection

There is a consensus in the literature that health shocks negatively affect household welfare, as measured by health outcomes and consumption patterns. A health shock is an unpredictable illness that diminishes health status (Leive and Xu, 2008). Health shocks lead to increased expenditure on medical services and loss of income. Health shocks in circumstances where households lack financial protection by the country's health care financing systems in the form of health insurance or any risk pooling mechanism are driven into poverty (McIntyre et al., 2006; Wagstaff, 2007; Bonfrer & Gustafsson-Wright, 2016). Financial protection in health occurs when households are cushioned from catastrophic health expenditure as a result of seeking healthcare. This study argues that lack of financial protection (prepayment and risk pooling mechanisms) is one of the major reasons why SSA countries have very poor health outcomes, as households extensively rely on OOP expenditure to finance medical expenses. The section below firstly presents the framework linking health shocks to poverty and thereafter provides a review of empirical studies on the determinants of catastrophic expenditure.

Health shocks may be catastrophic for low-income households since the cost of treatment could be large relative to income (Liu, 2015). Catastrophic health care expenditure occurs when OOP payments for health services consume such a large portion of a household's available income that the household may be pushed by this into poverty (Buigut, Ettarh & Amendah, 2015). In terms of measurement, health care expenditure is considered catastrophic expenditure when a household's expenditure on health care exceeds 10 to 25% of household expenditure on non-food items (Wagstaff & Van Doorslaer, 2003; Xu et al., 2005). When the share of expenditure exceeds this threshold, a household is forced to reduce consumption, dispose of productive assets and reduce investments in human capital and is eventually impoverished.

Secondly, even when OOP treatment costs are avoided by not seeking medical care, the household to which a sick individual belongs may still forgo earnings if there are work days lost by the sick individual or his informal caregivers. Additionally, individuals are more likely to transit into labour market inactivity and disability, or experience decreased individual earnings due to the effects of a health shock (Diaz & Valdivia, 2009; Alam & Mahal, 2014). Dhanaraj (2014) and Sparrow et al. (2014) provided additional channels through which health shocks lead to poverty by increasing expenditure on indirect costs related to caring for the sick, but the model does not significantly differ from the one proposed by Alam and Mahal (2014). Figure 3.1 below shows the consequences of a health shock for a poor household.

Figure 3.1 Health Shocks, Catastrophic Expenditure and Economic Consequences



Source: Alam and Mahal (2014)

Once a household has been pushed into poverty and has reduced access to medical services, its health status continues to deteriorate, resulting in poor health outcomes like high mortality (child, infant, maternal, neonatal) and morbidity and other economic consequences. Catastrophic OOP health care expenditure perpetuates the disease and poverty trap when risk management and fair health care financing systems are not in place.

Effective health care systems must protect people from the financial consequences of illness and death, or at least from the financial consequences associated with the use of medical care through risk pooling. Financial risk pooling is a health care financing role that involves the collection and management of health revenues from all members of the pool, such that the risk related to health care payment is borne collectively rather than by each individual contributor (risk-sharing mechanisms). Risk pooling also means that healthy people pay for the sick to save them from the double burden of illness and the financial costs of required health care (Yardim, Cilingiroglu & Yardim, 2010). The aim of financial protection is to reduce OOP health care expenditure as households that rely on OOP expenditure to finance health lack sufficient risk pooling and are vulnerable to health shocks. Health care systems with effective prepayment systems through health insurance (private, social, community-based) contributions or taxes are likely to enhance financial protection by favouring effective spreading of financial risk across

all population groups (Moreno-Serra, Millett & Smith, 2011). However, many health care systems around the world have been failing in this respect as 25 million households (more than 100 million people) are forced into poverty every year by illness and the struggle to pay for health care (Xu et al., 2005; Wagstaff, 2008).

3.8.1 Financial Development and Financial Protection

Financial development (inclusion and depth) enables households to manage risks, including health shocks, through the provision of useful financial instruments for both income and consumption smoothing. Well-developed financial systems can shield people from the impact of negative shocks and better position them to pursue opportunities through accessing appropriate instruments. According to the World Bank (2013), financial instruments like savings instruments enable people to accumulate buffers for 'rainy days' while credit instruments alleviate financing constraints, helping people to smooth consumption following negative shocks but also to exploit opportunities with greater flexibility.

Financial market instruments like insurance (such as health and residential insurance) provide a means to cover the costs of shocks. These instruments improve health by giving people the ability to manage medical expenses and rebound from a health crisis (Klapper, El-Zoghbi & Hess, 2016). Savings also provide a formal channel for mitigating the risks of health emergencies and provide a tool for managing medical expenses, whether planned or unplanned. In a field experiment in Kenya, Dupas and Robinson (2009) found that providing people with a safe yet informal place to store money increased their savings towards health care expenditure by 66 percent. Access to formal interest-bearing accounts can further increase the value of these investments.

3.8.2 Determinants of Catastrophic Health care expenditure

Existing literature on catastrophic health care expenditure can be divided into two major strands, with the more established strand focusing on measuring the incidence and intensity of catastrophic health care expenditure and the other strand focusing on the determinants of catastrophic health care expenditure at household and national levels. However, the literature on the determinants of catastrophic health care expenditure is more developed at household level than at cross-country level studies. Several studies have shown that the major determinants of catastrophic health care expenditure include household composition, income sources, disability and access to risk management strategies like health insurance, safety nets

as well as credit and savings (Somkotra & Lagrada, 2009; Buigut, Ettarh & Amendah, 2015; Liu, 2015).

Buigut, Ettarh and Amendah (2015) studied the determinants of catastrophic health care expenditures in the slum cities of Kenya using multivariate logistic regression analysis. The analysis shows that household composition, income levels, sources of medical service and safety nets are key determinants of the risk of catastrophic health care expenditure. The study also reveals that enrolment in an informal social safety net like rotational saving and lending schemes reduces the risk of catastrophic spending. The findings from this study highlight the importance of having financial instruments that allow households to manage risks associated with health shocks as shown by the effect on catastrophic health care expenditures of informal financial inclusion.

Similarly, Brinda, Andrés and Enemark (2014) studied health care expenditure patterns in old people in Nigeria and find that OOP health care expenditures are higher among households with disabled members and low income. The study also reveals that chronic diseases like diabetes, hypertension, chronic pulmonary disease, heart disease and tuberculosis increase the number of health visits and OOP health care expenditures. In a similar study in Nigeria, Adisa (2015) investigated the determinants of catastrophic health spending among poorly insured elderly households in urban Nigeria. The results show that poverty and education are positively related to catastrophic expenditure. The results on education are contrary to the theory that more educated people are expected to have limited exposure to catastrophic health care expenditure. Informal safety nets in this study were defined as receiving support from development agencies or remittances or gifts from relatives and friends. Membership of informal safety nets was negatively related to catastrophic expenditure.

Additionally, Liu (2015) studied the effect of health insurance on catastrophic expenditure in China as health insurance provides a mechanism for mitigating risks of illness. The results showed that households that are members of a health insurance scheme had reduced OOP expenditures and did not engage in impoverishing coping strategies likes reducing investment in children's education and agricultural activities. Health insurance and credit availability reduce the effects of negative health shocks. Insurance, including medical insurance, is one dimension that is brought about as a result of financial development and it allows households to save towards health care expenditure, cushioning them against the risk of illness (Habib, Perveen & Khuwaja, 2016).

Departing from small-scale surveys, Yardim, Cilingiroglu and Yardim (2010) studied the determinants of catastrophic health care expenditure in Pakistan, using national household survey data. The study, using a multivariate logistic model, shows that per capita health care expenditure, elderly or disabled persons increase the risk of catastrophe. Additionally, rural households are more likely to face catastrophic health care expenditure than households in urban areas. Interestingly, having a preschool child in the household is negatively related to catastrophic expenditure.

Somkotra and Lagrada (2009) studied the determinants of catastrophic health care expenditure in Thailand using data from household socioeconomic surveys. Using multivariate logistic regression analysis, the study shows that wealthy households (because they prefer using private facilities), households with a large proportion of elderly and disabled members and households headed by poorly educated heads are likely to incur catastrophic expenditure.

A multi-country study on the determinants of catastrophic expenditure by Xu et al. (2007), shows that per capita GDP, demographic structure and the health care financing system were major determinants of catastrophic health care expenditure. The study, which was carried out using data from 59 countries, also shows that countries that rely heavily on prepaid health care financing systems have low levels of catastrophic expenditures. In terms of demographic structure, countries with higher dependency ratios also tend to have higher levels of catastrophic expenditures.

Similarly, Saksena, Xu and Durairaj (2010) studied the drivers of catastrophic health care expenditure using World Health Survey (WHS) data collected in the 2002–2003 period from 51 countries. Analysing the data using a combination of nonparametric and multilevel regression techniques, the study shows that households headed by a person without a primary level education, households with disabled members, households with children or elderly members and households with female heads are likely to suffer catastrophic health care expenditures.

The literature on determinants of catastrophic health care expenditure is dominated by household-level studies with limited cross-country studies. The available cross-country panel studies upscaled the percentages of households with catastrophic expenditure to aggregate level. The studies relied on household surveys whose questionnaires were not standardised across studies (Lu et al., 2009). The studies were also done using largely binary models (probit

and logit models) and had a limited focus on how the share of OOP expenditure in a country's health care financing system changes over time.

Studies on the measurement of catastrophic health care expenditure exhibit methodological inconsistencies as different researchers use unstandardised tools to estimate household expenditure. The estimate of catastrophic health care expenditure is derived from the decomposition of household expenditure. To avoid this limitation, this study uses aggregate OOP health care expenditure as a proxy of catastrophic health care expenditure.

Additionally, the literature does not consider the role of financial development beyond health insurance. Financial inclusion is critical in enabling households to manage health shocks that can drive households into catastrophic expenditure and impoverishment. This study explores the impact of financial development on catastrophic health care expenditure using aggregate data.

3.9 Conclusion

This chapter reviewed the literature on health care financing, demand for health, health care expenditure, financial and financial development. The chapter began with a discussion of the objectives of health care systems and how health care financing plays a fundamental role in achieving health objectives. Health demand and endogenous growth theories were reviewed. A review of the role of financial development in achieving better health outcomes was also done. The chapter reviewed empirical studies on financial development, health care expenditure and health outcomes.

Overall, the literature on health care financing does not consider financial development as an important factor in the design of health care financing systems and health care systems performance. Further, the literature on financial development and economic growth has not focused much on the role of financial development and health human capital investment. Although a few studies have emerged in the post-2015 era, they neglect the role that financial development plays in health care expenditure and financial protection. This study explores the effects of financial development on health care systems performance as measured by population health status and financial protection, which are the core objectives of any health care system. The study also examines the effects of financial development on health care expenditure. The study argues that health care expenditure is a key transmission mechanism through which financial development leads to improved health care system performance. The

demand for health capital, as measured by aggregate health care expenditure, is influenced by access to credit, savings and the existence of risk management instruments, among other factors, and well-developed financial systems have in place instruments to mobilise savings, ameliorate risks and efficiently allocate the available savings, thereby facilitating investment in health human capital.

Chapter 4 Methodology

4. Introduction

This chapter presents the theoretical and empirical models used in the study. The first section presents the medical care market equilibrium and derivation of the demand for health inputs, the second section presents the empirical models that were used in the study and the third section discusses econometric issues relating to panel data.

4.1 The Market for Health Care

The supply of health care is determined by a number of factors that include health care facilities (hospitals and clinics), medical equipment (inpatient beds, wheelchairs, machines, etc.), health care staff (physicians, surgeons, midwives, nurses, auxiliary services staff), government public health activities, technology and the level of financial development in the economy. Governments play a crucial role in health service provision, the training of health staff and the regulation of the health care industry. Financial development is also key to health care financing in terms of funding infrastructure and research and development (R&D), mobilising of resources through health insurance and mitigation of risks, among other factors. The demand for health care is a function of income, financial development, the price of medical care, education, environment and initial endowment of health (Grossman, 1972). Financial development enables households to borrow and save to finance expenditure on health. Higher levels of income and education lead to increased demand for health care.

The health care supply function can be expressed as follows:

$$S^M = f(HI, G, P^M, rV) \quad \text{.....(4.1)}$$

Where *HI* is level of health sector infrastructure, G is government efforts in the health sector, P^M is price of medical goods and rV represents availability of loans.

The demand for medical care is determined by the health status of individuals, environmental factors, the price of health care as well as the availability and cost of loans. This relationship can be expressed as follows:

$$D^M = f(H, E, P^M, wL, rV) \quad \text{.....(4.2)}$$

Where *H* represents individual health status, *E* is environmental factors, P^M is price of medical goods, *wL* is labour income and r*V* is the availability of loans.

The medical care market is in equilibrium when demand is equal to supply and this relationship can be expressed as follows:

$$(\mathrm{HI}, \mathrm{G}, S^m(HI, G, P^M, rV) = D^m(S, E, P^M, wL, rV) \quad \text{.....(4.3)}$$

Given that financial development affects both the supply and demand for health, an increase in financial development must lead to improved health outcomes.

4.2 Demand for Health Inputs

The demand for health can be explained using the utility maximisation approach. According to Rosenzweig and Schultz (1983), a mother is assumed to derive utility, *U*, from a child's health, *H;* consumer goods with an effect on a child's health, *Y*; and consumer good with no effect on health, *X*. The utility function can be expressed as follows:

$$U = U(X, Y, H) \quad \text{.....(4.4)}$$

The relationship between child health and the levels of Y and Z is described by a production function expressed as follows:

$$H = F(Y, Z, \mu), \quad F_y,\ F_x, F_u > 0 \quad \text{.....(4.5)}$$

Where μ is an initial health endowment due to genetic or environmental factors.

Equation 4.5 represents a health production function for the child in the spirit of Grossman (1972) in which health status depends on health inputs like medical care and environment factors.

The family maximises the utility function (4.4) given the production function (4.5) and subject to a budget constraint (4.6). A household is assumed to finance its expenditure on medical and non-medical goods using income from labour and/or a loan from a bank. The budget constraint that the household faces can then be expressed as follows:

$$wL + rV = XP_x + YP_y + ZP_z \quad \text{.....(4.6)}$$

Where,

$\boldsymbol{w}$ is the market wage rate

$\boldsymbol{L}$ is the number of hours worked

$\boldsymbol{V}$ is the level of financial development as measured by loan availability

$\boldsymbol{r}$ is the market rate of interest

$\boldsymbol{X}$ is a health neutral good that only yields utility to an individual but has no direct effect on the health status of the individual

$\boldsymbol{P_x}$ is the price of health neutral good $\boldsymbol{X_x}$

$\boldsymbol{Y}$ represents health inputs or behaviour that yields utility to the individual and also affects health status positively (e.g. physical exercises) or negatively (e.g. smoking)

$\boldsymbol{P_y}$ is the price of health inputs

$\boldsymbol{Z}$ represents medical care services

$\boldsymbol{P_z}$ is the price of medical care services.

Maximising the utility function subject to production and budget constraints yields the following Lagrangian equation:

$$\mathcal{L} = U(H, X, Y) + \lambda(wL + rV) - \lambda\left(XP_x + YP_y + ZP_z\right) \quad \text{.....(4.7)}$$

Considering that $H = F(Y, Z, \mu), \quad F_y,\ F_x, F_u\ > 0$

First order maximisation of 4.7 yields;

$$\frac{\partial \mathcal{L}}{\partial X} = \lambda P_x = U_X \quad \text{.....(4.8)}$$

$$\frac{\partial \mathcal{L}}{\partial Y} = \lambda P_y = U_Y + U_H F_Y \quad \text{.....(4.9)}$$

$$\frac{\partial \mathcal{L}}{\partial Z} = \lambda P_z = U_Z \quad \text{.....(4.10)}$$

$$\frac{\partial \mathcal{L}}{\partial \lambda} = wL + rV - XP_x + YP_y + ZP_z \quad \text{.....(4.11)}$$

Solving the above equations using the Hessian matrix approach and assuming that the second order partial derivative of the Lagrangian function in respect to rV is greater than zero, financial

development will lead to better health outcomes. Financial development affects a household's health outcomes by influencing the cost and availability of credit as well as savings opportunities, which in turn affect its consumption of medical care. Households operating in economies with well-developed financial systems will have better health outcomes due to increased consumption of medical care *ceteris paribus*.

Solving 4.8 to 4.11 yields the following demand equations in terms of price and income:

$$X = D_x(P_x, P_y, P_z, I, \mu) \quad \text{.....(4.12)}$$

$$Y = D_y(P_x, P_y, P_z, I, \mu) \quad \text{.....(4.13)}$$

$$Z = D_z(P_x, P_y, P_z, I, \mu) \quad \text{.....(4.14)}$$

Z is the demand for health inputs which is measured by health care expenditure at household and aggregate levels. From equation 4.14, health care expenditure is a function of the prices of health inputs, the initial endowment of health, income from labour and the level of financial development.

4.3 Financial Development and Financial Protection

The theoretical framework that guided this study on financial development and financial protection comes from the work of Cochrane (1991), Mace (1991) and Townsend (1994) on full consumption insurance theory or full risk sharing. Market institutions like insurance, credit and financial markets play a critical role in risk sharing. Risk sharing eliminate the effects of idiosyncratic risks like health shocks. In full insurance or risk sharing circumstances, households' consumption must not change due to a shock nor must they suffer from catastrophic health care expenditure. Using Ligon's (2008) notation, we assume that an agent *i* receives a quantity of a single consumption good $\boldsymbol{x_i(s)}$ in state *s* and have expected utility expressed as follows:

$$EU_i(x_i) = \sum_{s=1}^{S} p(s) U_i\,(x_i(s)) \quad \text{.....(4.15)}$$

Where *s*= 1, . . ., *S*, is a finite set of possible states of the world each of which occurs with probability *p(s)*, $\boldsymbol{x_i}$ is a random variable, $\boldsymbol{x_i(s)}$ is its realisation. Considering that agents consume in several periods indexed by *t* = 1, . . ., *T*, with agent *i* discounting future expected utility using a discount factor $\boldsymbol{\beta_i}$. Different states of the world are realised in each period, with the probability of state $\boldsymbol{s_t} \in \{1, \ldots, S\}$ being realised in period t allowed to depend on the

period, and so given by $\boldsymbol{p_t(s_t)}$. The framework of risk sharing mimics that of a social planner who needs to maximise aggregate utilities in the face of an aggregate constraint. Following Ligon (2008), this can be expressed as follows:

$$\max_{\{(c_{it}(s))\}} \sum_{i=1}^{n} \lambda_i \sum_{t=1}^{T} \beta_i^{t-1} \sum_{st=1}^{S} p_t(s_t)\, U_i(c_{it}(s_t)) \quad \text{.....(4.16)}$$

Subject to resource constraints

$$\sum_{i=1}^{n} c_{it}\,(s_t) \leq \sum_{i=1}^{n} x_{it}\,(s_t) \quad \text{.....(4.17)}$$

which must be satisfied at every period *t* and state $(\boldsymbol{s_t})$. Denoting $\boldsymbol{u_t(s_t)}$ as a Lagrangian multiplier associated with the resource constraint for period *t* in state $\boldsymbol{s_t}$, then the first order conditions for the social planner's problem are:

$$\lambda_i \beta_i^{t-1} p_t(s_t) U_i'\big(c_{it}(s_t)\big) = u_t(s_t) \quad \text{.....(4.18)}$$

Since this condition must be satisfied in all periods and states for every agent, it follows that

$$U_i'\big(c_{it}(s_t)\big) = \frac{\lambda_j}{\lambda_i}\left(\frac{\beta_j}{\beta_i}\right)^{t-1} U_j'\big(c_{it}(s_t)\big) \quad \text{.....(4.19)}$$

for any period, *t*, any pair of agents (*i, j)* and any states *t*, so that corr$\boldsymbol{U_i'(c_{it})}$, $\boldsymbol{U_j'(c_{it})}$ =1. This condition constitutes full risk insurance which ensures constant consumption. No household is pushed into poverty due to health or any other shocks. In the health shocks context, households are protected from shocks related to illness by sharing the risk through market and non-market instruments and are not expected to make catastrophic health care expenditures.

Reparameterisation of and applying a logarithm to equation 4.20 (see Ligon, 2008 for detailed derivation) gives a simple consumption function specified as follows:

$$log\check{c}_{it} = \eta_t + \alpha_i + \delta_i t + \epsilon_{it} \quad \text{.....(4.20)}$$

In this case, the observed consumption is a function of aggregate supply of the consumption good, $\boldsymbol{\eta_t}$, expected agent's consumption, $\boldsymbol{\alpha_i}$, $\boldsymbol{\alpha_i}$ and agents' specific characteristics, $\boldsymbol{\delta_i t}$.

To achieve the study objectives, the study used a number of estimation approaches which included Fixed and Random Effects, Two-Stage Least Squares (2SLS) and General Method of Moments (GMM). The rationale for using each of these methods is discussed in detail in subsequent sections. The study used STATA v12 to estimate these regression equations.

4.4 Sources of Data and Description of Variables

This section provides a description of the variables and the sources of data used in the regression analysis. The study used panel data from 1995 to 2014 covering 46 SSA countries. The 46 countries were selected on the basis of data availability. The data was sourced from the World Bank online databases known as the World Development Indicators (WDI).

4.4.1 Description of Variables

Financial Development *(FD)*: This variable represents the level of financial development as measured by both depth and access dimensions. The depth dimension is measured by liquid liabilities of banks and non-banks to GDP (M3/GDP) and private bank credit to GDP. The access dimension is measured using the number of ATMs and commercial bank branches per 100 000 people. The rationale for using these proxies is discussed below.

Financial Access

Financial access refers to the availability of financial services of reasonable quality at reasonable costs, where reasonable quality and reasonable cost have to be defined relative to some objective standard, with costs reflecting all pecuniary and nonpecuniary costs (Claessens, 2005). The use of access to finance indicators (number of ATMs and commercial bank branches per 100 000 people) in the study is an attempt to capture the extent to which a country's population has access to the mainstream financial system. Micro-level studies have focused on microfinance and child health outcomes despite the fact that microfinance institutions are largely part of the informal rather than the formal financial system. Historically, microfinance institutions have not offered services that go beyond the provision of credit services. Although there has been an emergence of deposit-taking microfinance institutions in recent times their outreach remains very limited.

Macro-level studies by Beck, Demirgüç-Kunt and Levine (2007), Claessens (2005) and Claessens and Feijen (2006b) on financial development, poverty and health outcomes have extensively relied on indicators measuring the depth of the financial sector and not its inclusiveness (Mookerjee & Kalipioni, 2010). However, according to Beck et al. (2008), without inclusive financial systems, poor individuals and small enterprises need to rely on their personal wealth or internal resources to invest in their education, become entrepreneurs or take advantage of promising growth opportunities. Deep financial systems may not necessarily be inclusive, leaving the poor and unbanked behind in the process of growth and prosperity. As

noted by Claessens and Feijen (2006b), the lack of access to finance for lower-income countries derives in part from low banking sector outreach. This limited outreach excludes the financially unserved populations from benefiting from financial development.

Financial Depth

Financial depth and efficiency have been widely studied in the literature on financial development, growth, poverty and health outcomes. The justification for this overwhelming attention emanates from the premise that well-functioning financial systems are efficient and allocate funds to their most productive uses. They also offer savings, payments and risk-management products to as large a set of participants as possible, and seek out and finance good growth opportunities wherever they may be (Beck et al., 2008). The study could not ignore these invaluable roles that deep financial systems play in the economy and befittingly used financial depth indicators to understand the effect of financial development on health outcomes.

In financial development literature, the depth dimension of financial development is measured using a number of indicators, which include liquid liabilities of the financial system to GDP ratio and credit to private enterprises divided by GDP ratio (Levine, 2004). Other indicators of financial depth are related to the size of the stock markets and are measured using the value of the trades of domestic shares on domestic exchanges divided by GDP and market capitalisation, which equals the value of listed shares divided by GDP (Beck & Levine, 2004). However, there is no single indicator in the literature that has been considered to be perfect in measuring financial development as each indicator has its own merits and demerits. This study settled on two indicators to measure the depth of a country's financial sector: broad money to GDP ratio and private bank credit to GDP ratio. The use of broad money (M3) to GDP ratio aims to measure the size of the financial sector and its ability to provide transaction services and saving opportunities, whereas bank credit to the private sector to GDP has the advantage of measuring more accurately the role of financial intermediaries in channelling funds to productive agents and possibly to the poor and the level of intermediation (King & Levine, 1993; Beck, Demirgüç-Kunt & Levine, 2007; Jeanneney & Kpodar, 2008).

All the indicators of financial development (access and depth) were expected to be negatively related to child health outcomes and positively related to life expectancy. Table 4.1 below presents the detailed definitions of financial development proxies.

Table 4.1 Financial Development Indicators Definitions

Variable	Definition of Variable
Broad money to GDP ratio *(BroadMoney)*	Broad money is the sum of currency outside banks; demand deposits other than those of the central government; the time, savings and foreign currency deposits of resident sectors other than the central government; bank and traveller's cheques; and other securities such as certificates of deposit and commercial paper (World Bank, 2016).
ATM density per 100 000 people *(ATMs)*	Automated teller machines are computerised telecommunications devices that provide clients of a financial institution with access to financial transactions in a public place (World Bank, 2016).
Commercial bank branches per 100 000 people *(BankBranches)*	Commercial bank branches are retail locations of resident commercial banks and other resident banks that function as commercial banks to provide financial services to customers and are physically separated from the main office but not organised as legally separated subsidiaries (World Bank, 2016).
Private bank credit to GDP ratio	Domestic credit to the private sector by banks refers to financial resources provided to the private sector by other depository corporations (deposit-taking corporations excluding central banks) – such as through loans, purchases of non-equity securities and trade credits and other accounts receivable – that establish a claim for repayment (World Bank, 2016).

Health Outcomes *(H)*

This variable represents health outcomes. These outcomes measure the performance of health delivery systems and the socioeconomic well-being of countries. In this study, health outcomes are measured by a number of indicators, which include child mortality (neonatal, infant, under-five), maternal mortality, life expectancy and immunisation coverage. Table 4.2 gives detailed definitions of the proxies of health outcomes.

Table 4.2 Health Outcomes Variables

Variable	Definition of Variable
Neonatal Mortality Rate *(NeoMort)*	The neonatal mortality rate is the number of newborn babies dying before reaching 28 days of age, per 1 000 live births in a given year. Neonatal mortality rate, like other indicators of mortality, measures the performance of health delivery systems and the socioeconomic well-being of countries. Child mortalities are more responsive to change in environmental factors like health care systems delivery and other social-economic factors.

Infant Mortality Rate *(InfantMort)*	The infant mortality rate is the number of infants dying before reaching one year of age, per 1 000 live births in a given year.
Under-Five Mortality *(U5Mort)*	The under-five mortality rate is the probability per 1 000 live births that a newborn baby will die before reaching the age of five years.
Life Expectancy at birth *(Life_Exp)*	Life expectancy at birth indicates the number of years a newborn baby would live if patterns of mortality prevailing at the time of its birth were to stay the same throughout its life.

Health care financing System *(HFS*): Health care financing systems are mainly financed through three mechanisms: social insurance (Bismarck models), general taxation (Beveridge models) and OOP expenditure. Two dummy variables were included in the regression analysis to avoid the dummy variable trap. The dummy variables capture the most dominant health care financing systems in SSA, namely the tax-financed health care systems (*pub_financed*) and OOP-financed (*oop_financed*) systems. The distinction between these methods is not very clear in SSA as health care systems rely on more than one approach. In this study, the classification was based on a 40 percent threshold. If more than 40 percent of a country's health care expenditure emanated from the government it was classified as tax-financed and if 40 percent came from OOP expenditure it was classified as OOP-financed. The health care financing systems that fell in between were classified as social health insurance-financed health care systems. Health care financing systems with prepayment mechanisms promote better health outcomes compared to those requiring upfront payments.

Financial Protection (FP): Financial risk protection occurs when households are cushioned from the financial consequences of health shocks (Moreno-Serra, Millett & Smith, 2011; Saksena, Hsu & Evans, 2014). Catastrophic health care expenditure and impoverishment are the major consequences of OOP health care expenditure. According to the World Bank's World Development Indicators (2016), OOP expenditure refers to any payment by households to health practitioners and suppliers of pharmaceuticals, therapeutic appliances and other goods and services whose primary intent is to contribute to the restoration or enhancement of the health status of individuals or population groups. Catastrophic health care expenditure occurs when OOP payments for health services consume a 'large' proportion of a household's available income (Moreno-Serra, Millett & Smith, 2011; Buigut, Ettarh & Amendah, 2015). The aim of financial protection is to reduce OOP expenditure. Financial protection tends to be low in countries where health care systems are financed by OOP expenditure and high in

countries where health care financing comes through prepayment mechanisms like insurance and taxes.

In the light of these concepts, the study used two indicators measuring the level of OOP expenditure on health: OOP expenditure to total health care expenditure and OOP expenditure to private health care expenditure. A lower level of OOP expenditure implies a high level of financial protection and high catastrophic expenditure (Xu et al., 2005; OECD, 2014; McIntyre, Meheus & Røttingen, 2017). Empirical studies have confirmed this positive correlation between out-of-pocket and catastrophic health care expenditure, which is a commonly used measure of financial risk protection. A study by Xu et al. (2003) shows countries with a higher share of OOP payments in total health care expenditures are more likely to have a higher proportion of households facing catastrophic expenditure. The study also shows that a 1 percent increase in the proportion of OOP payments to total health care expenditure leads to a 2.2 percent average increase in the proportion of households facing catastrophic payments.

There is no universally agreed measurement of financial risk protection in health given the trade-offs that come with using each indicator. Several indicators have been used in the literature, particularly in studies using household surveys. Using survey-based indicators, households are considered to be at risk when their expenditure on health care exceeds 10–40 percent of total household expenditure (Wagstaff, 2002; Xu et al., 2005). Other studies have also used headcount indicators, which report the number of people below a certain poverty threshold. Many of these indicators, including those used in this study, are not without limitations. See Saksena, Hsu and Evans (2014) for a detailed discussion of measures of financial risk protection.

Health Care Expenditure Variables

Health care expenditure represents the final consumption of health care goods and services (i.e. current health care expenditure) including personal health care (curative care, rehabilitative care, long-term care, ancillary services and medical goods) and collective services (prevention and public health services as well as health administration) (OECD, 2018). It also reflects the volume of resources that have been mobilised for or available to the health sector (Anyanwu & Erhijakpor, 2009). In both the human capital (Grossman, 2000) and health production (Nixon & Ulmann, 2006) models, health care expenditure has been identified as an important measure of the level of health capital investment and health inputs. In light of the above, the study used three indicators of health care expenditure, namely total health care expenditure per

capita,public health care expenditure to GDP ratio and private health care expenditure to GDP ratios. The use of multiple indicators was aimed at determining the impact of financial development on different categories of health care expenditure, given that private and public health care expenditure affect health outcomes differently (Rad et al., 2013; Arthur & Oaikhenan, 2017). This expenditure can be expressed as total health care expenditure, government expenditure and private expenditure. These categories are defined in the table below.

Table 4.3 Health Care Expenditure Variables

Variable	Definition of Variable
Total Health Care Expenditure (THE) per capita	This an aggregate measure of health care expenditure by government, the private sector and overseas development assistance (ODA) per capita. In this study, aggregate is divided by total population to yield total health care expenditure per capita.
Total Government Expenditure on Health (PubHE)	The variable measures the per capita government expenditure towards health. The variable captures expenditure on health staff training, drugs, construction of health facilities and related recurrent expenditure. This expenditure is financed through various taxes, ODA on health, grants and loans. Health care expenditure is expected to lead to reduced OOP expenditure and subsequently to increased financial protection. The variable is measured by the proportion of public expenditure to GDP.
Private Expenditure on Health (PvtTHE)	This measures outlays by households, corporations and non-profit organisations to health practitioners and to suppliers of pharmaceuticals, therapeutic appliances and other goods and services (World Development Indicators, 2016). In this study, the variable is expressed as a proportion of GDP.

Access to Infrastructure *(INFRA)*: The variable measures the level of access by a country's population to basic infrastructure like electricity, potable water and sanitation facilities. Access to potable water and sanitation facilities reduces the incidence of waterborne diarrhoeal diseases which are responsible for many child deaths and undernutrition in SSA countries. Infrastructure, such as electricity and road networks, increases income-generating opportunities, access to health facilities, proper storage of vaccines and the provision of clean energy. According to Fullerton, Bruce and Gordon (2008), usage of organic cooking energy results in high levels of indoor air pollution and an increase in the incidence of respiratory

infections – including pneumonia, tuberculosis and chronic obstructive pulmonary disease, low birth weight, cardiovascular events and mortality in adults and children.

Education Level *(ED):* Education was measured by primary school enrolment for female students. Empirical research has shown that households with better education enjoy better health (Joyce, 1986; Mwabu, 2009). Educated households value health more and adjust their nutrition and lifestyles and/or are able to make better use of health information and the health care system (UNICEF, 1990; Claessens & Feijen, 2006a).

Real Gross Domestic Product (*GDP*): This variable measures the level of per capita real GDP. The variable is expected to lead to improved health outcomes as measured by reduced mortality rates (infant, child, maternal) and increased life expectancy. The variable was also expected to be positively related to health care expenditure and was also expected to lead to an increase in financial protection.

Demographic Structure *(DEM)*: This indicator represents the demographic structure of the population. This variable measures the age dependency ratio of a country. Age dependency ratio is the ratio of dependent people younger than 15 years or older than 60 years to the working-age population (those aged between 15 and 64 years). The study explored the different ways in which the proportions of people younger than 15 years and those over 60 years affect health care expenditure.

4.5 Diagnostic Tests

This section discusses a number of econometric issues relating to the violation of the OLS assumptions. Specific issues discussed include stationarity and endogeneity. However, the study also subjected the data to other diagnostic tests for multicollinearity and heteroskedasticity that are discussed in detail in subsequent chapters that contain empirical findings.

4.5.1 Stationarity

The presence of a time series dimension in panel data leads to the existence of the problem of autocorrelation. According to Phillips and Moon (2001), when the time dimension of a panel is large, there is an obvious need to consider serial correlation patterns in the panel more generally, including both short memory and persistent components. A time series is considered

to be stationary when its mean and variance are constant over time. Given, a time series expressed as follows:

$$y_t = \mu + \emptyset y_{t-1} + u_t \quad \text{.....(4.24)}$$

If $\emptyset < \mathbf{1}$ the time series is stationary. However, if $\emptyset = \mathbf{1}$ the series has a unit root.

Carrying out regression analysis using variables that are not stationary has undesirable implications in both pure time series and panel data. Using non-stationary data in a regression analysis leads to the spurious regression phenomenon characterised by a high $\boldsymbol{R^2}$ even when the variables in the model are not related (Granger & Newbold, 1974). Non-stationary variables in a regression model violate the asymptotic normality assumptions yielding invalid parameters. In panel data, this phenomenon persists even when both *N* and *T* reach infinite.

Literature has shown that most macroeconomic variables are not stationary and follow a unit root process making it imperative to test for the presence of unit root. A number of methods have been developed to test for the presence of a unit root in panel data (Levin, Lin and Chu Test; Im, Pesaran and Shin Test; Breitung's Test) and this study used tests selected from this menu. A panel unit root test is specified as follows:

$$\Delta y_{it} = u_i + \beta_i y_{i,t-1} + \varepsilon_{it} \quad \text{.....(4.25)}$$

The null hypothesis assumes that each cross-section has a panel root.

4.5.2 Panel Causality Test

The study also sought to establish the direction of causality between financial development and health outcomes as well as health care expenditure and health outcomes. A model for testing for causality is specified as follows:

$$y_{it} = \alpha_i + \sum_{k=1}^{p} \gamma^{(k)} y_{i,t-k} + \sum_{k=1}^{p} \beta_i{}^{(k)} x_{i,t-k} + v_{it} \quad \text{.....(4.27)}$$

Where $\boldsymbol{y_{it}}$ is the dependent variable, $\boldsymbol{x_{it}}$ is a vector of independent variables, $\boldsymbol{\gamma^{(k)}}$ represents the autoregressive coefficients, $\boldsymbol{\alpha_i}$ represents fixed effects and $\boldsymbol{v_{it}}$ is the error term. The first lag $(\boldsymbol{k-1})$ of the dependent and explanatory variables is used to estimate the model and test the hypothesis that $\boldsymbol{x}$ does not cause $\boldsymbol{y}$ for any cross-section. The study estimated a panel vector autoregression model and carried out a panel Granger causality test as proposed by Hartwig (2009) as well as Abrigo and Love (2015).

4.5.3 Endogeneity

The problem of endogeneity arises from a number of factors which include reverse causation, the omission of variables and measurement errors in the independent variables. The estimation by the Ordinary Least Squares (OLS) method in the presence of endogeneity yields biased and inconsistent estimates of the structural parameters. Ignoring endogeneity leads to biased parameters which yield erroneous results and incorrect conclusions about the veracity of theory (Antonakis et al., 2010). Given, a linear regression model specified as follows:

$$Y = \beta_0 + \beta_i X_i + \varepsilon \quad \text{.....(4.28)}$$

If $E[\varepsilon | X_i] \neq 0$. And $Cov[\varepsilon, X_i] \neq 0$ then endogeneity exists.

Theoretically, reverse causality exists among the variables that were used for this study. As higher levels of financial development lead to higher levels of health outcomes, healthy nations are also likely to demand more financial services, leading to higher levels of financial development. Similarly, inasmuch as health care expenditure leads to better health outcomes, like increased life expectancy, healthy and prosperous households will spend more on preventative health and other health-enhancing inputs.

Two-Stage Least Squares and Instrumental Variable Approach

The existence of the endogeneity problem was established using the Wu-Hausman test and a comparison of the OLS and 2SLS regression results was also carried out. The problem of endogeneity was addressed using the instrumental variable (IV) approach and the Two-Stage Least Squares (2SLS) approach. The 2SLS approach produces more consistent estimates compared to the IV approach.

$$H_i = \beta_i FD_i + \varepsilon_i \quad \text{.....(4.29)}$$

Assuming reverse causality exists between health outcomes $\boldsymbol{H_i}$ and financial development $\boldsymbol{FD_i}$ running a usual OLS regression will lead to inconsistent parameters as $\boldsymbol{FD_i}$ will be correlated with the error term, $\boldsymbol{\varepsilon_i}$. The 2SLS approach involves finding instruments that are correlated with $\boldsymbol{FD_i}$ but not with the error term. Once the instruments were identified a reduced form equation estimating $\boldsymbol{FD_i}$ was run. The reduced form equation is given as follows:

$$\widehat{FD_i} = \widehat{a_0} + \widehat{\beta_i} Z_i + \varepsilon_i \quad \text{..... (4.30)}$$

Where $\boldsymbol{Z_i}$ is the instrument $\boldsymbol{Z_i}$ is assumed to be correlated with $\boldsymbol{FD_i}$, ($Cov\ (FD_i, Z_i) \neq 0$) but must not be correlated with the error term ($Cov\ (Z_i, \varepsilon_i) \neq 0$).

Estimating equation 4.30 using instrument variables yields an estimate of $\widehat{\mathbf{FD}}_\mathbf{i}$ which is not correlated with the error term. $\widehat{\mathbf{FD}}_\mathbf{t}$ is then fitted in the regression estimating the effects of financial development on health outcomes to deal with the endogeneity problem.

Instrumental Variable Approach

The use of the instrumental variable approach in a Two-Stage Least Squares (2SLS) analysis extracts the exogenous component of financial development. Previous studies have identified instruments for financial development which included the origin of the country's commercial law, absolute latitude value of a country's capital city and religious composition of the country's population (Beck, Demirgüç-Kunt & Levine, 2004). La Porta et al. (1997) hinted that differences in the legal protection of investors may help to explain why firms are owned and financed differently from country to country. In the study by La Porta et al. (1997), the pattern of firm ownership and capital structure varied depending on whether the legal origin was English, Scandinavian, French or German.

In the spirit of Beck, Demirgüç-Kunt and Levine (2007) and La Porta et al. (1997), the study identified the perceived rule of law indicator from the World Bank's World Governance Indicators as one of the instrumental variables to use throughout the study. According to the World Bank (2016), the rule of law indicator captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular, the quality of contract enforcement, property rights, the police and the courts, as well as the likelihood of crime and violence. Experts give the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5.

The second instrumental variable used is the mobile cellular subscriptions per 100 people, also sourced from the World Development Indicators (2016). Access to mobile phones is a good instrument of financial infrastructure development and enhances the performance of the financial system. According to Sassi and Goaied (2013), the development of information and communication technology (ICT) infrastructure reduces market imperfections and promotes financial functions as it reduces market frictions which are information and transaction costs. A study by Jensen (2007) in India found that mobile phones increased fish market efficiency by reducing transaction costs and improving the information on the market. The development

of ICT infrastructure eases monitoring by managers and exerting corporate control, which are important functions of financial intermediaries.

Aker and Mbiti (2010) echoed similar thoughts when they identified five major roles played by mobile phones similar to those performed by financial systems in an economy. They indicated that mobile phones improve access to and the use of information, thereby reducing search costs, improving coordination among agents and increasing market efficiency. Increased communication and lowered communications costs improve firms' productive efficiency by allowing them to better manage their supply chains. Additionally, Aker and Mbiti (2010) indicated that mobile phones create new jobs to address the demand for mobile-related services, thereby providing income-generating opportunities in rural and urban areas. Mobile phones facilitate communication among social networks in response to shocks, thereby reducing households' exposure to risk. Mobile phones also provide a platform for the delivery of financial, agricultural, health and educational services.

Financial innovation in the form of wide usage of ATMs in the early 1990s in the SSA region (the first ATM was built and used in 1939) coincided with the growth in the use of mobile phones and the decline in the use of fixed phones commonly known as landlines. This period also witnessed a steady growth in the amount of credit extended to the private sector by banks. This makes the proportion of a country's access to mobile phones an appropriate instrumental variable not only for ATMs but also for other indicators of financial development. The researcher is aware of the advent of mobile money transfers but these did not exist in SSA prior to 2007 and had not expanded outside Kenya in 2012. Additionally, mobile money accounts typically do not provide access to as extensive an array of services as traditional financial accounts.

The study used these two instruments to ensure the efficiency of the estimates and also to enable the assessment of the validity of these instruments. The appropriateness of the instruments was tested using the Sargan-Hansen test for overidentification (OIR). Testing the appropriateness of the excluded instruments can only be done when the equation is overidentified, that is, when the number of instruments exceeds the number of endogenous variables. The OIR test jointly assesses whether the instruments are correlated with the endogenous variables and whether they are independent of the error process (Baum, 2007). Failure to reject the null hypothesis implies a failure to reject the validity of the instrumental variables. Additionally, the strength of the instruments is also vital as weak instruments lead to biased results. The test for weak

instruments was done using the Cragg-Donald Wald F test (Cragg & Donald, 1993). Using the Staiger and Stock (1997) rule of thumb, the Cragg-Donald Wald F Statistic is compared against 10. The instruments are deemed to be strong if the F statistic exceeds this threshold. In a similar spirit, the study also used the formalised Stock and Yogo (2005) critical values to assess the strength of the instruments.

General Method of Moments (GMM) Approach

In the absence of valid external instruments for health care expenditure variables, the study used the General Method of Moments (GMM) to address the problem of endogeneity. The approach allows the extraction of the exogenous component of health care expenditure variables. The GMM approach has its roots in the work of Hansen (1982) and was further developed by Holtz-Eakin, Newey and Rosen (1990), Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998). The difference GMM and system GMM are the most commonly used approaches to deal with the pitfalls of endogeneity, serial correlation, unit root and heteroskedasticity. According to Bond, Hoeffler and Temple (2001), the idea in difference GMM is to take the first-differences to remove unobserved time-invariant country-specific effects, and then instrument the right-hand-side variables in the first-differenced equations, using levels of the series lagged two periods or more, under the assumption that the time-varying disturbances in the original levels equations are not serially correlated. The system GMM utilises both lagged differences and levels of regressors as instruments to estimate the equation.

As with the 2SLS approach, the validity of instruments in the GMM estimation approach was tested using a Sargan test of overidentifying restrictions (OIR). The presence of serial correlation of the second order is tested using the Arellano and Bond test (Arellano & Bond, 1991).

4.5.4 Heterogeneity

The study acknowledges the existence of country-specific variables that are not observable but influence health outcomes and health care expenditure. These factors include religion, culture and customs as well as colonial history. Such time-invariant country-specific variables lead to the problem of heteroskedasticity. Assuming homoskedastic disturbances when heteroskedasticity is present results in consistent estimates of the regression coefficients, but these estimates will not be efficient. Also, the standard errors of these estimates will be biased

and one must compute robust standard errors correcting for the possible presence of heteroskedasticity (Baltagi, 2005).

In the absence of heterogeneity, random effects models are run. This type of model allows the parameters to vary over the cross-section (i.e. country). However, in instances where time-invariant country-specific factors have been established through appropriate tests, such as the Hausman test, fixed effects models are run. The fixed effects approach allows for unobserved factors that explain health outcomes and health care expenditure between two countries and, therefore, leads to unbiased and efficient results (Baltagi, 2005). However, the approach is unable to compute for the coefficient of time-invariant variables, such as a country dummy, because these variables are dropped within transformation. The approach also suffers from the use of too many dummy variables, therefore, costing a loss of degrees of freedom. In the study, whereas the data is drawn from a panel of 46 countries, it means the regression must have 45 dummy variables which leads to a major loss of degrees of freedom.

4.6 Conclusion

This chapter described the methodology used in the study, specifically focusing on theoretical and empirical models. The estimation of the demand for health and health inputs (health care expenditure) was guided by the work of Grossman (1972) and Rosenzweig and Schultz (1983). The chapter also discussed econometric issues relating to stationarity, heterogeneity and endogeneity. It also presented the general models for panel root testing, error correction and panel causality testing. The relevant results of diagnostic tests as well as corrective action to deal with endogeneity and stationarity, among other econometric issues, are presented and discussed in the following chapters on the main findings.

Chapter 5 Financial Development and Health Outcomes in sub-Saharan African Countries

5. Introduction

Having discussed the methodology employed in this study in the previous chapter, the next three chapters explain how the methodology was applied to the key theme areas within the research questions posed in Chapter 1, namely financial development, health care expenditure and financial protection, and discuss in detail the findings obtained. The last chapter draws together these findings in relation to the objectives of the study and presents the conclusions and recommendations derived from the work.

This chapter explores the effects of financial development on child health outcomes and life expectancy for selected SSA countries. The study used random and fixed effects as well instrumental variable estimation methods. The regression analysis was carried out using data from a 20-year period, from 1995 to 2014. The results showed that financial development leads to a reduction in neonatal, infant and children under five years mortality as well as increasing life expectancy. The study used four indicators of financial development to measure financial access and depth and they were all found to be negatively related to child mortality (neonatal, infant and under-five) and at the same time positively related to life expectancy at birth in years. Other variables that were found to be statistically significant include real GDP per capita, level of education, access to basic infrastructure and health care financing mechanisms.

5.1 Financial Development and Health Outcomes

Sub-Saharan African countries are faced with poor health outcomes that include high mortality rates for children (neonates, infants and under-fives) as well as high maternal mortality. The undesirable health outcomes are a result of challenges in health care financing systems as shown by low health care expenditure per capita, the absence of prepaid health care financing mechanisms and high OOP expenditure on health. Lack of access to basic facilities like water and sanitation, electricity and education further compounds the health care financing problem. However, the region experienced major declines in child mortality and increases in life expectancy at birth from the 1990s. The period from 1995 to 2014 registered a decline of 50.2 percent in child mortality in the SSA region but the rate is high, as 86 children per 1 000 live births are still dying before their fifth birthday. Child mortality, which is measured by the death

of children under five years of age, is a vital indicator of child survival as it encompasses the death of neonates (death within four weeks) and infants (deaths within 12 months). According to UNICEF (2015), 44 percent of under-five deaths in the world occur during the neonatal period. These are deaths that can be prevented if mothers could give birth in a health care facility in the presence of a qualified birth attendant. This points to the critical role played by health infrastructure and skilled health staff in the reduction of child mortality. However, investment in infrastructure like hospitals, laboratories, medical warehouses and hospital equipment is hampered by the absence of long-term finance due to low levels of financial development in the region, among other reasons.

Financial development is crucial for better health outcomes at the household level through a number of channels, which include access to credit and savings to finance health care expenditure, access to nutritious foods as well as risk management. Beyond the household level, firms and governments are able to access credit from the capital markets to increase expenditure on health services to curb diseases, improve quality of health care and invest in medical personnel (Reinhardt, 1986). The decline in child deaths in the 1990s coincided with the growth in SSA's financial sector which emerged against a background of new innovations like automated teller machines, deregulation of the sector and expansion of credit to the private sector. Many SSA countries deregulated their financial sectors and banks allocated more credit to the private sector. Although the pattern mildly fluctuated, a steady growth was experienced from 2002 to 2009. As alluded to in Chapter 2, the financial sector in SSA remains underdeveloped when compared to other regions of the world, despite the gains recorded after the deregulation era.

This study sought to extend the literature of financial development and human capital development because the role of financial development in improving health outcomes in the SSA region has been largely ignored in financial development and growth literature. The research aimed to assess whether financial development has an effect on health outcomes. The remainder of the chapter describes the methodology used to meet the study objectives and answer the research questions. The focus of the discussion then shifts to the results of the regression analysis before the concluding section provides the interpretation and discussion of the findings.

5.2 Methodology

The study used panel data from 46 sub-Saharan African countries from 1995 to 2014. Somalia and South Sudan were dropped from the complete list of all SSA countries due to inadequate data. Additionally, analysis related to automated teller machines (ATMs) and commercial bank branches only cover the period from 2004 to 2014. The study used four indicators of financial development: number of ATMs per 100 000 people, number of commercial banks per 100 000 people, bank credit to the private sector percentage of GDP and percentage of broad money (M3) to GDP. Health outcomes were also measured by four indicators: neonatal, infant and under-five mortality rates as well as life expectancy at birth in years. In addition to these variables, the study used dummy variables for each health care financing mechanism used by different countries in the study sample. These dummy variables are explained in detail in the subsequent sections of the chapter.

5.2.1 Model Specification and Estimation Techniques

The theoretical model that informed this study was borrowed from the work of Grossman (1972) and Rosenzweig and Schultz (1983) in which health status is estimated using a production function. An individual's health status is considered to be a function of health inputs consumed by that individual as well as environmental factors. Following Rosenzweig and Schultz (1983), the model is specified as follows:

$$H = f(Y, Z, \mu) \quad \text{.....(5.1)}$$

Where $\boldsymbol{H}$ is the health status, $\boldsymbol{Y}$ represents health-related goods that affect an individual's health but also yield utility, $\boldsymbol{Z}$ represents medical care goods and services and $\boldsymbol{\mu}$ represent genetic and other environmental factors that affect health. In this study, the micro-level model by Rosenzweig and Schultz (1983) is estimated using macro-level data and the model is specified as:

$$H_{it} = f(FDI_{it}, X_{it}) \quad \text{.....(5.2)}$$

Where,

$\boldsymbol{H}$ represents national health outcomes measured by neonatal mortality rate, infant mortality rate, under-five mortality rate and life expectancy

$\boldsymbol{FD}$ is the level of financial development

$\boldsymbol{X}$ represents a vector of various factors that affect a population's health like access to infrastructure, health care financing system and level of education.

Equation 5.2 is transformed by taking its natural logarithms to normalise the data and linearise the relationships among the variables in the equation. The financial development indicators used in the study aimed to capture access and depth dimensions of a financial sector and understand their respective impact on health outcomes. In addition to the financial development variables, the study used control variables to increase the precision of coefficients of financial development variables. Control variables used in the study include access to infrastructure, real GDP per capita, level of literacy, health care system financing mechanism, immunisation coverage and HIV prevalence. Immunisation coverage and HIV prevalence were included only for regression analysis for under-five mortality and life expectancy respectively. The model is then expressed as follows:

$$lnH_{it} = \alpha_0 + \beta_1 lnFD_{it} + \beta_2 ln\ GDP_{it} + \beta_3 lnED_{it} + \beta_4 lnINFRA_{it} + \beta_5 HFS_{it} + v_{it} \quad (5.3)$$

Where,

$\boldsymbol{FD}$ and $\boldsymbol{H}$ are as defined in 5.2

$\boldsymbol{\alpha_0}$ is the constant

$\boldsymbol{GDP_{it}}$ is real GDP per capita

$\boldsymbol{ED}$ is a proxy of female primary enrolment

$\boldsymbol{lnHFS_{it}}$ is a dummy variable for health care financing systems

$\boldsymbol{lnINFRA_{it}}$ represents access to basic infrastructure and is proxied by access to water.

To achieve the objectives of the chapter, equation 5.3 was estimated used the Fixed and Random Effects estimation approaches as guided by the results of the robust Hausman test. To control for the problem of endogeneity, a Two-Stage Least Squares (2SLS) approach was also used for regression analysis.

5.3 Results and Discussion

5.3.1 Descriptive Statistics

In terms of financial access over the study period, there were on average 9.2 ATMs and 5.5 commercial bank branches per 100 000 people in the SSA region. Over the same 20-year period, SSA had an average broad money ratio to GDP of 31.4 percent and private credit to GDP ratio stood at 16.9 percent. In terms of health outcomes, neonatal mortality stood at an average of 33.8 deaths per 10 000 live births, while infant mortality and under-five years mortality stood at 73.3 and 116.1 per 10 000 live births respectively. Table 5.1 shows the entire descriptive statistics for the variables used in this chapter.

Table 5.1 Descriptive Statistics

Variable	No. of observations	Mean	Standard Dev	Min	Max
Broad money to GDP ratio *(BroadMoney)*	867	31.4	23.7	1.6	151.5
ATM density per 100 000 people *(ATMs)*	399	9.2	14.3	0	66.2
Commercial bank branches per 100 000 people *(BankBranches)*	482	5.5	8.2	0.1	54.8
Private bank credit GDP ratio *(BankPvt_credit)*	868	16.9	16	0.2	108
Level of education *(ED)*	570	57.8	25.7	6.6	115
Real GDP per capita *(GDP)*	920	1623.6	64.8	64.8	23347.7
Access to infrastructure *(WaterAccess)*	939	65.8	17.5	19.5	99.9
Neonatal mortality *(NeoMort)*	960	33.8	11.9	8.7	66.5
Infant mortality *(InfMort)*	960	73.3	28.5	12	158.3
Under-five mortality *(U5Mort)*	960	116.1	51.4	13.8	280
Life expectancy at birth *(LifeExp)*	954	55	7	31.6	74.2
Immunisation coverage *(ImmuneDPT)*	936	71	21.3	3	99
HIV_Prevalence	875	5.94	7.18	1	29.6

5.3.2 Diagnostic Tests

The variables and estimation methods were subjected to a battery of diagnostic tests to ensure that the results were not misleading. The tests carried out included unit root, heteroskedasticity and autocorrelation, stability of parameters and tests that relate to the choice of estimation methods and instrumental variables. The study tested the stationarity of all the variables used

in the analysis to avoid running spurious regressions. The Fisher-type augmented Dickey-Fuller (ADF) tests were used to determine the stationarity of the data series. The tests showed that all the data in their logarithmic form are stationary. Table 5.2 below shows the results of the unit root tests.

Table 5.2 Panel Unit Root Test

Variable	Fisher-Type ADF Test	Result
	Model with trend	
Log*ImmuneDPT*	140.16***	I(0)
Log*ATMS*	231.9***	I(0)
Log*BankBranches*	150.6***	I(0)
logBankPvt_credit	118.5**	I(0)
log*BroadMoney*	110.4**	I(0)
Log*ED*	199.3***	I(0)
log*GDP_capita*	123.8***	I(0)
Log*WaterAccess*	118.8**	I(0)
Log*NeoMort*	304.8***	I(0)
Log*InfMort*	533.6***	I(0)
log*U5Mort*	726.4***	I(0)
LogLifeExp	2680.5***	I(0)
logHIV_Prev	329.4***	I(0)

Note: ***, **, * shows significance at 1%, 5% and 10% respectively.

The study also tested the data for the presence of heteroskedasticity and autocorrelation. The null hypothesis of no heteroskedasticity and autocorrelation was rejected. These problems were addressed by using robust standard errors. The results of the model stability tests are discussed later in this chapter.

5.3.3 Neonatal Mortality and Financial Development

Using the fixed effects estimation approach to estimate equation 5.1, the results showed that financial development is negatively and significantly related to neonatal mortality. A 10 percent increase in the number of ATMs per 100 000 people, commercial bank branches per 100 000 people, the percentage of broad money and bank credit to GDP leads to a decline in the neonatal mortality rate of 0.4 percent, 0.8 percent, 0.95 percent and 0.46 percent respectively. The study also showed that access to basic infrastructure *(logINFRA)*, real GDP

per capita *(logGDP_capita)* and female education level *(loged)* are also statistically and negatively related to the neonatal mortality rate. The complete results are shown in Table 5.3 below.

Table 5.3 Dependent Variable Log Neonatal Mortality Rate

Independent Variables	Fixed Effects Estimation			
	Model 1	Model 2	Model 3	Model 4
logATMS	-0.04*** (0.012)	-	-	-
logBankBranches	-	-0.08*** (0.017)	-	-
logBroadMoney	-	-	-0.095*** (0.032)	-
logBankPvt_credit	-	-	-	-0.046** (0.02)
logINFRA	-0.56*** (0.179)	-0.55*** (0.135)	-0.52*** (0.16)	-0.51*** (0.161)
Loged	-0.024 (0.047)	-0.06* (0.032)	-0.104*** (0.025)	-0.13*** (0.027)
logGDP_capita	-0.076** (0.03)	-0.065** (0.03)	-0.108*** (0.027)	0.099*** (0.027)
pub_financed	0.013 (0.011)	-0.003 (0.007)	-0.032** (0.015)	-0.039** (0.017)
oop_financed	0.024* (0.013)	0.013 (0.011)	0.004 (0.026)	0.001 (0.027)
Constant	6.3*** (0.71)	6.48*** (0.43)	7.05*** (0.5)	6.89*** (0.5)
R-squared	0.83	0.82	0.79	0.79
Number of Countries	44	45	46	46
Number of Observations	245	306	511	512

Note: Standard errors in parenthesis, ***, **, * shows significance at 1%, 5% and 10% respectively.

The above regressions also showed that the architecture of a country's health care financing system is important in influencing health outcomes. Tax-financed health care systems *(pub_financed)* have a statistically significant negative relationship with neonatal mortality rate while health care systems with no prepaid financing mechanisms *(oop_financed)* are positively and significantly related to the neonatal and infant mortality rates.

Neonatal Mortality and Financial Development: A 2SLS Approach

Before interpretation of the results of the instrumental variable approach, the validity of the instruments was tested using the Sargan-Hansen J test statistic of overidentification of all instruments and the Cragg-Donald Wald test for weak instruments. The results showed that all our instruments were valid and strong. The Cragg-Donald Wald test F statistic is greater than the suggested rule of thumb threshold of 10 and is also higher than the Stock and Yogo weak identification critical values at 10 percent.

The 2SLS regression approach results also showed that financial development is negatively and significantly related to the neonatal mortality rate. A 10 percent increase in ATMs per 100 000 people, commercial bank branches per 100 000 people, in broad money to GDP ratio and bank credit to the private sector, reduces the neonatal mortality rate by 0.8 percent, 1.2 percent, 3.3 percent and 3 percent respectively. Access to basic infrastructure as measured by access to potable water is negatively and significantly related to neonatal mortality. A 10 percent increase in the proportion of the population with access to potable water reduces infant mortality by between 3.6 and 4.9 percent. Table 5.4 below shows the entire results of the regression.

Table 5.4 Dependent Variable Log Neonatal Mortality Rate – 2SLS

Independent Variables	Fixed Effects Estimation			
	Model 5	Model 6	Model 7	Model 8
logATMS	-0.08*** (0.016)	-	-	-
logBankBranches	-	-0.12*** (0.02)	-	-
logBroadMoney	-	-	-0.33*** (0.08)	-
logBankPvt_credit	-	-	-	-0.3*** (0.076)
logINFRA	-0.49*** (0.177)	-0.49**** (0.13)	-0.41** (0.21)	-0.36* (0.2)
Loged	0.061 (0.068)	-0.042 (0.03)	-0.038 (0.034)	-0.05 (0.042)
logGDP_capita	-0.007 (0.028)	-0.039 (0.03)	-0.07** (0.029)	0.0061 (0.031)
pub_financed	0.012 (0.01)	-0.004 (0.008)	0.012 (0.016)	-0.008 (0.023)
oop_financed	0.03** (0.015)	0.004 (0.013)	0.002 (0.022)	0.004 (0.03)
Constant	6.01 (0.33)	6.01 (0.47)	6.8 (0.3)	5.9 (0.45)
R-squared	0.78	0.8	0.64	0.79
Number of Countries	32	44	46	46
Number of Observations	185	299	397	512
Hansen J test (p-value)	0.87	0.69	0.82	0.96
Cragg-Donald Wald F Statistic	29.62	36.29	43.3	23.49
Instrumental Variables	Perceived rule of law, Populations with mobile phones			

Note: Standard errors in parenthesis, ***, **, * shows significance at 1%, 5% and 10% respectively.

The other variables, like real GDP per capita and access to basic infrastructure, had the expected signs and were statistically significant for all the regression models. However, education level, despite having expected signs in three of the four equations, was not statistically significant in all the four regression models.

5.3.4 Infant Mortality and Financial Development

The study also explored the relationship between financial development and infant mortality using the benchmark equation provided in equation 5.1 above. The Hausman test was used to

choose between the fixed and random effects methods. The fixed and random effects regressions showed that financial development is also negatively related to infant mortality and the coefficients are statistically significant. The results are in line with the hypothesis which postulates that financial development leads to better health outcomes. The findings showed that a 10 percent increase in ATMs per 100 000 people reduces infant mortality by 0.5 percent. A similar increase in commercial bank branches per 100 000 people reduces infant mortality by 0.9 percent. A 10 percent growth in broad money to GDP ratio and bank credit to the private sector to GDP reduces infant mortality by 1.4 percent and 0.8 percent respectively. Table 5.5 shows the entire findings of these regressions.

Table 5.5 Infant Mortality and Financial Development

Independent Variables	Fixed Effects and Random Estimation			
	Fixed Effects Model 9	Fixed Effects Model 10	Fixed Effects Model 11	Random Effects Model 12
logATMS	-0.05*** (0.01)	-	-	-
logBankBranches	-	-0.09*** (0.03)	-	-
logBroadMoney	-	-	-0.14*** (0.03)	-
logBankPvt_credit	-	-	-	-0.08*** (0.026)
logINFRA	-1.04*** (0.368)	-0.9** (0.32)	-0.54** (0.22)	-0.51** (0.23)
Loged	-0.037 (0.064)	-0.05 (0.05)	-0.14*** (0.04)	-0.17*** (0.04)
logGDP_capita	-0.15*** (0.048)	-0.16*** (0.05)	-0.17*** (0.034)	0.16*** (0.033)
pub_financed	0.02 (0.022)	0.003 (0.012)	-0.031** (0.015)	-0.04** (0.016)
oop_financed	0.037** (0.013)	0.009 (0.014)	-0.005 (0.025)	-0.0009 (0.027)
Constant	9.68*** (1.46)	9.3*** (1.14)	8.6**** (0.73)	8.3*** (0.79)
R-squared	0.85	0.82	0.81	0.8
Number of Countries	44	45	46	46
Number of Observations	245	306	511	512
Breusch Pagan LM test (p-value)	-	-	-	0.000

Note: Standard errors in parenthesis, ***, **, * shows significance at 1%, 5% and 10% respectively.

Infant Mortality and Financial Development: A Two-Stage Least Squares (2SLS) Approach

Financial development indicators were also instrumented using the perceived rule of law and proportion of a population with access to mobile phones per 100 people. The results showed that financial development reduces infant mortality. A 10 percent increase in the number of ATMs per 100 000 people leads to a 1.0 percent reduction in the infant mortality rate, while a 10 percent increase in the number of commercial bank branches per 100 000 people reduces

the infant mortality rate by 1.4 percent. A similar growth in broad money to GDP and bank credit to the private sector to GDP ratios reduces infant mortality by 3.7 percent and 3.3 percent respectively. Table 5.6 below shows the results of the four regression models.

Table 5.6 Infant Mortality and Financial Development – 2SLS

Independent Variables	Random and Fixed Effects Estimation			
	Fixed Effects Model 13	Fixed Effects Model 14	Fixed Effects Model 15	Random Effects Model 16
logATMS	-0.1*** (0.02)	-	-	-
logBankBranches	-	-1.4*** (0.05)	-	-
logBroadMoney	-	-	-0.37*** (0.1)	-
logBankPvt_credit	-	-	-	-0.33*** (0.08)
logINFRA	-0.96** (0.39)	-0.8** (0.34)	-0.6* (0.31)	-0.51** (0.22)
Loged	0.074 (0.089)	-0.037 (0.05)	-0.037 (0.03)	-0.05 (0.053)
logGDP_capita	-0.073 (0.056)	-0.12** (0.053)	-0.15*** (0.046)	-0.07* (0.042)
pub_financed	0.025 (0.019)	-0.003 (0.013)	0.007 (0.021)	-0.01 (0.029)
oop_financed	0.044** (0.019)	0.002 (0.016)	-0.014 (0.024)	0.02 (0.033)
Constant	8.35 (0.7)	8.6 (1.33)	9.0 (0.92)	7.9 (0.7)
R-squared	0.82	0.81	0.73	0.68
Number of Countries	43	44	46	46
Number of Observations	243	299	397	397
Sargan-Hansen test (p-value)	0.99	0.33	0.52	0.37
Cragg-Donald Wald F Statistic	29.6	36.29	43.3	-
Instruments	Perceived rule of law, Populations with mobile phones			

Note: Standard errors in parenthesis, ***, **, * shows significance at 1%, 5% and 10% respectively.

5.3.5 Financial Development and Under-Five Mortality

The study explored the effect of financial development on the mortality of children under five years old. The set of regressions used in this analysis include immunisation coverage for diphtheria, pertussis (whooping cough) and tetanus (collectively, DPT diseases). According to the WHO (2018), immunisation currently averts an estimated 2 to 3 million deaths every year from DPT diseases and measles. The DPT vaccines are administered to children from 12 to 59 months. The relationship between financial development and deaths of children under five was explored using fixed and random effects regressions. Table 5.7 below shows the results of the regression analysis.

Table 5.7 Under-Five Mortality and Financial Development

Independent Variables	Random and Fixed Effects Estimation			
	Fixed Effects Model 17	Fixed Effects Model 18	Fixed Effects Model 19	Random Effects Model 20
logATMS	-0.074*** (0.021)	-	-	-
logBankBranches	-	-0.11*** (0.036)	-	-
logBroadMoney	-	-	-0.17*** (0.043)	-
logBankPvt_credit	-	-	-	-0.11*** (0.034)
logINFRA	-1.29*** (0.4)	-1.25*** (0.36)	-0.6** (0.299)	-0.52** (0.327)
Loged	0.001 (0.07)	-0. 08 (0.058)	-0.16*** (0.05)	-0.2*** (0.05)
logGDP_capita	-0.186*** (0.061)	-0.18*** (0.062)	-0.2*** (0.042)	-0.18*** (0.036)
logImmuneDPT	0.011 (0.09)	0.055 (0.051)	-0.09* (0.051)	-0.12** (0.026)
pub_financed	0.034 (0.021)	0.004 (0.013)	-0.062** (0.02)	-0.07** (0.03)
oop_financed	0.05** (0.019)	0.022 (0.018)	0.003 (0.03)	0.009 (0.03)
Constant	10.6*** (1.9)	11.19*** * (1.35)	10.13**** (0.93)	9.6*** (0.83)
R-squared	0.83	0.81	0.81	0.8
Number of Countries	44	45	46	46
Number of Observations	245	306	511	512
Breusch Pagan LM test (p-value)	-	-	-	0.00

Note: Standard errors in parenthesis, ***, **, * shows significance at 1%, 5% and 10% respectively.

The 2SLS was also used to estimate the effect of financial development on the mortality rate of children below five years. The results showed that financial development – as measured by the number of ATMs and commercial bank branches per 100 000 people, broad money and bank credit to the private sector as a percentage of GDP – is negatively related to the mortality rate of children below five years and the relationship is statistically significant. A 10 percent

increase in the number of ATMs and bank branches per 100 000 people caused a decline in under-five mortality by 1.4 percent and 2 percent respectively. The relationship is stronger with broad money and private bank credit to GDP ratios as a 10 percent increase in these variables led to a decline of 4.8 percent and 4.3 percent in the mortality rate of children below five years respectively. However, most of the variables that were significant in the linear models are no longer significant. These variables include female level of education *(loged)*, immunisation coverage *(logImmuneDPT)* as well as dummy variables for the health care financing system *(pub_financed and oop_financed)*. Table 5.8 below shows the results of the regression analysis.

Table 5.8 Under-Five Mortality and Financial Development – 2SLS

Independent Variables	Random and Fixed Effects Estimation			
	Fixed Effects Model 21	Fixed Effects Model 22	Fixed Effects Model 23	Random Effects Model 24
LogATMS	-0.14*** (0.047)	-	-	-
logBankBranches	-	-0.2*** (0.07)	-	-
logBroadMoney	-	-	-0.48*** (0.1)	-
logBankPvt_credit	-	-	-	-0.43*** (0.091)
logINFRA	-1.21*** (0.42)	-1.1*** (0.4)	-0.85** (0.32)	-0.67** (0.24)
Loged	0.14 (0.124)	-0. 05 (0.065)	-0.045 (0.05)	-0.07 (0.06)
logGDP_capita	-0.08 (0.075)	-0.12* (0.063)	-0.17*** (0.056)	-0.07* (0.045)
logImmuneDPT	0.16 (0.122)	0.059 (0.051)	0.09 (0.1)	0.035 (0.026)
pub_financed	0.031 (0.021)	0.004 (0.013)	-0.006 (0.024)	-0.02 (0.03)
oop_financed	0.06** (0.019)	0.006 (0.022)	0.027 (0.029)	0.032 (0.037)
Constant	8.8 (2.4)	10.1 (1.6)	10.6 (1.0)	9.1 (0.73)
R-squared	0.83	0.79	0.74	0.8
Number of Countries	44	44	46	46
Number of Observations	245	299	397	397
Sargan statistic (p-value)	0.99	0.41	0.72	-
Sargan-Hansen test (p-value)	-	-	-	0.55
Cragg-Donald Wald F Statistic	29.6	36.29	38.6	-
Instruments	Perceived rule of law, Populations with mobile phones			

Note: Standard errors in parenthesis, ***, **, * shows significance at 1%, 5% and 10% respectively.

5.3.6 Life Expectancy and Financial Development

The study also explored the relationship between financial development and life expectancy, using the fixed effects approach. The results showed that financial development indicators are

positively related to life expectancy. A 10 percent increase in ATMs and commercial bank branches per 100 000 people results in a 0.23 percent and 0.3 percent increase in life expectancy respectively. A similar increase in financial development as measured by the proportion of broad money and bank credit to the private sector to GDP ratios is associated with a 0.58 percent and 0.5 percent increase in life expectancy at birth respectively. Table 5.9 below shows the results of the regression analysis.

Table 5.9 Life Expectancy and Financial Development

Independent Variables	Fixed Effects Estimation			
	Model 25	Model 26	Model 27	Model 28
logATMS	0.023*** (0.024	-	-	-
logBankBranches	-	0.03*** (0.008)	-	-
logBroadMoney	-	-	0.058*** (0.016)	-
logBankPvt_credit	-	-	-	0.05*** (0.013)
logINFRA	0.21 (0.2)	0.21* (0.15)	0.06 (0.14)	0.03 (0.16)
Loged	-0.02 (0.078)	0.005 (0.016)	0.04 (0.02)	0.03* (0.02)
logGDP_capita	0.052** (0.023)	0.05** (0.025)	0.05*** (0.01)	-0.04*** (0.012)
logHIV_Prev	0.003 (0.11)	-0.012 (0.022)	-0.005** (0.024)	-0.06*** (0.01)
pub_financed	-0.003 (0.007)	0.001 (0.003)	0.01* (0.007)	0.015** (0.005)
oop_financed	-0.004 (0.004)	0.002 (0.005)	0.01 (0.013)	0.001 (0.01)
Constant	2.8 (0.57)	2.7 (0.38)	3.11 (0.5)	3.3 (0.32)
R-squared	0.69	0.7	0.58	0.6
Number of Countries	42	43	46	44
Number of Observations	238	297	494	495

Note: Standard errors in parenthesis, ***, **, * shows significance at 1%, 5% and 10% respectively.

Financial Development and Life Expectancy – Two-Stage Least Squares (2SLS) Approach

The results of the 2SLS regression analysis showed that financial development, as measured by the number of ATMs and commercial bank branches per 100 000, bank credit to the private sector to GDP and broad money to GDP ratios, is positively and significantly related to life expectancy. Table 5.10 shows the relationship between financial development and life expectancy using the instrumental variable approach.

Table 5.10 Life Expectancy and Financial Development – 2SLS approach

Independent Variables	Fixed Effects Estimation			
	Model 29	Model 30	Model 31	Model 32
logATMS	0.073*** (0.024)	-	-	-
logBankBranches	-	0.09*** (0.029)	-	-
logBroadMoney	-	-	0.13*** (0.039)	-
logBankPvt_credit	-	-	-	0.12*** (0.029)
logINFRA	0.14 (0.17)	0.01 (0.02)	0.03 (0.15)	0.001 (0.13)
Loged	-0.1* (0.058)	-0.003 (0.02)	-0.01 (0.02)	0.007 (0.02)
logGDP_capita	-0.02 (0.046)	0.13 (0.11)	0.057*** (0.01)	0.04* (0.014)
logHIV_Prev	0.042 (0.047)	0.01 (0.03)	-0.06*** (0.025)	-0.05** (0.022)
pub_financed	-0.005 (0.012)	0.007 (0.009)	-0.003 (0.006)	0.002 (0.007)
oop_financed	-0.016* (0.009)	0.007 (0.008)	0.006 (0.009)	0.003 (0.012)
Constant	3.9 (0.69)	3.27 (0.45)	3.2 (0.49)	3.5 (0.47)
R-squared	0.52	0.58	0.6	0.52
Number of Countries	41	42	44	44
Number of Observations	236	291	385	385
Sargan-Hansen test (p-value)	0.1	0.63	0.59	0.4
Cragg-Donald Wald F Statistic	26.0	39.8	36.1	17.7
Instruments	Perceived rule of law, Populations with mobile phones			

Note: Standard errors in parenthesis, ***, **, * shows significance at 1%, 5% and 10% respectively.

5.4 Discussion of Findings

Financial Development

The results of the regressions analysis confirm the hypothesis that the chapter aimed to test. The results showed that financial development causes an improvement in the health status of a country's population as measured by child health outcomes. In models 1, 5, 9, 13, 17 and 21,

the number of ATMs per 100 000 people was found to be negatively and significantly related to child health outcomes. The reduction in mortality associated with a 10 percent increase in financial access ranged from 0.4 percent to 1.4 percent. In models 21 and 25, the number of ATMs per 100 000 people is positively and significantly related to life expectancy and a 10 percent increase in the number of ATMs per 100 000 people led to a 0.23 and 0.73 percent decline in child mortality. Similar results were found with the number of commercial bank branches per 100 000 people, which also measures the level of financial access. Access to financial services is important for health for two major reasons – access to credit and savings. Access to financial services enables households to invest in health and health-enhancing products. Households are able to borrow and save for the purpose of financing health-related expenditures. Additionally, access to financial services by health service institutions also yields positive health outcomes. According to Reinhardt (1986), access to financial capital is essential for any health care organisation that would respond to changes in its community, acquire new technologies and replace old equipment, renovate or replace deteriorated facilities, offer new programmes or new services, or make changes to improve productivity or enhance quality.

The ratios of broad money and bank credit to the private sector to GDP are also negatively and significantly related to child health outcomes. These ratios mainly measure the intermediary depth of the financial sector relative to the national economy. Deep financial sectors are critical for yielding positive health outcomes as household and firms can borrow to invest in health capital (Demirgüç-Kunt & Levine, 2009). The results showed that a 10 percent increase in broad money to GDP ratio is associated with a decline in child mortality ranging from 0.95 percent to 3.7 percent. A 10 percent increase in the broad money GDP ratio increases life expectancy at birth from 0.45 percent to 1.3 percent. A similar increase in the ratio of bank credit to the private sector to GDP reduces child mortality by between 0.46 percent and 4.3 percent. The results are similar to the findings of Claessens and Feijen (2006), who found an elasticity of -0.34 between private sector credit to GDP and under-five mortality. In terms of bank credit to GDP ratio and life expectancy, a 10 percent increase in bank credit to GDP ratio leads to an increase of between 0.5 percent and 1.2 percent in life expectancy. The findings on the effect of financial development and health outcomes reinforces findings of previous studies by Beck, Demirgüç-Kunt and Levine (2004), Claessens and Feijen (2006b), Bhatta (2013) and Reliwak (2013).

Control Variables

Access to basic infrastructure: Access to infrastructure as proxied by the percentage of the population with access to safe drinking water is negatively and significantly associated with child health outcomes. The findings are in line with the literature as access to basic services like water, sanitation, roads and electricity are critical for better health outcomes. Country level and cross-country level studies by Woldemicael (2000), Alemu (2015) Ezeh (2015), Sommer (2015) showed that access to water significantly reduce the incidence of child mortality. In all the 24 regression models that focused on child mortality, access to basic infrastructure is negatively and significantly related to child mortality (neonatal, infant and under-five). The elasticity ranged from -0.49 to -1.29 showing that access to infrastructure is a key factor in reducing deaths among children below five years. In all the linear random and fixed effects regressions on life expectancy at birth, access to basic infrastructure is also statistically significant but in the 2SLS regressions, it is only significant in one of the four regression equations and has the expected sign.

Income (Real GDP per capita): Real GDP per capita is significantly and negatively related to child health outcomes in all the linear random and fixed effect regression models except one. However, in the 2SLS, some of the coefficients are insignificant although the bulk of them are correctly signed except one. Generally, the findings confirm the hypothesis that income growth is critical for a country to attain better health outcomes. Previous studies by Bigs, Basu & Stackler (2010), Nishiyama & Asiedu (2015) found similar results in which GDP per capita was negatively and significantly related to child health outcomes.

Level of Education: In most of the regression equations level of education is negatively and significantly related to child health outcomes. In instances where it carried a positive sign, it was not statistically significant. These results support findings from earlier studies done by Mukherjee & Kizhakethalackel (2012), Shapiro & Tenikue (2015) and Bado & Susuman (2016). These studies showed that female education is very crucial in reducing child mortality in developing regions including SSA.

Health Care Financing System: The results confirmed that health care systems that do not require upfront payment by households to access health services are negatively related to child health outcomes, as shown by the negative coefficient of the tax-financed dummy variables (pub_financed) and positive coefficients of OOP-financed health care systems. Chou, Grossman & Liu (2011) and Bagnoli (2017) also found that health systems with prepayment

mechanisms have better child health outcomes as opposed to those relying on upfront payments.

Immunisation Coverage: In the linear fixed and random effects models, immunisation is both positively and negatively related to under-five mortality. However, in instances where the coefficients are positively signed, the variable is not statistically significant. In the 2SLS fixed and random effects models, the variable is not statistically significant. McGovern and Canning (2015) and Oliwa and Marais (2015) also found that vaccination of children against diseases leads to a decline in child mortality.

HIV Prevalence: This variable was also added as an extension to the benchmark model on financial development and life expectancy. The variable is negatively and significantly related to life expectancy in four of the eight regressions run. In the other four, the coefficients are positive but not statistically significant. The results are supported by findings from other studies like that Lai, Tsai and Hardy (1997) and Mba (2007) which showed that elimination of AIDS leads to gains in life expectancy.

Granger Causality Test

In addition to controlling for reverse causality, the study also tested for direction causality in the sense of Granger (1969). The study estimated a panel vector autoregression model and carried out a panel Granger causality test as proposed by Hartwig (2009) as well as Abrigo and Love (2015). Broadly, the results show that there is bi-causality between financial development and health outcomes. However, the direction of causality depends on the proxies used to measure both financial development and health outcomes. Financial development, as measured by the number of ATMs, Granger-cause a reduction in neonatal mortality. On the other hand, neonatal mortality Granger-causes financial development as measured by the proportion of bank credit to the private sector to GDP. The complete results are shown in Table 5.11 below.

Table 5.11 Granger Causality Test

Variable	Financial development does not Granger-cause health outcomes				Health outcomes do not Granger-cause financial development			
	logNeoMort	logInfantMort	logU5Mort	logLife_Exp	logNeoMort	logInfantMort	logU5Mort	logLife_Exp
logATMS	2.36* 0.09	0.32 0.95	0.61 0.76	0.59 0.77	0.47 0.62	0.18 0.99	0.5 0.84	1.6 0.14
logBankBranches	1.82 0.12	0.86 0.55	1.27 0.26	0.75 0.64	0.96 0.42	1.71 0.10	0.78 0.6	5.37 1.E05
logBroadMoney	0.83 0.55	0.92 0.49	0.52 0.79	0.55 0.76	1.29 0.29	0.71 0.67	0.81 0.56	1.6 0.13
logBankPvt_credit	0.72 0.65	0.17 0.99	0.47 0.85	0.73 0.61	2.2** 0.03	1.13 0.33	1.48 0.17	1.97* 0.06

Note: ***, **, * shows significance at 1%, 5% and 10% respectively.

The weak causality between financial development and health outcomes can be attributed to low levels of financial development in SSA. As alluded in Chapter 2, the level of financial development remains very low, despite the great strides that were achieved in the aftermath of the liberalisation of the financial sectors of many countries in the SSA region. Financial services remain inaccessible to many poor households who face challenges related to health care access.

Robustness Test

The study tested the stability of the model run in the above regressions using the Chan, Mancini-Griffoli and Pauwels (2006) test for heterogeneous panel data. The data was divided into two samples of 10-year periods each. The first sample covered a 10-year period from 1995 to 2004 and the second sample covered the period from 2005 to 2014. Fixed and regressions effects estimation methods were applied and the parameters from the two samples were compared to assess stability and evolution. A total of eight regressions were run for model stability testing in each decade. In the first decade studied, the financial development indicators were not significant in four out of the eight regression estimations. However, in the second decade, all the financial development indicators were statistically significant. The results showed that the differences between the two samples for each regression model were statistically significant. Financial development played an increased role in improving health outcomes in the second half of the study period. The early 1990s was an era of financial

deregulation in the SSA region and the magnitude of the impact of such policy reforms increased over time.

5.5 Conclusion

This chapter aimed to determine the effect of financial development on child health outcomes that include neonatal, infant and under-five mortality as well as life expectancy at birth in years. Financial development was measured using four indicators to capture both the access and depth dimensions of financial development. These indicators included the number of ATMs and commercial bank branches per 100 000 people and the ratios of broad money and bank credit to the private sector to GDP. A set of control variables were used in the regression analyses which included measures of access to infrastructure, real GDP per capita, the source of health care financing and level of education. These variables were tested for stationarity to avoid running spurious regressions. The regressions were also tested for heteroskedasticity and autocorrelation and these were corrected using robust standard errors as provided in the econometrics literature. Fixed and random effects estimation methods were used as guided by the robust Hausman test. To control for the endogeneity or simultaneity bias, a Two-Stage Least Squares approach was adopted. The results of both linear and 2SLS fixed and random effects regression methods showed that financial development leads to a reduction in child mortality (neonatal, infant and under-five). The results also showed that financial development is key in improving life expectancy. Control variables that had a significant impact on reducing child mortality include access to infrastructure, income (real GDP per capita), female education, immunisation coverage and level of education. The analysis also showed that sources of health care financing are key in determining health outcomes as tax-financed health care systems reduce child mortality whereas health care systems financed by OOP health care expenditure perpetuate child deaths.

Chapter 6 Health Care Expenditure and Health Outcomes in sub-Saharan African Countries

6. Introduction

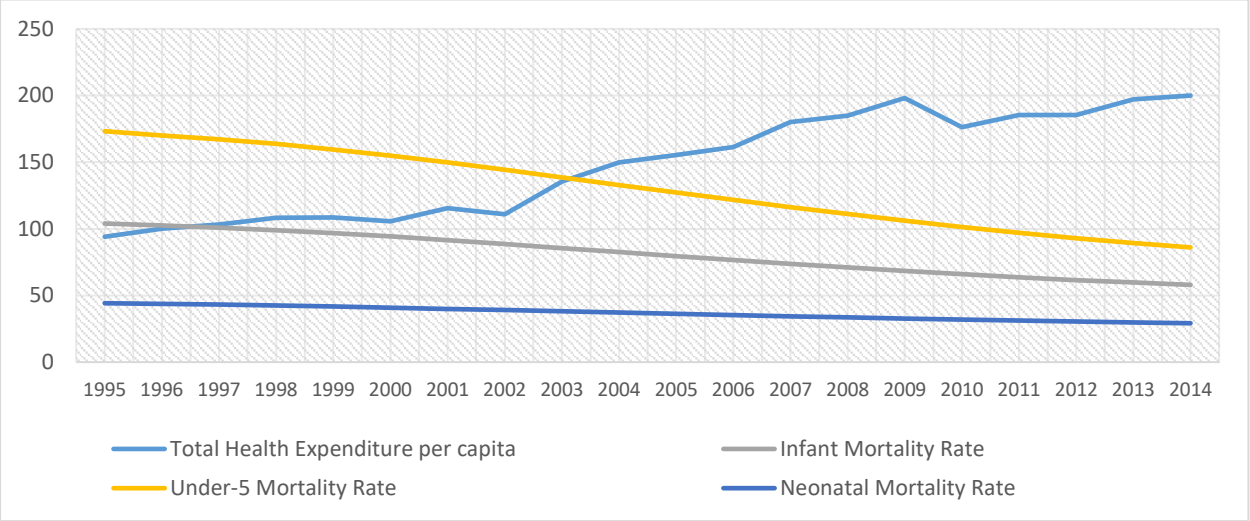
Sustainable health care financing has been one of the key development issues in recent times as developing countries seek to achieve universal health coverage. Financing of universal health coverage requires predictability in the level of public funding over a period of years and dominant reliance on compulsory funding, among other factors (McIntyre & Kutzin, 2016). In addition to increasing the stability and predictability of funding, expenditure on health needs to be increased to levels that enable the achievement of basic health services provision. In SSA, health care financing is beset by challenges that include the absence of mandatory prepayment health care financing mechanisms, low government revenue and inadequate accountability mechanisms (McIntyre & Meheus, 2014). As a result of these factors, health care expenditure per capita remains very low and the health funding gap continues to rise. Limited funding yields poor health outcomes as the citizenry lacks access to basic health services.

Government revenue is the major source of stable development finance for many SSA countries and the revenue base can be further expanded through tax reforms and financial development. Reforms of tax legislation, systems and structures are key to unlocking more funds to allocate to the health sector, as well as addressing the issue of illicit financial flows and losses through transfer mispricing, corruption, double taxation agreements and tax evasion (Bokosi, 2015). Additionally, the promotion of financial development is crucial in availing development finance for health. Well-developed financial sectors are capable of mobilising resources required to fund health care expenditure and related investments as countries with well-developed financial sectors have large revenue bases that ensure increased expenditure on health.

6.1 Health Care Expenditure and Health Outcomes

The literature on the determinants of health outcomes has shown that health care expenditure by governments and households is crucial to improving the health status of the citizens of a country (Moreno-Serra & Smith, 2001; Akinkugbe & Mohanoe, 2009; Gani, 2009). In SSA, growth in health care expenditure from 1995 to 2014 coincided with a decline in child mortality (neonatal, infant and under-five), as depicted in figure 6.1.

Figure 6.1 Health Care Expenditure and Child Health Outcomes in SSA (1995–2014)



Source: World Development Indicators, 2016

6.2 Methodology

The study used panel data from 46 SSA countries from 1995 to 2014. The study used three indicators of health care expenditure, namely total health care expenditure per capita, public health care expenditure to GDP ratio and private health care expenditure to GDP ratio. As described in the previous chapter, health outcomes were also measured by four indicators: neonatal, infant and under-five mortality rates, as well as life expectancy at birth in years.

Model Specification

Following the model by Grossman (1972), in which health status is a function of health inputs, a macro-level model was used to determine the effect of health care expenditure on health outcomes. The equation used in this study is specified as follows:

$$lnH_{it} = \alpha_0 + \beta_{it} lnHE_{it} + \beta_{it} lnED_{it} + lnGDP_{it} + \beta_{it} lnINFRA_{it} + \beta_{it} HFS + e_{it} \quad \text{.....(6.1)}$$

Where,

H represents health outcomes as measured by neonatal mortality, infant mortality, under-five mortality and life expectancy.

HE represents health care expenditure. *HE* was expected to be positively related to health outcomes.

ED represents the country's level of education as measured by female enrolment. ED was expected to be positively related to health care expenditure.

HFS measures the country's health care financing structure, whether it is tax-financed or OOP-financed.

INFRA is a proxy for access to basic infrastructure like water, sanitation, electricity and roads.

The benchmark model (equation 6.1) was extended by adding immunisation coverage *(ImmuneDPT)* and human immunodeficiency virus (HIV) prevalence (*HIV_Prev)*. Immunisation of children against three diseases is vital as far as the prevention of under-five deaths is concerned. Children aged 12–23 months are vaccinated against diphtheria, pertussis (whooping cough), and tetanus. The vaccination does not cover neonates and infants. Immunisation coverage was expected to be negatively related to under-five mortality.

HIV prevalence (*HIV_Prev)* was also added to the baseline model with life expectancy at birth as an independent variable. This was done to capture the effect of the disease burden on adult mortality. SSA is the worst-affected region globally in terms of people living with HIV and deaths related to the virus. In the absence of life-prolonging antiretroviral drugs, HIV results in the reduced life expectancy of the infected population.

6.3 Results and Discussion

6.3.1 Descriptive Statistics

This section provides descriptive statistics of the pooled data from 1995 to 2014 for 46 SSA countries. Total health care expenditure per capita averaged US$174.3 and total health care expenditure to GDP stood at 5.4 percent in the period. Table 6.1 shows the descriptive statistics for health care expenditure variables used in this chapter.

Table 6.1 Descriptive Statistics

Variable	No. of observations	Mean	Standard Dev	Min	Max
Total Health care expenditure per capita (Constant 2011 PPP prices)	912	174.3	220	5.9	1768.6
Public Health care expenditure to GDP (%)	912	2.4	12	0.04	9.0
Private Health care expenditure to GDP (%)	912	2.9	1.6	0.18	11.0

Source: World Development Indicators, 2016

6.3.2 Diagnostic Tests

Testing for Stationarity

This section presents the stationarity test results on health care expenditure variables (see Chapter 5 for stationarity test results of other variables). The Fisher-type (ADF) test was used because the panels are unbalanced. The tests showed that all the data series in their logarithmic form were stationary. Table 6.2 shows the results of the panel unit roots.

Table 6.2 Panel Unit Root Test

Variable	Fisher-Type ADF Test	Result
	Model with trend	
logTHE_capita	172.5***	I(0)
logPubHE2GDP	129.5***	I(0)
LogPvtHE2GDP	143.7***	I(0)

Note: ***, **, * shows significance at 1%, 5% and 10%.

Other Diagnostic Tests

The data was also tested for the presence of heteroskedasticity and autocorrelation. The null hypothesis of no heteroskedasticity and autocorrelation was rejected. These problems were addressed using robust standard errors.

Fixed vs Random Effect Estimation Approach

The choice of random versus fixed effect methods was made using a robust Hausman test due to the presence of heteroskedasticity. The fixed effects method was selected as the appropriate method for estimating the effect of health care expenditure on neonatal mortality and life

expectancy for all the financial development indicators. The estimation of the infant and under-five mortality was done using fixed and random effects as determined by the Hausman test.

However, econometrics literature has shown that the results of the fixed and random effect estimation approach may be biased due to the problem of endogeneity resulting from temporary measurement errors and omission of variables that affect health outcomes and reverse causality. The level of a country's health outcomes is, among other factors, determined by the level of health care expenditure. However, expenditure may vary in response to the level of health outcomes. High child mortality may trigger government and donor agencies to spend more on a country's health sector to reverse the high mortality trend. In the absence of valid instruments for health care expenditure variables, the study used the General Method of Moments (GMM) approach to address the problem of endogeneity. The approach allows the extraction of the exogenous component of health care expenditure variables. The Sargan test of overidentifying restrictions showed that the instruments are valid. The Arellano and Bond test (Arellano & Bond, 1991) shows there is no serial correlation of second order (AR2). The results presented in this study are based on the two-step difference GMM method which is robust to heteroskedasticity and also corrected for the downward bias using robust standard errors (Windmeijer, 2005). The regressions passed these tests and are discussed in the remaining sections of this chapter.

6.3.3 Neonatal Mortality and Health Care Expenditure

The results of the fixed effects regression analysis showed that health care expenditure, as measured by total health care expenditure per capita and private health care expenditure to GDP, is negatively and significantly related to neonatal mortality. The results showed that a 10 percent increase in total health care expenditure per capita and private health care expenditure to GDP leads to a 1.2 and 0.8 percent reduction in neonatal mortality rate respectively. Although public health care expenditure to GDP is not statistically significant, it has the expected sign. The study also showed that access to basic infrastructure *(logINFRA)*, real GDP per capita *(logGDP_capita)* and education level *(logED)* are also statistically and negatively related to neonatal mortality rate. The complete results are shown in Table 6.3 below.

Table 6.3 Health Care Expenditure and Neonatal Mortality Rate

Independent Variables	Fixed Effects Estimation		
	Model 1	Model 2	Model 3
Log THE_capita	-0.12***	-	-
	(0.03)		
Log PubHE2GDP	-	-0.04	-
		(0.02)	
Log Pvt2GDP	-	-	-0.08**
			(0.03)
LogINFRA	-0.27	-0.36**	-0.37**
	(0.17)	(0.16)	(0.16)
Log Education	-0.16***	-0.18***	-0.17***
	(0.04)	(0.03)	(0.03)
Log GDP per capita	-0.06**	-0.11***	-0.12***
	(0.02)	(0.02)	(0.02)
Government-financed HS	0.013	-0.01	-0.035
	(0.01)	(0.02)	(0.01)
OOP-financed HS	0.004	0.01	0.008
	(0.02)	(0.03)	(0.02)
Constant	6.25***	6.3***	6.5***
	(0.71)	(0.53)	(0.54)
R-squared	0.79	0.76	0.77
Number of Countries	46	46	46
Number of Observations	533	533	533

Note: Standard errors in parenthesis, ***, **, * shows significance at 1%, 5% and 10% respectively.

Neonatal Mortality and Health Care Expenditure: A GMM Approach

The results of the GMM regressions also showed that health care expenditure as measured by total health care expenditure per capita and private health care expenditure to GDP is negatively and significantly related to neonatal mortality rate. A 10 percent increase in total health care expenditure per capita and private health care expenditure to GDP reduces the neonatal mortality rate by 0.5 percent and 0.6 percent respectively. However, public health care expenditure was positively and significantly related to neonatal mortality, which was contrary to expectations. The contrary result can be explained by inefficiency and ineffectiveness of public health expenditure in SSA. The efficiency and effectiveness of public health expenditure in SSA is greatly limited by a number of factors which include bad governance,

corruption, poor quality of institutions (Novignon, 2015). These factors inhibit health care expenditure to reach the intended beneficiaries leaving health outcomes to worsen unabated.

Access to basic infrastructure, real GDP per capita and level of education are negatively and significantly related to neonatal mortality. The results also showed that the health care financing system is a crucial determinant of health outcomes as government-financed health care systems were negatively related to infant mortality rate. Table 6.4 below shows the entire results of the two-step standard GMM regressions.

Table 6.4 Neonatal Mortality and Health Care Expenditure – A Two-Step Standard GMM Approach

Independent Variables	Two-Step Standard GMM		
	Model 4	Model 5	Model 6
Log THE_capita	-0.05*** (0.02)	-	-
Log PubHE2GDP	-	0.04* (0.02)	-
Log Pvt2GDP	-	-	-0.06** (0.03)
LogINFRA	-0.71*** (0.18)	-0.86*** (0.2)	-0.7*** (0.19)
Log Education	0.08*** (0.019)	-0.05** (0.02)	-0.05* (0.03)
Log GDP per capita	-0.03* (0.018)	-0.03** (0.01)	-0.05*** (0.019)
Government-financed HS	-0.07** (0.03)	-0.10 (0.04)	-0.101*** (0.037)
OOP-financed HS	0.008 (0.02)	0.02 (0.01)	0.05 (0.038)
Wald χ^2 Test, (p-value)	170.8 (0.00)	188.8 (0.00)	156.15 (0.00)
Number of Countries	45	45	45
Number of Observations	404	403	404
Number of Instruments	40	39	40
Arellano and Bond Test (p-value)	AR(2) (0.17)	AR(2) (0.32)	AR(2) (0.49)
Hansen test of overid. Restrictions (p-value)	0.31	0.51	0.34

Note: Standard errors in parenthesis, ***, **, * shows significance at 1%, 5% and 10% respectively.

6.3.4 Infant Mortality and Health Care Expenditure

The fixed and random effects regressions showed that health care expenditure is negatively related to the infant mortality rate and the coefficients are statistically significant. The results showed that a 10 percent increase in health care expenditure per capita, public expenditure to GDP and private expenditure to GDP reduces infant mortality by 1.5 percent, 0.7 percent and 1.6 percent respectively. The results also showed that access to basic infrastructure, real GDP per capita and level of education are negatively related to infant mortality. Table 6.5 shows the entire results of the fixed and random effects regression analysis.

Table 6.5 Infant Mortality and Health Care Expenditure

Independent Variables	Fixed and Random Effects Estimation		
	Fixed Effects Model 7	Fixed Effects Model 8	Random Effects Model 9
Log THE_capita	-0.15*** (0.05)	-	-
Log PubHE2GDP	-	-0.07** (0.03)	-
Log Pvt2GDP	-	-	-0.16*** (0.05)
LogINFRA	0.19 (0.22)	-0.3** (0.21)	-0.31** (0.21)
Log Education	-0.23*** (0.04)	-0.25*** (0.04)	-0.23*** (0.04)
Log GDP per capita	-0.14*** (0.04)	-0.19*** (0.03)	0.21*** (0.03)
Government-financed HS	-0.0006 (0.02)	0.023 (0.03)	-0.03 (0.02)
OOP-financed HS	0.009 (0.026	-0.01 (0.02)	0.012 (0.29)
Constant	7.6*** (0.72)	7.7**** (0.73)	7.9*** (0.69)
R-squared	0.85	0.78	0.79
Number of Countries	46	46	46
Number of Observations	533	533	533
Breusch Pagan LM test (p-value)	-	0.000	-

Note: Standard errors in parenthesis, ***, **, * shows significance at 1%, 5% and 10% respectively.

Infant Mortality and Health Care Expenditure: A Two-Step Standard GMM Approach

The results of the two-step difference GMM approach showed that a 10 percent increase in health care expenditure per capita leads to a 2.8 percent reduction in the infant mortality rate, while a 10 percent increase in public health care expenditure to GDP reduces the infant mortality rate by 6.4 percent. A similar growth in private health care expenditure to GDP reduces infant mortality by 0.8 percent. Access to basic infrastructure, real GDP per capita and level of education were found to be negatively and significantly related to the infant mortality rate.

Table 6.6 below shows the results of the three regression models.

Table 6.6 Infant Mortality and Health Care Expenditure –Two-Step Standard GMM

Independent Variables	Two-Step Standard GMM		
	Model 10	Model 11	Model 12
Log THE_capita	-0.28*** (0.09)	-	-
Log PubHE2GDP	-	-0.03 (0.06)	-
Log Pvt2GDP	-	-	-0.08* (0.04)
LogINFRA	-0.56** (0.27)	-0.64** (0.31)	-0.70*** (0.24)
Log Education	-0.05 (0.03)	-0.11*** (0.03)	-0.09*** (0.03)
Log GDP per capita	-0.06** (0.03)	-0.15*** (0.03)	-0.17*** (0.04)
Government-financed HS	-0.009 (0.07)	-0.04 (0.03)	-0.06 (0.05)
OOP-financed HS	-0.001 (0.03)	0.02 (0.07)	0.02 (0.05)
Wald χ^2 Test, (p-value)	143.0 (0.00)	158.0 (0.00)	122.5 (0.00)
Number of Countries	45	45	45
Number of Observations	329	329	329
Number of Instruments	32	32	32
Arellano and Bond Test (p-value)	AR(2) 0.39	AR(2) 0.15	AR(2) 0.23
Hansen test of overid. Restrictions (p-value)	0.55	0.29	0.19

Note: Standard errors in parenthesis, ***, **, * shows significance at 1%, 5% and 10% respectively.

6.3.5 Health Care Expenditure and Under-Five Mortality

The study also explored the effect of health care expenditure on mortality of children under five years. The set of regressions used in this analysis included immunisation coverage for diphtheria, pertussis and tetanus (DPT) as additional explanatory variables. The effect was firstly explored using fixed and random effects regressions and, secondly, using the difference GMM approach. The results of the fixed and random effects estimations showed that health care expenditure is negatively and significantly related to the under-five mortality rate. A 10 percent increase in total health care expenditure per capita, public health care expenditure to GDP and private health care expenditure to GDP leads to a decline in the under-five mortality

rate by 1.8 percent, 0.8 percent and 1.7 percent respectively. Table 6.7 below shows the result of the regression analysis.

Table 6.7 Under-Five Mortality and Health Care Expenditure

Independent Variables	Random and Fixed Effects Estimation		
	Model 13 Fixed Effects	Model 14 Random Effects	Model 15 Fixed Effects
Log THE_capita	-0.18*** (0.06)	-	-
Log PubHE2GDP	-	-0.08* (0.05)	-
Log Pvt2GDP	-	-	-0.17* (0.06)
LogINFRA	-0.17 (0.27)	-0.32 (0.25)	-0.21 (0.32)
Log Education	-0.28*** (0.06)	-0.31*** (0.06)	-0.28*** (0.06)
Log GDP per capita	-0.16*** (0.04)	-0.22*** (0.04)	-0.24*** (0.04)
logImmune_DPT	-0.07 (0.05)	-0.05 (0.05)	-0.07 (0.05)
Government-financed HS	-0.02 (0.03)	-0.0002 (0.04)	-0.06 (0.04)
OOP-financed HS	0.001 (0.03)	-0.008 (0.03)	-0.02 (0.03)
Constant	8.7*** (0.88)	8.96 (083)	9.18 (0.84)
R-squared	0.79	0.77	0.78
Number of Countries	46	46	46
Number of Observations	533	533	533
Breusch Pagan LM test (p-value)	-	0.000	-

Note: Standard errors in parenthesis, ***, **, * shows significance at 1%, 5% and 10% respectively.

Under-Five Mortality and Health Care Expenditure: A Two-Step GMM Approach

The results of the standard GMM regressions showed that total health care expenditure per capita and private health care expenditure to GDP are negatively related to under-five mortality and the relationship is statistically significant. A 10 percent increase in total health care expenditure per capita and private health care expenditure to GDP results in a decline in under-five mortality by 3.4 percent and 1.5 percent respectively. Public health care expenditure had

an expected sign although it was not statistically significant. Real GDP per capita, access to infrastructure and level of education were some of the statistically significant determinants of the under-five mortality rate. Table 6.8 below shows a complete set of results of the regression analysis.

Table 6.8 Under-Five Mortality and Health Care Expenditure – Two-Step Standard GMM

Independent Variables	Two-Step Standard GMM		
	Model 16	Model 17	Model 18
Log THE_capita	-0.34*** (0.10)	-	-
Log PubHE2GDP	-	-0.10 (0.08)	-
Log Pvt2GDP	-	-	-0.15* (0.09)
LogINFRA	-0.76** (0.30)	-1.0*** (0.36)	-0.97*** (0.35)
Log Education	-0.7* (0.04)	-0.045 (0.05)	-0.11** (0.05)
Log GDP per capita	-0.05 (0.05)	-0.15** (0.05)	-0.24** (0.09)
logImmune_DPT	0.24 (0.22)	0.28 (0.35)	0.33 (0.32)
Government-financed HS	0.07 (0.05)	-0.1* (0.06)	-0.16* (0.09)
OOP-financed HS	0.01 (0.05)	-0.03 (0.08)	0.02 (0.09)
Wald χ^2 Test, (p-value)	86.6 (0.00)	154.76 (0.00)	160.45 (0.00)
Number of Countries	45	45	42
Number of Observations	333	331	333
Number of Instruments	32	32	32
Arellano and Bond Test (p-value)	0.17	0.15	0.18
Hansen test of overid. Restrictions (p-value)	0.81	0.59	0.34

Note: Standard errors in parenthesis, ***, **, * shows significance at 1%, 5% and 10%.

6.3.6 Health Care Expenditure and Life Expectancy

The study also explored the relationship between health care expenditure and life expectancy from birth, using the fixed effects approach. The results showed that health care expenditure, as measured by total health care expenditure per capita, public health care expenditure to GDP

and private health care expenditure to GDP, are all positively and significantly related to life expectancy at birth. A 10 percent increase in total health care expenditure per capita, public health care expenditure to GDP and private health care expenditure to GDP results in a 0.5 percent, 0.2 percent and 0.6 percent increase in life expectancy respectively. Table 6.9 below shows the results of the regression analysis.

Table 6.9 Life Expectancy and Health Care Expenditure

Independent Variables	Fixed Effects Estimation		
	Fixed Effects Model 17	Fixed Effects Model 19	Fixed Effects Model 20
Log THE_capita	0.05** (0.02)	-	-
Log PubHE2GDP	-	0.02* (0.01)	-
Log Pvt2GDP	-	-	0.06*** (0.02)
LogINFRA	-0.034 (0.11)	0.004 (0.11)	0.02 (0.07)
Log Education	0.053** (0.025)	0.062** (0.25)	0.05*** (0.02)
Log GDP per capita	0.042** (0.06)	0.064*** (0.01)	0.058*** (0.01)
logHIV_Prev	-0.074** (0.02)	-0.05** (0.025)	-0.06*** (0.01)
Government-financed HS	0.01 (0.09)	-0.002 (0.011)	0.02* (0.01)
OOP-financed HS	0.01 (0.013)	-0.02 (0.01)	0.004 (0.01)
Constant	3.45*** (0.37)	3.3 (0.37)	3.28 (0.25)
R-squared	0.6	0.57	0.6
Number of Countries	44	44	44
Number of Observations	516	516	516

Note: Standard errors in parenthesis, ***, **, * shows significance at 1%, 5% and 10% respectively.

Health care expenditure and Life Expectancy – A Two-Step GMM Approach

The study also explored the effect of health care expenditure on life expectancy using the standard two-step GMM approach and the results showed that health care expenditure is positively and significantly related to life expectancy at birth. The results showed that a 10 percent increase in health care expenditure per capita and public health care expenditure to GDP leads to a 0.5 percent increase in life expectancy. A similar increase in private health care expenditure to GDP leads to a 0.8 percent increase in life expectancy. The results also showed that education and real GDP per capita are positively related to life expectancy. However, HIV prevalence is negatively and significantly related to life expectancy.

Table 6.10 shows the relationship between financial development and life expectancy using the two-step GMM approach.

Table 6.10 Life Expectancy and Health Care Expenditure – A Two-Step GMM Approach

Independent Variables	A Two-Step GMM Approach		
	Model 17	Model 19	Model 20
Log THE_capita	0. 05*** (0. 01)	-	-
Log PubHE2GDP	-	0.05*** (0.01)	-
Log Pvt2GDP	-	-	0.08* (0.04)
LogINFRA	0.15 (0. 12)	0.11 (0.08)	0.16 (0.12)
Log Education	0. 05** (0.02)	0.06*** (0.02)	0.05** (0.02)
Log GDP per capita	0.02** (0.01)	0.03* (0.01)	0.03** (0.01)
logHIV_Prev	-0.10*** (0.03)	-0.08*** (0.03)	-0.08** (0.03)
Government-financed HS	-0.05* (0.02)	-0.06*** (0.01)	-0.05** (0.03)
OOP-financed HS	0.01 (0.01)	-0.02 (0.01)	0.02 (0.02)
Wald χ^2 Test, (p-value)	54.17 (0.00)	58.52 (0.00)	41.56 (0.00)
Number of Countries	43	43	43
Number of Observations	376	376	376
Number of Instruments	42	42	42
Arellano and Bond Test (p-value)	0.10	0.1	0.26
Hansen test of overid. Restrictions (p-value)	0.35	0.36	0.54

Note: Standard errors in parenthesis, ***, **, * shows significance at 1%, 5% and 10% respectively.

6.4 Discussion of Findings

Health care expenditure: The results showed that health care expenditure, as measured by total health care expenditure per capita and private health care expenditure, are negatively and significantly related to child health outcomes and positively and significantly related to life expectancy. The effect of total health care expenditure on child health outcomes ranged from -0.5 to -3.4 percent, while the effect of private health care expenditure ranged from -0.6 to -1.7 percent with a 10 percent increase in health care expenditure. In instances were public health

care expenditure to GDP was significant and negatively related to child health outcomes, the effect ranged from -0.7 to -0.8 percent with a 10 percent increase in health care expenditure. The results of this study confirm the hypothesis that health care expenditure by both government and the private sector has a great bearing on the population's health status. These findings corroborate results from earlier studies by Anyanwu and Erhijakpor (2007), Nixon and Ulmann (2006), Bokhari, Gai and Gottret (2007) as well as Kim and Lane (2013).

Control Variables

Access to basic infrastructure: Access to infrastructure, as proxied by the percentage of the population with access to safe drinking water, is negatively and significantly associated with child health outcomes. The findings are in line with literature showing that access to basic services like water, sanitation, roads and electricity are critical for better health outcomes. In 13 of the 18 regression models that focused on child health outcomes, access to basic infrastructure is negatively and significantly related to child mortality (neonatal, infant and under-five). The elasticity ranged from -0.49 to -1.29 showing that access to infrastructure is a key factor in reducing deaths among children below five years of age. However, this variable was not significant for life expectancy regressions.

Income (real GDP per capita): Real GDP per capita is significantly and negatively related to child health outcomes in all regression models. The elasticity of real GDP to child health outcomes ranged from -0.03 to -0.24. In regressions involving life expectancy, the results also showed that income is positively and significantly related to life expectancy at birth. These results showed that income remains a crucial determinant of health outcomes.

Level of Education: In all the regressions save one level, education is negatively and significantly related to child health outcomes.

Health Care Financing System: The results showed that health care systems that do not require upfront payment by households to access health services are negatively related to child health outcomes as shown by the negative coefficient of the tax-financed dummy variables (pub_financed).

Immunisation Coverage: This variable was not significant in all the six regression models in which it was included. In the entire two-step GMM regressions the variable had the expected sign but in random and fixed effects models it did not have the expected sign.

HIV Prevalence: This variable was also added as an extension to the benchmark model on health care expenditure and life expectancy. The variable is negatively and significantly related to life expectancy in all the six regressions run. This is a confirmation that HIV/AIDS prevalence has a significant bearing on the life expectancy of a country's population.

6.5 Financial Development and Health Care Expenditure

After establishing that health care expenditure indeed yields positive health outcomes, the study explored the effect of financial development on health care expenditure. The core hypothesis of this study is that financial development leads to improved health outcomes through increasing health care expenditure by both private and public players. Previous studies had income, employment and education as transmission mechanisms through which financial development leads to improved health outcomes. However, as alluded to in the early chapters, these pioneering studies on financial development and health outcomes ignored the role played by financial development on health care financing.

To examine the relationship between financial development and health care expenditure, the study used a model borrowed from the work of Rosenzweig and Schultz (1983). In their model, a family is assumed to derive utility from the child's health, *H;* consumer goods with an effect on a child's health, *Y*; and consumer goods with no effect on health, *X*. The health of a child is determined by the level of *Y* goods, as well as Z, which are inputs bought or allocated only because they contribute to child health, e.g. medical services. The family's utility function can be expressed as follows:

$$U = U(X, Y, H) \quad \text{.....(6.2)}$$

The relationship between child health and the levels of *Y* and *Z* is described by a production function expressed as follows:

$$H = F(Y, Z, \mu) \quad \text{.....(6.3)}$$

Where $\boldsymbol{\mu}$ is an initial health endowment due to genetic or environmental factors.

The family maximises equation 6.3 given 6.4, subject to a budget constraint specified as follows:

$$I = XP_x + YP_y + ZP_z \quad \text{.....(6.4)}$$

Where $\boldsymbol{P_x}$, $\boldsymbol{P_y}$ and $\boldsymbol{P_z}$ are the prices of the health-neutral and health-related consumption goods and child health investment goods, respectively, and I is income. Maximising equation 6.3, subject to 6.4, yields the following demand equations:

$X = D_x(P_x, P_y, P_z, I, \mu)$……..…….(6.5)

$Y = D_y(P_x, P_y, P_z, I, \mu)$……..…….(6.6)

$Z = D_z(P_x, P_y, P_z, I, \mu)$……...…….(6.7)

Equation 6.7 represents the demand for health investment goods or medical care, Z, which is determined by its price, the price of other goods, income and the individual's initial endowment of health.

In this study, equation 6.7 is expanded to include financial development (FD), education (ED) and health care financing systems (HFS) and is estimated using macro-level data. The equation is expressed in logarithm form as follows:

$logHE_{it} = \alpha_0 + \beta_{it} lnFD_{it} + \beta_{it} lnGDP_{it} + \beta_{it} HFS_{it} + \beta_{it} lnDEM_{it} + \beta_{it} TAX_{it} + \varepsilon_{it}$……..….(6.8)

Where,

HE represents health care expenditure as measured by total health care expenditure per capita, public health care expenditure to GDP and private health care expenditure to GDP.

FD represents the level of financial development as measured by bank credit to the private sector to GDP ratio, broad money to GDP ratio, ATM density per 100 000 people and commercial bank branches per 100 000 people. *FD* was expected to be positively related to health care expenditure.

TAX represents the percentage of government tax revenue to GDP.

HFS measures the country's health care financing system whether out-of-pocket or centrally/tax-financed. Insurance-based health care financing systems were expected to be positively related to health outcomes while tax-financed health care systems were expected to be negatively related to health outcomes. The dummy variable *pub_financed* represents health care systems financed through government tax whereas *oop_financed* dummy represents health care systems financed through OOP expenditure.

6.5.1 Financial Development and Total Health Care Expenditure per capita

The results of the fixed effects regression analysis showed that all four indicators of financial development are positively and significantly related to total health care expenditure per capita. A 10 percent increase in the number of ATMs per 100 000 people, commercial bank branches per 100 000 people, broad money to GDP ratio and proportion of bank credit to the private sector to GDP leads to an increase in health care expenditure per capita of 1 percent, 0.9 percent, 3.5 percent and 2.1 percent respectively. The study also showed that income, as measured by real GDP per capita (logGDP_capita) and government tax revenue to GDP (logtax), are also statistically and positively related to total health care expenditure per capita. Table 6.11 below shows the entire results of the fixed effects regression analysis.

Table 6.11 Financial Development and Total Health Care Expenditure per capita

Independent Variables	Fixed Effects Estimation			
	Model 1	Model 2	Model 3	Model 4
LogATMS	0.10** (0.04)	-	-	-
LogBankBranches	-	0.09* (0.05)	-	-
LogBroadMoney	-	-	0.35*** (0.07)	-
LogBankPvt_credit	-	-	-	0.21*** (0.04)
Log GDP per capita	0.06 (0.12)	0.26** (0.11)	0.39*** (0.05)	0.37*** (0.06)
Logtax_revenue	0.27*** (0.07)	0.14* (0.08)	0.2* (0.1)	0.23** (0.1)
LogU14	-2.5*** (0.88)	-2.6*** (1.1)	-0.79 (0.57)	-0.83 (0.71)
Logover65	0.6 (0.71)	0.06 (0.78)	-0.17 (0.37)	0.18 (0.38)
Government-financed HS	-0.03 (0.074)	-0.04 (0.06)	0.0008 (0.039)	0.01 (0.03)
OOP-financed HS	-0.12** (0.06)	-0.1** (0.42)	-0.07 (0.04)	0.09 (0.04)
Constant	12.3*** (3.7)	12.4*** (4.6)	3.16**** (2.3)	3.9*** (2.9)
R-squared	0.5	0.5	0.66	0.66
Number of Countries	43	44	46	46
Number of Observations	345	438	753	754

Note: Standard errors in parenthesis, ***, **, * shows significance at 1%, 5% and 10% respectively.

The results also showed that a country's demographic structure has a statistically significant bearing on total health care expenditure per capita. The proportion of the population below 15 years *(logU14)* is significantly and negatively related to per capita health care expenditure. The study also showed that OOP health care financing systems are negatively related to health care expenditure per capita.

Financial Development and Total Health Care Expenditure per capita: A Two-Stage Least Squares (2SLS) Approach

A Two-Stage Least Squares (2SLS) approach was used to deal with the problem of endogeneity. Two variables were used to instrument financial development, namely rule of law and ownership of mobile phones. See Chapter 5 for a detailed discussion of the instruments used for the study. The results of the 2SLS showed that the indicators of financial development are positively and significantly related to health care expenditure per capita. A 10 percent increase in ATMs and commercial bank branches per 100 000 people, in broad money to GDP ratio and bank credit to the private sector to GDP ratio increases total health care expenditure per capita by 1.9 percent, 2.5 percent, 5.7 percent and 7.2 percent respectively. Table 6.12 below shows the 2SLS results.

Table 6.12 Financial Development and Total Health Care Expenditure per capita – A 2SLS Approach

Independent Variables	Two-Stage Least Squares Estimation			
	Fixed Effects Model 5	Fixed Effects Model 6	Fixed Effects Model 7	Fixed Effects Model 8
LogATMS	0.19*** (0.06)	-	-	-
LogBankBranches	-	0.25** (0.12)	-	-
LogBroadMoney	-	-	0.57*** (0.18)	-
LogBankPvt_credit	-	-	-	0.72** (0.32)
Log GDP per capita	-0.12 (0.15)	0.1 (0.13)	0.3*** (0.06)	0.15 (0.17)
Logtax_revenue	0.3*** (0.05)	0.07 (0.07)	0.12 (0.13)	-0.24 (0.33)
LogU14	-2.4*** (0.84)	-2.2** (1.0)	-1.33** (0.57)	-0.7 (0.8)
Logover65	0.74 (0.76)	0.23 (0.83)	-0.06 (0.34)	0.08 (0.49)
Government-financed HS	-0.01 (0.07)	-0.002 (0.06)	0.003 (0.03)	0.05 (0.03)
OOP-financed HS	-0.13** (0.05)	-0.1 (0.04)	-0.1 (0.04)	-0.01 (0.06)
Constant	12.9*** (3.5)	11.8*** (4.4)	5.3*** (3.8)	6.0*** (4.3)
R-squared	0.44	0.44	0.64	0.39
Number of Countries	43	43	45	45
Number of Observations	333	416	551	551
Hansen J test (p-value)	0.66	0.17	0.099	0.29
Cragg-Donald Wald F Statistic	119.4	73.8	49.4	11.0
Instrumental Variables	Perceived rule of law, Populations with mobile phones			

Note: Standard errors in parenthesis, ***, **, * shows significance at 1%, 5% and 10% respectively.

The above regression results also showed that a country's health care financing system and demographic structure are crucial factors in determining per capita health care expenditure.

The study further explored how financial development affects expenditures from different sources of health care financing by using two indicators to measure public and private expenditure on health to GDP. Private expenditure on health is made up of direct household spending, private insurance, charitable donations and direct service payments by private corporations, while public health care expenditure consists of recurrent and capital spending from (central and local) government budgets, external borrowings and grants (including donations from international agencies and non-governmental organisations) and social (or compulsory) health insurance funds (World Bank, 2016).

6.5.2 Financial Development and Public Health Care Expenditure

Analysis of the effect of financial development on public health care expenditure using the random and fixed effects estimation approaches showed that financial development as measured by ATMs per 100 000 people, broad money to GDP ratio and bank credit to the private sector to GDP is significantly and negatively related to public health care expenditure. The study also showed that a 10 percent increase in the number of ATMs per 100 000 people, amount of broad money and bank credit to the private sector to GDP leads to a 0.6 percent, 4.1 percent and 2.3 percent increase in public health care expenditure respectively. Table 6.13 below shows the full set of results of the regression analysis.

Table 6.13 Financial Development and Public Health Care Expenditure to GDP

Independent Variables	Random and Fixed Effects Estimation			
	Random Effects Model 9	Random Effects Model 10	Fixed Effects Model 11	Fixed Effects Model 12
LogATMS	0.06* (0.03)	-	-	-
LogBankBranches	-	0.06 (0.04)	-	-
LogBroadMoney	-	-	0.41*** (0.07)	-
LogBankPvt_credit	-	-	-	0.23*** (0.06)
Log GDP per capita	-0.14*** (0.05)	-0.07 (0.05)	-0.05 (0.05)	-0.06 (0.05)
Logtax_revenue	0.4*** (0.1)	0.33*** (0.11)	0.25 (0.17)	0.28* (0.15)
LogU14	-1.0 (0.67)	-1.0 (0.71)	0.25 (0.56)	-0.3 (0.73)
Logover65	-0.65* (0.39)	-0.8* (0.43)	0.41 (0.38)	0.43 (0.38)
Government-financed HS	0.32*** (0.8)	0.32*** (0.07)	0.31*** (0.04)	0.32 (0.04)
OOP-financed HS	-0.28*** (0.06)	-0.25*** (0.05)	-0.28*** (0.04)	0.3 (0.04)
Constant	5.18*** (3.0)	5.3*** (3.1)	0.45 (2.5)	0.47 (0.04)
R-squared	0.41	0.36	0.43	0.43
Number of Countries	43	44	46	46
Number of Observations	345	438	753	754
Breusch Pagan LM test (p-value)	0.00	0.00	-	-

Note: Standard errors in parenthesis, ***, **, * shows significance at 1%, 5% and 10% respectively.

Other factors that had expected signs and were statistically significant included health care systems financing and level of tax revenue to GDP. Real GDP per capita and the proportion of the population over 65 years, though statistically significant, had unexpected signs.

Financial Development and Public Health Care Expenditure – A 2SLS Approach

A 2SLS regression analysis showed that financial development as measured by the proportion of broad money to GDP ratio and bank credit to the private sector to GDP ratio is positively and significantly related to public health care expenditure. A 10 percent increase in the proportion of broad money to GDP ratio and bank credit to the private sector to GDP leads to a 2.6 and 3.3 percent increase in public health care expenditure respectively. The results also showed that increases in public health care expenditure are driven by growth in government tax revenue and health care financing systems. The regression analysis results also showed that lack of prepaid health care financing systems and young populations have a negative effect on public health care expenditure.

Table 6.14 shows the results of the regression analysis.

Table 6.14 Financial Development and Public Health Care Expenditure to GDP – 2SLS

Independent Variables	Two-Stage Least Squares Estimation			
	Random Effects Model 13	Random Effects Model 14	Fixed Effects Model 15	Fixed Effects Model 16
LogATMS	0.07 (0.04)	-	-	-
LogBankBranches	-	0.14 (0.11)	-	-
LogBroadMoney	-	-	0.26* (0.15)	-
LogBankPvt_credit	-	-	-	0.33* (0.19)
Log GDP per capita	-0.18*** (0.07)	-0.12* (0.06)	-0.06 (0.05)	-0.13 (0.09)
Logtax_revenue	0.42*** (0.1)	0.29*** (0.13)	0.4 (0.24)	0.23 (0.27)
LogU14	-1.0** (0.67)	-0.87 (0.73)	-0.69 (0.64)	-0.4 (0.78)
Logover65	0.62 (0.39)	-0.7 (0.43)	0.22 (0.42)	0.23 (0.49)
Government-financed HS	0.32*** (0.08)	0.35*** (0.07)	0.36 (0.04)	0.39 (0.49)
OOP-financed HS	-0.29*** (0.05)	-0.24*** (0.05)	-0.27 (0.05)	-0.29 (0.05)
Constant	5.3* (3.0)	4.7 (3.18)	1.5 (2.9)	1.3 (3.2)
R-squared	0.41	0.41	0.45	0.43
Number of Countries	43	43	45	45
Number of Observations	333	333	551	551
Hansen J test (p-value)	0.57	0.78	0.9	0.88
Cragg-Donald Wald F Statistic	-	-	49.4	11.0
Instrumental Variables	Perceived rule of law, Populations with mobile phones			

Note: Standard errors in parenthesis, ***, **, * shows significance at 1%, 5% and 10% respectively.

6.5.3 Financial Development and Private Health Care Expenditure

Regression analysis of the effect of financial development on private health care expenditure showed that financial development has a positive impact on private health care expenditure. This analysis showed that a 10 percent increase in commercial bank branches per 100 000 people, proportion of broad money and bank credit to the private sector to GDP ratio leads to a 1.1 percent, 1.7 percent and 1.0 percent increase in private health care expenditure. The results are shown in Table 6.15 below.

Table 6.15 Financial Development and Private Health Care Expenditure to GDP

Independent Variables	Random and Fixed Effects Estimation			
	Fixed Effects Model 17	Random Effects Model 18	Fixed Effects Model 19	Fixed Effects Model 20
LogATMS	0.05 (0.04)	-	-	-
LogBankBranches	-	0.11** (0.05)	-	-
LogBroadMoney	-	-	0.17*** (0.05)	-
LogBankPvt_credit	-	-	-	0.1* (0.05)
Log GDP per capita	-0.19 (0.11)	-0.17* (0.09)	-0.06 (0.05)	-0.06 (0.06)
Loged	0.01 (0.09)	0.002 (0.08)	0.01 (0.07)	0.02 (0.07)
LogU14	-1.1** (0.52)	-1.0* (0.5)	0.58 (0.73)	0.46 (0.7)
Logover65	1.6** (0.81)	1.27 (0.82)	0.19 (0.3)	0.55 (0.41)
Government-financed HS	-0.24** (0.1)	-0.2** (0.04)	-0.16*** (0.03)	-0.11*** (0.03)
OOP-financed HS	0.05 (0.06)	0.06 (0.05)	0.08** (0.04)	0.07* (0.04)
Constant	4.6* (2.3)	4.5** (2.1)	-1.0 (3.3)	-1.37 (3.3)
R-squared	0.22	0.19	0.11	0.12
Number of Countries	45	46	46	46
Number of Observations	245	306	753	754

Note: Standard errors in parenthesis, ***, **, * shows significance at 1%, 5% and 10% respectively.

Government financed health care systems and young populations (under 15 years) have a negative effect on private health care expenditure while aged populations and health care systems relying on OOP payments for health services increase private health care expenditure.

Financial Development and Private Health Care Expenditure – A 2SLS Approach

In addition to the random and fixed effects regressions, the study also used the 2SLS approach to determine the effect of financial development on private health care expenditure. The results

showed that a 10 percent increase in the number of ATMs and bank branches per 100 000 people leads to an increase in private health care expenditure by 2.8 and 3.0 percent respectively. Additionally, a similar increase in the proportion of broad money to GDP ratio and bank credit to the private sector to GDP leads to an increase of 3.2 and 3.4 percent in private health care expenditure respectively. The results of the 2SLS regression are shown in Table 6.16 below.

Table 6.16 Financial Development and Private Health Care Expenditure to GDP – 2SLS

Independent Variables	Two-Stage Least Squares Estimation			
	Random Effects Model 21	Random Effects Model 22	Fixed Effects Model 23	Fixed Effects Model 24
LogATMS	0.28*** (0.07)	-	-	-
LogBankBranches	-	0.3** (0.14)	-	-
LogBroadMoney	-	-	0.32** (0.15)	-
LogBankPvt_credit	-	-	-	0.34** (0.16)
Log GDP per capita	-0.5*** (0.13)	-0.33* (0.13)	-0.06 (0.06)	-0.13* (0.07)
LogEducation	0.45*** (0.22)	-0.09 (0.1)	0.07 (0.09)	-0.09 (0.11)
LogU14	-1.0** (0.54)	-0.89 (0.51)	0.22 (0.64)	0.5 (0.77)
Logover65	2.0*** (0.76)	1.4* (0.81)	0.81** (0.41)	0.85 (0.41)
Government-financed HS	-0.2.4*** (0.08)	-0.17** (0.07)	-0.14*** (0.04)	-0.12*** (0.03)
OOP-financed HS	0.001*** (0.06)	-0.07 (0.05)	0.05 (0.04)	0.06 (0.06)
Constant	8.2*** (2.9)	5.0 (2.2)	-2.8 (4.1)	-1.7 (3.5)
R-squared	0.01	0.12	0.13	0.06
Number of Countries	44	45	45	45
Number of Observations	243	299	398	398
Hansen J test (p-value)	0.52	0.9	0.9	0.2
Cragg-Donald Wald F Statistic	31.5	39.5	49.4	16.3
Instrumental Variables	Perceived rule of law, Populations with mobile phones			

Note: Standard errors in parenthesis, ***, **, * shows significance at 1%, 5% and 10% respectively.

6.6 Discussion of Findings

Financial Development: The results of the regression analysis showed that financial development leads to an increase in health care expenditure. All the indicators of financial development were correctly and statistically significant in 20 of the 24 regressions estimated. These results confirm the study hypothesis that health care expenditure is a key transmission mechanism through which financial development leads to better health outcomes. Indicators of financial depth showed a greater magnitude of the effect of financial development on health care expenditure. These findings are similar to the results of randomised control trials by Dupas & Robinson (2009) and Prina (2012) which showed that access to informal saving facilities like rotational savings and credit schemes (ROSCAs) increased household expenditure on health care related products and services.

Income (real GDP per capita): In terms of income, the results showed that real GDP per capita is positively related to health care expenditure per capita. This is congruent with previous studies which showed that an increase in real GDP leads to increased expenditure on health per capita. However, for public and private expenditure on health, the results were contrary to the literature as real GDP per capita was shown to be negatively and significantly related to these dependent variables. The negative relationship between public health care expenditure and real GDP can be explained by the crowding out effect military expenditure. Increased military expenditure reduces the capacity of government to direct expenditure to health expenditures. The crowding-out effect is more pronounced in low than high income countries (Fan, 2019). Probably as government revenue increase through GDP growth, military expenditure may grow at the expense of health care expenditure. On the hand, private health expenditure in SSA is made up of OOP and as a result growth in GDP may lead growth in social health insurance and public expenditure.

Tax revenue: The results showed that government revenue is positively and significantly related to total health care expenditure per capita and public health care expenditure. These findings are in line with previous studies which showed that an increase in government tax revenue leads to an increase in government expenditure on health. For example, the study by Micah (2019) showed that tax revenue is a key determinant of government expenditure on health care.

Health Care Financing System: The analysis showed that the architecture of a country's health care financing system is crucial in determining health care expenditure. Broadly, the study showed that health care systems financed through prepayments lead to increased health care expenditure per capita. Specifically, the study showed that public-financed health care systems are positively related to health care expenditure per capita and public health care expenditure but negatively related to private health care expenditure. Health-financed systems financed by OOP expenditure are negatively related to health care expenditure per capita and public health care expenditure but positively related to private health care expenditure.

Demographic Structure: The results showed that the proportion of the population below 15 years is negatively related to health care expenditure while the proportion of the population above 65 years is positively related to health care expenditure. These findings are congruent with the results of previous studies on health care expenditure documented in the literature. This include studies by Xu, Saksena and Holly (2011), Samadi and Rada (2013) and Olaniyan, Onisanwa and Oyinlola (2013).

6.7 Conclusion

This chapter aimed to determine the effect of health care expenditure on child health outcomes that include neonatal, infant and under-five mortality as well as life expectancy at birth in years. In addition, the chapter also explored the effect of financial development on health care expenditure using fixed and random effects as well as the Two-Stage Least Squares estimation approaches. Health care expenditure was measured with three indicators, namely total health care expenditure per capita, public health care expenditure to GDP and private health to GDP. A set of control variables was used in the regressions analysis and these variables included measures of access to infrastructure, real GDP per capita, source of health care financing, level of female education and government tax revenue to GDP.

The GMM and 2SLS approaches were used to control for the endogeneity or simultaneity bias. The results of both fixed and random effects and GMM regression methods showed that health care expenditure leads to a reduction in child mortality (neonatal, infant and under-five). The results also showed that health care expenditure is key in improving life expectancy at birth in years. Regarding the effect of financial development on health care expenditure, the results showed that financial development leads to an increase in health care expenditure as measured by total health care expenditure per capita, public health care expenditure and private health care expenditure to GDP. In conclusion, this chapter showed that health care expenditure is a

major determinant of health outcomes and a transmission mechanism through which financial development leads to better health outcomes.

Chapter 7 Financial Development and Financial Protection in Health in sub-Saharan Africa

7. Introduction

Globally, 100 million people are pushed into poverty and 150 million people suffer financial catastrophe because they have to pay directly for their health care (WHO, 2014b). Africa and Asia are among the worst affected regions of the world in terms of direct payment for health care, also known as out-of-pocket (OOP) health care expenditure. Health care systems funded by OOP expenditure do not provide financial protection to the citizens of a country in the event of sickness (Xu et al., 2003). In Africa, 11 million people are falling into poverty every year due to high OOP payments (WHO, 2014b). Households faced with sickness in the absence of insurance and risk management instruments to cushion them from health shocks are easily driven into poverty due to medical expenditures which are too high relative to household income (catastrophic health care expenditure), loss of income due to inability to work and other costs related to the care of a sick person. The high reliance on OOP expenditure to access health services results from the absence of prepaid health care financing systems like social insurance, private health insurance and government financing of health care expenditure. An effective health care system must protect citizens from the effects of health shocks and consequent impoverishment.

This chapter assesses the effect of financial development on financial protection in health in SSA. Health care systems in SSA are largely financed by OOP expenditure which leads to financial catastrophe and impoverishment. The study argues that financial development is able to reduce the risk of financial catastrophe and impoverishment of households by improving access to credit, providing risk management instruments to households and increasing government expenditure through the widening of the tax base.

The results of the study showed that financial development, as measured by the bank credit to the private sector to GDP ratio, is statistically significant and negatively related to indicators of catastrophic health care expenditure, namely OOP expenditure to total health care expenditure and OOP health care expenditure to private health care expenditure. These findings confirm the hypothesis that financial development reduces catastrophic health care expenditure

as well as the number of people that are pushed into poverty by catastrophic health care expenditures.

7.1 Theory of Full Insurance and Health Shocks

This chapter is premised on the theory of full consumption insurance which argues that the cross-section distribution of consumption of any group of households is constant over time and growth in consumption is uncorrelated with individual endowments (Deaton, 1992; Townsend, 1994; Jappelli & Pistaferri, 1999). The sources of full insurance are both market and non-market and include stocks and securities markets, unemployment insurance, borrowing and lending in credit markets, crop insurance, health insurance and insurance among family and close community members (Mace, 1991). The market-based hypothesis of full insurance has its roots in the Arrow and Debreu model which assumes complete markets (Arrow, 1951; Debreu, 1951; Arrow & Debreu, 1954). Full insurance implies that households are able to perfectly share risk by equalising their inter-temporal marginal rates of substitution in every state and every time in the face of idiosyncratic risks (Monteiro, 2008). Cochrane (1991) also put forward a theory of full consumption insurance based on non-market risk-sharing institutions such as government programmes, charities, private insurance and informal risk sharing like gifts and loans from friends and relatives. The idea of non-market risk sharing is also supported by the work of Besley (1995) in which consumption is insured through informal institutions like credit cooperatives and informal insurance. Empirical studies have shown that households have close to full insurance against idiosyncratic risks using non-market approaches. Studies by Cochrane (1991), Townsend (1994), Fafchamps and Lund (2003), among others, showed that households are able to partially insure themselves against idiosyncratic risks. The results ranged from low to near-full insurance against risk depending on the size and nature of the risk as well as household characteristics.

The existence of the full insurance phenomenon implies that households do not suffer any welfare loss due to idiosyncratic risks because they can save and borrow to smooth consumption. Household welfare (consumption) is not affected by changes in the household's income neither does it change due to changes in its endowments. In contrast to the full risk-sharing situation, in the absence of complete markets, households' consumption entirely depend on household income as they do not have an option to borrow or save income and as such current consumption is entirely determined by current income.

In the context of health and health shocks, households do not suffer any welfare loss due to illness if they are fully insured against health shocks through markets and non-market risk-sharing institutions. If households suffer a health shock they are able to borrow from the credit market, draw on their savings and/or utilise their insurance policy to meet medical and non-medical expenses. The household can also benefit from non-market risk-sharing institutions like government-provided health schemes or public transfers, credit cooperatives, community health insurance and gifts from relatives to cushion them from catastrophic expenditure (Kalemli-Ozcan, Luttini & Sørensen, 2014).

However, the theory of full insurance has empirical deficiencies as the real world and particularly the low-income countries are characterised by incomplete markets or the absence of markets and non-market risk-sharing institutions. The effectiveness of credit and insurance markets mainly in developing countries is constrained by transaction costs, information asymmetries and difficulties in enforcing contracts (Morduch, 1995). As a result of these factors, several empirical studies have rejected the full insurance hypothesis (Cochrane, 1991, Townsend, 1994; Gertler & Gruber, 2002). The absence of complete risk-sharing markets and institutions in low-income countries means that poor households are vulnerable to diverse shocks like droughts, income loss, and sickness, among others. Health shocks are among the major idiosyncratic risks faced by households in low-income countries and have devastating effects due to the aforementioned challenge of incomplete markets and absent formal risk-sharing institutions.

7.2 Financial Development and Financial Protection in Health

Financial development provides a mechanism through which households are protected from falling into poverty through the curbing of catastrophic health care expenditure. As defined earlier, catastrophic health care expenditure occurs when OOP payments for health services consume such a large portion of a household's available income that the household may resultantly drift into poverty (Buigut, Ettarh & Amendah, 2015). Financial protection in health occurs when people are cushioned from being poor as a result of using health care services or from being forced to choose between their health and their economic well-being.

Existing literature has documented how financial development leads to poverty reduction through income growth and improving access to credit (Jalilian & Kirkpatrick, 2002; Beck, Demirgüç-Kunt & Levine, 2007; Kpodar & Jeanneney, 2008). However, the deficiency in this existing literature is the omission of the role played by financial development in reducing

catastrophic health care expenditure and protecting households from falling into poverty traps. Well-developed financial systems are capable of arresting an increase in the number of poor people, unlike underdeveloped financial systems. The financial sector performs a number of functions which enable the efficient functioning of market and non-market-based risk-sharing institutions, enabling the curbing of catastrophic expenditure. The effectiveness of insurance and credit markets is hindered by high transaction costs, moral hazards, poor enforcement of contracts and corporate governance, among other factors. However, well-developed financial systems are able to collect information, monitor managers, reduce transaction costs and ease the trading of goods, services and contracts (Levine, 1997). This does not only enhance the functioning of market-based risk-sharing techniques but also non-market-based ones.

7.3 Methodology

The study used panel data from 46 SSA countries from 1995 to 2014. Due to data limitations, analysis relating to automated teller machines (ATMs) and commercial bank branches only cover the period from 2004 to 2014. The study used four indicators of financial development: number of ATMs per 100 000 people, number of commercial bank branches per 100 000 people, the percentage of bank credit to the private sector of GDP and percentage of broad money (M3) to GDP. The use of different indicators of financial development in the study aimed to capture the access and depth dimensions of the financial sector and understand their respective impacts on financial protection in health.

Model Specification

The model used to achieve the objectives of this chapter was borrowed from the work of Cochrane (1991), Mace (1991) and Townsend (1994) on full consumption insurance theory. The detailed specification in presented in Chapter 4 and following that strand of literature, the studye estimated Equation (4.21). However, the consumption variable was replaced with catastrophic health care expenditure proxies. The study also included financial development, demographic characteristics and health financing system as additional explanatory variables. The variables were transformed by taking their natural logarithms to normalize the data and linearise the relationships among the variables in the equation. This yielded an empirical model specified as follows:

$$FP_{it} = \alpha_i + \beta_i FD_{it} + \beta_i GDP_{it} + \beta_i DEM_{it} + \beta_i HFS_{it} + \varepsilon_{it} \quad \text{.....(7.5)}$$

Where,

FP measures financial protection.

FD represents the level of financial development. This indicator was expected to be negatively related to financial protection.

GDP measures real GDP per capita. The variable was expected to be negatively related to financial protection.

DEM measures the demographic structure of a country. Two variables are used to assess the effect of demographic structure on financial protection. The indicators include the proportion of the population below 15 years and the proportion of the population above 65 years. The former variable was expected to be negatively related to financial protection and the latter was expected to be positively related.

HFS measures the country's health care financing structure, be it insurance-based or centrally/tax-financed.

7.4 Econometric Analysis and Findings

To estimate the impact of financial development and financial protection in health, the fixed effects method was selected as the appropriate method for all the financial development indicators. As in the earlier chapters, the study used a perceived rule of law indicator and mobile cellular subscriptions per 100 people from the World Bank's World Governance Indicators as instrumental variables for the two-stage estimation approach. The study used these two instruments to ensure the efficiency of the estimates and also to enable the assessment of the validity of the instruments. The instruments passed the tests for appropriateness and strength which were done using the Sargan-Hansen test for overidentification (OIR) and the Cragg-Donald Wald F test for weak instruments.

7.4.1 Diagnostic Tests

The variables and the regression outputs were subjected to a battery of diagnostic tests to ensure that the results were not misleading. The tests carried out included unit root, heteroskedasticity and autocorrelation and tests that relate to choosing estimation methods and instrumental variables. The study tested the stationarity of all the variables used in the analysis to avoid

running spurious regressions. Fisher-type (ADF) tests were used to determine the stationarity of the data series. The ADF tests showed that all the data series in their logarithmic form are stationary. Table 7.1 below shows the results of the test for stationarity for OOP expenditure data. Stationarity test results of financial development indicators can be found in Chapter 5.

Table 7.1 Testing for Stationarity

Variable	Fisher-Type ADF Test	Result
	Model with trend	
LogOOP_THE	226.8 ***	I(0)
LogOOP_Pvt	174.9***	I(0)
Logunder14	128.3***	I(0)
Logover65	156.9***	I(0)

Note: ***, **, * shows significance at 1%, 5% and 10% respectively.

The study also tested the data for the presence of heteroskedasticity and autocorrelation. The null hypothesis of no heteroskedasticity and autocorrelation was rejected. These problems were addressed through the use of robust standard errors.

7.4.2 Financial Development and Out-of-Pocket Expenditure to Total Health Care Expenditure

The results of the fixed effects regression analysis showed that financial development, as measured by the proportion of private bank credit to GDP, has a negative and significant impact on OOP expenditure. The results showed that a 10 percent increase in bank credit to the private sector to GDP reduces catastrophic health care expenditure by 0.8 percent. However, other indicators of financial development, such as the numbers of ATMs and commercial bank branches per 100 000 people, were not significant although they had the expected signs. Table 7.2 below shows the complete set of results.

Table 7.2 Out-of-Pocket Expenditure to Total Health Care Expenditure

Independent Variables	Fixed Effects Estimation			
	Model 1	Model 2	Model 3	Model 4
LogATMS	-0.02 (0.02)	-	-	-
logBankBranches	-	-0.04 (0.03)	-	-
logBroadMoney	-	-	-0.07 (0.08)	-
logBankPvt_credit	-	-	-	-0.08*** (0.02)
logGDP_capita	-0.06 (0.07)	-0.04 (0.05)	-0.06* (0.03)	0.05 (0.04)
LogU14	1.43 (1.42)	1.20 (1.35)	1.71 (1.22)	1.69 (1.18)
Logover65	0.89 (0.76)	1.19* (0.63)	0.16 (0.49)	0.18 (0.47)
pub_financed	-0.13*** (0.04)	-0.12*** (0.04)	-0.17*** (0.05)	-0.17*** (0.05)
oop_financed	0.29*** (0.05)	0.24 (0.04)	0.28*** (0.03)	0.28*** (0.03)
Constant	-2.6 (5.8)	-2.1 (5.5)	-2.7 (5.1)	-2.5 (4.8)
R-squared	0.32	0.33	0.39	0.40
Number of Countries	45	45	48	48
Number of Observations	360	458	824	825

Note: Standard errors in parenthesis, ***, **, * shows significance at 1%, 5% and 10% respectively.

The results also showed that real GDP per capita and health care financing systems are also key determinants of OOP health care expenditure to total health care expenditure. The results of the 2SLS estimation approach showed that all the indicators of financial development had no significant impact on OOP health care expenditure to total health care expenditure. The results of the 2SLS estimation approach are shown in Table 7.3 below.

Table 7.3 Out-of-Pocket Expenditure to Total Health Care Expenditure – 2SLS Approach

Independent Variables	Fixed Effects Estimation			
	Model 5	Model 6	Model 7	Model 8
logATMS	-0.01 (0.04)	-	-	-
logBankBranches	-	0.05 (0.03)	-	-
logBroadMoney	-	-	-0.07 (0.11)	-
logBankPvt_credit	-	-	-	-0.07 (0.11)
logGDP_capita	-0.08 (0.10)	-0.15** (0.07)	-0.05 (0.03)	0.04 (0.04)
LogU14	1.13 (1.46)	1.25 (1.45)	2.14 (1.41)	2.11 (1.43)
Logover65	1.16 (0.74)	1.50** (0.64)	0.70 (0.63)	0.69 (0.62)
pub_financed	-0.12*** (0.04)	-0.11** (0.04)	-0.12*** (0.03)	-0.13*** (0.03)
oop_financed	0.29*** (0.05)	0.27** (0.04)	0.31*** (0.04)	0.31*** (0.04)
Constant	-2.7 (5.3)	-2.0 (5.5)	-4.4 (5.6)	-4.5 (5.5)
R-squared	0.30	0.35	0.40	0.40
Number of Countries	45	46	47	47
Number of Observations	348	436	584	584
Sargan statistic (p-value)	0.28	0.84	0.18	-
Sargan-Hansen test (p-value)	-	-	-	0.17
Cragg-Donald Wald F Statistic	98.24	88.19	79.4	29.8
Instruments	Perceived rule of law, Populations with mobile phones			

Note: Standard errors in parenthesis, ***, **, * shows significance at 1%, 5% and 10% respectively.

However, real GDP per capita, health care financing system and demographic structure emerged as statistically significant determinants of OOP health care expenditure to total health care expenditure.

7.4.3 Financial Development and Out-of-Pocket expenditure to Private Health Care Expenditure

The study also explored the effect of financial development on OOP health care expenditure to private expenditure using the fixed effects estimation approach. The results showed that the proportion of bank credit to the private sector to GDP was negatively and significantly related to OOP health care expenditure. A 10 percent increase in bank credit to the private sector to GDP reduces catastrophic health care expenditure by 0.5 percent. However, other indicators of financial development did not have the expected outcomes. Table 7.4 below shows the results of the fixed effects regression analysis.

Table 7.4 Financial Development and Out-of-Pocket Expenditure to Private Health Care Expenditure

Independent Variables	Fixed Effects Estimation			
	Model 9	Model 10	Model 11	Model 12
LogATMS	-0.02 (0.02)	-	-	-
logBankBranches	-	-0.04 (0.03)	-	-
logBroadMoney	-	-	0.04 (0.05)	-
logBankPvt_credit	-	-	-	-0.05* (0.03)
logGDP_capita	-0.01 (0.05)	-0.02 (0.04)	-0.03 (0.03)	-0.02 (0.03)
LogU14	1.38 (0.98)	1.02 (1.02)	0.97 (0.71)	0.96 (0.69)
Logover65	-0.37 (0.66)	0.02 (0.64)	0.005 (0.05)	0.13 (0.48)
pub_financed	-0.08 (0.05)	-0.09 (0.05)	0.04 (0.04)	0.04 (0.04)
oop_financed	0.12*** (0.02)	0.13*** (0.02)	0.11*** (0.03)	0.11*** (0.02)
Constant	-0.82 (3.7)	0.001 (3.7)	0.8 (3.0)	0.77 (2.9)
R-squared	0.1	0.1	0.13	0.40
Number of Countries	45	46	48	48
Number of Observations	360	458	824	825

Note: Standard errors in parenthesis, ***, **, * shows significance at 1%, 5% and 10% respectively.

7.5 Discussion of Findings

Financial Development. The study showed that financial development, as measured by the proportion of bank credit to the private sector to GDP, is negatively and statistically significant. A 10 percent increase in the proportion of private bank credit to GDP is associated with a 0.5 to 0.8 percent reduction in OOP expenditure. This to a larger extent shows that financial development is a key determinant of financial protection in health. Countries with deep financial systems are able to reduce catastrophic health care expenditure and prevent households from falling into poverty. In this sense, financial protection is one causal mechanism through which financial development leads to the reduction in poverty, as found by earlier researchers (Jalilian & Kirkpatrick, 2001; Beck et al., 2008; Kpodar & Jeanneney, 2008). However, other indicators of financial development, like the number of ATMs and commercial bank branches per 100 000 people as well as broad money as a percentage of GDP, were not statistically significant. None of the financial development indicators were significant in the 2SLS estimation approach. The weak relationship between financial access and financial protection indicators maybe attributed to limited presence of commercial banks branches and ATMS in rural areas where most of the population in SSA resides. The rural population in SSA is scattered leaving commercial bank branches and ATMS being concentrated in urban areas where population density is high.

Control Variables

The study showed that real GDP per capita was significantly and negatively related to OOP expenditure. Real GDP growth is key in reducing catastrophic health care expenditure in a number of ways, including raising household income and expenditure by government on health. The results also showed that the demographic distribution of a country's population is a major determinant of catastrophic health care expenditure. A relatively aged population (over 65 years) is positively and significantly associated with increased catastrophic health care expenditure. A micro-level study by Buigut, Ettarh and Amendah (2015) showed similar results. The study showed that household income and composition are major determinants of catastrophic health expenditure. As expected, the health care financing system is also a major determinant of catastrophic health care expenditure. Government-financed health care systems reduce catastrophic health care expenditure by households while health care systems financed through OOP payments fuel catastrophic health care expenditure. The finding underscores the need for governments to design appropriate health care financing mechanisms. Xu et al. (2005) argue

that catastrophic expenditures do not automatically disappear with rising income, calling for the need to design national health care financing systems that protect households from financial catastrophe by reducing OOP spending.

7.6 Conclusion

The chapter aimed to establish the impact of financial development on financial protection in health, using fixed effects and 2SLS estimation approaches. The study used data from 46 countries from SSA from 1995 to 2014. The level of financial protection was measured using two indicators, namely OOP health care expenditure to total health care expenditure and OOP health care expenditure to private expenditure. Financial development was measured using four indicators, namely the number of ATMs and commercial bank branches per 100 000 people as well as the proportion of broad money and bank credit to the private sector to GDP. The data and regressions were subjected to a number of econometric tests which include testing for stationarity, autocorrelation and heteroskedasticity. The test for stationarity showed that all the variables were stationary in their logarithmic form. The challenges of autocorrelation and heteroskedasticity were addressed using robust standard errors. The results of the fixed effects regression analysis showed that financial development, as measured by the proportion of bank credit to the private sector to GDP, is negatively and significantly related to OOP health care expenditure. However, other indicators of financial development were not statistically significant despite having the expected signs. The results also showed that real GDP per capita, demographic structures and the architecture of a country's health financial system are also crucial determinants of financial protection in health. In terms of policy formulation, these results suggest that governments in SSA need to promote financial development to reduce catastrophic health care expenditure and thereby protect people from falling into poverty.

Chapter 8 Summary, Conclusion and Policy Implications

8. Introduction

The chapter aims to provide a summary, conclusion and policy implications of the study. It also indicates areas that warrant further research that could not be exhaustively explored in the current study. The chapter is organised as follows. First, the background to the study is provided. This is followed by a summary of all the study findings and the policy implications of the study, before concluding with a short description of the limitations of the study and areas for further exploration.

8.1 Background

Development in the SSA region has been greatly hampered by lack of development finance and the region has a large development gap spanning over US$90 billion per year. This has resulted in poor health outcomes, a high disease burden and the absence or shortage of basic infrastructure like roads, hospitals and schools, among other amenities. Governments of the SSA region have a number of policy options at their disposal to finance development. Among these options are tax reforms, fostering financial development, promoting foreign direct investment and external borrowing. This study focuses on financial development as a policy option that governments can pursue to mobilise resources to fund development. Financial development achieved through proper policies and regulation provides a powerful tool to mobilise resources to finance development initiatives, from private investment in the manufacturing sector of the economy to investment in human capital. The volatility and decline of official development assistance (ODA) call for the need to increase the generation of domestic resources for development finance. A well-developed financial sector in an economy is able to mobilise domestic resources towards development finance. There is a large body of empirical literature that shows that financial development leads to increased investment, economic growth, poverty alleviation and improved health outcomes. However, these studies do not consider the role of financial development as a conduit to the attainment of better health outcomes through increasing health care expenditure. Given this gap in the literature, the study aimed to explore the impact of financial development on a number of factors which included health outcomes, health care expenditure and financial protection in health.

The specific objectives of the study were to:

1. Review the trends in health care expenditure, health outcomes and the state of financial development in sub-Saharan Africa.
2. Determine the effect of financial development on national health outcomes (neonatal, infant, child mortality and adult life expectancy) in sub-Saharan Africa.
3. Determine the effect of health care expenditure on health outcomes in sub-Saharan Africa.
4. Establish the determinants of health care expenditure in sub-Saharan Africa.
5. Determine the effect of financial development on health-related financial protection in sub-Saharan Africa.

8.2 Summary

Chapter 2 of the thesis provided an overview of financial development, health care expenditure and health outcomes in SSA. It discussed the trends in health outcomes, financial development and health care expenditure in SSA from 1965 to 2015. This review revealed that SSA has the least developed financial sector compared to other regions of the world. However, the region has been on a growth path for the past three decades, despite experiencing a decline in the past five years. The study determined that there was an average of 9.2 ATMs and 5.5 commercial bank branches per 100 000 people in the SSA region. In terms of financial depth, the region had an average broad money to GDP ratio of 31.4 percent and private credit to GDP ratio stood at 16.9 percent.

Health care financing in SSA is largely dominated by government and OOP expenditure. However, some countries have immensely benefited from development assistance for health with countries like Malawi, the Gambia, Lesotho and Burundi having more than 50 percent of their total health care expenditure financed through development assistance. Health care expenditure in the SSA region is very low as measured by indicators such as total health care expenditure per capita and total health care expenditure to GDP. Over the 20-year period from 1995 to 2014, total health care expenditure per capita averaged US$174.3 and total health care expenditure to GDP stood at 5.4 percent. OOP expenditure to total health care expenditure stood at 39.3 percent while OOP expenditure to private health care expenditure was 71.6 percent. Low per capita expenditure on health and high OOP expenditure on health have led to poor health outcomes in the region in terms of neonatal, infant, child and adult mortality.

Neonatal mortality stood at an average of 33.8 deaths per 10 000 live births, while infant mortality and under-five mortality rates were 73.3 and 116.1 per 10 000 live births respectively.

Chapter 3 discussed the relevant existing literature on financial development, economic growth, health outcomes, health care financing systems and financial protection in health. The chapter also extensively reviewed endogenous growth theories in which growth is driven by human capital and finance. Competing schools of thought on the role of financial development in economic growth were also reviewed. The aim of the literature review was to identify theoretical underpinnings that link financial development, health care expenditure, health outcomes and financial protection in health. The review showed that human capital is a crucial driver of economic growth through improving labour productivity and adoption of technology. Human health capital, like physical capital, needs to be augmented over time because it depreciates, making expenditure on health by both private players and government vital for better health outcomes and economic growth. Theories relating to demand for health and health investment were also reviewed focusing mainly on the work of Grossman (1972), Ehrlich and Chuma (1990) as well as Rosenzweig and Schultz (1983).

In terms of financial development, this discussion showed that financial development fosters investment and economic growth and reduces poverty. The financial sector contributes towards these outcomes by performing five major functions, namely mobilisation of savings, easing trading of good and services, exerting corporate control, allocation of resources and collection of information. Dissenting views on the role of financial development in economic growth were also reviewed. Some views argue that it is economic growth which leads to financial development while another school of thought holds that financial development is disruptive of the process of economic growth.

In terms of health care financing, the chapter reviewed the major objectives of health care systems, health frameworks and health care financing models. The review showed that health care systems around the world mainly endeavour to improve a population's health status, ensuring equity and access to health care as well as improving quality of care and consumer satisfaction. The chapter discussed the major health funding models which follow Beveridge and Bismarck models. Beveridge models are tax-financed health care systems while Bismarck systems are based on social health insurance.

Chapter 3 also reviewed empirical studies on financial development and health outcomes, health care expenditure and health outcomes, determinants of public and private health care

expenditure as well as catastrophic health care expenditure. The empirical studies show that financial development has a positive impact on health outcomes like infant mortality rates and life expectancy. Studies on the impact of health care expenditure and health outcomes show similar results. The major determinants of health care expenditure cited here were real GDP per capita, government expenditure on health, demographic structure, technology and architecture of health care system financing. The chapter reviewed the literature on the determinants of catastrophic health care expenditure. The review showed the studies mainly focused on micro-levels and that the determinants of catastrophic health care expenditure are household demographics, income sources, disability and access to risk management strategies.

The literature review also revealed a number of gaps in the existing literature on financial development and health care financing. It showed that extant health care financing literature does not consider financial development as an important factor in the design of health care financing systems and health care systems performance. The literature on the role of financial development in economic growth pays little attention to the role of financial development in health human capital investment. Only a handful of studies have emerged recently despite the fact that the important role of financial development in economic prosperity has been recognised since the 19th century.

Chapter 4 provided a discussion of the methodology used in the study, specifically focusing on theoretical and empirical models. The chapter also presented empirical models, definitions of variables and sources of data that were used to test the study hypothesis set out in Chapter 1. Financial development in this study was measured using four indicators to capture both the access and depth dimensions of financial development. These indicators were the number of ATMs and the number of commercial bank branches per 100 000 people, the ratios of broad money to GDP and the ratio of bank credit to the private sector to GDP. Health outcomes were also measured using four indicators, namely neonatal mortality rate, infant mortality rate, under-five mortality rate and life expectancy at birth in years. Health care expenditure was measured using total health care expenditure per capita, public expenditure on health to GDP, private health care expenditure to GDP, OOP expenditure to total health care expenditure and OOP expenditure to private health care expenditure. The data for these indicators was drawn from 46 SSA countries covering a period from 1995 to 2014 and was sourced from the World Bank's World Development Indicators (2016).

In terms of theoretical models, the study drew on the works of Grossman (1972) and Rosenzweig and Schultz (1983). In these models, the demand for health and the resultant demand for health inputs are determined by factors such as income, environmental factors, education, initial health endowment and age. These are microeconomic models which the study extended to the macro level in line with similar practices in literature. The regression analysis was carried out using fixed and random effects approaches, as guided by the robust Hausman test. In an attempt to address the problem of endogeneity associated with many economic relationships, the Two-Stage Least Squares (2SLS) and the General Method of Moments (GMM) were used. The 2SLS approach used two instruments, namely the perceived rule of law indicator and mobile cellular subscriptions per 100 people, all sourced from the World Bank's World Development Indicators (2016). Econometric issues relating to stationarity, heterogeneity and endogeneity were also discussed in terms of how they yield biased results and how these potential pitfalls could be addressed.

Testing for stationarity was done using the Fisher-type Augmented Dickey-Fuller (ADF) test and the results showed that all the data series used in the study are stationary in logarithmic form. However, the null hypothesis of no autocorrelation was rejected and this was addressed by using robust standard errors. The appropriateness of the instruments used in the 2SLS and GMM estimation approaches was tested using the Sargan-Hansen test for overidentification (OIR). The strength of the instruments was determined using the Cragg-Donald Wald F test (Cragg & Donald, 1993). The results showed that the instruments were both relevant and strong.

Chapters 5, 6 and 7 focused on the empirical analysis of the effect of financial development on health outcomes, health care expenditure and financial protection in health. The results of this empirical analysis showed that financial development leads to better health outcomes, increases public and private expenditure and reduces catastrophic health care expenditure. The results also showed that public and private health care expenditure leads to improved health outcomes. The empirical findings of these three chapters are summarised below.

Chapter 5 aimed to determine the effect of financial development on child health outcomes, namely neonatal, infant and under-five mortality as well as life expectancy at birth in years. The results from the fixed and random effects analysis showed that financial development reduces child mortality rates and is key in improving life expectancy. These results are similar to findings from studies done by Claessens and Feijen (2006a, Rosner (2011) Pascucci (2012)

Besong (2016). These scholars also found that financial development has a positive impact of health outcomes.

Control variables that have a significant impact on reducing child mortality include access to infrastructure, income (real GDP per capita), education level, immunisation coverage and level of education. Disease burden, as measured by HIV prevalence, also has a significant negative impact on life expectancy. The analysis also showed that sources of health care financing are key in determining health outcomes as tax-financed health care systems reduce child mortality whereas health care systems financed by OOP health care expenditure perpetuate child deaths. The findings on the relationship between financial development and health outcomes are congruent with results from previous studies.

The empirical analysis in Chapter 6 had two objectives, namely to assess the effect of health care expenditure on health outcomes as well as the effect of financial development on health care expenditure. The results of fixed and random effects as well as GMM estimation approaches showed that health care expenditure, as measured by total health care expenditure per capita, public health care expenditure to GDP and private health care expenditure to GDP, has a positive effect on child health outcomes and life expectancy at birth in years. An increase in health care expenditure leads to a decline in child mortality and at the same time increases life expectancy. Findings from studies by Anyanwu and Erhijakpor (2007), Nixon and Ulmann (2006), Bokhari, Gai and Gottret (2007) as well as Kim and Lane (2013) corroborate results obtained in Chapter 6 of the thesis.

Other explanatory variables which are statistically significant include real GDP per capita, access to basic infrastructure, level of education and health care system financing.

The results showed that financial development leads to increases in health care expenditure. These findings are congruent with those from randomised control trials by Dupas & Robinson (2009) and Prina (2012) which showed that access to informal saving facilities like rotational savings and credit schemes (ROSCAs) increased household savings towards expenditure on preventative health products, medicines and traditional remedies. These results proved the core hypothesis of the study which is that health care expenditure is one of the major transmission mechanisms through which financial development leads to improved health outcomes. This also forms the major contribution of the study as previous studies had focused on income, education and agricultural productivity as causal pathways through which financial development leads to better health outcomes.

Other variables that have a statistically significant impact on health care expenditure include government tax revenue to GDP, real GDP per capita, demographic characteristics and the health care financing system. These findings are also in tandem with the results from previous studies.

Guided by the theory of full insurance, Chapter 7 aimed to establish the impact of financial development on financial protection in health, using fixed effects and 2SLS estimation approaches. The fixed effects regression analysis results showed that financial development, as measured by the proportion of bank credit to the private sector to GDP, is negative and significantly related to OOP health care expenditure. However, other indicators of financial development, like the numbers of ATMs and commercial bank branches per 100 000 people and broad money to GDP, were not statistically significant despite having the expected signs. In the 2SLS estimation approach, all the indicators of financial development were not statistically significant. In terms of the control variables, the results showed that real GDP per capita, population structure as well as the architecture of a country's health financial system were statistically significant and had the expected signs.

In conclusion, the empirical analysis showed that financial development leads to improved health outcomes through increasing health care expenditure and reducing catastrophic health care expenditures. The results also showed that health care expenditure by public and private agents leads to better health outcomes.

8.3 Policy Implications

The implications of these findings include the need to develop and implement policies that foster financial development to increase health care expenditure, infrastructure development and the design of appropriate health care financing systems. These policy implications are discussed below.

Sound financial sector policies: Fostering the development of the financial sector through crafting and implementing sound financial policies is imperative as external finance for development in the SSA region has been volatile and declining. Financial development can be promoted through deregulation of the sector, reducing government ownership of banks and strengthening the regulatory environment. Inclusive financial development is also a key policy measure that governments of the SSA region can implement to ensure that poor people are able to benefit from a robust financial system. As shown in this study, the depth of the financial

sector as measured by bank credit to the private sector proved to be vital as far as health outcomes and expenditure on health outcomes are concerned. Growing a country's financial sector does not only lead to better health outcomes but reduces catastrophic expenditure on health, which assists in arresting the number of people that are pushed into poverty.

Design of appropriate health care financing systems: The results of the study showed that prepaid health care systems lead to better health outcomes than health care systems funded from OOP expenditure. Governments of the SSA region must endeavour to put in place health care financing mechanisms like social health insurance and tax-financed health care systems to minimise upfront payments. The mechanisms must have wide coverage to ensure that the population of each country has access to health services and is safeguarded from the risk of catastrophic health care expenditures.

Infrastructure development: The study showed that access to basic infrastructure, as proxied by the percentage of the population with access to potable water, has a large and statistically significant effect on child health outcomes. Governments in SSA must put in place mechanisms that ensure that people have access to basic services infrastructure like clean water, sanitation, clean energy, roads and health facilities. Improved access to these facilities helps to curb the spread of diseases which drive child and adult mortality rates. Well-developed financial systems become more imperative as they provide the resources required to finance infrastructure development.

Increased government expenditure: The results showed that increasing government expenditure on health is crucial to the reduction of child mortality. Significant government participation in the health sector, in terms of service provision and provision of resources for health infrastructure development, acquisition of medicines, immunisation and training of staff, is required if better health outcomes and ultimately economic growth are to be achieved. Government policies aimed at reforming and strengthening tax systems can unlock resources to channel towards health care expenditure. Government expenditure must be improved in line with the Abuja Declaration, of which most members of the African Union (and therefore SSA governments) are signatories. The declaration requires governments to spend at least 15 percent of their budgets to ensure the provision of basic health services in the health sector.

Macroeconomic stability and growth: Real GDP per capita was shown to be a statistically significant variable influencing health outcomes, health care expenditure and financial protection in health. Given the strong influence of real GDP per capita, there is a need for

governments in SSA to grow their economies to increase income per capita and implement prudent economic policies that promote economic stability. Countries with large GDPs have large formal sectors in the economy which make it feasible for the respective governments to roll out prepaid health-financed systems in the form of social insurance or tax-financed health care systems. A growth in GDP therefore implies that government revenue also grows and expenditure on health is then likely to improve.

Design of appropriate health care financing systems: Governments in SSA need to develop appropriate health care financing policies that increase access to health services. Currently, a large proportion of health care expenditure in the region is being financed by OOP payments which leads to impoverishment, increased disease burdens and poor health outcomes. It is in the interest of governments to reduce these upfront payments in the form of user fees and replace them with social health insurance schemes and tax-financed health care systems.

Tax reforms: The results of the analysis showed that the ratio of tax revenue to GDP is significantly and positively related to public expenditure on health. At the same time, public expenditure on health has a positive effect on health outcomes and also reduces catastrophic health care expenditure. This calls for the need to enhance domestic resource mobilisation in the form of improving tax systems, including increasing the capacity of tax bodies to collect tax and reforming tax laws to generate more resources that can be channelled towards development finance and especially towards expenditure in the health sector. At the global level, innovative development finance initiatives around taxes on, for example, air travel, mobile phones and currency have proved useful in generating resources for health care financing. According to Bokosi (2015), increasing taxes on harmful products like tobacco and alcohol as well as greenhouse gases provides ways to raise funds for financing development, including expenditure in the health sector.

8.4 Contributions to the Literature

The major contribution of this study to the literature comes from the exploration of the impact of financial development on health care expenditures. Existing literature on financial development and economic growth, poverty as well as health overlooked the role that financial development plays in public and private health care expenditure. This literature posited income, education and gender as the only causal pathways through which financial development leads to better health outcomes.

Secondly, the literature on the determinants of health care expenditure and the role of financial development on health outcomes in the SSA region is scanty and not many studies have explored the determinants of health in the region. This study contributes a comprehensive analysis covering 46 SSA countries.

8.5 Limitations of the Study and Areas for Future Research

The study was constrained by data unavailability for some variables and for some countries. The data for ATMs and bank branches per 100 000 people is only available for 10 years while the study spanned a period of 20 years. Some countries had the entire data series missing for various reasons. South Sudan and Somalia, which had more than one series missing, were dropped from the analysis. Future studies may need to explore the impact of financial access on health outcomes, health care expenditure and financial protection over longer periods of time.

There are some scholars who argue that increased expenditure on health workers reduces the resources that are available to other sectors of the economy. Further research is needed to understand issues relating to the effect of financial development on health infrastructure and investment in health staff. The region currently suffers from limitations related to health infrastructure development. Inasmuch as previous studies have explored the relationship between financial development and education, it would be insightful to understand whether different education skills are affected in different ways.

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Appendix

Annexure Table 5.1 Random vs Fixed Effects Method Selection

Dependent Variable	Independent explanatory variables	F Test Hausman Test
LogNeoMort	LogATMS logGDP_capita, logWaterAccess loged oop_financed pub_financed	17.7 (0.007)
LogNeoMort	logBankBranches logGDP_capita, logWaterAccess, logTHE_capita, logED	13.87 (0.031)
LogNeoMort	logBroadMoney, logGDP_capita, logWaterAccess, logTHE_capita, logED logSanitationAccess, HFS	22.2 (0.001)
LogNeoMort	logBankPvt_credit logGDP_capita, logWaterAccess, logED	19.98 (0.002)
LogInfantMort	logATMS, logGDP_capita, logWaterAccess, logTHE_capita, logED	19.28 (0.003)
LogInfantMort	logBankBranches, logGDP_capita, logWaterAccess, logTHE_capita, logED	12.14 (0.058)
LogInfantMort	logBroadMoney, logGDP_capita, logWaterAccess, logTHE_capita, logED	28.6 (0.000)
LogInfantMort	logBankPvt_credit, logGDP_capita, logWaterAccess, logTHE_capita, logED	5.38 (0.49)
LogU5Mort	logATMS, logGDP_capita, logWaterAccess, logTHE_capita, logED	34.65 (0.000)
LogU5Mort	logBankBranches, logGDP_capita, logWaterAccess, logTHE_capita, logED	17.06 (0.017)
LogU5Mort	logBroadMoney, logGDP_capita, logWaterAccess, logTHE_capita, logED	19.2 (0.007)
LogU5Mort	logBankPvt_credit, logGDP_capita, logWaterAccess, logTHE_capita, logED	4.42 (0.72)
LogLifeExp	logATMS, logGDP_capita, logWaterAccess, logTHE_capita, logED	39.0 (0.000)
LogLifeExp	logBankBranches, logGDP_capita, logWaterAccess, logTHE_capita, logED	53.45 (0.000)
LogLifeExp	logBroadMoney, logGDP_capita, logWaterAccess, logTHE_capita, logED	30.45 (0.000)
LogLifeExp	logBankPvt_credit, logGDP_capita, logWaterAccess, logTHE_capita, logED	21.4 (0.003)

Model Stability and Parameter Evolution

Annexure Table 5.2 Dependent Variable: Neonatal Mortality (LogNeoMort)

Independent Variables	Sample I: 1995–2004		Sample II:2005–2014		Parameter Differences	
	A	B	C	D	C-A	D-B
Log ATMS	-	-	-	-		
Log Commercial Bank Branches per 100 000 people	-	-	-	-		
Log BroadMoney (M3/GDP)	-0.03 (0.035)	-	-0.101*** (0.03)	-	-0.071*** 0.005	-
Log Bank Credit to the Private Sector	-	-0.005 (0.03)	-	-0.066*** (0.02)		-0.061*** 0.01
LogINFRA	-0.58** (0.16)	-0.58** (0.229)	-0.644*** (0.175)	-0.72*** (0.171)	-0.064*** -0.015	-0.14*** 0.058
Log Education	- 0.111*** (0.032)	-0.125*** (0.035)	-0.064* (0.034)	-0.05* (0.033)	0.047*** -0.002	0.075*** 0.002
Log GDP per capita	-0.108** (0.041)	-0.105** (0.043)	-0.111*** (0.029)	0.091*** (0.028)	-0.003*** 0.012	0.196*** 0.015
Government-financed HS	-0.017 (0.017)	-0.017 (0.018)	-0.003 (0.004)	-0.004 (0.006)	0.014 0.013	0.013 0.012
OOP-financed HS	0.0008 (0.038)	0.007 (0.036)	0.007 (0.0089)	0.01 (0.008	0.0062 0.0291	0.003 0.044
Constant	7.11*** (0.8)	7*** (0.83)	7.41*** (0.56)	7.45*** (0.5)	0.3 0.24	0.45 0.33
R-squared	0.5	0.51	0.78	0.78		
Number of Countries	41	41	42	42		
Number of Observations	233	234	278	278		

Annexure Table 5.3 Dependent Variable: Infant Mortality (logInfantMort)

Independent Variables	Sample I:1995-2004		Sample II: 2005-2014		Estimate Differences	
	A	B	C	D	B-C	D-B
Log ATMS	-	-	-	-		
Log Commercial Bank Branches per 100 000 people	-	-	-	-		
Log BroadMoney (M3/GDP)	-0.068* (0.036)	-	-0.14*** (0.041)	-	-0.072*** 0.005	
Log Bank Credit to the Private Sector	-	-0.065** (0.027)	-	-0.104*** (0.025)		-0.039*** 0.002
LogINFRA	-0.33 (0.31)	-0.27 (0.256)	-0.97*** (0.32)	-0.101*** (0.28)	-0.64*** 0.01	0.169*** 0.024
Log Education	- 0.199*** (0.058)	-0.22*** (0.048)	-0.027 (0.057)	-0.03 (0.049)	0.172*** 0.001	0.19*** 0.001
Log GDP per capita	-0.14*** (0.042)	-0.143*** (0.043)	-0.21*** (0.047)	-0.179*** (0.036)	-0.07*** (0.005)	-0.036*** 0.007
Government-financed HS	-0.032 (0.027)	-0.029 (0.028)	-0.011 (0.011)	-0.013 (0.013)	0.021 (0.016)	0.016 0.015
OOP-financed HS	0.02 (0.043)	0.03 (0.03)	0.0004 (0.011)	0.006 (0.01)	-0.0196 0.032	-0.024 0.02
Constant	7.5*** (0.8)	7.32*** (0.9)	10.2*** (1.02)	9.9*** (0.94)		
R-squared	0.5	0.52	0.82	0.82		
Number of Countries	41	42	42	42		
Number of Observations	233	234	278	278		

Annexure Table 5.4 Dependent Variable: Under-Five Mortality (LogU5Mort)

Independent Variables	Sample I: 1995–2004		Sample II: 2005–2014		Parameter Differences	
	A	B	C	D	C-A	D-B
Log ATMS	-	-	-	-		
Log Commercial Bank Branches per 100 000 people	-	-	-	-		
Log BroadMoney (M3/GDP)	-0.078 (0.047)	-	-0.181*** (0.05)	-	-0.103*** 0.003	
Log Bank Credit to the Private Sector	-	-0.084** (0.034)	-	-0.125*** (0.025)		-0.041*** 0.009
LogINFRA	-0.34 (0.381)	-0.235 (0.3)	-1.42*** (0.36)	-0.1.36*** (0.28)	-1.08*** 0.021	0.371*** 0.02
Log Education	-0.241*** (0.075)	-0.264*** (0.061)	-0.076 (0.061)	-0.102* (0.055)	0.165*** 0.014	0.162*** 0.006
Log GDP per capita	-0.127** (0.048)	-0.143*** (0.045)	-0.231*** (0.057)	-0.197*** (0.041)	0.358*** 0.105	0.054*** 0.086
logImmuneDPT	-0.103 (0.065)	-0.11* (0.069)	-0.034 (0.058)	-0.024 (0.047)	0.069*** 0.007	0.086*** -0.022
Government-financed HS	-0.054* (0.031)	-0.052 (0.032)	-0.01 (0.014)	-0.011 (0.015)	0.044*** 0.017	0.041*** 0.017
OOP-financed HS	0.016 (0.051)	0.032 (0.038)	0.001 (0.013)	0.009 (0.013)	-0.015 0.038	-0.023 0.025
Constant	8.37*** (1.35)	8.29*** (1.09)	13.1*** (1.16)	12.39*** (1.07)	4.73*** 0.19	4.1 0.02
R-squared	0.52	0.53	0.81	0.8	-	-
Number of Countries	41	41	42	42	-	-
Number of Observations	233	234	278	278	-	-

Annexure Table 5.5 Dependent Variable: Life Expectancy (logLife_Exp)

Independent Variables	Sample I:1995–2004		Sample II: 2005–2014		Parameter Differences	
	A	B	C	D	C-A	D-B
Log ATMS	-	-	-	-		
Log Commercial Bank Branches per 100 000 people	-	-	-	-		
Log BroadMoney (M3/GDP)	0.021 (0.028)	-	0.642*** (0.12)	-	0.621 -0.092	
Log Bank Credit to the Private Sector	-	0.048*** (0.028)	-	0.05*** (0.01)		0.002 0.018
LogINFRA	-0.007 (0.179)	-0.04 (0.165)	0.2** (0.096)	0.242** (0.095)	0.207 0.083	0.282 0.07
Log Education	0.066* (0.038)	0.073 (0.034)	0.001 (0.017)	-0.006 (0.015)	-0.065 0.021	-0.079 0.019
Log GDP per capita	0.029 (0.019)	0.033* (0.018)	0.063*** (0.02)	0.048* (0.019)	0.034 0.001	0.015 0.001
logHIV_Prev	-0.04 (0.033)	-0.045 (0.03)	-0.029 (0.02)	-0.039* (0.019)	-0.011 0.013	-0.006 0.011
Government-financed HS	0.017 (0.011)	0.014 (0.01)	0.0006 (0.0022)	0.0006 (0.003)	-0.0164 0.0088	0.0146 0.007
OOP-financed HS	0.015 (0.037)	0.013 (0.03)	0.004 (0.0045)	0.003 (0.004)	-0.011 0.0325	-0.01 0.026
Constant	3.5*** (0.59)	3.57*** (0.56)	2.53*** (0.32)	2.61*** (0.31)	-0.97 0.27	-0.96 0.25
R-squared	0.18	0.25	0.7	0.73	-	-
Number of Countries	39	39	40	40	-	-
Number of Observations	221	222	273	273	-	-

Annexure Table 6.1 : Random vs Fixed Effects Method Selection

Dependent Variable	Independent explanatory variables	F Test Hausman Test
LogNeoMort	LogTHE_capita logGDP_capita, logWaterAccess loged oop_financed pub_financed	19.2 (0.003)
LogNeoMort	logTHE2GDP logGDP_capita, logWaterAccess, logED pub_financed oop_financed	13.29 (0.038)
LogNeoMort	LogPvtHE2GDP, logGDP_capita, logWaterAccess, l logED loged, HFS	16.45 (0.011)
LogNeoMort	LogPubHE2THE logGDP_capita, logWaterAccess, logED HFS	15.17 (0.01)
LogInfantMort	logTHE_capita, logGDP_capita, logWaterAccess, logED, pub_financed oop_financed	19.644 (0.003)
LogInfantMort	LogTHE2GDP, logGDP_capita, logWaterAccess, logED pub_financed oop_financed	11.466 (0.075)
LogInfantMort	LogPubHE2GDP, logGDP_capita, logWaterAccess, logED pub_financed oop_financed	6.13 (0.408)
LogInfantMort	LogPvtTHE2GDP, logGDP_capita, logWaterAccess, logED pub_financed oop_financed	20.11 (0.002)
LogU5Mort	logTHE_capita, logGDP_capita, logWaterAccess, logED, logImmuneDPT pub_financed oop_financed	36.4 (0.000)
LogU5Mort	LogTHE2GDP, logGDP_capita, logWaterAccess, logED logImmuneDP pub_financed oop_financed	17.06 (0.013)
LogU5Mort	LogPubHE2GDP, logGDP_capita, logWaterAccess, logED logImmuneDP pub_financed oop_financed	9.5 (0.21)
LogU5Mort	LogPvtTHE2GDP, logGDP_capita, logWaterAccess, logED logImmuneDP pub_financed oop_financed	24.3 (0.001)
LogLifeExp	logTHE_capita, logGDP_capita, logWaterAccess, logED, logHIV_Prev pub_financed oop_financed	25.63 (0.000)
LogLifeExp	LogTHE2GDP, logGDP_capita, logWaterAccess, logED logHIV_Prev pub_financed oop_financed	20.09 (0.005)
LogLifeExp	LogPubHE2GDP, logGDP_capita, logWaterAccess, logED logHIV_Prev pub_financed oop_financed	17.33 (0.015)
LogLifeExp	LogPvtTHE2GDP, logGDP_capita, logWaterAccess, logED logHIV_Prev pub_financed oop_financed	21.4 (0.003)

Annexure Table 7.1 Random vs Fixed Effects Method Selection

Dependent Variable	Independent explanatory variables	Hausman Test
LogOOP_THE	LogATMS logGDP_capita, logU14 logover65 oop_financed pub_financed	32.2 (0.00)
LogOOP_THE	LogBankBranches logGDP_capita, logU14 logover65 oop_financed pub_financed	36.4 (0.00)
LogOOP_THE	LogBroadMoney logGDP_capita, logU14 logover65 oop_financed pub_financed	44.4 (0.00)
LogOOP_THE	LogBankPvt_credit logGDP_capita, logU14 logover65 oop_financed pub_financed	43.2 (0.00)
LogOOP_Pvt	logATMS, logGDP_capita, logWaterAccess, logTHE_capita, logED	29.17 (0.00)
LogOOP_Pvt	logBankBranches, logGDP_capita, logWaterAccess, logTHE_capita, logED	31.3 (0.00)
LogOOP_Pvt	LogBroadMoney logGDP_capita, logU14 logover 65 loged oop_financed pub_financed	33.8 (0.000)
LogOOP_Pvt	LogBankPvt_credit logGDP_capita, logU14 logover 65 loged oop_financed pub_financed	35.6 (0.00)