



A Ph.D. RESEARCH THESIS IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR
THE AWARD OF Ph.D. IN BUSINESS MANAGEMENT

**TOPIC: HEALTHCARE FINANCING AND ITS EFFECT ON THE EQUITY OF
HEALTHCARE SYSTEMS AND UNIVERSAL COVERAGE IN SUB-SAHARAN AFRICA.**

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Student Declaration

I, the undersigned, declare that this is my original work and has not been submitted to any other college, institution, or university other than the University of the Witwatersrand.

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Abstract

This work examines the contribution of different arrangements for financing healthcare to health systems' equity in Sub-Saharan Africa (SSA); with equity of the health system measured as health outcomes. More specifically, the study explores: 1) How financing of healthcare using domestic resources affects health outcomes. 2) The effect of increased budgetary allocation to healthcare on health outcomes. 3) And the effect of financial pooling and financial risk mitigation on the health systems' equity.

The concept of health production, based on Grossman's (1972 & 2017) health capital theory, serves as the framework for empirical analysis of this work, using balanced panel data from 47 SSA countries, over 19 years. The dataset is pulled from relevant governments' and multi-lateral organizations' databases. Broadly, descriptive statistics and multivariate regression analysis are deployed in assessing the hypothesized relationships between the study's relevant variables – financing of countries' healthcare systems and various forms of health outcomes (i.e., life expectancy at birth, 5-year mortality rate, crude death mortality rate, and rate of infant mortality).

The results indicate that financing healthcare using domestic *public* resources does relate insignificantly or negatively to health outcomes, but financing healthcare using domestic *private* resources relates significantly well with health outcomes. An increase in budgetary allocation to healthcare per capita relates beneficially to health outcomes. However, an increase in budgetary allocation as a percentage of total government expenditure affects the region's health outcomes adversely; however, further tests of this relationship reveal that a reduction in indirect investment in healthcare could be responsible for the adverse effects. Thus, pointing to the need to balance the effects of the increase in both direct and indirect healthcare investments (expenditures). Lastly, apart from financial pooling using the private health insurance method, which affects health outcomes negatively, all the other pooling methods of healthcare financing affect the region's health outcomes favorably. However, the social health insurance (SHI) effect on the region's health outcomes is largely insignificant. Which may call into question its appropriateness as a vehicle for universal health coverage (UHC).

The main conclusion of the study is that governments' participation in healthcare financing is necessary for the SSA region's health systems. However, increased government allocation should not be done at the expense of allocation to health-related activities (like the provision of clean water, sanitary services, etc.). We also found that domestic private healthcare funding methods associate favorably with health outcomes while domestic public healthcare funds do not. We argue that the reason for these confounding results is because of allocation problems, and recommend redistributive policies with a focus on the indigent and rural areas. Further diagnostic tests show that domestic public financing methods increase access to healthcare but not health outcomes. This shows that a financing method can increase access to healthcare but fail to improve population health status. Our findings also show that SSA health systems still need external financial assistance to be equitable. We

recommend a gradual weaning from external assistance. On risk pooling, we recommend an increase in pool sizes and more accurate actuarial data to improve the performance of SHI and, to make it appropriate for UHC.

Finally, governments of the SSA region should increase funding of healthcare by using public resources, ensure healthcare financing risk mitigation by increasing pool sizes of public financial pooling methods, and enact requisite legal and regulatory frameworks to guide the administration of private non-profit healthcare finance pooling schemes. Importantly, these governments should consider policies that correct for imbalances in the distribution of healthcare between the rich and the poor, and between rural and urban areas.

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Dedication

This work is dedicated to my late parents Mr. Charles Okaka and Mrs. Maria Aluoch Okaka.

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List of Abbreviations

AIDS – Acquired Immune Deficiency Syndrome

ATP – Ability-to-Pay

CBHI – Community-Based Health Insurance

CDR – Crude Death Rate

CFA – Compulsory Financial Arrangement

CHE – Catastrophic Healthcare Expenditure

CHI – Compulsory Health Insurance

CHITCHE – Compulsory Health Insurance as a Percentage of Total Healthcare Expenditure

CRTS – Constant Return-to-Scale

DGHEPCP – Domestic Government Healthcare Expenditure Per Capita

DHEPCP – Domestic Healthcare Expenditure Per Capita

DHETCHE – Domestic Healthcare Expenditure as a Percentage of Total Healthcare Expenditure

DPHEPCP – Domestic Private Healthcare Expenditure Per Capita

DPHETCHE – Domestic Private Healthcare Expenditure as a Percentage of Total Healthcare Expenditure

DRTS – Direct Return-to-Scale

EXTHTCHE – External Healthcare Expenditure as a Percentage of Total Healthcare Expenditure

FE – Fixed Effect

GFA – Government Financial Arrangement

GFATCHE – Government Financial Arrangement as a Percentage of Total Healthcare Expenditure

GHEGDP – Government Healthcare Expenditure as a Percentage of the Gross Domestic Product

GHEGGE – Domestic Government Expenditure in Healthcare as a Percentage of General Government Expenditure

GLS – Generalized Least Square

HIV – Human Immunodeficiency Virus

IMF – International Monetary Fund

IMR – Infant Mortality Rate

IT – Information Technology

KHPFP – Kenya Health Policy Framework Paper

LEB – Life Expectancy at Birth

LICs – Low-Income Countries

MLR – Medical Loss Ratio

MMR – Maternal Mortality Rate

NHIF – National Health Insurance Fund

OOP – Out-of-Pocket Payment

OOPTCHE – Out-of-Pocket Payment as a Percentage of Total Healthcare Expenditure

OPFA – Other Private Financial Arrangement

OPFATCHE – Other Private Financial Arrangement as a Percentage of Total Healthcare Expenditure

PHC – Primary Health Care

PHI – Private Health Insurance

PHITCHE – Private Health Insurance as a Percentage of Total Healthcare Expenditure

PPACA – Patients Protection and Affordable Care Act

RE – Random Effect

SA – South Africa

SHI – Social Health Insurance

SHITCHE – Social Health Insurance as a Percentage of Total Healthcare Expenditure

SPHC – Selective Primary Health Care

SSA – Sub-Saharan Africa

U5MR – Under Five Mortality Rate

UDMHC – Universal Decent Minimum Health Care

UHC – Universal Health Coverage

UPHC – Universal Primary Health Care

USA – United States of America

VFA – Voluntary Financial Arrangement

WHO – World Health Organization

CHAPTER ONE

1. INTRODUCTION

1.1 Background of the Study

Poor health has a dire negative impact on both individuals' well-being and countries' economic performance (Schultz, 2010). This is because it not only reduces these individuals' ability to function optimally but also reduces their productive potential. According to the World Health Organization (WHO), health systems are the most important institutions in the promotion of population health. (The World Health Organization makes no distinction between health systems and healthcare systems; therefore, we use them as synonyms in this study). This is because health systems promote health by distributing healthcare to those who are experiencing ill (poor) health, and ensuring that those who are healthy do not become ill by promoting healthy habits and behavior. This study is based on Grossman's health capital theory (Grossman 1972). According to the theory, a health system that distributes healthcare fairly to all members of society improves welfare through the optimization of population health stock (Baltangi,2008). Because of the optimization of population health stock, such a health system is said to be equitable. Where health system equity refers not only to the fairness with which health systems distribute healthcare across the population but also to the effectiveness of the healthcare in contributing to aggregate population health. We note that healthcare is a means through which health is maintained and/or repaired. Therefore, by effectiveness, we are referring to its ability to restore health to those who experience ill health and to ensure that those who are healthy do not become sick. This is why Grossman, (1972) argues that an individual's health stock depends on the quality of healthcare. However, access to needed healthcare is only one, but not the only determinant of health (Fleurbaey & Schokkaert, 2009; Grossman, 1999; Hren, 2012).

Research (e.g., by Barasa et al., 2017; Marphatia, 2010; Stubbs et al., 2017) shows that the cost of healthcare is the main cause of exclusion to needed healthcare. It is also a major cause of impoverishment globally, but more so in low-income economies (Chuma & Maina, 2012; Eze et al., 2022; World Health Organization, 2019b). It is for this reason that health financing experts and the World Health Organization are

urging countries to find ways of financing healthcare that would not only increase access to needed healthcare but also reduce the impoverishing effect of healthcare costs.

Scholarly interest has increased around health financing methods and access to healthcare and health systems outputs. The main concern, particularly in low-income countries, is how to provide quality healthcare to the majority without exposing the poor and the vulnerable to financing hardship. The other concern is finding a healthcare financing method that is sustainable. Previous empirical studies (e.g. by Ataguba, 2016; Barasa, Maina, & Ravishankar, 2017) show that the method used in the financing of healthcare is critical in ensuring that health systems can repair and add value to population health stock. This, as noted by Stubbs et al., (2017), is because the amount of healthcare available to households and a country, and, its allocation depends on the method used in financing it. For this reason, health systems' equity depends on both the amount of finances available for healthcare and the financing methods used in financing healthcare. We note that the theory of health capital states that the link between health expenditure (the amount spent on healthcare) and population health stock should be positive. We, therefore, argue that if an increase in expenditure from a financing method is positively associated with health system's outputs (health outcomes) then the financing method injects equity into the health system. Going by the a priori expectations of the health capital theory, this implies that health system's equity, as measured by population health stock (health outcomes), should improve with increase in the amount of finances allocated to healthcare whatever the financing source of the allocation.

However, empirical studies around equity in healthcare based on access to needed healthcare show that increase in expenditure using some methods of financing increases access while some impede it. If we assume that access to needed healthcare would automatically translate to the improvement in population's health stock, then these studies suggest that increasing financing of healthcare using some methods can be detrimental to population health stock. Although we argue that access to healthcare may not automatically translate to improvement in population health, we note that health experts and empirical studies seem to suggest that increased access is all that is required for health system's equity. They proceed with the assumption that a health

financing method that increases access to healthcare should also lead to an improvement in a population's health stock.

Because of the assumption that access to needed healthcare would automatically translate to better population health stock, the debate on the association between healthcare financing methods and the health system's equity has relied heavily on access. For example on public and private financing methods, some experts (e.g., Ataguba, 2010; Ataguba, 2016; Barasa et al., 2017; Kwesiga et al., 2015) argue that privately financed healthcare is unsuitable for low-income countries, particularly those in the sub-Saharan Africa region, others (e.g., Atinga et al., 2015; Buigut et al., 2015; Hsiao et al., 2016; Hsiao & Shaw, 2007; Pauly et al., 2006) aver that to improve health stock of its population, SSA cannot rely on public financing methods. The proponents of public financing methods argue that the poor in SSA cannot afford the cost of healthcare without suffering financing hardship, however little the payment is. They point out that because of widespread poverty and high inequality in the region, governments must intervene either directly through taxes or, by imposing financing solidarity between the rich and the poor to improve access to needed healthcare. Its opponents, on the other hand, posit that public financing methods are inadequate, inefficient, and wasteful. They argue that the levels of wastefulness, political interference, and inefficiencies undermine the beneficial effects of social support required to make solidarity (in the financing of healthcare) effective. Given the implications of a strong association between health financing methods and health systems' equity, the impact of public and private financing methods on health systems' equity in SSA warrants a closer look, particularly from the output perspective.

Apart from the debate on private versus public financing methods, another debate that has been raging is between proponents of external assistance and its opponents. This debate is based on the sustainability of healthcare financing method. While some (e.g., Barasa et al., 2017) have argued that for health financing to be sustainable it has to be financed using domestic resources, others (e.g., Pauly et al., 2006) point out that resource-challenged countries do not have the capacity to provide quality healthcare to all their citizens without external support. They argue that attempting to do so would cause an economic meltdown that would result in economic ruin for these countries. Indeed, even if such an attempt does not result in an immediate economic meltdown, it

would be counter-productive because it would suck away resources from other important social and economic activities, some of which are beneficial to health (Pauly, 1986; Pauly et al., 2006). Such an argument shows that without donor support the health systems in SSA would register negative results. Given the recent evidence of donor fatigue and economic slowdown in the main donor countries, it is important to find out how the health systems in the countries of the SSA region would perform without external support.

Still on sustainability, some experts argue that taxes and direct payment for healthcare are either unsustainable or regressive or, both. They (e.g., Carrin et al., 2008; Carrin & James, 2005; Norman et al., 2009; Pauly et al., 2006; Preker et al., 2002) point out that direct payment and use of taxes have been tried over and over again, but they have failed each time. They argue that the elixir to the hubris is financial pooling for healthcare in low-income economies. This is because financial pooling spreads the cost of healthcare more equitably between the rich and the poor and, between the sick and the healthy (Mathauer et al., 2011; Saltman et al., 2004; Scheil-Adlung et al., 2006). They also argue that financial pooling alleviates the burden of the cost of healthcare from the economy by shifting the incidence of healthcare financing from taxes to the pools. However, some experts (De Allegri et al., 2009; Ekman, 2004; Wagstaff, 2010; Wagstaff & Lindelow, 2008) argue that a keener look at how financial pools operate as well as research findings shows that financial pooling is not suited for low-income countries. This is because due to the existence of small formal sectors (large informal sectors), the pools are either too small to be effective or too expensive to be economical. Furthermore, just like taxes, pooled funds are exposed to misappropriation and inefficient allocation. Given the current emphasis, particularly by the World Health Organization, on financial pooling and universal health coverage, it is important to have a closer look at the impact of financial pooling for healthcare on the equity of SSA's health systems.

On health system equity, there is an ongoing debate as to whether the concept of health system equity should focus on health or healthcare. While some experts (e.g., Dworkin, 2018b; Mooney, 1987) argue that the best way to go about equity in health systems is by equalizing individuals' opportunities to benefit from healthcare, others (e.g., Braveman & Gruskin, 2003; Daniels, 1982; Pereira, 1993)) argue that because good health is what consumers of healthcare are looking for when they seek healthcare from the health systems, health system's

equity should be based on a fair distribution of health and not healthcare. The latter insist that in terms of cost, equity should be measured in terms of utility. And, utility is represented by the end product, which is the health status (outcomes) of consumers of healthcare. We argue that to the extent that healthcare is a means of maintaining and repairing health, there is no contradiction between the two. Indeed as pointed out by Mooney (1983), the product of equity in healthcare and equity in the distribution of healthcare services is equity in health. He argues further that equity in health can be ensured through equity in expenditure in healthcare. Mooney is showing that healthcare is simply a means of achieving good health and healthcare expenditure can be used to measure investment in healthcare for the improvement of health. We note that because health is neither tangible, transferable, nor divisible, the legitimate economic equity concern should be based on healthcare. This is because healthcare is not only tangible and divisible, but it is also measurable.

However, to the extent that the real equity concern is based on health and not healthcare per se, it is important to find ways of capturing the concept of equity in terms of health. Although some experts (e.g., Dworkins, 2018a) argue that equity of health can be proxied using healthcare, we argue that health can be measured more directly by using health outcomes. Health outcomes are measures of a population's health stock. And because health systems should add (contribute) to a population's health stock, health outcomes are a better proxy of the products of health systems. Note also that the World Health Organization defines health system as a system consisting of all organizations, people, and actions whose primary intent is to promote, restore or maintain health. This means that health systems exist to support health through healthcare. Even according to the WHO, health systems' function is to support population health. Therefore, unlike most previous studies on health system's equity, this study uses health outcomes to proxy equity of the health systems in sub-Saharan Africa.

Sub-Saharan Africa (SSA) is home to almost 20% of the world's population, it is also home to the largest number of poor people, and the most economically unequal region on earth. SSA is also home to the sickest (in terms of health outcomes) population on earth (Barasa et al., 2017; Eze et al., 2022; World Health Organization, 2016, 2019a). The region accounts for two thirds of global maternal deaths, and is the only region where transmitted diseases are still the leading cause of infant and adult mortality (Eze et al., 2022). Child mortality in

Africa (at 51 per 1 000 live births) is six times higher than that in the European region (Kiross et al., 2020). According to Eza et al (2022), catastrophic health expenditure in the region increased between 2015 – 2019 while the global trend of catastrophic health expenditure has been declining in the last decade.

Furthermore, although SSA has a global population of 20%, its total expenditure in healthcare is a mere 3% of global expenditure in healthcare (World Health Organization, 2019a). This means, a low investment in healthcare, which can translate into low health systems' outputs (Mooney, 1987). According to the World Bank, on average SSA spends only \$85 on healthcare per capita per year, this is well below the world average of \$950 per capita per year (Eze et al., 2022). Furthermore, the report also shows that the region spends only 6% of its GDP on healthcare, compared to 17% that North America spends. Showing that healthcare takes a lower priority in SSA's budgets compared to other regions of the world. It is for this reason that equity in the SSA's health systems has raised concerns and as a result, attracted research attention. However, as we explain below, most of this has concentrated on equity of healthcare, in terms of vertical and horizontal equity (access to needed healthcare), instead of equity of health (health system's outputs or outcomes).

Research (e.g., Leighton, 1996, Stubbs et al, 2017) shows that most of SSA's healthcare expenditure is concentrated on the high-income groups. This means that its health systems' payment methods could be regressive. A regressive payment method is where the poor bear disproportionately a higher cost of healthcare compared to the rich (Stubbs et al., 2017). A regressive payment method impairs health system's ability to distribute healthcare fairly, which translates into vertical inequity. Furthermore, because of weak solidarity (World Health Organization, 2010) in the way financing of healthcare is done, research (e.g., by Jui-fen, 2007; Van Doorslaer et al, 2008; Watanabe & Hashimoto, 2012) shows that health services in SSA countries may not be allocated according to need. That is, people with the same need for healthcare in these countries may not be receiving the same amount of healthcare. If the healthcare financing method is unable to ensure that people with the same need for healthcare receive the same treatment, the health system is said to be lacking in horizontal equity. Lack of vertical and horizontal equity means that individuals who need healthcare in SSA countries may

not be having access to needed healthcare in the right quantity and quality. This can translate into the low health outcomes reported by some studies.

Apart from the problem caused by the lack of vertical and horizontal equity, the concern that unaffordable cost of healthcare can increase or exacerbate incidences of impoverishment has also attracted experts' attention. According to some studies (e.g. by Barasa et al, 2017; McIntyre, 2012; Mebratie et al, 2015; Nyman, 2008; Okpani & Abimbola, 2015; Xu et al., 2007), the reason why paying for healthcare increases incidences of poverty is because of lack of financing risk mitigation. They argue that incorporating risk mitigation measures in the financing methods would assist in reducing the incidences and the severity of poverty caused by unaffordable healthcare. Furthermore, they argue that financing risk mitigation measures can increase vertical and horizontal equity. The financing approach recommended by these studies for health financing risk mitigation is pooled methods. They argue that financial pooling, spreads healthcare financing risk across many households, thereby, reducing the burden of paying for healthcare on individual households.

As we have pointed out, these studies look at health systems' financing equity from the point of healthcare. That is, how the financing methods contribute to access to needed healthcare and the effect of the cost of healthcare on the consumers' financial well-being after consuming healthcare. This approach ignores the most important aspect of a health system's function, that of contributing to population welfare through supporting health. Due to the dearth of studies that focus on the contribution of financing methods to health systems' equity, in terms of health, as measured by health outcomes, this study attempts to fill this gap not only to provide an alternative way of looking at health system's equity but also to provide a base upon which subsequent studies (both on horizontal and vertical equity) on equity can build to provide a more holistic picture of health system's equity. This can be done by research that looks at healthcare financing equity in terms of equity of healthcare (vertical and horizontal equity) and equity of health (health outcomes).

1.2 The Concept of Equity in Healthcare

Although equity and equality are sometimes used as synonyms, the two terms are not the same. While equality is a descriptive term, equity is a normative term (LeGrand, 1987). Equal distribution means that everybody

gets an equal share of the resource, while equitable distribution means that the resource is allocated to individuals according to need. We note that despite the stated differences, unequal distribution can lead to inequity. Society should, therefore, pursue equality in distribution unless such action leads to inequities. Equity is, therefore, more like justice. Both are normative social concepts that are concerned with the general well-being of society. This means that while it is not possible to achieve equality, and probably not even desirable in a social setting, equity, just like justice, is both achievable and desirable. According to Rawls (2004), injustice should neither be constant nor tolerable. He argues that injustice can only be tolerated when it is necessary to avoid (or to correct) an even greater injustice. Analogously, the only thing that permits us to acquiesce to unequal distribution is if it works to the advantage of the most disadvantaged. Where equity in healthcare means that individuals receive needed healthcare when they need it in the right amounts and quality. Therefore, inequality in healthcare can refer to lack of access, low amount, or low quality of care. Because healthcare is a necessity, inequality in needed healthcare should not be tolerated by society. Going by Rawls' argument, if it is to be tolerated at all, inequality in the distribution of healthcare can only be permitted if such a distribution is structured to the advantage of the most disadvantaged (e.g., the poor, chronically ill people, low-caste, etc.). Or, if it is aimed at correcting pre-existing inequities in access and the consumption of needed healthcare. We note that equality in health is not achievable, however, equity which is a normative term is achievable.

Empirical studies on health systems' equity in the SSA region have concentrated on health systems' equity in terms of distribution of healthcare. Mainly in terms of access to needed healthcare, in the forms of vertical and horizontal equity. Vertical equity refers to the extent to which households pay for healthcare in accordance with ability-to-pay (ATP). The main characteristic of vertical equity is vertical progressivity. That is a healthcare system where the payment incidence falls more on the rich than on the poor. And payment as a proportion of income increases with increase in ATP (Wagstaff, 2002; Mills, 2012). As we have pointed out, the other form of equity that has received research attention in the region is horizontal equity. This form of equity requires that people with the same need for healthcare receive the same amount of healthcare. That is, deferential treatment should not be based on any other factor apart from the need for healthcare. The other form of health system's

equity that has begun to receive research attention is what Ataguba & McIntyre (2018) refer to as overall (holistic) equity. Overall equity combines horizontal and vertical equity. These forms of equity concentrate on equity of access to needed healthcare. They study health system's financing equity in terms of whether the financing method graduates payment in accordance with ATP and whether the financing method increases or impedes access to needed healthcare.

Because of the widely held belief that difficulty in financing healthcare is the main reason why individuals, particularly the poor, choose to forego needed healthcare, and if they consume healthcare they are most likely to suffer catastrophic expenditure, researchers (e.g. Chuma, Maina, & Ataguba, 2012; Jehu-Appiah et al., 2011; Phiri & Ataguba, 2014) have concentrated on looking at health system's equity from a vertical equity perspective. Those (e.g., Jui-fen, 2007; Van Doorslaer et al, 2008; Watanabe & Hashimoto, 2012) that have looked at health system's equity from the angle of horizontal equity have been worried that studies on vertical equity concentrate too much on payment at the expense of service. They argue that such studies ignore the need for healthcare. They point out that even if individuals have the same ATP or different ATP, the one with greater need (e.g., chronic illness) should be allowed to consume more healthcare compared to the one with less need. And an equitable financing method should ensure that this happens. This means that a financing method can be vertically progressive but still not equitable if it ignores the specific needs of consumers of healthcare. In this case, a vertically progressive health system remains inequitable if it treats consumers of healthcare with the same need differently.

On the other hand, Ataguba & McIntyre (2018) argue that holistic equity should form the framework upon which health system's equity is built. They argue that holistic equity goes beyond the separation of vertical equity (VE) and horizontal equity (HE) in healthcare provision, as has been the norm. Holistic requires that an equitable health system should be equitable both vertically and horizontally. This means that a good healthcare financing method should not only satisfy the concepts of progressivity but it should also ensure that healthcare is distributed equitably among those with the need for healthcare. We note that the VE, HE, and even holistic equity view of equity, look at the health system's equity from an input (access) and healthcare angle. We argue that while these

equity perspectives do not depart considerably from the concept of equity, by ignoring the output of the healthcare system, they may not capture equity in all its perspectives. Indeed, it may matter little if all three forms of equity are in a health system, if the health system's outputs are weak. This is because the health outputs are what can show if the health system has performed the purpose for its existence. We argue further that a financing method that causes a health system to maximize a population's health outcomes, should also cause it to be both VE and HE. Therefore, looking at health system's equity from an output perspective is more holistic than the combination of vertical and horizontal equity as recommended by Ataguba and McIntyre (2018).

1.3 Statement of Research Problem

There is probably no greater inequity than the inequity that denies a sick person needed healthcare, particularly if the remedy for her sickness exists, on account of her inability to afford it. This is because it calls upon the sick not only to accept the direct suffering resulting from the malady, but also to accept the economic and social consequences that come with it. The inequity is made worse if attempts to remedy the situation, using coping mechanisms, end up sinking the sick into poverty. They do not only get sicker but also poorer. Furthermore, because poor health impairs an individual's productive capacity, if the lack of remedy is widespread it also reduces the population's ability to contribute to development. Therefore, poor health affects economic well-being both at the household and national levels (Schultz, 2010; Well, 2007).

Concerned about the situation the World Health Organization (2005a) called upon member countries to strengthen their health systems by adopting healthcare financing methods that can allow broad access to needed healthcare without causing financing hardship to many people. WHO has also pushed the agenda to attract more precise (effective) responses to the problem through empirical research. Indeed, the intensity of the problem has led the World Health Organization to call for a more knowledge-based approach to the search with the aim of finding a solution that can be demonstrated to be both reliable and sustainable.

The call has triggered increased empirical research attention aimed at finding an appropriate healthcare financing approach for low-income countries. An approach that can ensure unimpeded access to needed healthcare for all, regardless of economic, social, or health status. That is, a financing method that can ensure

sustainable equity in the health systems. Equity that will not only reduce incidences of exclusion from needed healthcare but also ensure that more people are healthy and remain healthy so that they can contribute to the economic growth of their countries.

There is a broad consensus that the overriding objectives of healthcare financing should be three-fold: (1) to enable broad access to quality healthcare services, (2) to improve the health status of the population and, (3) to ensure the utilization of the system's services does not leave the users in financial hardship. Based on these objectives and drawing from existing research around health systems' equity in the SSA region, we notice that scant research attention has been given to the relationship between methods used in financing healthcare and health systems' outputs (outcomes). Yet this is what would capture the objective of improvement of health status more accurately. As we have explained, the pattern of research focus in SSA (e.g. by Chuma, Maina, & Ataguba, 2012; Jehu-Appiah et al., 2011; Magadi, Zulu, & Brockerhoff, 2003; Orem & Zikusooka, 2010; Phiri & Ataguba, 2014; Mebratie et al., 2015; Okpani & Abimbola, 2015) has concentrated on the effect of health financing on health systems vertical and horizontal equity. Vertical and horizontal equity is concerned with the progressivity of a financing method or, whether a financing method allows those with greater need for healthcare to access more care than those with less. A few researchers (e.g., Ataguba & McIntyre, 2012, 2018) have looked at health system's equity in terms of both vertical and horizontal (overall or holistic) equity. Holistic equity simply combines the two dimensions of equity into a single study. According to Ataguba & McIntyre, (2012), this is a marked improvement in the study of health system's equity. They argue that this is because the key challenge for health systems globally is not only to ensure that payment for healthcare is done according to ability-to-pay (ATP), but also that the healthcare is distributed according to need.

We note also there is agreement among experts that the pattern of health financing determines the effectiveness with which health systems distribute healthcare, and the level of exposure to financing hardship. The purpose of this study is to investigate the contribution of specific healthcare financing sources to the equity of the healthcare system in SSA. We pay particular attention to the contribution of domestic healthcare expenditure to health outcomes. As we have noted, external support is becoming less reliable because of the

slowdown in the economies of the main donor countries, and donor fatigue (McIntyre et al., 2018; Olakunde et al., 2019). Yet research (e.g., by McIntyre et al., 2005) shows that most SSA countries still rely on external support for their healthcare needs. Although weaning them from the dependence on external support may, on the face of it, seem an attractive proposal, this can only be done if it becomes clear that as currently constructed, domestic financing sources are effective. Otherwise, removing the external support to healthcare in the region can result in the collapse of health systems that may have global ramifications given the externalities associated with healthcare and disease outbreaks. Given the health concerns and the need to wean SSA health systems from the overreliance on external support, it is surprising that no empirical study (to our knowledge) has been done on the association between domestic funding and health systems performance in the region. The current work attempts to fill this gap. Apart from domestic financing, we also look at the contribution of public funding to health outcomes. Research on the contribution of publicly managed funds and private funds to access to needed healthcare (e.g., by Ataguba & McIntyre, 2012; Ataguba & McIntyre, 2013; Makinen et al., 2000; Okech & Lelegwe, 2016) and alleviation of financing difficulties (e.g., by Barasa et al., 2017; Eze et al., 2022; Kwesiga et al., 2015) have returned contradictory results. This study contributes to this matter by looking at the contribution of both public and private funds from the perspective of health outputs.

Finally, we look at the relationship between financial pooling and health outcomes. Although health financing experts (e.g., Mebratie et al., 2015; Okpani & Abimbola, 2015) and the World Health Organization are insisting that financial pooling can provide a lasting solution to SSA's healthcare financing problem, there is little empirical evidence to support this position. We argue that it is important to find out if the different pooling mechanisms in place in SSA are making a difference in the health outcomes of the region. This is why this study investigates the relationship between financial pooling for healthcare and health systems output in the SSA region.

As we have pointed out, this study looks at health systems' financing equity from a different dimension. It departs from the tradition of looking at the health system's equity in terms of access (vertical and horizontal equity), and distribution justice, and looks at it from the perspective of health systems' outputs – the health outcomes. As we have stated, previous research attention concentrates on equity in terms of healthcare. That is

the contribution of financing methods to fairness in access to needed healthcare and fairness in the distribution of healthcare. They have largely ignored the outcome of this process. It may not matter a lot if the financing method promotes access and, at the same time, leads to a fair distribution of healthcare if the output of the process is weak. Indeed some experts (e.g., Hercot et al., 2011, Leighton, Becker, Derriennic, & Laurin, 1994; Shaw & Griffin, 1995) argue that some financing methods may lead to increased access and even fairness in the distribution of healthcare while compromising the quality of the care.

We argue that the quality of healthcare is an important dimension of equity. Any study that ignores this dimension leaves out, probably, the most important characteristic of equity. The best way to capture this dimension of equity is through the output of the health systems. Indeed, we argue further that looking at equity from the perspective of health system's output provides a more accurate measure of equity, as the main function of a health system is to repair and/or maintain health. Indeed, as pointed out by some experts (e.g., Pereira, 1993), the proper way to look at equity of health systems is not to concentrate on equity in terms of healthcare, but to look at it in terms of health. We argue that looking at the contribution of financing methods to health system's equity from the perspective of vertical and horizontal equity concentrate on equity of healthcare at the expense of equity of health itself. We posit that healthcare is simply a process of repairing health whose result is better health in terms of less mortality and increased longevity. Although health is neither tangible nor divisible, it can be proxied using a population's health outcomes. This is because the process of repairing health should lead to less mortality and increased longevity. This is why population health outcomes are proxied by mortality rates and life expectancy. This study uses health outcomes (life expectancy and mortality rates) to estimate the contribution of financing methods to health systems' equity.

Additionally, unlike previous research on health systems' equity in SSA, this study is grounded on the economic concept of health production. The theory looks at health as a product of a production process that is supported by healthcare. more specifically, this study relies on the health capital theory which was proposed by Grossman in 1972 (Grossman, 2017). Grossman developed the theory to investigate the relationship between investment in health and individual's health stock, using a model that he called the health capital model. The

model has been modified (e.g., by Fayissa* & Gutema, 2005) to capture the return on investment in the population's health stock instead of just an individual's health stock. Being a health production concept, it states that an increase in investment in healthcare should correlate favorably with improvement in population health. This clearly shows that the purpose of investment in health systems should be the improvement (increase in health production) in population health stock in the form of better health outputs.

1.4 Scope and Aims of Research

Consistent with previous studies on health production, the dependent variables used in this study to proxy health system's outputs are health outcomes. We use expenditure in healthcare as proxies of direct investment in population health. This approach of looking at investment in health in terms of expenditure in healthcare is supported by experts in health economics (e.g., Dworkins 2018a). Because healthcare expenditures come from different sources, each expenditure source represents a financing method. Using the concept of health production and health systems' outputs, we can show more clearly the contribution of each financing method to equity (measured in terms of health outputs) better than studies that looked at health system's equity from the perspective of vertical or horizontal equity (i.e., which mainly reflect access).

Furthermore, we have shifted the attention of this study away from the traditional method of investigating the effect of payment (whether direct or indirect) methods on equity of the health systems, to looking at the contribution of different techniques of financing healthcare to health systems' equity. This approach focuses attention on the techniques used in collecting the funds before payment for healthcare is made. It does this by identifying healthcare expenditure by financing source. Then disaggregating the source in terms of the collection techniques used. That is, whether the fund was collected by public or private means, whether pooling techniques were used or not or, whether the funds come from domestic or external sources, and so on. Therefore, this study does not only show the effect of payment methods on equity, it identifies the exact source of the fund and collection technique and traces its effect on health systems' equity. By doing this, this study focuses attention on the contribution of both the funds (financing method) and the techniques used in collecting the funds to health systems' equity. This approach, thereby contributes more to policies on health systems' financing.

To improve the robustness of our findings we use panel data study design. According to Kennedy, (1998) panel data modeling is superior to both time-series and cross-section because it explores more issues. Panel data also provides more informative data, more variability, takes care of collinearity among variables, and gives more degrees of freedom and efficiency (Baltagi, 2008). Using panel data, therefore, increases the robustness of the results of this study which, in turn, increases the reliability of its recommendations. Furthermore, unlike the other studies, we improved the quality of our findings by using both bivariate and multivariate regression analysis. We have also controlled for both unobserved heterogeneity and allowed for the inclusion of cross-section specific (in this case country-specific) time-variant variables which may be relevant in explaining the dependent variables. Heterogeneity bias can affect panel design such as this one because sampled countries often differ from each other in ways that cannot be measured. These unmeasured differences can bias the coefficients of the models. Therefore, we used the fixed-effect models to solve the problem, as recommended by Petersen (1993). On the other hand, to ensure that all time-variant variables that are relevant in explaining the dependent variables are captured we used the random effect model (Kennedy, 1998). This means that this study has taken care of as many sources of measurement bias as evidently possible. And to help in choosing the right model for each estimation we carried out the Hausman test (Kennedy, 1998).

Additionally, this study traces the contributions of specific financing methods to health outcomes. This improves the quality of recommendations to policy, as it shows exactly which financing method is responsible for what level of health outcome. Therefore, apart from measuring health system's equity from the perspective itself (i.e., health outputs), as opposed to healthcare (access to healthcare) as has been the practice, we have also used better research methods and design to ensure that the results of our estimations are robust and that associated recommendations are more reliable.

1.4.1 Aims of the Research

The role of financing methods on health systems' equity in the SSA region has not been widely studied using the systems' output. This study aims to gain an understanding of how the different methods used in the financing of healthcare, impact the health systems' equity in terms of its outputs in the SSA region. This approach

is based on the concept of health production. The product (output) is measured in terms of four health outcomes; that is, life expectancy at birth, under- 5 mortality rate, crude death rate and maternal mortality rate.

To do this the study seeks to isolate the different healthcare financing approaches and find out how they correlate with health outcomes (outputs), in order to uncover the financing method(s) that positively correlate with improvement in health outcomes. We argue that the financing method that is associated with improvement in health outcomes is also the one that makes the systems more equitable.

Once this is done, the study makes policy recommendations for the improvement of health systems' financing in SSA. And because it is based on the health capital theory, the study hopes to add to the theory through its findings

1.5 Objectives of the Study

The overarching objective of this study is to investigate the contribution of different healthcare financing mechanisms to healthcare systems' equity in the sub-Saharan Africa region. In a departure from previous works that looked at health systems' equity, using access to needed healthcare, we investigate equity from health systems' output perspective. We use specific healthcare systems' outcomes as proxies for health systems' outputs. The selected health systems' outcomes are life expectancy at birth, maternal mortality rate, under-five mortality rate, and crude death rates.

To investigate the effect of different healthcare financing methods on health outcomes in the sub-Saharan Africa region, we break down the main objective into the following salient objectives. To:

1. Establish how an increase in the funding of healthcare using domestic (local) resources affects health outcomes of the sub-Saharan Africa (SSA) region.
2. Investigate the effect of increased budgetary allocation to healthcare on the health outcomes of the SSA region.
3. Evaluate the effect of financial pooling techniques and financial risk mitigation, on health outcomes in the SSA region.

1.5.1 Research Questions

Based on the stated research objectives, the study seeks to answer the following research questions:

1. How does an increased use of domestic healthcare expenditure per capita affect the health outcomes of the population of the sub-Saharan Africa region?
2. What is the effect of increased budgetary allocation to healthcare on SSA's health outcomes?
3. What is the relationship between healthcare financial risk mitigation and health outcomes in SSA?

Each of the three questions has a private and public health expenditure component. We do this to find out if there is a difference between the public and private components of each financing technique under investigation.

The objectives and the related questions after breaking down the questions into their public and private components are summarized in Table 1.1 below:

Table 1 1: The Summary of Research Objectives and Research Questions

S/N	Research Objective	Research Questions
1	To establish how an increase in the funding of healthcare using domestic (local) resources affects health outcomes of the sub-Saharan Africa (SSA) region	1. How does an increase in the use of domestic public healthcare expenditure per capita affects health outcomes of the population of the sub-Saharan Africa region? 2. How does increased use of domestic private healthcare expenditure per capita affect health outcomes of the population of the sub-Saharan Africa region?
2	To Investigate the effect of increased budgetary allocation to healthcare on the health outcomes of the SSA region.	1. How does increased public expenditure in healthcare as a percentage of total government expenditure affect the SSA region's health outcomes? 2. What is the effect of increased budgetary allocation to healthcare as a percentage of GDP on SSA's health outcomes?
3	Evaluate the effect of financial pooling techniques and financial risk mitigation, on health outcomes in the SSA region.	1. What effect does financial pooling for healthcare have on SSA's health outcomes? 2. Do public financial pooling techniques affect health outcomes of SSA differently compared to private pooling techniques?

1.6 Contributions of the Research

WHO has identified health financing methods as the main culprit in the exclusion of households from needed healthcare, and the low health status in low-income regions. To increase access to needed healthcare,

in 2005 the World Health Assembly passed a resolution for WHO, where WHO member countries should use healthcare financing methods that would ensure universal access to needed healthcare (World Health Organization, 2016). And, in 2010, WHO adopted universal health coverage (UHC) as a policy for the improvement of health systems' financing equity among member countries (World Health Organization, 2010). All these policies are driven by poor health outputs in low-income countries. And due to the linkages between health outcomes and economic growth, it is hoped that such policies will not only improve health outcomes but also economic growth in these countries. By looking at health system's equity from the perspective of health system's output, this study goes to the core of these concerns.

This study also makes the following other contributions:

1. Because of externalities inherent in health and healthcare, we note that access to needed healthcare by an individual does not only reduce the individual's suffering, it also contributes to the general welfare. It does this through the improvement in caring externality, and the reduction in incidences of communicable diseases. Therefore, this study contributes to the improvement of general welfare of the SSA region. It does this by helping with the identification of the right health system's financing method for equity of the region's health systems. An equitable healthcare financing method leads to a reduction in the suffering caused by ill health, an increase in satisfaction by those with caring externalities, and a reduction in incidences and prevalence of communicable diseases.
2. There are concerns that low-income countries in general, and sub-Saharan African countries in particular, over-rely on external sources to fund their health systems. This source of funding is becoming less reliable due to dips in the economic performance of donor countries and donor fatigue. This has led to increased debate by experts on how SSA can increase funding for its healthcare by using internally generated resources. This study contributes to this debate by investigating the extent to which the use of domestic resources contributes to the region's health systems equity, compared to external sources.
3. Some experts have argued that the reason for low health status in Africa is because of the low budgetary allocation to healthcare by these countries compared to what countries with better health status allocate.

This led to the Abuja Declaration (2001) that called upon African countries to increase government health funding to at least 15% of their total budget. Since this declaration was made, there has been a debate as to whether such an increase would lead to improvement in the region's health status. This study adds to the discussion by finding out if there is a correlation between health status (outcomes) and budgetary allocation to healthcare in the region.

4. In 2005, the World Health Assembly resolved that WHO should adopt financial pooling as a policy for financing healthcare among member countries (Mebratie et al., 2015). Particular attention was given to low-income countries (LICs). The reason for this policy is to increase equity in the way healthcare is financed by spreading the cost of ill health among many households. Some experts have argued that this method works in countries with high formal sectors and good health infrastructure. Therefore, it is unsuited for LICs. Others insist that it is the best method in countries where taxes rarely cover expenditure needs, such as LICs. We contribute to this discussion by uncovering the contribution of financial pooling to health outcomes in the SSA region.

1.7 Outline of the Report

So far, we have laid down the framework for this study in chapter one of the study. We have explained the research problem and outlined the purpose of the current study. We have also described the objectives of the study. oo

The remaining sections are distributed as follows:

1. Chapter two deals with a debate with previous works by experts and researchers in the area of healthcare financing and health systems' equity. We analyze the findings and the arguments of previous works in relation to the current study and show gaps in the previous works that this study can help in closing.
2. Chapter three discusses the research methodology used in this study starting with the paradigm and philosophy that inform the method used in measuring the variables of the study. Based on the philosophy and the paradigm, we explain the theoretical framework. After the theoretical framework, we explain how the empirical frameworks and the study models are derived from the theoretical framework, and describe

how the constructs of the study fit into the empirical framework and how they relate to the research problem.

3. Chapters 4, 5 and 6 start by describing the techniques used in analyzing the relationship between the study's dependent and independent variables. We show the results of the analysis and later, we discuss the importance of the results in relation to existing literature and theory. Using the findings, we provide recommendations for policy under each chapter. The three chapters are broken down in terms of the study's objectives: That is chapter four deals with objective one, chapter five with objective two, and chapter six deals with objective three. More specifically the following work is done in each of the three chapters:
 - a. Chapter four deals with objective one. Objective one investigates if financing healthcare using domestic resources affects the Sub-Saharan Africa (SSA) health outcomes differently compared to financing healthcare using external resources. We explain how the results relate to previous research and theory. And, provide suggestions to policy on how to improve the performance of domestic healthcare finances using the results.
 - b. Chapter five provides the analytical methods, results, and discussions of the findings on the effect of an increase in budgetary allocation to healthcare on health outcomes.
 - c. In chapter six we provide the results of the analysis of the relationship between financial pooling and health financing risk mitigation on the one hand and, health outcomes on the other. We also discuss the importance of the results in terms of previous empirical works, theory, and policy.
4. Chapter seven is the last chapter of this study. In this chapter, we provide a summary of the findings of the entire study. We start by giving a brief explanation of the importance of the study and a summary of the investigative methods used in the study. We also provide a brief explanation of the findings, and lastly, using the findings, we provide a summary of policy recommendations. The chapter ends with recommendations for further research.

CHAPTER TWO

2. LITERATURE REVIEW

2.1 The Evolution of Healthcare Financing Thought

Over time, different countries have used different methods of financing healthcare. Most European countries use financial pooling mechanisms under the concept of *solidarity*. The concept of solidarity is grounded on the principle of caring externality, whereby people are intrinsically concerned about the suffering of other people. As such, they are willing to make personal sacrifices or forego personal comfort to assist in alleviating other people's suffering. Healthcare financial pooling is, however, done differently in different countries. For example, the United Kingdom and Australia use a single-payer system, whereby, the government pays directly, using taxes, for healthcare into a statutory national insurance scheme. The delivery of healthcare is left in the hands of private health care providers. France and Germany, on the other hand, use a hybrid system of financing mechanisms. In this system, taxes are used to finance a portion of healthcare known as a decent minimum; anything above the decent minimum is financed directly by consumers. The Netherlands operates a unique financing mechanism. The government of the Netherlands collects (pools) finances from the citizens and then puts them into a statutorily established fund. The finances are then distributed, from the fund, into competing private healthcare insurance firms. To cushion both the insurers and the consumers against adverse healthcare financing burden, the government has an equalization fund whose aim is to spread risk between funds (Ter Meulen & Jotterand, 2008; Ter Meulen & Maarse, 2008; West, 1981).

The United States of America (USA) largely operates a market-driven method of financing healthcare with little government involvement (Benatar, 1998). The degree of government involvement in healthcare financing, however, differs from state to state. Some states, like Massachusetts, are more involved, particularly, in cushioning vulnerable consumers, like the elderly, from adverse financing hardships. While others like Ohio, only get involved in providing financing framework for private suppliers. We note that in 2010 the federal government of the USA introduced legislation known as the Patients Protection and Affordable Care Act (PPACA) which, if fully implemented, will increase state participation in health care financing. PPACA is to protect vulnerable

consumers from financing hardship and to increase access to those who need healthcare (Rosenberg, 2012). PPACA has not been fully implemented and is still undergoing reforms.

Sub-Saharan Africa (SSA) operates different healthcare financing methods, from those countries whose healthcare is financed with general taxes (e.g., South Africa) to those whose care is financed using cost recovery mechanisms. However, the largest provider of healthcare in SSA is the state. We note that most health care systems in SSA are not able to respond, adequately, to their population's need for health care, mainly due to financing weaknesses (Alubo, 1990; Green & Singer, 1984).

A consensus that the method used in financing healthcare determines how the healthcare system distributes its benefits across the population has gained momentum in recent policy debates and much of philosophical literature on healthcare — the disagreement centers on two extremes. On one end, are those who insist that healthcare benefits should be provided according to need only, and on the other end, are those who believe that market forces should be allowed to distribute healthcare benefits. Other thoughts fall in between these two extremes. It should be noted that the justification for all these schools of thought, at least in part, is informed by the claim that the financing method determines whether health resources are distributed fairly (equitably) or not. Therefore, to the extent that a financing method was justified (at one time) using equity, then, it would be naïve for us to neglect to examine how they performed in this respect (equity), even if available evidence shows that they were inequitable. This is important for this study because such analysis will provide us with historical information to draw from during our quest to find equitable health care financing mechanisms.

The first global healthcare policy on equity in financing and access to needed healthcare was made in 1978 in Kazakh, Alma-Ata - Soviet Union (Boland & Young, 1982). The Alma-Ata Declaration recognized healthcare as a human right and emphasized the provision of Primary Health Care (PHC) to all, particularly among the population of low-income countries. To achieve this, WHO encouraged the active participation of government and donors in the provision of resources and integration of the local population through the involvement of grassroots like school teachers, extension officers, ministers of religion, women, and youth groups, in the management of healthcare. Its main pillars were stated as follows:

'The Conference strongly reaffirms that health, which is a state of complete physical, mental, and social wellbeing, and not merely the absence of disease or infirmity, is a fundamental human right and that the attainment of the highest possible level of health is a most important world-wide social goal whose realization requires the action of many other social and economic sectors in addition to the health sector' — Alma-Ata Declaration, 1978. (Walley et al., 2008)

It is from the Alma-Ata Declaration that WHO (1989) declared the need to provide universal access to PHC for all member countries by the year 2000. As a result, countries in SSA adopted the Alma-Ata blueprint on PHC, and most countries rolled out 'free' Universal Primary Health Care (UPHC) in one form or another by 1981 (Warren, 1988).

However, as noted by Warren (1988), the Alma-Ata Declaration was short-lived because it came under attack as soon as it was adopted. The attack came from experts and politicians from developed countries on the basis that it was both too ambitious and too expensive and that it gave the wrong people (local communities) the main responsibility – the responsibility for the implementation of UPHC. These experts proposed an alternative to UPHC, an alternative which according to them, was less expensive and therefore more sustainable (Tarimo et al., 1994; Warren, 1988). This was done by changing the main pillar of Alma-Ata from Universal Primary Health Care to Selective Primary Health Care (SPHC). By doing this, the emphasis was moved from *'universal access'* to *'reduced infant mortality and management of infectious diseases'*. Together with the change in the focus, was the change in its management. The responsibility for the realization of SPHC was wrested away from local communities and vested in technical experts answerable to donor communities (Unger & Killingsworth, 1986). This action did not only dilute but also changed, the focus of Alma-Ata. It was later realized that the changes to the original document made the realization of PHC objectives even more difficult (Unger & Killingsworth, 1986).

The placing of the authority for the implantation of SPHC in the hands of donors weakened both its ownership and monitoring. As a result, the implantation got bogged down by lengthy reporting processes and mismanagement of funds (Tarimo et al., 1994). It also led to a shirking of responsibility for healthcare by governments of developing countries because of the promised donor support. Political leaders used the promised

donor funding as a pretext to cut down on healthcare expenditure and hardly bothered with the performance of their countries' health systems. This led to a drop in financing and access equities, as well as distributive inefficiency of the health services offered under SPHC (Tarimo et al., 1994). As a result, there was a wastage of funds, poor implementation of SPHC programs, and a near collapse of healthcare systems in developing economies by the mid-eighties (Unger & Killingsworth, 1986).

Effectively rendered dysfunctional by the changes, the Alma-Ata Declaration was replaced as a healthcare goal in 1993 by a new proposal named '*Investing in Health Care*' under the general health care policy reforms by the World Bank known as '*The Health Sector Reforms*' (Musgrove, 1993). The new World Bank proposal was a complete change in healthcare financing orientation. It adopted a *neo-liberal economic* approach to the delivery and financing of healthcare. It approached healthcare as an economic good, whose importance rested on its ability to provide human capital and related economic benefits. Neo-liberals argued that the provision of healthcare should be left to the market forces. Since the market is the most efficient allocator of resources, it was argued that healthcare should not be taken out of the market allocation system if efficiency and equity in its provision are to be achieved (De Ferranti, 1985). The market, it was argued, will allow efficiently the flow of health benefits and in a manner that promotes choice, quality and accessibility. In this way, healthcare would reach all income groups, including the low-income groups, in a way that is both effective and sustainable. The neoliberal proponents (e.g. De Ferranti, 1985; Litvack & Bodart, 1993) believed that a free market regulates itself to create social justice thereby, ensuring the effective distribution of resources, including health resources. It was upon this background that the shift to market-driven financing of healthcare was introduced in the early 1990s. Though it was partly a response to the financial crisis facing the low-income countries at the time, it was largely predicated upon the efficiency of the healthcare systems. In the new program, governments were expected to disengage from the provision of healthcare and to 'decentralize' healthcare provision (Mwabu, 1986), as a condition for donor funding. Governments in SSA, as a result, drastically reduced healthcare budgets and introduced cost-sharing even in basic healthcare.

These reforms largely ignored the prevailing economic situation on the ground, particularly in low-income countries. Its implementation precipitated a downward trend in health outcomes in these countries as evidenced by reduced life expectancy, increased infant mortality, increased incidences of catastrophic expenditure, and run-down healthcare systems (Whitehead et al., 2001). Research (e.g. by Breman et al., 2004; Onwujekwe, 2005; Van Doorslaer et al. 2006) shows that this led to reduced equity in the health care financing in particular, it led to cost-based exclusion to medical care. Furthermore, even where the governments financed part of healthcare, and prices were deemed minimal, the low-income groups still were either excluded or suffered catastrophic healthcare expenditure (CHE) whenever they needed healthcare services (Breman et al., 2004; Gwatkin, 2004).

With the realization that the poor from low-income countries had to be protected from the vagaries of market forces, the international health care agenda started shifting in the mid 1990s. Experts, including proponents of the free market like De Farrenti (2000) started questioning the performance of '*The Health Sector Reforms*' agenda. This led to a shift in global healthcare thought towards a system that would increase access to needed healthcare, while at the same time cushioning consumers of health services from incurring catastrophic expenditure. As a result, a concurrence of thought has emerged around a method of financing healthcare that would increase access to healthcare and reduce incidences of catastrophic expenditure. World Health Organization is advocating for financial pooling as the most effective financing method in ensuring increased access and reduced financing hardship. Financial pooling is also the best financing method to realize the WHO's goal of *Universal Health Coverage* (Lagomarsino et al., 2012; Marten et al., 2014). Stemming from this, the UN included financial pooling as an important pillar in realizing equity in the provision of healthcare, in the Sustainable Development Goals, (Costanza et al. 2016).

Unlike the Millennium Development Goals (MDGs), the emphasis of SDGs is on universal access to needed healthcare, through the removal of all barriers including (and most importantly) financing barriers to access. It is believed that equity in healthcare is a *sin-quo-non* if the general population's health outcomes are to improve. And, the ultimate goal should be to ensure universal access to needed healthcare through UHC (Scheil-

Adlung et al., 2010; Somi et al., 2009; Van Doorslaer et al., 2006), while protecting consumers of health services from preventable adverse financing difficulties. WHO (World Health Organization, 2010b) has since adopted a policy of '*sustainable healthcare financing*' through financial pooling to achieve universal coverage by 2030. The stated policy for its member countries is the protection of the vulnerable from financing difficulties and any social barriers to needed healthcare (World Health Organization, 2016). The new policy has, therefore, heralded a change in the global approach to healthcare, a change whose focus is on 'universal access' to healthcare and protection from healthcare 'financing difficulties'.

We note that the new global focus is on 'holistic equity' in healthcare, systems, which is the focus of this study. Ataguba & McIntyre (2018) argue that holistic equity should include the analysis of vertical equity, horizontal equity, and the determination of benefit incidence. The result of holistic equity is, therefore, improved average health outcomes.

With this in mind, we can now discuss the current state of health financing in Sub-Saharan Africa and how equity is applied to health care and health care financing.

2.2 The State of Healthcare and Healthcare Financing in Sub-Saharan Africa

Discussions about healthcare financing in the Sub-Saharan Africa (SSA) region have centered around finding an appropriate financing mechanism(s) for the region's healthcare system. These discussions aim to find a financing arrangement or regime that would lead to the improvement of the region's health outcomes and, consequently, to increased economic development. After more than five decades of research and several policy changes, Africa is still the continent with the highest mortality rates, and the lowest level of life expectancy, and is the only continent where deaths from infectious diseases outnumber deaths from chronic disease (Poullier et al., 2002). Africa also has the lowest per capita spending in healthcare, most of which is concentrated on the high-income groups (Leighton, 1996, Ataguba & McIntyre 2018). According to Ataguba (2012), the solution to Africa's healthcare problem lies in finding a financing mechanism that is sustainable, efficient, equitable, and free from political influence.

Most African countries gained independence from colonization in the 1960s. Independence brought enormous expectations for improvement in the quality of life and development. Among other things, the new governments embarked on fighting ignorance and diseases. It is from the objective of fighting diseases that, almost all, independent governments in SSA started with financing healthcare from tax revenue. This trend continued up to the mid-seventies, at which time, SSA economies started showing signs of strain. To finance their operations, most SSA countries resorted to heavy borrowing both from domestic and international sources. By the mid-1980s, SSA economies were tottering under an excruciating debt burden which was accompanied by insufficient tax revenue and inefficient utilization of available resources.

As the economies plunged, something had to give, African governments, under the supervision of the International Monetary Fund (IMF) and driven by the neo-libertarian school of thought, embarked on fiscal policy changes that included cutting back on major expenditures. The IMF induced (sometimes imposed) austerity measures, targeted mainly the education and health sectors. In the health sector, the reform took the form of cost recovery, a proposal that was based on the neo-liberal economists' school of thought. They argue that to achieve a sustainable and equitable healthcare system, there has to be some form of cost recovery. Their proposal effectively introduced user charges (out-of-pocket payments) in the health sectors of the affected countries. Proponents of cost recovery (e.g. Leighton, Becker, Derriennic, & Laurin, 1994; Litvack & Bodart, 1993; Shaw & Griffin, 1995) method of financing healthcare argue that, in addition to raising the revenue needed to promote financial sustainability of the health systems, user charges also make available resources for the improvement of the quality of services. They also argue that out-of-pocket (OOP) payments increase equity through increased access to medical services through improved quality and increased distribution of healthcare resources. Some studies (e.g. by Musgrove, 1993; Shaw & Griffin, 1995; World Bank, 1994) showed that the introduction of OOP improved the quality of healthcare services and led to increased access to needed healthcare, even for the poor.

However, in the mid-nineties, health outcomes coming from the region started contradicting these findings. The health outcomes showed that both infant and adult mortalities were on the rise, infectious diseases were becoming more vicious and some diseases (like polio) that were thought to have been eradicated were

making a come-back and to make matters worse there was a spike in maternal mortalities in the same period (Murray & Lopez, 1997). All indications were that something was wrong. Subsequent studies (Marphatia, 2010; Stubbs et al., 2017; Stuckler & Basu, 2009) in the region exposed health systems in crisis. These studies found that the health systems in SSA were teetering on the brink of collapse. By the mid-90s public health centers and hospitals had been reduced to consulting clinics, where prescriptions were more often out of stock, the morale of health workers was at an all-time low, and the few physical infrastructures were falling apart due to lack of maintenance. User charges were simply not living up to its promise. The beleaguered health systems were further compromised by the emergence of the HIV/AIDS pandemic. To make the bad situation worse, as a result of user charges, incidences of medical care-induced impoverishment increased, both in terms of incidence and severity (Gwatkin, 2004; Marphatia, 2010; Onwujekwe, 2005).

Whitehead et al. (2001) posited that the distressing effect of user charges on the low-income, in low-income countries, (LIC), is so pervasive that it does not only make them poor but ensures that they remain poor. They called the cycle of impoverishment triggered by medical expenses, the *medical poverty trap*. They called it so because, apart from direct expenses of healthcare, ill-health also impairs individuals' ability to fend for themselves, and in cases where income is dependent on labor - as is the case in most SSA countries - income is severely, negatively, impacted. The adverse consequences of user charges, according to these studies, have a spiral effect on the entire social welfare, through the medical poverty trap. The situation, if not contained, could precipitate a general collapse in the healthcare systems of the entire region, and with it, the entire social infrastructure of the region (Marphatia, 2010; Stubbs et al., 2017). The high cost of healthcare antedates, not only, catastrophic expenditure - which results in a reduction in the general standard of living - but also, cost-based exclusion - which leads to increased spreading of infectious diseases from the infected to the healthy, turning easily containable diseases into epidemics or even pandemics.

Given that the most important hindrance to healthcare is cost, the World Health Organization (2010, 2015) is calling upon member countries to find methods of financing health care that *leave no one behind*. The consensus among experts is that prepayment mechanisms offer better protection from financial catastrophe and

healthcare financing-related impoverishment (Xu et al., 2007). This is because prepayment financing methods separate utilization from payment and therefore can protect even the most vulnerable from financing hardships (Carrin, 2002). Countries can choose between financial pooling or tax-based (pooling) financing. However, Carrin (2002) warns that tax financing methods may run into difficulties and may not be sustainable in less-developed countries (LIC). He avers that owing to limited tax bases, low organizational capacity to enforce tax compliance, and the extensive existence of shadow economies in LICs, LICs cannot rely on taxes to finance health care sustainably.

Sub-Saharan Africa witnessed almost two decades of falling health outcomes, although there has been a slight improvement in health indicators in the last five years, after some reforms of its health sectors, SSA health systems are not yet out of the woods. This is because the reported improvements coincided with the containment of HIV/AIDS, – and donor funds heavily subsidize the containment of HIV/AIDS – therefore, the improvements may have little correlation with the ongoing reforms of the healthcare systems. According to empirical studies (e.g., by Alubo, 1990; Asfaw et al., 2004; Barnett & Tefera, 2010; Fonta et al., 2010), SSA still has the weakest healthcare systems globally, therefore, the improvement in health outcomes may have little correlation with the performance of the healthcare systems.

However, we should note that many countries in the SSA region have heeded WHO's call, and embarked on reforming their healthcare systems, particularly in terms of financing. A brief synopsis of healthcare systems and reforms in some selected countries is given below.

Rwanda, according to studies (e.g. by Chemouni, 2016.; Sekabaraga et al., 2011), has carried out one of the most successful healthcare reforms in the region. It operates a progressive healthcare financing mechanism known as *mutuelle de sante'*. *Mutuelle de sante'* is a hybrid between community-based health insurance (CBHI) and government subsidies, packaged in the form of a mutual fund (Sekabaraga et al., 2011). At initiation, *mutuelle de sante'* operated, fully, as a CBHI, where individuals contributed, annually, about US\$ 2. The contribution proved unsustainable, since one, the funds were insufficient to meet treatment demands, and two, the very poor could not afford the premium, and therefore, were excluded from benefiting. In 2013, *mutuelle de sante'* adopted a

sliding system of payment, whereby, premium payment was now based on income. The poorest were exempted, and their premiums were taken over by the government through targeted subsidies. According to Sekabaraga et al. (2011), because of *mutuelle de sante* Rwanda achieved more than 90% health insurance coverage, 80% of those who needed AIDS treatment were getting treatment, and hospital utilization rate more than tripled.

Kenya, Ethiopia, and South Africa (SA) are undertaking a major transformation of their healthcare financing systems. Studies (e.g. by Chuma & Maina, 2012; Chuma et al., 2009; Kimani, Mugo, et al., 2016; Wamai, 2009) showed that Kenya's healthcare financing is dangerously skewed against the poor, with the poor spending disproportionately higher ratio of their income in healthcare compared to the rich. Kenya also experiences very high levels of catastrophic healthcare payments and healthcare-related impoverishment (Barasa et al., 2017; Chuma & Maina, 2012; Kimani et al., 2016; Xu et al., 2007). As a result, Kenya is carrying out a healthcare financing transformation aimed at strengthening financial pooling. The reforms are guided by the Kenya Health Policy Framework Paper (KHPFP) of 1994, with a guiding policy of *'quality of health care that is acceptable, affordable and accessible to all'* (Wamai, 2009).

KHPFP led to the change of the public health insurance fund, the National Hospital Insurance Fund (NHIF) to the National Health Insurance Fund (NHIF) to transform it into a nationwide social health insurance (SHI) vehicle that is open, not only to those in formal employment but also, to those in the informal sector (Kamani et al 2004). Membership in the transformed NHIF is currently mandatory for individuals working in the formal sector and voluntary for those in the informal sector. It operates a sliding premium payment system for those in the formal sector, based on income, and a flat rate for those in the informal sector (Chuma et al. 2009). Though, in policy, Kenya abolished user charges in 2004 at all public dispensaries and health centers, a study by Chuma et al. (2009) revealed that some user charges are still in place at these facilities. Wamai (2009) observes that, despite the reforms, user fees remain a significant barrier to health care in Kenya. His findings are supported by the continuing revelation of increasing occurrences of catastrophic healthcare payments (e.g. studies by, Barasa et al., 2017; Buigut et al., 2015; Kimani et al., 2016) even after the reforms.

Just like Kenya, South Africa (SA) is in the process of transforming its health care financing system to improve the quality of and access to needed health care. Currently, South Africa operates a two-tier health care system, the public and private sector, which locks most healthcare funding for the well-off (Ataguba & McIntyre, 2013; McIntyre, 2012). In terms of financing, SA has a fragmented healthcare financing system; the pooling mechanism is dominated by private health insurance that pays into expensive private health providers (Ataguba, 2010). We should note that South Africa has the highest percentage share of private voluntary health insurance in the world (McIntyre, 2012), which operates as separate risk pools. Since they operate as separate risk pools, they are not able to benefit from scale economies. And, because they cannot take full advantage of economies of scale, they operate an ineffective and inefficient payment mechanism which makes SA to have the highest global health insurance spending (Marten et al., 2014). Due to the high spending, the health insurance premiums are extremely high, and as a result, the insurance serves only 16% of South Africa's population (Ataguba & McIntyre, 2013; McIntyre, 2012) mainly from the high-income group. Unfortunately, the *high spending – high cost* - private health insurance firms are subsidized by public funds, since, even government and state-owned enterprises' employees' health care funds are directed into these schemes (Marten et al., 2014). Effectively, more than 45% of health spending, including public money, is spent on 16% of the population, in the private health sector (Ataguba, 2010).

The public health sector, which caters to around 70% of the population, relies on only about 40% of health funding (Ataguba, 2010). On a per-capita basis, ZAR 10 000 and ZAR 1 900 were spent, in 2008, on health care per medical scheme member and per individual dependent on the public health sector respectively (Ataguba, 2010), further emphasizing the huge disparities between the private and public sector healthcare spending in South Africa. Because of this skewed distribution of healthcare resources, while South Africa accounts for almost one-half of sub-Saharan Africa's total economic output, its health outcomes are not any better than an average performing country in the region, indeed lower, in some respect, than some countries, smaller economies like Rwanda.

In recognition of these structural imbalances in the distribution of health care resources, the government of South Africa has started a process of restructuring its healthcare financing mechanisms. The aim is to put in place, a compulsory prepayment financing mechanism – National Health Insurance - in the form of social insurance, (Ataguba, 2010; McIntyre, 2012) with a sliding payment (according to income) system for the whole country. These reforms are expected to lead to the redistribution of health resources towards the low-income, thereby, reducing cost-induced access inequalities and financing hardship.

Ethiopia is in the process of reforming its health sector to improve equity and achieve universal coverage (El-Saharty et al., 2009; Mebratie et al., 2015). However, even according to SSA standards, Ethiopia's health system is very weak and experiencing systemic failure at multiple levels (El-Saharty *et al.* 2009). For example, in 2014 according to the WHO (World Health Organization, 2015) report, life expectancy (LE) in Ethiopia stood at 52.3 years against the SSA average of 57 years, the under-five mortality rate (U5MR) was 190, against the SSA average of 86 in the same period and it had infant mortality rate (IMR) of 133, against SSA average of 57 per 1 000 live births in the period. Its out-of-pocket health expenditure has been among the highest in the world at 90.6%, in 2014 (WHO, 2015) an indication of the population's extreme exposure to CHE. Indeed studies by Barnett & Tefera (2010) and Ali (2014) confirm this, by identifying medical cost as the main hindrance to access to health care in Ethiopia.

In recognition of the poor health condition in the country, the government of Ethiopia has embarked on reforming the health sector with assistance from development partners. The policy launched in 2011 was to establish health insurance for people in both the formal and informal sectors (Zeleelew, 2014). For the informal sector and rural areas, the government encouraged the establishment of CBHI at the community level, operating as a semi-formal health insurance scheme, with targeted subsidies from the government. For those in the formal sector, the Ethiopian government is in the process of establishing a national health insurance scheme (Zelalew, 2014) in which those in formal employment are expected to pay according to earnings.

According to Mebratie et al. (2015), enrollment into the CBHI reached an impressive 41% by 2012, and by 2013 it reached 48%, this rate is faster than even that of *mutuelles de sante'* of Rwanda, arguably the Sub-

Saharan Africa model CBHI (Chemouni, 2016). After these reforms, Ethiopia's health outcomes have been on the rise, and this is expected to continue as the government rolls out more financing safeguards (Mebratie et al, 2015).

Botswana operates a one-payer universal health care insurance system for all its citizens, which offers standard minimum coverage, although other private health insurance are available to those who wish to take them (World Health Organization, 2015). It has one of the best health care financing mechanisms in SSA, and, as a result, Botswana has some of the best health outcomes in the region according to WHO (World Health Organization, 2015).

Nigeria, on the other hand, operates a hybrid health care financing system, which consists of a national health insurance scheme for those in formal employment and a hotchpotch of CBHI schemes. The national health insurance scheme covers 40% of those in the formal sector (Omoruan et al., 2009). The CBHIs, on the other hand, are organized around ethnic groups or trade, for example, Ariaria Traders Health Scheme for taxi operators and the Ndo-nwanne Health Scheme for an ethnic community (Omoruan et al., 2009). They are generally informally organized with a very weak legal foundation and inadequate funding, which leaves them exposed to the risk of insolvency due to insufficient funding, misapplication of funds, and the weak legal foundation (Obansa & Orimisan, 2013; Ogunbekun, 1996; Omoruan et al., 2009).

To solve the Nigerian healthcare financing problem and improve health outcomes, Okpani & Abimbola (2015) recommend a nationwide prepaid social health insurance for everyone. They argue that this is the best way to increase access and reduce cost-based exclusion, which in their opinion ails the Nigerian healthcare system. We note that Nigeria records some of the worst health outcomes in SSA.

From the above discussion, we can see that the health sector in SSA requires transformation, particularly, as far as financing is concerned. Indeed, most countries in the region have recognized the need for a healthcare system that works due to the link between health and development. A consensus exists that there is a link between a healthy population and economic growth. Therefore, less developed countries need to put resources

into health care if they are to achieve the desired growth. We note that, if health affects economic development, then economic development may also affect health care.

However, so far, we have failed to find research evidence on the correlation between health outcomes and both economic indicators and health expenditures (health financing) in Sub-Saharan Africa. An analysis of economic indicators and health outcomes in Sub-Saharan Africa provided by the most recent World Health Organization (2019b), the largest economies by Gross Domestic Product, Nigeria and South Africa (IMF, 2018) are doing worse than most Sub-Saharan African countries in almost all major health indicators. Indeed, in terms of health outcomes, Nigeria, the largest economy in Sub-Saharan Africa, has some of the lowest outcomes in the region. Even expenditure in health care does not seem to correlate with health indicators. South Africa and Botswana have the highest total per capita expenditure in health care (i.e., US\$1 148, and US\$ 871 respectively). Yet they are dominated by Rwanda on all major health outcomes, while Rwanda's per capita expenditure in health care is only a small fraction (i.e., US\$ 125) of theirs. Neither can we attribute healthcare outcomes to healthcare infrastructure since South Africa has the best healthcare infrastructure in the region (Ataguba, 2016), yet its health outcomes are worse than countries with weaker infrastructure.

The statistical relationship between health outcomes and economic indicators suggests that something else, apart from economic performance, is responsible for a good or a bad performance in health in Sub-Saharan Africa. Given that empirical evidence (e.g. Crémieux, Ouellette, & Pilon, 1999; Feinstein, 1993; Or, 2000; Well, 2007) from industrialized countries shows that health outcomes improve with improvement in economic performance and health outcomes should correlate favorably with health expenditure there is need to carry out a more in-depth analysis for an extended period to find out if this hypothesis holds for sub-Saharan Africa (SSA) since a casual look at the most recent WHO (2019) for SSA data does not seem to support this hypothesis.

2.3 Equity as a Term of Distribution of Economic Resources

This section discusses equity and how equity applies to healthcare financing. We shall place more emphasis on the schools of thought that inform the doctrine of equity in health and health care.

Equity is a normative term that relates to distributive justice (Varian, 1975), due to its emphasis on symmetry it is usually confused with equality. The two terms are almost homonyms; however, according to Le Grand (1987), equality is a descriptive term as opposed to equity, which is a normative term, more like justice. Equity, just like justice, is a social concept, and just like injustice, inequity should neither be constant nor tolerable. Injustice is only tolerable when it is necessary to avoid an even greater injustice (Rawls, 2009), analogously, the only thing that permits us to acquiescence to unequal distribution is, if it works to the advantage of the least well-off (Rawls, 1974), that is, if it is structured to correct pre-existing inequities. This means that unequal distribution can be tolerated, or even encouraged if its aim is to correct skewed distribution. In healthcare, the underlying principle behind vertical equity is the use of unequal financing mechanisms to redress pre-existing inequities.

Accordingly, social inequities which are undesirable, arise if the same people are at the bottom of several heaps (in terms of income, consumption of health care, education, and so on) and the same people are at the top of several heaps. What aggravates the situation further, is '*....when the same people at the top of the heaps use their power, money and influence..... to get to the top of even more heaps*' (Walzer, 2008). The problem with this state of inequity is that it closes the door to those at the bottom of the heaps, thereby consigning them to a state of perpetual want. The situation of those at the bottom of the heap eventually becomes insufferable, and unless, radical measures are put in place to redress the problem, it can lead to social disorder. Therefore, it is in the common interest of the entire society to find a solution to this kind of inequality.

Equity is a term considered capable of infinite meanings and interpretations depending on a person using it. However, there is a general agreement that, there is an underlying guideline in achieving equity, that is, no arbitrary distinctions should be made between individuals when distributing benefits in society, particularly those benefits that can be regarded as basic rights (Rawls, 1974). And that, rules or known guidelines, should determine a proper balance between claims to the advantages availed by the benefits in society. In the area of health, where the benefit - good health - is not divisible, equity concern is in the distribution of healthcare, that is, the extent to which healthcare benefits are distributed fairly across the population.

A study of equity in health and healthcare, therefore, faces many challenges, that is, apart from the difficulty in pinning down health as a product (goods or services) that is amenable to allocation (distribution), there is the added problem that comes with the differences in the meaning of the concept 'equity'. Health itself is not divisible, and therefore impossible to distribute, most health economists zero down on healthcare when studying equity in the field of health (Pereira, 1993). This approach comes with some difficulties (as we will find out later) particularly when equity is to be achieved since healthcare on its own is not valued, what people value is what healthcare does to health, and therefore equity in healthcare may not be the same thing as equity in health.

On the other hand, the concept of equity as it applies to the allocation of resources has been the subject of a lot of disagreement among economists. Indeed, some experts dismiss equity as '*...not a legitimate economic concern....*' since it comes along with - '*value judgment*' -something that, according to them, belongs elsewhere. While others (e.g. Le Grand, 2002; Mooney, 2003; Sen, 1986; Williams, 1978) assert that most economic terms (e.g. efficient allocation), are value-laden, and therefore dismissing equity on that ground of 'value judgment' is running away from economic reality.

World Health Organization has adopted and strongly advocated for the use of the term, equity, in the allocation of healthcare benefits - over other economic terms. The adoption of 'equity' over other economic concepts of allocating resources is driven by the belief that health and healthcare are not ordinary goods that can be allocated in any other way. This is because, health affects the functioning of a human being and is deeply rooted in the human psyche, as pointed out by Arrow (1963) '*...the desire for prolongation of life is one of the most universal of all human motives*' therefore healthcare which plays an integral part in ensuring this motive is met, is viewed as no ordinary good or service. Indeed in 1986, WHO emphasized the importance of healthcare by declaring that equity in health is '*...where everyone should have fair opportunity to attain full health potential.....and no one should be disadvantaged from achieving the potential if it can be avoided*'. (Creese, 1991). The reasoning has formed the framework against which the World Health Organization's current healthcare policies are built. For example, the current push for universal health coverage is informed by this reasoning.

However, even after this clarification by WHO, on how healthcare benefits should be distributed, controversy persists. This is due to a lack of consensus as to what constitutes an equitable pattern of distribution. Because this is a study on financing equity in healthcare, it is important that we elaborate more on the term equity; explain how the concept has been used over time by different schools of thought and how it can be used to inform policy decisions in the distribution of healthcare benefits for improvement of health.

2.4 The Concept of Equity and Fairness in the Distribution of Healthcare

The concept of equity has occupied the minds of economists and social philosophers for centuries. Rousseau in 1762 (Rousseau, 1964), postulated that equity is nested in the social contract and asserted that *'....the greatest good of all reduces to equality and liberty....none of which can exist without the other....'*, meaning that equity, according to Rousseau, is an integral part of society's common good, without which the total welfare of the society is compromised. Rousseau uses the terms equality and equity as homonyms, this is the position taken by most early philosophers' theoretical postulation of the term equity. Hobbes in 1660 (Hobbes, 2016), posited that inequality does not exist in a 'state of nature' that is, people are equal naturally, and inequality is constructed through culture and civil laws. As such, a just society is only possible through people's recognition that equality is natural. Picking from Hobbes' postulates, Locke (1823) argues that, the purpose of government is to secure natural rights. The cardinal natural right is the right to life (Locke, 1823), which, to a large extent, depends on good health, while good health can be secured by access to quality healthcare. Equality by nature has to be secured by the government, not only because it protects individuals, but also because, it is important for social justice and by extension the common good of the society as a whole (Rawls, 2009). The gist of Rawls' argument is that equity in healthcare cannot be achieved without government involvement in the provision of healthcare.

Indeed, many equity experts argue that government involvement is important for the promotion of equity. The government should not only ensure equity in its operations and allocation of resources but it should also be seen to be doing so through the structure of public administration and policy implementation (Frederickson et al., 2015; Wilson, 1989). On the government function of allocation of resources, Wilson (1989), asserts that equity is

more important a goal than efficiency and effectiveness, particularly in the distribution of resources that are important for securing natural rights. This is because equity ensures that the distribution function is carried out in the three patterns that promote the common good; that is, equal allocation for equal need, proportional allocation according to need, and unequal allocation for unequal need – the third refers to unequal distribution that corresponds to relevant differences in individuals' situation (Chitwood, 1974), which corresponds to the principle of progressivity. That is an unequal allocation that is aimed at addressing pre-existing inequities. Adhering to this pattern of allocation, ensures social benefits are distributed to individual members of the society in a *socially optimal* fashion (Rawls, 1974). This view of equitable distribution is consistent with WHO's pronouncement of equity in healthcare; its main strength is in treating health as a right and therefore nobody should be denied healthcare on any ground. Again, it calls for fraternity and strong government involvement in the distribution of *merit goods*¹ such as education and healthcare.

However, there exist alternative viewpoints to equity, which do not agree that for a distribution pattern to be equitable government needs to be involved or, that it must be fraternal. This alternative view is based on the concept of liberty. Nozick, a leading proponent of libertarianism, argues that fraternity and government involvement in any distribution pattern distorts the pattern of distribution and therefore makes allocation inequitable (Vallentyne, 2014). The main plank of his argument is that nothing unearned should be given lest it causes injury, not only to society but also to the recipient. It injures the individual through the diminution of the urge for personal achievement and the society through dissuasion from personal effort since such effort does not lead to any higher advantage in comparison to those who did not make a similar effort. Libertarians argue that each person, pursuing, single-mindedly, his interest makes the greatest contribution to the collective good, and a 'reward system' should be configured to recognize individual effort by putting all goods and services to be allocated by the reward system. Therefore, removing any commodity (such as healthcare) from the system of reward, according to them, weakens the system thereby threatening the motive force that ensures economic well-

¹ Goods or services whose consumption are considered so important that they are made available in terms that are more generous than ordinary goods or services. They are usually taken out of the market reward system by government to ensure equity in their allocation (Musgrave, 1974).

being and the common good. Therefore, according to this school of thought, the most equitable way of allocating healthcare is through the '*invisible hand of the market*' since it '*rewards*' efforts. And, because it rewards effort, it inherently ensures equity in the allocation of the resource.

From the preceding, it is apparent that there are different strands of equity. To understand equity in healthcare, therefore, we have to go through the theories that have been put forward over time by different schools of thought, to guide us in understanding the subject matter of '*equitable distribution of healthcare*'.

2.5 The Theories of Equity in Healthcare

We proceed with the discussion of equity in healthcare by the assumption that equity ensures that health systems distribute healthcare fairly. Equity in healthcare in general and healthcare financing, in particular, is informed by the general theories of equity as well as additional thoughts put forward by social scientists and health economics. It should be noted that there is a general agreement that healthcare is a special product that would require special methods of allocation. Even though there is some degree of consensus that health impacts opportunity, the nexus between health and healthcare is still problematic. Therefore, to the extent to which there is doubt as to the contribution of healthcare to good (or bad) health, the debate on whether healthcare should be allocated in a special way will remain. Proponents of allocating healthcare in a special way do not see any contradiction in equating quality healthcare to good health, while opponents cannot see why a *want* (or even need) for one thing (health) should be attributed to another *want* (healthcare) however related (Daniels, 1982). As such, even though there is agreement that health is central to the normal functioning of humans, and lack of it restricts the range of opportunities that are open to individuals, and by extension, the well-being of individuals and society (Daniel 1982), the role of healthcare in all these remains unclear. And, due to this, '*unclearity*', a case for equity in the distribution of healthcare gets shrouded (and sometimes lost) in uncertainty.

There are six equity theories relevant to the distribution of healthcare and healthcare financing; that is; the theory of equality, the theory of entitlement, the theory of decent minimum, and the utilitarianism theory. The others are the Rawlsian theory of maximin, and the envy-free theory. In addition to these six, there is one more equity theory that addresses itself specifically to health and healthcare; the theory of 'equity as a choice', proposed

by Le Grand (1984). Most of the theories, as pointed out by Culyer (1971a), agree that the subject of how to allocate healthcare for the improvement of health, as opposed to other goods, can best be tackled by first isolating it as different from other goods or services and by providing a rationale for treating it differently.

2.5.1 The Theory of Equality

The theory of equality (egalitarianism) emphasizes a sense of collective citizenship between people. They posit that there is no doubt that healthcare contributes to good health, and good health is a human right. Apart from being a human right, they also argue that good health is necessary for economic development of a country. Therefore healthcare is seen by egalitarians as a natural right and therefore a citizen right (Culyer, 1980), whose benefits must be distributed equally to all citizens in need of healthcare. Payment for healthcare, according to egalitarians, should be positively related to ability-to-pay (ATP); that is; persons who can pay should be made to pay more (Goodin & Le Grand, 2018; Mooney, 1983; Wagstaff & Van Doorslaer, 2000; Wagstaff, Van Doorslaer, & Paci, 1989) and those who cannot pay should not be denied healthcare services based on financing inability. This means that equitable patterns of provision of healthcare should be ensured irrespective of the sacrifice by the society (Culyer, 1980). It further advocates for '*equal treatment for equal need*' as well as '*equality of access*, to healthcare (Sugden, 1983). That is, if two people are in equal need of healthcare, one should not receive more healthcare than the other based on any other consideration apart from their health condition. Indeed Sugden (1983) emphasizes that people in the same health circumstances should consume the same combination of healthcare whether they would choose to do so or not. This means that in healthcare, equalizing individual's net benefit, represented by health status, is universal and cannot be curtailed by anybody, including the would-be beneficiaries themselves.

Because health status cannot be distributed physically, Dworkins (2018a) argues that the best way to go about equalizing individuals' health is by equalizing individuals' opportunities to benefit from healthcare. This argument makes a strong case for the current push for UHC. He points out that egalitarians must call for equalizing resources available to people and not merely their welfare or utility represented by benefits. To do this, Dworkins (2018b) postulates that '*....distribution pattern treats people as equal if it transfers resources among them until*

no further transfer would leave their share of the total resources more equal...'. Although this assertion, when applied to health, does not clarify whether equality of resources means equality of use of healthcare services equality of access to healthcare, or even equality of health, it is an important guide to making healthcare equitable and available to all, regardless of status in the society. Furthermore, resources can refer to both physical and intellectual resources, which by extension means equality of access to good health as well as the availability of goods and services needed for healthcare for the promotion of good health. Mooney (1983) clarifies that Dworkin's proposal can be applied to healthcare through; equality of public expenditure in healthcare (assuming a homogenous population), equality of treatment for equal needs (focusing on individual needs), and equal distribution of health itself (focusing on the outcome of healthcare i.e. health outcomes). This consequently, makes it possible to formulate policies that will ensure equitable allocation of healthcare resources, increase access to needed healthcare for all in need of it and, to ensure that those with equal need for healthcare receive equal allocation (treatment) of healthcare.

In practice, as pointed out by Ter Meulen and Maarse (2008), egalitarianism is found in the concept of solidarity – an approach to financing healthcare predominant among European countries. Solidarity has its roots in the spontaneous voluntary and reciprocal arrangement of support and care within defined social groups and communities, such as professional groups, ethnic groups, religious groups, and labor unions. Solidarity, in this form, is motivated – to a large extent – by a genuine sense of fellowship and compassion for the needy and those in distress within the group. Over time, there has been a need to consolidate the gains of solidarity and to introduce predictability in benefits and contributions, particularly in the field of health and healthcare. The body with the social and financial infrastructure and the organizational ability to do this effectively is the government.

For this reason, solidarity- in the field of health and healthcare- morphed into a comprehensive system of organized and enforced contributions to provide uniform healthcare for all - controlled and enforced by the government (Houteven & Ter Meulen, 2000b; Ter Meulen, 2011). Based on solidarity, most European countries historically operate a collectively financed risk-sharing arrangement of healthcare systems that cover all citizens. Where all have equal rights to, at least some basic, healthcare by need. This method of financing healthcare is

modeled in the form of contractual solidarity, whereby, everyone makes a fair – but obligatory – contribution to the healthcare system in return for guaranteed ‘equal access’ to needed healthcare (Houtepen & Ter Meulen, 2000a) - clearly relying on the concept of egalitarianism.

However, a strict interpretation of egalitarianism will find the use of the term ‘obligatory contribution’ in the concept (solidarity) objectionable, particularly as far as it applies to those in ‘absolute poverty’. This is because households already in absolute poverty cannot make any financial contribution to healthcare (however small) without risking suffering catastrophic (CHE) payment. The options for those who cannot make the obligatory payment therefore are, either foregoing the consumption of needed healthcare or suffering financing hardship in the process of making their contribution. Both of which are unacceptable under egalitarianism. Furthermore, looking at the concept of solidarity through the lens of egalitarianism has come under increasing attack (Ter Meulen & Maarse, 2008), this is because there is the concern that health systems may not be able to meet the responsibilities associated with this form of solidarity due to resource constraints and increasing demand for expensive treatment.

Both the proponents of egalitarianism in allocating healthcare and those of solidarity in financing healthcare seem to agree that the two concepts are not reconcilable. The opposition to egalitarianism among proponents of solidarity is based on its sustainability. For example. They argue that in most industrialized countries the demand for healthcare is complicated by both an aging population which has resulted in a change in morbidity patterns and *a patient who is more informed* of the range of available treatment possibilities. The informed patient is empowered to make demands about how her condition should be managed and is aware of a wide range of treatment possibilities. These three factors together with advancement in medical technology – which has made the management of complicated conditions possible, (usually at a very high cost) - have combined to make healthcare very costly, calling into question the sustainability of the egalitarian concept of equal access to all with equal need, even in these resource-endowed countries (Huotepen & Ter Meulen, 2000). Furthermore, the blanket application of solidarity, which makes it acceptable to egalitarians, seems to have reached its limits even in countries with a long history of solidarity and UHC, like the Netherlands, Sweden, and the UK. There is, already,

a covert push in some countries in Europe. like Sweden and Netherlands, to moderate what is seen as the adverse effects of 'equal access to all' through collective responsibility as advocated by egalitarians (Houtepen & ter Meulen 2000, Ter Meulen, 2011), through a paradigm shift to '*universal access to basic health care*'. Under this concept, the state is expected to guarantee some defined minimum amount of healthcare, while individuals take financing responsibility for any healthcare above this minimum either through co-payment, deductibles, or out-of-pocket (OOP). This shift in the concept of '*solidarity*' is essentially a shift from 'egalitarianism'. The shift is towards a different theory, the theory of '*decent minimum*'. We note that because of globalization, expensive, technology-driven treatment, is now a reality in many countries including those in the SSA region. This means that the problems faced by the concept of equality in high-income countries apply to the region. Likewise, the aging population is already a problem in parts of the SSA region.

Opposition to equality is also based on its application to the provision of healthcare by private players. Equality, as advocated by Dworkin and Mooney focuses mainly on publicly provided healthcare and therefore, provides little guidance on how private facilities can participate in equality in the provision of healthcare. By ignoring the contribution of private healthcare providers, equality leaves out an important player in the provision of healthcare. By doing this it suggests that private providers of healthcare have no place in making healthcare systems equitable. A position that is obviously defective, given the prevalence of private healthcare providers globally.

At the same time, it does not clarify the role of solidarity through voluntary financial pooling. That is, it ignores the solidarity not driven by government or governmental agencies. Indeed as Pereira (1993) points out, both Dworkin's and Mooney's postulates lack specific constraints that are amenable to policy building, aspects that are important in constructing an equitable healthcare system. Furthermore, he argues that equality, *as a whole*, collapses as a theory of equity since (as proposed), it fails to show how equalization can be accomplished, be it in health or healthcare, particularly in the face of resource constraints. From the preceding, there is some doubt that the theory of egalitarianism can provide a realistic platform for achieving equity in healthcare and

improvement of health outcomes in the SSA region. This is even more complicated considering the huge resource requirements for its operation and the resource-challenged economies of the SSA region.

2.5.2 Libertarian Theory of Equity

At the opposite end of egalitarianism is libertarianism - though both share in deontological approach to equity - it is the view of libertarians that each person has the right to live her life and use her resources in the way she chooses to, as long as she respects the right of others to do the same. The gist of libertarian thought is the belief in personal liberty, economic freedom, and a *skepticism of government power*. Robert Nozick in his work on the 'concept of entitlement', with the title 'Anarchy, State and Utopia' (Vallentyne, 2014), postulates that libertarianism is grounded on certain inviolable individual rights which should not be intentionally transgressed by other individuals or government for any purpose. These rights are; the right not to be harmed or killed if one is doing no harm to others. The right not to be coerced or imprisoned, the right to own and use personal property as one wishes to as long as one does not violate others' rights, and the right not to have one's property taken away or destroyed. From these principles, libertarianism emphasizes what they call, '*respect for natural rights*'.

Libertarians argue that equitable distribution is '*distribution according to entitlement*', that is - a distribution pattern that recognizes that individuals have the right to acquire and transfer their holdings as they wish, as long as they are not in violation of others' rights. Any other method of distribution that does not recognize these rights is unjust and therefore not equitable. They regard access to healthcare as part of a society's reward system, in which people should be allowed to use their income and wealth to get more or better *rewards* (healthcare) for better health outcomes if they so wish (Donabedian, 1971). Given that, they hold that distribution is equitable depending entirely on the path used to reach it (Pereira, 1993), healthcare, according to the theory, should be distributed through the market forces of demand and supply, just like any other product. And, the financing of healthcare should be based on *willingness to pay* and not ability-to-pay.

According to the theory, equity is achieved through the 'efficient' market forces which not only reward those who deserve the reward through the payment of the full price but also ensure the sustainability of the system of production and consumption through market intervention and private sector expansion. The entire concept of

progressivity is alien to libertarian theory, which instead views the free market as the legitimate and equitable mechanism to redistribute resources (Vallentyne 2014), healthcare included. The proponents of the theory aver that since there is a connection between moral excellence and dedication to personal effort to achieve, withdrawal of any commodity from the reward system, therefore, weakens both the economic and moral well-being (Donabedian, 1971). As such, a weak reward system is a threat to society's common good, since individuals and society depend on the integrity of the reward system. Any inequalities that may emerge are not unfair since the market will end up rewarding the merit of those who work hard. Therefore, no one should have access to healthcare unless it has been acquired through the market (Ruger, 2008). They argue that since individuals are ends in themselves, they cannot be used, as proposed by egalitarians, instrumentally to assist others. In any case, doing so compromises the integrity of the reward system which subsequently works against the common good. Accordingly, the average population's health outcomes should improve through adherence to the principles of libertarianism. Furthermore, according to libertarians, in the long run, society is better off by showing indifference to those with no ability to afford healthcare due to income levels or chronic illness, even if it lowers their health outcomes since this is the only way to ensure the integrity of the reward system.

The application of the allocation frameworks proposed by the libertarian theory to healthcare is practically controversial. The distribution of healthcare benefits solely by market forces assumes the presence of the market. This assumption ignores the special circumstances surrounding healthcare (goods and services). Consumer ignorance rules this market; the supplier (doctors and other medical experts) dictates in almost all circumstances what is consumed (Evans, 1981). Consumers are therefore ill-equipped to make informed choices in this market, a requirement of a functional and efficient market operation (perfect market). Consumer ignorance is what Evan (1981) referred to as an *'incomplete vertical integration between consumers and suppliers'*. This is because it gives the supplier too much power over what is consumed. As noted by Culyer (1989), this consumer ignorance is deeper than ordinary consumer ignorance, since – even highly educated and informed consumers usually defer judgment of their healthcare consumption to professionals. The healthcare market is therefore vulnerable to 1) misplaced technical zeal by experts – where experts subject patients to pointless diagnostic

testing that yields little usable information; 2) class biases – where healthcare experts belonging to higher economic class compared to their clients are unable to understand the economic circumstances of the clientele, and 3) financial distortions caused by supplier-induced demand (SID) and price gouging (Evans, 1974).

Furthermore, as pointed out by Culyer (1971b), some patients, due to the state and nature of their ill health (e.g. the mentally ill, those requiring emergency treatment, unconscious patients, etc.) are in no condition to make consumption decisions, which further undermines the principle of consumer sovereignty – a basic requirement of perfect market operation. These are genuine concerns, capable of causing market failures, which should call for special warrants to protect the consumer. These are facts that are ignored in the strict application of the theory.

The theory is also completely blind to the existence of externalities in health and healthcare services. The externalities in health and healthcare are caused by the fact that some diseases can move from the infected to the healthy. Therefore, by being indifferent to the infected the healthy are indirectly acting against their own best interest since they are exposing themselves to the diseases. Externalities can also be caused by the disutility suffered by some individuals from seeing a person suffering from ill health, which causes them to be willing to sacrifice personal income to see others get better (Goodin & Le Grand, 2018). Such individuals gain in terms of utility by contributing to the improvement of the health of others through healthcare. It is therefore incumbent upon society not to ignore the 'caring externality' that is possessed by such individuals through the strict application of libertarianism.

By insisting on entitlement, the theory proceeds from the assumption that all health conditions are fair and even where the condition is inherited, it is a matter of 'fate' and therefore society should be indifferent to those who suffer from ill health (Folland, Goodman, & Stano, 2007; Mooney, 2003). These assumptions are highly contentious since the onset of ill health is usually stochastic. Furthermore, some individuals suffer ill health (e.g., job-related diseases) during their effort to increase their income position which, hopefully, could have increased their ability to effectively take part in the 'market-driven reward system'. Leaving such people to their own devices and the vagaries of market forces is being insensitive to their unfortunate situation which can hardly qualify to be

equitable. Likewise, being indifferent to a child who cannot afford healthcare after inheriting a health condition like HIV-AIDS from his dead parent can hardly be regarded as equitable by any measure.

The assumption by the theory that all who are wealthy are wealthy through merit and that, all the poor are 'deserving' poor (Vallentyne, 2014) has no moral basis. It is akin to equating economic failure and success to moral failure and success. The failure to achieve is not necessarily equal to moral depravity or worthlessness as implied in the theory. The moral justification for using personal achievement as a criterion for distributing reward is therefore weak, particularly, if all contestants did not start on equal footing. That is, if the pre-requisites of achievement (like, quality education for all, equal access to means of production, etc.) were not made available to all, either through historical injustices (e.g. apartheid laws) or unfair distribution patterns (urban-rural disparities) that excluded a section of the society from accessing such pre-requisites. Then, rewarding achievement resulting from the use of such prerequisites is *ipso-facto* inequitable. For these reasons, there could be individuals who are '*worthy poor*' in society, and therefore, who require certain levels of safety nets to access healthcare and other merit goods.

By insisting on distributing healthcare benefits through market forces (reward system), which reward individuals through their holdings (wealth and income) and ignores health and income conditions, libertarianism is incurably unjust to the unhealthy and the poor. Due to this, it is doubtful that its application in SSA would increase the average population health outcomes. This means that financing arrangements that follow this method of distributing health benefits may not inject equity into the region's healthcare systems.

2.5.3 The Equity Theory of Decent Minimum

The theory of decent minimum is an offshoot of libertarianism; it is an attempt to '*moderate*' some extremes of Nozick's principle of entitlement. According to this school of thought, healthcare should be 'rationed primarily' according to a willingness to pay. However, some social justice considerations should be permitted by guaranteeing everybody '*a basic level of healthcare*' (Culyer & Simpson, 1980) for a basic minimum level of health outcomes. The gist of their argument is that '...people should, at the margin, at least, be permitted to use their income and wealth to gain more or better healthcare' than others. However, nobody should be left without some

minimum (basic) level of healthcare for the enjoyment of a certain level of health status. And, where income transfer from the non-poor to the poor is done to provide the basic level of healthcare, it should only be done in kind. Which should be in the form of a subsidized 'basic or minimum level' of healthcare targeted at the poor. The purpose of a decent minimum is to provide minimum standards of health status below which individuals should not be allowed to fall.

The proponents of decent minimum (e.g. Buchanan, 1984), argue that 'a decent minimum healthcare' is the most logical path to universal healthcare. According to this school of thought, this is because one, it allows each society to set its own 'decent minimum' according to its ability (resource availability), while at the same time, giving room for adjustment as the society's wealth position improves. And two, it cures the main weakness of equality – the universal, equal access – which is disproportionately expensive, while still acknowledging the need to provide some acceptable levels of healthcare even to those without sufficient ability to effectively participate in the market-driven reward system. It acknowledges the principle of the universal right to health care, only that the 'right' should be moderated by the country's ability to afford it. Its version of UHC is an adjustable *universal decent minimum health care* (UDMHC). The proponents of decent minimum healthcare argue that any implementation of UHC that does not take into consideration resource constraints is bound to run into financing difficulties and may not succeed. They argue further that UHC cannot be implemented successfully if its implementation infringes on individuals' freedom to consume additional or better healthcare according to their willingness-to-pay (i.e., consumer sovereignty).

Furthermore, proponents of decent minimum argue, that a major weakness of 'universal equal access, as proposed by egalitarians, is that the universal equal access forces the society to choose between either setting the publicly guaranteed healthcare at a level lower than the level that is technically possible or to set it at a level that is as high as is technically possible. In the former case, individual freedom to consume better health care is curtailed, even if they can afford it. They (e.g., Fried, 1976; Daniel 1982) argue that such a case cannot be equitable since it infringes on individuals' freedom of choice. They posit that individuals should be allowed to consume better healthcare using their resources, so long as such consumption does not affect the provision of a

'decent package of health care *'for all'*'. On the other hand, if the level of '*universal equal access*' is set as high as technically possible, to eliminate the need to seek extra care beyond the level, healthcare would consume most of society's resources such that there would be very little left for provision of other important goods and services. If this is true, then we argue that universal equal access would not lead to the desired improvement in a country's health status. We note that according to Grossman's theory of health capital, direct investment in healthcare is just one aspect of the improvement of health capital, the other aspect lies in the indirect investment. If direct investment consumes most of the resources, then population health would still suffer as a result of little investment in sectors (such as education, clean environment, etc.) that complement the direct investment in healthcare.

It is for these reasons, that advocates of decent minimum, advise that to achieve universal healthcare, it is better to approach it through 'universal decent minimum healthcare' (Daniels, 1982, 1985; Ooms et al., 2014), than through 'universal equal accesses'. In any case, the right to healthcare must be limited in scope since healthcare needs are not only heterogeneous, they are also stochastic. As such, there is a need for the assignment of priority in the allocation of healthcare. Prioritization is only possible if we acknowledge that society has limited resources and universal equal access to healthcare would be a prodigiously expensive undertaking (Fried, 1976; Mechanic & Meyer, 2000). Therefore, according to this school of thought, to guarantee universal access to healthcare, we need to set the requirement of universal access at cost-effective levels, this is achievable only through the use of universal decent minimum (UDMHC).

Furthermore, they argue, that so long as the society considers inequality in wealth and income to be morally acceptable – and as long as the systems that produce these inequalities are not morally suspect - it makes little sense to carve out healthcare and insist that equality must reign. Moreover, healthcare is not different from other 'basic needs' like food and shelter – therefore, if we do not insist on 'universal equal access to food' and 'universal equal access to shelter' the insistence on 'universal equal access to healthcare' is ideologically weak (Fried, 1976). What we should concern ourselves with, is, determining the 'decent minimum' healthcare - the standard of healthcare that is adequate for a decent 'tolerable' life for all - just as we should do with food and shelter (Fried, 1976). As we do this, we should maintain the virtues of freedom of choice, provision of variety, and

flexibility in accessing healthcare, for a decent level of health status. Fried (1976) concludes that both the provision of variety and flexibility are also aspects of equity just like equal access. This means that equal access is not the only measure of equity.

We note that the proponents of UDMHC do not provide an acceptable measure of decent minimum healthcare. The World Health Organization (WHO) provides some basis for measuring decent minimum healthcare. According to WHO (2010), minimum, decent healthcare is premised on three foundations. These are; 1) access to healthcare facilities, goods, and services on a non-discriminatory basis, especially for vulnerable and marginalized groups, 2) provision of 'essential drugs' as from time-to-time defined under WHO's *'Action Programme on Essential Drugs'* and, 3), ensure equitable distribution of healthcare facilities, goods, and services. We note that, due to resource constraints, the right to healthcare does not confer on individuals the right to access the best available healthcare, this is not practical even in developed economies. And has never been achieved even in countries with a long history of UHC, like the United Kingdom (Ooms et al., 2014). Even WHO (2010) advises states to *'take steps'* to provide healthcare to all, *'to the maximum of their available resources'*, thereby acknowledging that different countries will provide different levels of healthcare depending on 'available' resources. Which specifically speaks to 'decent minimum healthcare' for all, as opposed to, 'universal equal healthcare' for all. Therefore, WHO agrees that equity in the provision of healthcare and distribution of healthcare goods and services is mitigated by and depends on available resources. As such, equity in healthcare is achievable if we take little steps, informed by resource availability through some basic *'minimum decent healthcare'*. This is more so for the low-income countries.

As a theory, the decent minimum is confusing, while it postulates, should ideally, be based on a minimum standard of health status, its application has been on the provision of healthcare (Pereira, 1993). As a result, in practice, states are restricted to the provision of minimal levels of healthcare for everybody (or for the poor) while the private sector provides all other healthcare needs. Even if we agree that 'decent minimum' refers to 'decent minimum standard of healthcare' we are still left with the problem of operationalizing the 'decent standard of healthcare', even with the WHO definition. Furthermore, it is even more difficult to approximate the

effect of the 'decent minimum healthcare' on health over time, which should be a necessary condition to sustain the argument for the theory. According to Pereira (1993), the practice of a decent minimum has been based on cost, which makes it an unjust method of allocating healthcare resources. Where it is universally provided, decent minimum ignores the special circumstances of the poor. On the other hand, where it targets only those who are below 'minimum standards' its application is problematic. That is, even if minimum standards were to be found, the implications of applying them remain unclear. For example, it would mean finding out the number of people who are not receiving a decent minimum standard of care, then proceeding to compute the number of resources needed to bring them to the level of decent minimum standards healthcare or health status. This will invariably mean the redistribution of healthcare from those who are above 'decent minimum' to those below it. Its implications would defeat the purpose of minimizing healthcare cost, that is, where the supply of healthcare is less than perfectly elastic (which is usually the case), it requires the bringing in of other inputs to healthcare production function, which as a result, will increase demand for more healthcare from those below the minimum standard healthcare or status. Thereby making it unsustainable, the same reason advanced by its proponents against universal access.

Furthermore, due to the redistribution effect, some people who were marginally above the decent minimum may fall below 'the decent minimum' making it a never-ending cycle of searching for those who fall below the decent minimum with the attendant cost. Its application in economies with imprecise data on income distribution, which affects most countries in SSA, can be problematic and inefficient. And, apart from the lack of precision, this theory carries along most of the weaknesses of libertarianism, for example, it ignores the problem of consumer ignorance. It also does not provide proper guidelines on the health status achievable through the provision of UDMHC.

We however argue that due to resource constraints, it offers the most practical approach for SSA countries to move towards achieving UHC status. To do this, these countries need to define the products and services to include in the 'minimum decent' health care and put in place, a policy that will enable adjustments to be made in the 'decent minimum' packages. The changes in the packages should follow changes in their

economic conditions to be sustainable. In this way, universal coverage will not only be responsive to the economic conditions but, will also be taken in doses that do not '*break the bank*'. However, the healthcare financing approach or financing regime that can deliver equity to the healthcare systems through the concept of decent minimum remains unclear. We note also that the link between decent minimum healthcare and health status (represented by health outcomes) remains unclear. Because the concept of decent minimum is unclear, using the theory as a basis for distributing healthcare may not lead to equity in the healthcare system and, consequently, may not help in increasing health outcomes in the sub-Saharan Africa region.

2.5.4 Equity Theory of Utilitarianism

Utilitarianism as a theory is grounded on the concept of *morality*. It states that something is moral if it produces the greatest amount of good for the greatest number of members of society. It looks at the concept of equity from a deontological perspective. Those actions that make people happy are *good*, where good, is the existence of pleasure and the absence of pain, otherwise known as utility. According to utilitarianism, utility is maximized with an action that maximizes total benefits while reducing negative consequences for the largest number of people (Harsanyi, 1977). This means that resources should be allocated to maximize aggregate utility. We note that the concept of maximization of country-level health outcomes borrows heavily from this theory.

In the context of health, being a maximization theory, utilitarianism would call for the maximization of aggregate population health, that is, the healthcare benefits (goods and services) should be distributed in a manner that alleviates ill health (suffering) to the largest number of people. In the context of individuals, it would imply giving priority to healthcare to the patient who is expected to gain the largest total amount of health, if treated, over his/her remaining life-span, while taking into account, possible indirect consequences for other people's health (Cookson & Dolan, 2000). In its strict application, utilitarian theory advocates that 'we must not benefit a few at a cost to many'. Implicit in the theory, is the doctrine of maximization of aggregate society's utility through the satisfaction of individual member's needs. It is from this doctrine that we derive the healthcare equity concept of '*distribution according to need*' (Wagstaff & Van Doorslaer, 2000). This means that healthcare benefits should be distributed in a pattern that ensures that, those who can derive the highest utility, per unit of healthcare,

receive a higher allocation, while at the same time, ensuring that the benefit is spread to the greatest number of people. Utilitarianism views equity of healthcare from two perspectives; maximization of aggregate benefits (good) to the whole society and maximization of per unit utility of healthcare allocated per individual. This means that each unit of healthcare consumed should result in the highest utility. That is, the consumer that will derive the highest benefit from the consumption should be given priority. The proponents of utilitarianism argue that this pattern of distribution results in the highest increase in aggregate utility. For example, if there are two people with the same need for healthcare, and we have a unit of healthcare enough for only one of them, then the one with the highest chance of benefiting from the unit takes precedence. According to proponents of utilitarianism, doing this maximizes utility for the unit healthcare and, as a result, welfare.

The main weakness of applying the constructs of utilitarian theory to healthcare is that in health there is no logical connection between greater equality and greater equity since there is a lack of identical preferences (Periera, 1993). For example, according to the theory, allocating more healthcare resources, from a common pool to a rich person who responds to a type of treatment better than a poor person is equitable. Note that, the rich may be responding better to treatment due to better nutrition and living conditions, which are functions of their, already, advantaged position. Furthermore, while the rich person may not have difficulties financing her own health needs, the poor person may experience financing difficulties. By following such a policy, we will be required to take away health-promoting resources from the poor - which will reduce their stock of health - to the rich. According to the theory, although the poor would lose utility as her health declines, this would be more than compensated by the rich, as her health improves. And the rich person makes better use of each unit of healthcare compared to the poor person. A situation that is justified by the net increase in aggregate utility. The resulting distribution may be functionally efficient, but logically inequitable, indeed it is in complete violation of the principle of vertical equity. We argue that such a distribution is also in contravention of the principle of natural justice.

Maximization of utility is very difficult to achieve in health, particularly in cases where people are born with life-long health conditions (e.g., sickle cell anemia, polio, etc), or where they are affected by a health condition that requires life-long management (e.g., diabetes). Utilitarianism will justify the exclusion of such people from

even minimal healthcare since persons with such conditions, because of their ill health, make a minimal contribution to social utility (Buchanan, 1984). Furthermore, apart from the lack of identical preferences as argued by Culyer (1980), there is the added difficulty in the identification of '*a just utilitarian distribution*' in healthcare. This is because utilitarian distribution depends on several empirical facts which are very difficult to obtain in the health sector. For example, how do we identify the amount of utility derived from chemotherapy treatment given to a cancer patient or the utility derived from anti-retroviral medicine given to HIV/AIDS patients? Given that the medication does not lead to a cure. Even if we were to identify them, there is still the added problem of precise measurement and interpersonal comparison of the utility.

All these factors combine to make the application of utilitarianism as a theory of equity in healthcare problematic. Indeed, maximizing aggregate health or healthcare does not respond adequately to either horizontal or vertical equity. And, as Rawls (2009) reasoned, it may expose the worst-off economically and the terminally ill to catastrophic expenditures, since, it has no safeguards for those at extreme ends. We argue that for a country, where the maximization of aggregate health outcomes should be the healthcare motive, utilitarianism should over a good guideline in formulating healthcare policy. However, care should be taken to protect those at the margins, the terminally ill and the poor, from the adverse effects of pursuing the maximization of aggregate health outcomes. If this is not done, we argue, the objective of maximization of aggregate health may not be achieved, particularly in SSA where the poor are the majority.

2.5.5 Rawlsian Theory of Maximin and Equity

Maximin is part of John Rawls' renowned 'Theory of Social Justice' that was postulated in 1971. Rawls considers 'maximin' as an off-shoot of the concept of social contract in the wider theory of social justice (Rawls 2009). Rawls argues that injustice – just like inequality - exists because basic agreements are made too late when people already know their social positions and relative strengths in bargaining abilities and preferences - these contingencies and knowledge, according to him, distort the 'social system'. To remedy this anomaly, Rawls recommends the use of the concept of 'original position' as envisaged in the concept of the social contract.

To negotiate equitably, Rawls (2001) argues that individuals in the original position act under 'a veil of ignorance,' that is – *"everyone is deprived of certain morally irrelevant information. They do not know their place in society, their class position or social status, their place in the distribution of natural assets and liabilities, their deeper aim and interest, or their particular psychological make-up"*. Due to this 'veil of ignorance' individuals in the original position will operate under the principle of '*difference*' – which evaluates every possible institutional arrangement in terms of the interest of the least advantaged (or the worst-off) individuals. This is because all of them fear that they may end up being the worst-off individuals when the veil is removed.

As a social contract, maximin is superior to both utilitarian theory and egalitarian theory (Rawls, 1975), this is because the principles that predominate maximin regulate both social and economic inequalities in the basic structures that affect the '*life prospects*' of individuals. Unlike utility, which leaves too much to judgment – a situation which gives opportunity to those favored by the existing inequalities an opportunity to exploit their advantages to gain even higher advantages, thereby increasing the existing inequalities. Rawls (1974) argues that maximin is easier to enforce since once the most disadvantaged group is identified, it is easy to determine the policies that work to their advantage. He posits further that, though equality is less ambiguous in terms of distribution patterns, it is less efficient than both maximin and utility theories. Maximin, therefore, cures the inefficiencies inherent in egalitarianism while at the same time, it exhibits sufficiently ascertainable distribution patterns (Rawls, 1974), unlike utilitarianism. Maximin appeals to people's sense of altruism as well as idealism, and therefore, as a theory of equity, it addresses the inner person since it goes to correct the deep and pervasive inequalities that people find hard to accept (Rawls, 2001). This is unlike utilitarianism, which asks the worst-off to consider first the greater advantage of all, including those who have more, as a sufficient reason for having a lower prospect of life (Rawls, 1974). Maximin ensures that any inequality works to the advantage of the least advantaged (Rawls, 1974). Rawls argues that it counterbalances the disadvantage that may be felt by the advantaged group by calling upon them to give up much less than what they are already enjoying as a result of their fortunate situation, to alleviate the suffering of the worst-off, those with poor health or with less income to afford healthcare.

Given that people evaluate their situation relative to others, maximin ensures everyone is happy (Raz, 1986). According to Raz (1986), what makes us care about inequality is not inequality itself but the ‘concern’ identified by the underlying principle. He states that “... *it is the hunger of the hungry, the need of the needy, the suffering of the ill..... the fact that they are worse off in relative terms than their neighbors.....that is relevant for our action*”. It is relevant not as an independent evil of inequality, but in showing that ‘.....*their hunger is greater, their suffering more hurtful....*” that brings out our concern. That is, our concern is for the hunger of the hungry and the suffering of the ill and not for equality *per se* which makes us give them priority (Raz, 1986). Therefore, addressing equity from the concept of maximin goes to address the core of our concern for others, which, clearly is not driven by an *inner sense of justice* or equity.

Rawls (1974) argues that aggregate utilitarianism, the concept of utilitarianism, has the potential to sacrifice the interest of the minority to produce greater aggregate utility, which can lead to slavery and servitude, conditions that can hardly pass as equitable. For this reason, the theory of maximin does not allow that, the sacrifices imposed on a few are outweighed by the larger advantages enjoyed by many (Rawls, 2009). However, maximin does not rule out, totally, actions that can be adjudged as unequal distribution. It only insists that any departure from equitable distribution has to be rationally justified and the justification is only rational if it works to benefit the worst-off. We argue that the justification for unequal distribution in favor of the worst-off is in line with the argument by some healthcare financing experts that treating ‘unequal-unequally’ - as postulated under the concept of *vertical equity* - is necessary to inject equity into the healthcare systems. And, because empirical studies show that sub-Saharan Africa’s (SSA) healthcare systems are largely financially regressive because of a lack of vertical equity, the application of the concept of maximin could improve equity in the region’s healthcare financing. This can be done through affirmative action in the distribution of healthcare that favors the disadvantaged groups, such as the poor, the terminally ill and those in the rural areas.

However, there are counterarguments against the concept with regard to equity in healthcare. According to Harsanyi (1975), by ranking alternatives by their worst possible outcome, Rawlsian maximin presents us with ‘paradoxes’ that are very difficult to defend. For example, suppose a society is presented with two actions A and

B. And, suppose action A guarantees US\$ 2.00 at worst and US\$ 2.01 at best while action B guarantees US\$1.99 at worst and US\$ 20 000 at best. Using maximin principle, action A must be preferred over action B, since A has the best possible 'worst' outcome, which is US\$2.00 compared to US\$1.99 in action B. Such a decision is clearly neither rational nor equitable, indeed it is extremely irrational to make a decision based wholly on the worst possible outcome of alternatives (Harsanyi, 1975). Which makes maximin unsuitable in many decision situations. Likewise, Nozick (as quoted in Vallentyne, 2014) asserts that Rawlsian maximin can only be applied if primary goods are free, in which case, no one would have a special entitlement to them. However, since people exert their labor in the production process, maximin principle of allocation, with the worst-off as the primary consideration, is unjust. He argues further that, it cannot be equitable for any social system to use individual gains (acquired in a manner that is morally acceptable) for the benefit of others, even if, they are the 'worst-off'.

Contrary to Rawls's assertion that utilitarianism treats persons as means to an end of other persons, Schaefer (1979), finds that Rawls's maximin is equally guilty. For, in his opinion, it cannot be reasonable or equitable to prevent the better-off from enjoying their entitlement, which they have acquired through their effort and ingenuity, in consideration of the worst-off. At the same time, while Rawls argues that the principle of maximin is clear (sharp), in practice the term 'worst-off is vague (Choptiany, 1973), this is particularly so in the area of health and healthcare, since 'worst-off in this area can take several forms. Are they those who are disadvantaged in the overall consumption of primary goods? Are they those who are disadvantaged due to ill health? or, are they those who cannot benefit from healthcare for any reason? (Choptiany, 1973).

Furthermore, it will be very difficult to distinguish the inequalities that benefit the worst-off from those that do not, such that, such policies aimed at correcting such inequalities may end up not serving the purpose intended by the theory. Even if the disadvantaged group can be identified, there is no guarantee that within such a group there are no individuals who are better-off than those in the advantaged group. And therefore, who can leverage their advantages to gain (unfairly) on an unequal distribution pattern directed at such a group at the expense of the genuinely disadvantaged individuals in the group. Le Grand (1987) argues that, in the area of health, the theory would suggest that an equitable position would be arrived at, at the point where all individuals' health status

is equal to the sickest person. He argues that such a situation cannot be equitable. The theory's overemphasis on the 'worst-off is unsettling to many (Harsanyi, 1980). For example, in a hypothetical situation where we have two patients suffering from acute meningitis, one is generally healthy apart from the meningitis attack, while the other is terminally ill with Parkinson's disease. And, suppose in the store there are only enough antibiotics to treat only one of them. The '*difference principle*' in the theory of maximin will require that we treat the terminally ill patient (since he is the worst-off between the two) even if this will prolong his life only a little and let the condition of the generally healthy person degenerate further. Such a response would not rest well with what most people would consider to be an equitable allocation of resources.

This theory does not state how equals (in terms of social status or health) should be treated. Therefore, it ignores the concept of horizontal equity (of equal treatment of equals) in the distribution of healthcare since it only recognizes equity in terms of the worst-off. On the other hand, we argue that it has only limited application on vertical equity. Maximin takes the position that the only *unequals* that deserve unequal treatment are the worst-off, this is not exactly the position of vertical equity. According to vertical equity, the treatment of unequal unequally applies across the board. We therefore note that as far as it does not take care of all vertical equity concerns, it may not help in curing the problem of lack of vertical equity in healthcare financing in the SSA region.

We note also that although maximin has several appeals to the situation in sub-Saharan Africa, particularly concerning its distribution pattern that favors the worst-off, it may fail to go deep enough to address the underlying inequitable distribution of healthcare in the region. Because, although the worst-off in terms of income are also the worst-off in terms of health, those in the intermediate position neither have adequate means to improve their health status nor health status that is remarkably better than the worst-off. Therefore, such a pattern of distribution will only serve to leave them even more exposed, thereby reducing their health stock. And as a result, reduces the aggregate health outcomes of the region.

2.5.6 The Equity Theory of Envy-Free

This theory of 'envy-free', according to Varian (1973), was proposed by Foley in 1967 to address the weaknesses of both the concepts of entitlement (in libertarianism) and contract (in maximin). Although he

attributed it to Foley, Varian, expounded on the theory under the doctrine of *fairness* to present a coherent concept that would address both equity and efficiency concerns. Something that he argued, was missing in all the pre-existing theories of equity. He (Varian, 1973), argued that an allocation is equitable only when – ‘... if we present each *agent* in a distribution matrix with the consumption bundle held by each of the other *agents*, none of them would wish to exchange his bundle for another *agent*’s bundle...’. Such an allocation is both Pareto-efficient and equitable (Varian, 1975). An allocation is Pareto-efficient if its pattern of allocation is such that – ‘*it is impossible to make one person better-off without making one or more persons worse-off*’ (Sugden, 1984).

Varian asserts that while, on the one hand; libertarianism and utilitarianism concepts are efficient, they are inequitable. While on the other hand, egalitarianism and maximin are equitable, they are both inefficient. Envy-free is both efficient and equitable (Varian, 1973). Furthermore, *no-envy* does not require elaborate hypothetical formulation and assumptions - like hypothetical welfare functions and hypothetical original positions - which are required for the formulation and understanding of the other equity theories. No-envy theory is, therefore, a straightforward theory, a theory with few procedural constraints and fewer abstractions (Baumol, 1982). Envy-free captures the fundamental requirements for an equitable distribution better than the other deontological theories of fair allocation, this is because it provides for both procedural and distributive justice (Varian, 1975). Furthermore, the argument that it is a consumption theory has been overcome by the incorporation of labor and leisure into its statement (Varian, 1975).

Proponents of envy-free theory argue that health and healthcare *being merit goods* should not be distributed according to income or any other social standing. They state that this is adequately addressed by envy-free allocation, which implicitly, upholds the principle of inviolability of the individual right to good health and healthcare, while at the same time, promoting the principle of maximization of social welfare in access to healthcare. We can see in its statement that - the stock of one person’s health and healthcare is envy-free in comparison to the stock of every person’s health and healthcare. Implicit in this arrangement, is the amenability of the principle of no-envy to the concept of progressivity, that is, people with better health will not envy those with ill health, and as such, will find it agreeable for those with ill health to consume more healthcare. Which is in

agreement with the concept of vertical equity. Likewise richer people, under the framework of no-envy, would find it easier to carry, disproportionately, a larger burden of the cost of healthcare compared to their poorer neighbors. And, because the envy-free concept assumes symmetry between agents, it easily conforms to the principle of *equal treatment of equals*, a requirement of the concept of horizontal equity. This would be the point at which no agent envies the bundle of health status and health goods held by other agents. Therefore, we argue that provided that there is no information asymmetry, a distribution pattern that follows that concept of envy-free would be both vertically and horizontally equitable. And, as a result, would lead to better aggregate health outcomes.

However, some experts have pointed out some weaknesses that, according to them, make envy-free unsuitable in explaining equity in healthcare. Sudgen (1984) points out that, by relying on Paretian efficiency, no-envy theory exposed itself to the weaknesses of aggregation that bedevils utilitarianism – that is, the proper objective of a society is to maximize aggregate social welfare. He argues that following such a policy in the distribution of healthcare would lead to decisions that are *regressive* and therefore inequitable. Because such decisions would disadvantage those at the bottom of the pile – the terminally sick and the poor. Apart from its reliance on Paretian efficiency, Sudgen (1984) argues further that, envy implies unsatisfied wants (or needs). However, eliminating envy does not lead to the satisfaction of the want. For example, suppose A and B are both suffering from a fracture of the hip bone. A can afford and therefore uses a motorized wheelchair to move around as he recuperates. B can only afford a manual wheelchair, therefore B envies A. Suppose A and B both do not have any type of wheelchair, there will be no envy. But, it does not mean that the want (need) for the wheelchair is satisfied since both are still incapacitated by their injuries. It only means that both cannot access wheelchairs (i.e. needed healthcare). We have argued earlier that, the healthcare market is a producer market, that is, a market that the producers (healthcare experts) have better information than the consumer (the patient). Therefore envy-free, which implies that the consumer is not only aware of her stock of health and the needed healthcare, but that she also has sufficient information about her neighbor's stock of health, is a highly inappropriate measure of equity in the area of health and healthcare. This is because lack of envy may be a result of ignorance and not the absence of inequity.

To make envy-free complete Varian introduced production and leisure into the concepts of envy-free allocation and called it, the principle of '*wealth-fair allocation*' (Varian, 1975). He postulated that if one agent cannot possibly produce what another can, then envy complaint should not arise against the one that can produce from the one who cannot. While this argument is logically sound, it invariably introduces into the theory the concept of sanctification of productivity, a roll-back to libertarianism's concept of entitlement ('*to each according to entitlement*'). In this case '*to each according to productivity*'.

The addition improves the theory's technical capacity but makes it weaker as a theory of health and healthcare because the addition works against the terminally ill and the poor and favors the healthy and the rich (those who have superior physical and mental capacities as well as those who control means of production). As a result, the addition violates the principle of vertical equity. Musgrave (1974) asserts that the addition may be offensive even to the principle of horizontal equity – *equal treatment of equals*. He states that since only those who are identical, both preference-wise and production-wise, are treated equally, those who are only identical preference-wise will be treated differentially to the extent to which they are different production-wise. Apart from the partial differential treatment of individuals, the envy-free doctrine is complicated further by the fact that the no-envy principle cannot rank alternative states (Pereira, 1993), it only states what is fair and what is not fair. Therefore, should we find no feasible allocation – as often happens in the field of health and healthcare – we are left with no grounds to decide as to whether a distribution is equitable or not. Because, this dichotomy, of fair or unfair, does not give room for the determination of the range (or magnitude) of equity in between. Such that the use of equity tools like progressivity is rendered impractical and, therefore, practically ineffective in informing equity in health and the distribution of healthcare. As a result, it is doubtful whether distributing healthcare following the principles laid down in the theory of envy-free can lead to equity of the healthcare systems in the SSA region.

2.5.7 The Theory of Equity as a Choice

The theory of 'equity as a choice' was proposed by Julian Le Grand in 1984, specifically for the area of health and healthcare. Le Grand (1984) argues that a proper definition of equity is that '*.....it should not lead*

most people to judge a situation which is inequitable as equitable ... and vice versa...'. According to Le Grand, a definition and therefore an understanding of equity must '*...command consensus...*' and '*...conform to the way the term is commonly applied...*'. In support of consensus, Le Grand falls back to Rawl's (1974) argument, which is that, when determining the meaning of moral terminology like equity, *intuition* provides the best criteria for assessing the '*reasonableness*' of a situation. This is in direct conflict with Hare's (as cited from Carson, 1993) assertion that the use of intuition in judging a moral situation provides '*little basis for establishing moral principle*' and indeed, is useless in cases where moral propositions conflict. However, Le Grand (1984) insists that to define terms that have a moral bearing, like equity, widespread acceptability has to be the principal basis of evaluating a situation as either moral or not. And that intuition offers the best, if not the only, guideline for reaching a consensus. It is from this standpoint that he (Le Grand) proceeded to provide us with the theory of '*equity as a choice*'. A theory that he posits commands both intuitive acceptabilities and is also specific enough to avoid ambiguities that would make it difficult for it to inform debates on matters of equity.

The central theme in Le Grand's argument is that equity should not be judged without looking at the historical circumstances that led to the unequal position. For example, unequal income cannot be used as a basis for inequity judgment without looking at the circumstances behind the inequality. For example, he points out that suppose we have two brothers, equally endowed both physically and mentally, they are bequeathed by their father the same amount of wealth, if one of them invests and another squanders the wealth, in Le Grand's opinion, the resulting income distribution cannot be considered inequitable since it comes about as a result of '*informed choices*'. That is, '*...if an individual situation was the outcome of his choice, the resulting discrimination should not be adjudged inequitable*'. He (Le Grand 1984) sums up his position as follows "*.... our judgment as to the degree of inequality inherent in a given situation depends on the degree to which we see that situation as the outcome of individual choice*". His view of equity can formally be stated as follows, suppose we call factors that can limit the range of possibilities over which an individual can make his choices, constraints, and the set of possibilities bounded by his constraints, his choice set, '*...then a situation is equitable if it is the outcome of*

individual choice over equal choice sets'. Le Grand is pointing out that individuals should not be allowed to benefit from an equity judgment if their inequitable situation results from informed choices.

For example, a smoker, knowing fully well, that smoking causes cancer, should not receive the same amount of care as non-smoking cancer sufferers based on 'equal treatment for equal need'. This is because doing so will not capture the true meaning of equity. To make his argument even more clear, he gives an example of a drunk driver, who out of his drunken status leaves the road and knocks a child on the sidewalk. If the two receive the same degree of injuries; is it equitable to give them the same treatment in terms of access to healthcare and the financing of their medication? Le Grand believes any form of solidarity should be directed at the child and not the drunken driver. Now, suppose the drunk driver received a higher degree of injuries, is it equitable to take away some healthcare from the child to him, if the amount of healthcare available from a common pool is not enough for both, on account of his higher needs? In Le Grand's opinion, our sympathy, and therefore, more healthcare should be directed at the child even if the driver is more injured. Lastly, suppose the child comes from a higher income household compared to the drunk driver, which means she can afford extra healthcare outside the common pool, is it equitable for the driver to be allocated more healthcare resources for his injuries from the pool than the child, on account of low income? He points out that such allocation in most people's opinion will not be equitable. He (Le Grand, 1987) argues that the responses to these questions, to many people, will be 'intuitively' negative. Therefore, he concludes that *'..disparities in health status that arise from fully informed individuals, exercising autonomous preferencesfacing the same range of choices over health and health-related activities are not 'intuitively' equitable.....'* only those disparities *'....that can be directly related to differences in the constraints facing those individuals are inequitable'*. That is the extent to which inequitable situations arose from free choices - *ceteris- paribus* - matters to many people in their judgment of a situation as to whether it is inequitable or equitable.

Based on the theory of equity as a choice, ascertaining health actions that are attributable to autonomous action can assist healthcare providers including health insurance to impose sanctions, including direct financing responsibility on the individuals responsible for their ill-health. According to the theory, individuals

only have equity claims on the part of their ill-health that are attributable to circumstances outside their control. That is, individuals who from an informed position, and exercising free will, decide to expose themselves to circumstances that compromise their health situation should not be allowed to draw healthcare from a common pool to remedy their situation. Consequently, equity as a choice would bring down the common cost of healthcare and, as a result, increase welfare. In the area of health insurance, equity as a choice would bring down the costs resulting from *moral hazard*, thereby increasing the aggregate utility of healthcare (Le Grand, 1986). If the cost reductions are achieved, equity as a choice would, ultimately, lead to better health outcomes.

We note that the theory of equity as a choice is readily applicable to the provision of sustainable universal healthcare (UHC). This is because the government can impose a uniform levy on providers of goods and services that expose the population to ill-health (e.g. alcoholic beverage brewers, tobacco manufacturers, etc). The proceeds from the levy can be used to take care of those who become ill from the consumption of these products, thereby removing the cost of ill-health resulting from their consumption from the common pool. Likewise, individuals whose ill-health results from circumstances upon which they were able, either wholly or in part, to exercise free will, should meet the full cost of their ill-health to the extent to which they were able to exercise free choice. If every circumstance that is responsible for ill-health is assessed in this way, the total cost of the common pool of finances upon which individuals have equity claims will reduce substantially, thereby, making healthcare more affordable.

However, some experts argue that the theory of *equity as a choice* has certain serious flaws. The most important is its application in policy formulation. Given that, almost all situations in which normal healthy people find themselves involve certain elements of risk to their health. And, almost all cases of ill-health can be blamed, at least in part, on an individual's autonomous preferences, it would be extremely difficult to accurately ascertain the proportion of ill-health that can be attributable to an individual's free choice in all cases of ill-health. As acknowledged by Le Grand (1987) himself, the application of the principle of 'free choice' will have absurd policy consequences. Before commencing treatment, for example, healthcare providers will have to ascertain the proportion of ill-health that is attributable to constraints that individuals face and which proportion to attribute to

their autonomous preferences to ensure equity in the provision of healthcare is observed. This process of ascertainment will not only be time-wasting (which can lead to the health condition getting worse) but also impractical. Furthermore, as pointed out by Periera (1993), the application of choice in the area of health, which is characterized by uncertainty and consumer ignorance, is extremely limited. This is because apart from the technical difficulties in apportioning responsibility for ill-health, there is that added problem in the requirement of autonomous preference which assumes that the consumer has perfect information about health and healthcare, a situation which is unattainable in the area of health and healthcare.

In SSA an array of health conditions exist that are extremely difficult to find the proportion that can be attributed to autonomous preferences. People living in informal settlements are exposed to communicable diseases like cholera, which can be controlled by basic hygiene practices, like boiling drinking water. However, due to congestion, one can still be infected even if he observes the hygiene requirements. It will be difficult to identify those who qualify for equity consideration from those who do not. Indeed even if we were to isolate those who have no responsibility for suffering ill-health as a result of such diseases, and give them treatment on equity grounds. It will amount to an exercise in futility if the rest who were judged to be responsible out of free choice are not treated since those treated are most likely to get re-infected by those who are not treated.

Based on Le Grand's theory of equity as a choice we argue that, where possible, individuals who acting from free will are responsible for their ill-health should be excluded from benefiting from a common pool of healthcare. Doing this will not only reduce the aggregate cost of healthcare but will also reduce incidences of health conditions that result from careless actions by some members of society. Likewise, there should be a levy imposed on producers of products and services that expose society to ill-health. Such levies should be made part of the healthcare financing pool. The net result of such actions is a more financially sustainable healthcare system and, consequently, an equitable healthcare system. But, just as has been observed by some health financing experts, the application of the concept should be limited to actions that are readily identifiable to the consequences. Otherwise, it would be costly in terms of both time and money, which would defeat its aim. We

note also that a blank application of the theory would lead to the exclusion of some people who deserve equity consideration, for example, illiterate people. Which would cause the system to be less equitable.

Having ventilated on the different theories of equity and their application to health and healthcare, we now turn our attention to practical ways of reducing the cost of healthcare and increasing access to needed healthcare. As we stated in an earlier chapter, there is consensus that the main cause of exclusion to needed healthcare is the cost of healthcare. And, there are different methods of financing healthcare, some increase the number of people that are excluded while others reduce the numbers. That is, some methods of financing healthcare have higher financing risk than others. Those methods that have higher financing risk cause more people to be excluded from needed healthcare. To find out how methods of financing healthcare allow or impede access to needed healthcare, it is important to discuss healthcare financing risk and its relationship with healthcare financing methods. We note that the financing method that allows more access to quality healthcare should lead to equity in the healthcare system, which we measure using health outcomes.

2.6 Risk in the Financing of Healthcare and Risk Pooling

As we have stated, the price of healthcare is the leading cause of exclusion from needed healthcare. Because healthcare financing risk is measured by the impact of the cost of healthcare at the point of consumption, to increase access to needed healthcare there is a need to reduce the cost of healthcare or to spread it in ways that reduce its impact on consumers at the point of consumption. Just like any other good or service, healthcare is produced. The production of healthcare consumes resources, therefore, to be sustainable the cost of production must be recovered in one way or another. This means that the cost of producing healthcare has to be borne by someone or some agency. This means that sick people can pay for their healthcare or the government or any other organization can pay on their behalf. If people pay directly for their healthcare when they are sick, research shows that the impact of payment is very high. For this reason, people choose to spread the cost over time, so that they pay for their healthcare in installments even when they are healthy. This method of payment for healthcare is called prepayment. The prepayment methods reduce the risk of financing healthcare by, one spreading the cost into manageable instalments, and two, shifting the cost burden to healthy days. However, it

does not reduce the amount paid by the sick. Another method of reducing the impact of the cost of healthcare is through sharing the cost with other people. This method is called healthcare financial pooling. Pooling is where people put together finances to defray the cost of healthcare of contributors who become sick. Although there are instances where contribution is made after the onset of sickness, a good pooling is done before the onset of sickness. Health insurance is the main form of healthcare financial pooling. We note that a good financial pooling mechanism should reduce the impact of financing sickness cost to members and, should be sustainable.

The World Health Organization (WHO) strongly recommends financial pooling, in any form, to its member states. According to the World Health Organization (2010), financial pooling is the best financing method for ensuring sustainable equity in healthcare systems. This is because financial pooling can cross-subsidize both income risk – the less poor subsidizing the poor and, the risk of illness – the healthy subsidizing the sick - if well implemented (World Health Organization, 2010). Thereby, ensuring unimpeded access to needed healthcare for all. Financial pooling can take any of the following forms: voluntary pooling (private healthcare insurance), social or compulsory pooling (social insurance and compulsory contribution enforced by government), and tax-based pooling, using general of defined taxes.

According to WHO a framework of financial pooling in the form of healthcare insurance coverage, that is configured in a way that brings the contribution of both the rich and the poor into one healthcare financing basket is the best way to reduce healthcare financing risk. According to the World Health Organization (2013), this form of pooling promotes equity in the healthcare system by gradually building up a capital (financial) base. If a contribution is made in accordance with the contributors' income, the cost of the contribution does not put too much burden on the contributors. As a result, this financing system reduces healthcare financing risk and is sustainable. And because this method of payment is a pre-payment method, the financial pooling method makes available finances, a priori, from all that are exposed to the risk of illness, out of which, it finances healthcare for those who fall ill. In this way, it maximizes social welfare by shifting healthcare financing risk from good-health status to ill-health status, while at the same time ensuring that those who are unfortunate to suffer ill-health only pay a fraction of the cost of their healthcare (Pauly, 1968).

Furthermore, the ability to shift the risk of illness – a feature built into prepaid financial pooling, such as health insurance, for many people, is worth the price. This is even if the cost of contribution (e.g., insurance premium), due to administrative and transaction costs, is higher than the fair cost of illness (an '*actuarially fair*' price). The 'loading cost', that is, all additional costs above the fair cost of illness (actuarially fair cost), is a feature of all prepaid pooled financial contributions, like insurance covers. This is because the contributions must be collected, accumulated and distributed, all processes involve some cost. So even if we assume that the insurer behaves in a risk-neutral way he has to cover, at least, these costs to continue offering the cover (Arrow, 1963).

For this reason, insurance premiums are usually above their actuarially fair value, where an actuarially fair price is where the premiums paid are equal to the expected value of the compensation received (Nyman, 1999). Calculated by multiplying the probability of the event insured occurring by the expected compensation in case the event occurs. By the reason that insurance covers are priced above their actuarially fair value, they are intrinsically socially sub-optimal (Manning & Marquis, 1989). Accordingly, going by cost against benefit alone, individuals would not voluntarily purchase health insurance covers. This means that people would be unwilling to make contributions to healthcare pooling financial arrangements. However, health insurance covers are still purchased even with the loading fees because the economic purpose of insurance is to reduce financial uncertainty (Manning & Marquis, 1989) and not to cover the cost of what is insured. Therefore, an analysis of reasons for contribution to pooled healthcare finances and for the purchase of health insurance should consider both the value of what is to be insured as well the chances (risk) of becoming ill. People make contributions to pooled healthcare finances and purchase health insurance because they prefer certainty to risk; therefore, *ceteris paribus*, for contribution to be made and insurance to be purchased, risk avoidance benefits must exceed actuarially fair premium plus the loading fee (Arrow, 1963). As we have stated, prepaid healthcare financial pooling comes mainly in the form of health insurance, however, some prepayment methods are not pooled. Likewise, some prepayment methods are not insurance. For example, prepayment methods that are supported by donors, where donors prepay into a pool to support the healthcare needs of the indigents.

The demand for health insurance rises with the rise in 'unpredictability' of the risk of ill health and the financial loss that accompanies the occurrence of the risk. As noted by Arrow (1963), illness is not only risky but also costly, both in itself (cost of loss of income due to ill health) as well as the cost of healthcare. Ill-health is extremely stochastic both in timing and in terms of financial loss accompanying it. This makes individuals willing, more than any other risky event, to pay more than the actuarially fair premium to avoid exposure to financial losses resulting from the occurrence of ill-health (Arrow, 1965).

It should be noted that apart from the unpredictability of the onset of ill-health, the healthcare insurance market is also very different from other insurance markets. This is because individuals purchase healthcare insurance not only because they prefer less to more risk, but also because, a '*fair insurance*' enables consumers to gain access to medical procedures whose cost exceeds the consumers' wealth (income) by a large margin (Nyman, 1999). The reason being that consumers need only to pay an actuarially fair premium (plus loading fees). While the value of health (or ill-health) cannot be predicted with any margin of accuracy. Nyman (1999) points out that people value good health and would pay any price to avoid ill-health. For example, he noted that the cost of a liver transplant in the USA in 1992 was approximately US\$ 300,000. This cost is way beyond most household's income, but because most individuals place a very high value on good health, they would be willing to pay the price for themselves and members of their household, even if it would lead to impoverishing the household. By enabling individuals to shift, substantially, such costs, health insurance guarantees access to such an expensive procedure without the risk of impoverishment.

It is for this reason that health insurance becomes very attractive even with the loading costs. For example, the probability of requiring a liver transplant at the time (1992) was 1.33/100 000, which translates to an actuarially fair premium of US\$ 4 ($300\,000 \times 1.33/100\,000$) per annum. Even with the loading cost, the cost cannot exceed US\$ 10. Because such illnesses are highly unpredictable, individuals are willing to pay premiums well above *actuarially fair premiums* to cover themselves against such an eventuality. In this case, individuals are not only motivated to purchase insurance to avoid financial loss due to illness but also, due to the ability to 'access' costly medical procedures.

Nyman (2008) notes further that, the health insurance market has another unique factor - income transfer. According to Nyman, *health insurance* transfers income from those who take healthcare coverage and remain healthy to those who take the cover and become ill. Nyman (2008) posits that this transfer of income is unique since those who remain healthy also gain; they gain through '*altruistic benefit*'. Altruism is a source of utility to many in society, as such, health insurance, through income transfer, increases social welfare by optimizing this utility.

The outlined benefits of health insurance show that prepaid financial pooling, whether privately done or done through the government, is the best way to reduce healthcare financing risk. And, as a result, the best way to increase access to needed healthcare to as many people as possible. This shows that prepaid pooled methods of financing healthcare offer the most reliable path to healthcare systems' equity.

The major problem of healthcare insurance, as opposed to other forms of insurance, is its more than normal exposure to market failure. This is because market failure in health insurance is made worse by the existence of externalities in healthcare. To illustrate this weakness Arrow gives the following example,

'...an individual who refuses to be immunized against a communicable disease does not only endanger his life but also that of others. ...a disutility which, presumably, he has weighed against the utility of avoiding the procedure. In an ideal 'price system' there would be a price that he would have to pay to anyone whose health is endangered by his refusal to undergo the procedure, a price high enough to make others feel sufficiently compensated, alternatively, there would be a price which would be paid by others to induce him to undergo the procedure. (Arrow, 1965).

If this were to happen, then we would end up with an optimal state, but according to Arrow, such a price is impractical and probably impossible to arrive at. Which is a glaring sign of market failure in this (health insurance) market (Arrow, 1965).

Because of the outlined *special characteristics* of healthcare insurance market, there is a need to have a *collective intervention* to ensure the market functions at a socially (Pareto) optimum level (Arrow, 1965; Nyman,

2008). Which calls for special warrants, warrants that can be guaranteed only through state participation (Arrow, 1965). According to Arrow, the state can ensure the proper functioning of healthcare insurance and its market indirectly, in the form of incentives like subsidies, tax rebates, or directly, through social and/or compulsory (contribution) insurance. By doing this, the state would not have only corrected some market failures by reducing loading charges, thereby reducing insurance premiums payable – by making payable premiums to move closer to actuarially fair premiums – but also, it would have ensured equity in the financing of healthcare – through subsidizing the low-income groups (Nyman, 1999, 2008). He (Nyman, 1999) proposes a type of government intervention that would lower the cost of healthcare, particularly to those from the low-income groups, and spread the cost of ill-health between the healthy and the sick. Presumably, such an intervention will ensure equity in the healthcare systems and pave the way for a smooth transition to universal health care.

However, some experts have pointed out that even with government and donor interventions the healthcare insurance market cannot function optimally. The two major practical limitations to the achievement of health systems' equity and universal coverage through financial pooling or any form of prepayment are moral hazard and adverse selection. These limitations have been identified to be responsible for the rise in the cost of health premiums to households, governments and donors which, ultimately, makes the healthcare systems less equitable. We discuss these limitations in detail below.

2.6.1 Moral Hazard

Moral hazard has been defined in different ways by different experts, according to Dickerson (1968) it is '*....the intangible loss-producing propensity of individuals insured..*'. Faulkner (1960) defines it as '*....the hazard that arises from the failure of individuals who are/ or have been insured ... to uphold accepted moral qualities..*'. The central theme of these definitions is that moral hazard in insurance is a deviation from normal behavior by those affected by insurance towards exposure to risk against which the insurance policy has been taken. By doing so, they increase the chances of the risk occurring thereby interfering with the normal functioning of the insurance market. The health insurance market is more exposed to moral hazard because there is a higher information asymmetry between the insured and the insurer. The insured (and/ or his agent) has better information about the

risk (his health status) against which the cover is taken compared to the insurer (Zweifel et al., 2009). Zweifel et al (2009) argue that the insurer is usually ignorant about the loss in well-being suffered by the clients after an illness.

Furthermore, the insurer may not even be informed about the actual illness of the client. As noted by Arrow (1963) and Pauly (1986), unlike other insurance markets, it is difficult to observe the insured preventive activities and to define, in an objective way, the customer's illness, once it has occurred. Factors that combine to make the health insurance market, a difficult market. For these reasons, the insurer is forced to base benefits either on the level of expenditure to ill-health or on the advice of an expert, acting on behalf of the insured. Therefore, together with the above reasons, by lowering the marginal cost of healthcare, insurance acts as an incentive for excess use of healthcare and/or reduced investment in self-protection (Buchanan, 1965) by the insured and his agents.

Buchanan (1965) observes that there are two types of moral hazard, the ex-ante moral hazard, and the ex-post moral hazard. Ex-post moral hazard is caused by either excess demand by the insured or by the supplier through *supplier-induced demand* (SID). As pointed out by Manning and Marquis (1989), an individual with healthcare insurance is not motivated to refrain from her 'overuse' since the incremental benefit to her for excess use is greater, while the additional cost, for the additional use, is spread over other insurance subscribers. As such, even though she is aware that the excess use will increase her premium, the strategy of 'refrain use' is dominated by that of 'use excess' (Buchanan, 1965). On the other hand, SID is caused by the physician's (suppliers of health care) incentive to recommend healthcare procedures (treatment) whose cost outweighs their health benefits. Because of information asymmetry, the physician can influence demand for her services (Anderson et al., 1981).

Ex-ante moral hazard, on the other hand, is caused by inefficient investment in self-protection and disease prevention by those with medical (healthcare) insurance (Ehrlich & Becker, 1972). It is ex-ante because it concerns the effect of insurance on the actions that an individual takes before the possible health event and the

provision of healthcare. Examples of such activities include increased smoking or drinking, reduced exercise, failing to take medication for chronic conditions, and so on.

Moral hazard causes market imperfection which results in sub-optimal welfare. In the face of moral hazard, choosing economically optimal health insurance involves a trade-off between 'risk reduction' and 'healthcare overuse' which makes it very difficult to optimize social welfare through health insurance (Manning & Marquis, 1996). While health insurance is supposed to increase social welfare through lowering risk, the gains of lowering the risk, are canceled out by excess consumption. That is, the more that the health insurance lowers the risk, the more it increases the 'excess demand' (moral hazard) response, which results in a decrease in social welfare represented by reduced aggregate health outcomes. It follows then, that, the higher the coverage, the greater will be the reduction in financing uncertainty (risk). And the more the decrease in financing uncertainty, the higher the excess demand, and therefore, the greater will be the decrease in social welfare. Therefore, the call for government intervention to increase coverage through social health insurance and compulsory coverage will be counterproductive, based on this argument. This means that, in the face of moral hazard, higher health expenditure from pooled finances does not correlate with better health outcomes.

We note that there are some doubts as to the existence of moral hazard in the healthcare market. However, empirical studies have found evidence of moral hazard in different health insurance markets. Most of them (Kim et al., 2005; Nolan, 2007; Winkelmann, 2004; Wong et al., 2010) found evidence that consumers react to cost-sharing and co-payment by a reduction in healthcare utilization. Which, according to these studies, indicates the presence of excess consumption, in the absence of cost-sharing. Winkelmann (2004), found that an increase in co-payment in Germany reduced the number of doctor visits by 10%. Van Dijk et al. (2013) found an increase of 5.3% in physician-initiated visits among individuals with social insurance compared to privately insured consumers. He noted that SID is higher in subsidized insurance (social insurance) compared to unsubsidized (private) insurance. While studying the Ghanaian social insurance scheme, Debpuur et al (2015) noted the following among those registered with the scheme. Frequent and frivolous visits to health facilities, impersonation of those with cover by those without coverage to get treatment, feigning of sickness to collect drugs

for those not registered, over-charging of services by service providers, charging patients for services not offered and poly-pharmacy (over-subscription). They also noted that those registered with the scheme had reduced the use of mosquito nets. Studies by Anderson et al. (1981) and Dranove (1988) noted that individuals with health coverage have higher physician-initiated visits and poly-pharmacy compared to those without insurance. Other studies (e.g. Bhattacharya & Packalen, 2012; Klick & Stratmann, 2007; Van Dijk et al., 2013) have found either reduced investment in disease prevention or an increase in unhealthy behavior by those who are enrolled in prepayment schemes. These studies show that moral hazard is a reality in the health insurance market and prepayment schemes. If the optimal allocation is lost through moral hazard, then the entire argument in support of financial pooling and prepayment for better health outcomes is also lost.

However, some experts and empirical studies do not agree, they have shown that, on the contrary, financial pooling (through health insurance) and any form of prepayment maximizes social welfare. As such moral hazard is either not a major impediment to social welfare or it does not exist in this market. Tang (2010) posits that ex-ante moral hazard can be eliminated by including preventive measures in health insurance and any form of prepayment method, thereby canceling out its effects on financial pooling and the health insurance market. He summarizes his argument as follows “*...if the market price of health insurance is actuarially fair, it should reflect preventive activities.....this will make sure that the insured has the correct incentives to invest in prevention...*”. This means that, by not including preventive activities in the prepayment and health insurance contracts, insurers are themselves causing market distortion, and moral hazard is not the problem. Other studies that have come up with similar findings include Baicker et al. (2015), Dave & Kaestner (2009), and Ehrlich & Becker (1972). Nyaman (1999) argues that if the findings (e.g. by Feldstein, 1973; Manning & Marquis, 1996) that moral hazard loss is higher than risk avoidance gain, then, it is difficult to justify the continued existence of unsubsidized health insurance firms. Nyaman posits that the reason for the continued purchase of unsubsidized health insurance must be outside the simple cost-benefit analysis between risk avoidance and moral hazard loss. He asserts that the reason for the purchase of healthcare insurance, even after loading moral hazard cost, is because health insurance gains are more than the simple risk avoidance gains. Indeed, there are empirical findings (e.g. Arrow,

1976; Kim et al., 2005) that co-payment does not increase welfare. This means that either co-payment does not reduce moral hazard, or moral hazard does not reduce social welfare. Certain practices that have been identified with moral hazards like feigning sickness to collect medication for those not enrolled and impersonation can be cured through subsidized nationwide insurance cover (Debpur et al., 2015). Likewise, frequent visits to healthcare providers are beneficial since such visits lead to early detection of diseases (such as cancer and diabetes), which if not detected early cost much more to manage compared to the cost of frequent visits (De Jaegher & Jegers, 2000; Newhouse, 1992, 2006).

Bhattacharya & Packalen (2012) made an interesting finding of ex-ante moral hazard. They found that ex-ante moral hazard increases social welfare through increased innovation. They argue that the increase in unhealthy habits like heavy drinking, obesity, and so on, associated with the ex-ante moral hazard, increases the incidences of associated diseases. Which increases the demand for treatment of such diseases. As a result, there is an increase in innovators' rewards for innovation of treatment and management of such diseases (e.g., cancer and diabetes). And, consequently, there will be an aggregate increase in benefit to society through better treatment of such diseases to all who suffer from the diseases. They found that the social benefit from increased innovation more than offset the moral hazard loss. This means that through the innovations the population health outcomes are made to improve rather than decrease.

From the above, we argue that there is inconclusive evidence that moral hazard, even if it exists, decreases welfare. And therefore, we find no reason to limit or decrease the use of financial pooling and prepayment techniques to finance healthcare for the realization of equity in health care systems. On one hand the existence of externalities, access motive, and income transfers in the healthcare market provide adequate justification not only for the expansion of financial pooling but also for government intervention to remove market inefficiencies (Nyman, 2008). Government and donor intervention may also be necessary to increase the size of the pools and to cover the healthcare needs of those who cannot afford the contributions. We argue that all that is required is increased innovation to insulate the market from the negative effect of moral hazard. As pointed out by Arrow (1965), there is a need for innovation in the provision of health insurance and any other form of financial

pooling for healthcare, and there is no justification why it should not take the form of increased government participation, particularly in the absence of a better alternative. On the other hand, we are forced to doubt its effectiveness given the compelling evidence adduced by empirical studies that financial pooling is responsible for over-use, SID and careless behavior among those covered. We also doubt if the governments of the SSA region have sufficient resources, know-how, or willingness to confront the problem of moral hazard in the health insurance market. It is also doubtful if donors will be willing to continue subsidizing healthcare in the region if they realize that their intervention is affected by moral hazard.

2.6.2 Adverse Selection

Adverse selection results from asymmetric information between the agent (insured) and the principal (insurer). Dionne et al. (1992) posit that adverse selection in the insurance market is caused by 'hidden knowledge', that is, the insured who are heterogeneous concerning their expected loss, have more information than the insurer, and, the insurer is not able to differentiate between risk types. It is a situation where high-risk individuals select a particular cover and low-risk individuals avoid the cover. The result is a reduced risk diversification. According to Marquis and Phelps (1987), the following conditions are necessary for adverse selection to occur in the insurance market:

- a. There must be heterogeneity among risks that the insurer cannot detect
- b. The consumer must be able to assess his risk so that a single posted price, among the heterogeneous group, produces a different real price for insurance
- c. The consumer must respond to that price difference

In the healthcare insurance market, the three conditions are easy to meet, since health has so much information that the insurer cannot observe before and after insurance contracting. Adverse selection leads to disequilibrium in the market, thereby reducing Pareto efficacy, which impacts the general welfare. Several empirical studies (e.g. Beliveau, 1982; Cutler & Zeckhauser, 1998; Finkelstein & Poterba, 2004; Handel, 2013) have found evidence of adverse selection in different insurance markets. However, some studies (Pauly, 1985) have found no evidence of an adverse effect of 'adverse selection'. Indeed van de Ven & van Vliet (1995) argue that in reality the insurers

are better placed to have superior information. This is because the insurers have more resources than the insured which they can leverage to access better health information. That is, they have more access to health indicator data, healthcare technology, and healthcare experts. Indeed, some have found advantageous selection rather than adverse selection. For example, studies by Buchanan & Cretin (1986) and Eggers(1980) found a favorable (advantageous) selection in the health insurance market. The opposite of adverse selection, and, according to them, this is beneficial to both the insured and the insurer.

Despite these conflicting findings, there is a long history of adverse selection in the insurance market. The distortion of the market through information asymmetry was first articulated by Akerlof (1978) in 1970, in what he termed the 'lemon principle'. He argued that under conditions of asymmetric information, bad products drive out, from the market, good products. This is because, in the face of asymmetry, competitive equilibrium does not exist and where they exist, they have strange properties (Rothschild & Stiglitz, 1978). Such distortions of the market, by asymmetry, are what cause adverse selection in the insurance market. Adverse selection in the health insurance market occurs when individuals with poor health tend to choose insurance with high benefits and individuals with good health avoid such insurance because of high cost (Marquis & Phelps, 1987) thereby affecting risk diversification.

It can also occur when policies designed for low-risk consumers and priced at the expected cost for the low-risks are purchased by high-risk people because of their low cost (Spence, 1978), which causes low-risk people to either consume less insurance or pay more. As a result, it '*... results in informationally-based negative externalities running from high to low-risk people that damage the latter and impair the performance of the market..*' (Spence, 1978). The result is both market distortion and a reduction in – aggregate - welfare. The reduction in welfare is caused by a reduction in Pareto efficiency, since, in the face of adverse selection, the low-risk individuals are made worse-off than they would be in the absence of high-risk individuals, while the high-risk individuals are no better off than they would be in the absence of the low-risk individuals (Rothschild & Stiglitz, 1978). Because of adverse selection the aggregate health outcomes to not get better as a result of increased expenditure from this source of healthcare financing.

Arkelof (1978) points out that apart from welfare loss, market distortion caused by asymmetric information can lead to the collapse of insurance firms, in what he called the *adverse selection death spiral*. He reasons that because of asymmetry, insurers are not able to distinguish between high and low-risk applicants. Therefore, ‘...if the insurer prices its policy at an average price, only those who are worse than the average will purchase the insurance. Since this will result in losses to the insurer...’ due to excessive claims by the higher-than-average risky individuals, prices will be raised. And ‘.... of those who had purchased the insurance previously, only those worse than the new average will purchase at the new price. Prices will go up again, and the process continues. Eventually, only the very worst-off will purchase the insurance at a very high cost....’, culminating in the collapse of the insurance firm. The *death spiral* has been empirically observed by Cutler & Zeckhauser (1998) when they studied two groups of employees’ policies; Harvard University and the Group Insurance Commission of Massachusetts. In the case of Harvard University, they observed that the more generous policy disappeared in three years when the employer decided to make an equal contribution for all classes of policies. They attributed the disappearance (collapse) of the generous policy to adverse selection.

Puelz & Snow (1994) pointed out another problem of adverse selection; the increase in the average cost of products; which they posit lowers welfare. They argue that adverse selection forces sellers of good products to undertake costly activities designed to signal buyers that they offer high-quality products to avoid being driven out of the market. In healthcare insurance, this may include constant market communication, designing risk-adjusted policies, carrying out costly evaluations, and/or employing skilled (costly) evaluators. Costs are usually passed to the consumers. Insurers are also forced to design methods of mitigating the negative effects of adverse selection, like, coinsurance, reinsurance, and product differentiation, all of which add to the cost of insurance without going directly to healthcare.

It has been noted by some empirical studies (e.g. Cutler & Zeckhauser, 1998; Glazer & McGuire, 2000) that some methods used to reduce the negative effects of adverse selection, by insurers, distort the market even more. This is because most methods used by insurers are specifically targeted at discouraging high-risk individuals from purchasing insurance. Such measures include distortion of the quality of services and risk

classification (Glazer & McGuire, 2000). On the one hand, distortion of services leaves high-risk individuals either exposed, since their risks are not fully covered or to pay higher than actuarially fair price (plus normal loading) to be covered, and, on the other hand, risk classification inevitably leaves the neediest, medically, outside the insurance pool (Jha & Baker, 2012). Rather than curing the negative effects of adverse selection, if left unchecked, some methods used by insurers to fight adverse selection, can exacerbate the problem and work against the common good of the society. Thereby lowering the quality of healthcare, and consequently causing the average population health outcomes to go down.

It is for this reason that some experts have called for government intervention, not only to stem market distortions caused by asymmetric information but also to protect consumers of health insurance from distortions caused by suppliers of health insurance. Pauly (1984), Dahlby (1981), and Johnson (1977) among others have argued that some form of compulsory (minimum) insurance can provide the elixir to the problems caused by adverse selection. Pauly (1984) and Johnson (1977) argue that compulsory insurance leads to Pareto improvement. Indeed Johnson (1977) found that compulsory insurance can do this even if high-risk individuals choose only up to the level of compulsory insurance and leave out some of their risk uncovered. Compulsory insurance causes Pareto improvement because it has two main advantages; cross-subsidies, whereby the low-risks cross-subsidize the high risks and the high-incomes cross-subsidize the low-incomes (Leonard et al., 2013). It also leads to the reduction of the aggregate cost of healthcare through broader cost-sharing (Leonard et al., 2013; Wolfe & Goddeeris, 1991). Leonard et al. (2013) argue further that payment by clients is more likely to have a positive effect on quality if made through the organization, which is a characteristic of compulsory insurance, compared to when made directly by clients to practitioners. Thereby, leading to further Pareto improvement.

Just like in the case of moral hazard, there is a lack of consensus among experts on the effect of adverse selection on welfare. While some argue that the existence of adverse selection in the health insurance market causes the health insurance funds to perform below optimum, others see no correlation between adverse selection and the performance of health insurance and other prepayment funds. This means that more empirical

studies, such as this one, need to be done to provide more accurate information and close the information gap regarding the effect of adverse selection on the performance of pooled funds.

After the expose regarding health insurance and how market factors can affect the contribution of pooled funds to welfare (aggregate health outcomes), we now turn attention to different forms of health insurance contribution in the sub-Saharan Africa (SSA) region. We note that some experts have argued that the contribution of health insurance (pooled healthcare funds) to welfare (health outcomes) can be strengthened through government (state) intervention. We provide below discussions regarding financial pooling health insurance and prepayment methods in the SSA region. We pay close attention to the performance of financial pooling prepayment funds with some form of direct government input and those without government input on the welfare of the population of the SSA region.

2.6.3 Prepayment and Financial Risk Pooling for Healthcare in Sub-Saharan Africa

In this section, we discuss financial pooling and prepayment methods. When discussing financial pooling we pay particular attention to health insurance. This is because what affects health insurance also affects other financial pooling methods, and most financial pooling methods are in the form of health insurance.

As we have stated there are two forms of financial pooling for healthcare, those supported by the government and private ones. Government-supported pooled funds can be in the form of direct payment from taxes (general or defined taxes), or indirectly through state-managed health insurance (i.e., social health insurance or compulsory health insurance). While experts agree that tax-based financial pooling is the most progressive method of financing if applied properly, they differ on its suitability for low-income countries. Because public financing systems (e.g. tax-based and compulsory insurance) have the widest risk pooling (Wagstaff & Van Doorslaer, 2000), they should provide the strongest protection against the impoverishing effect of healthcare costs. However, according to some experts, tax-based financial pooling methods are not suitable for LICs, particularly those in SSA, since LIC economies are characterized by inferior tax systems. This is because the tax systems in these countries are dogged by small formal sectors, shadow economies, and inefficient tax collection mechanisms (Pauly et al, 2006). Indeed, there is evidence that tax-based publicly financed healthcare does

not reduce the cost of healthcare to households in SSA. Some reasons given for this are insufficient allocation and widespread use of informal charges (Atinga et al., 2015; Buigut et al., 2015). Because of this reason, exclusion from needed healthcare due to lack of finances is evident even in countries that profess to offer free (tax-financed) healthcare. These weaknesses suggest that a possible alternative to government involvement in healthcare financing might be in a bigger role of insurance as an alternative to tax-based funding.

Insurance may provide the cure to the shortcomings in the pooling using taxes because insurance-based pooling techniques promote sustainability by gradually building-up capital base, a priori, from all those exposed to the risk of illness, out of which it finances the of the few that suffer illness. Even though insurance premiums are, generally, priced higher than their *actuarially fair prices* and are more exposed to market distortions (i.e. moral hazard and adverse selection) than taxed-based financing methods, studies (e.g. by Dixon, Tenkorang, & Luginaah, 2013; Kanchebe Derbile & van der Geest, 2012) in SSA and other LICs suggest that health insurance is better at increasing access to healthcare compared to tax-based financing methods. This is because, apart from sustainability issues, taxes, high enough to adequately cover the cost of healthcare, for all, in the SSA region would generate a kind of public sector failures that are more damaging to welfare than the damage caused by market distortions found in the health insurance market (Pauly et al, 2006). Indeed, Pauly et al (2006) argue that even with an honest and wise government possible, without external budgetary support, the less developed countries, like the countries in the SSA region, would, rationally and appropriately, limit the scope of their tax-financed healthcare. Therefore, based on the foregoing, the welfare case for financial pooling through insurance in LICs is overwhelming. However, despite its documented advantages over alternative financing approaches, there is no evidence of widespread adoption of financial pooling through health insurance in the SSA region.

Although the case for the adoption of financial pooling as a method of financing healthcare, through insurance, has been receiving positive attention from the leadership and policy experts in SSA, debate on its appropriateness in SSA continues. The ongoing debate is based both on the appropriateness of health insurance and the relative advantage of different forms of health insurance given the economic circumstances of SSA countries. Even if we take the appropriateness of financial pooling through health insurance as given, we still have

to fathom the fact that for insurance to be effective as a risk-sharing mechanism, insurance should have a large risk pool and be efficient. We note that (1) risk pooling strategies for healthcare do not concern ill-health itself, but its financial impact on households and that, (2) efficiency refers to distributive and management efficiency, which we argue, leads to lower premiums and wider coverage. Efficiency can, hopefully, free resources to be used to cover the uninsured. We note as well that a large risk pool is dependent on several socio-economic factors, some of which seem to be lacking in SSA.

While in the industrialized world the main problem of health insurance is market distortion caused by the presence of a moral hazard and adverse selection in the insurance market, less developed countries (LICs) have additional problems caused by the nature of their economies, governance, capacity, and culture. LICs in general have a very small formal sector (Ron et al., 1990). People in the formal sector are generally more financially secure and can easily be organized into health insurance schemes compared to people in informal employment. Apart from restricting the risk-sharing pool, a large informal sector also increases the administrative cost of insurance through difficulty in accessing and assessing income for premium collection. When potential numbers are hard to reach or when their income is hard to assess the administrative cost invariably goes up (Carrin, 2002).

Furthermore, the majority of the SSA population lives in scattered settlements in rural areas, where small-scale agriculture is the dominant source of employment (Asgary et al 2004). Apart from the high cost of administering insurance and other financial pooling mechanisms to the scattered population, there is the added problem of regular premium collection. Cash income from small-scale agriculture is subject to significant fluctuations, indeed, in many cases, the rural population faces cash liquidity constraints for most of the year, making it difficult for them to make regular payments required to make health insurance functional.

As we have pointed out, the efficiency of financial pooling for healthcare in LICs is also impacted by governance issues, lack of capacity, and culture problems (World Health Organization, 2010a). Hsiao & Show (2007) argue that widespread corruption, in most of these countries, not only affect available fund for meeting the objectives of healthcare but also increases administrative cost through intensive monitoring. Likewise, lack of administrative capacity and shortage of skilled staff are also important factors that reduce the efficiency of pooled

funds in LICs (Carrin, 2002; Mathauer, et al, 2011). The World Health Organization (2010a) argues that the culture of financial pooling for healthcare has not taken root in LICs, particularly in Sub-Saharan Africa. Therefore, there is an insufficient understanding of the insurance concept, and a low degree of solidarity and mutual support which are required for optimal performance of financial pooling and health insurance.

Therefore, we argue that all the above factors combine to make it doubtful whether financial pooling – the health financing method currently favored by WHO and a majority of experts - can increase equity and maximize overall welfare in SSA. We note that even among proponents of financial pooling there is no consensus regarding the most appropriate type of healthcare financial pooling method for developing countries. While some experts (e.g. Pauly et al., 2006) aver that voluntary insurance is the most appropriate, others (e.g. Boadway, et al, 2006; Ooms et al., 2014) assert that government intervention is necessary for health insurance and any other form of pooling mechanism to offer better overall risk protection. However, experts agree that good insurance should have a broad risk pooling to protect subscribers from the adverse effects of excessive costs. We note, therefore, that income and risk pooling (cross-subsidies) are important in judging whether a type of health financial pooling is appropriate in the SSA region or not. We also agree that government intervention may be necessary to increase the sizes of risk pools. However, we note that apart from the size of the pools, income and healthcare financing risk pooling are affected by any factor that increases the cost of insurance above an actuarially fair price. One such factor is the high administrative cost. We argue that if health insurance and financial pooling's administrative costs are excessive, they should be a legitimate target for efficiency-increasing attempts in health systems reforms in the SSA region. Therefore, government intervention should not only focus on increasing financing pool sizes but should also consider reducing administrative costs. We argue further that equity in healthcare systems in SSA can be achieved only if all factors that hinder its achievement are identified and addressed. According to the World Health Organization (2010a), administrative costs have become an important factor in health insurance and pooled funds' efficiency, yet they have been overlooked by researchers outside the USA. We argue that since more and more SSA countries are opting to mobilize funds through insurance and

other forms of financial pooling to increase the feasibility of this policy, administrative costs should feature prominently in policy decisions.

However, from the foregoing arguments, we are not able to authoritatively conclude that pooling as a means of financing healthcare can lead to better health outcomes. We now explore the concept of equity in the health system and the role of health insurance in the discussions below.

2.7 Health Systems' Equity and Forms of Health Insurance in Sub-Saharan Africa

The shift in policy in healthcare financing from cost recovery to risk pooling, in SSA, has been motivated not only by the realization that direct user charges can cause exclusion from needed healthcare and increase poverty but also because user charges are responsible for additional welfare-decreasing problems. For example, user charges cause poor people to delay seeking treatment which can lead to both more expensive procedures to restore health status and, at the same time may cause the disease to spread to more people if the disease is infectious. User charges also lead to underutilization of health facilities, the underutilization of health facilities reduces the running cost of the facilities less than proportionate due to the high share of fixed costs. As a consequence, cost-effectiveness declines resulting in a reduction in overall welfare. Furthermore, the contribution from user fees, due to reduced utilization, turned out to be smaller than was envisaged, which led to rising cases of bad debts in health facilities, further compromising welfare (Wiesmann & Jütting, 2000).

Because of the outlined weaknesses of cost recovery, and given that tax-financed had been abandoned in favor of the cost recovery method, experts are now vouching for risk pooling through insurance. There are two broad categories of health insurance; voluntary health insurance and mandatory health insurance. While enrollees are free to join and leave voluntary health insurance at will, the government compels individuals and other entities (e.g., employers) to finance mandatory insurance which pays into either public or private providers of health services for enrollees' needs.

As we have stated, although there is a wide consensus that health insurance increases access to healthcare and reduces health financing hardship better than other financing options, the debate on which form

of insurance is best suited for less-developed countries continues. Under the two broad categories, we have three forms of health insurance. Community-based Health Insurance (CBHI) and Private Health Insurance (PHI) are the two forms of voluntary health insurance and Social Health Insurance (SHI) is a form of semi- mandatory health insurance. Compulsory health insurance (CHI) on the other hand is mandatory health insurance. In the SSA region, there is almost no difference between SHI and CHI, and most countries operate SHI. For this reason, our discussion on state-managed health insurance concentrates on SHI. We note that, in practice, countries use a mixture of these forms of insurance in financing healthcare at the same time.

2.7.1 Community-Based Health Insurance

Community-based health insurance (CBHI) is a type of health insurance that is commonly found in low-income countries (LICs) (Norman et al., 2009). They are constructed like mutual funds and operate like buyers' cooperatives, managed by elected members or by supporting NGOs on behalf of enrollees. They are non-profit organizations that collect premiums from households with roughly similar prior health risks and pay healthcare providers for the needs of members who become ill (Jütting, 2004). CBHI is a response to the inability of governments in LICs to provide sickness protection to most of their citizens, and the neglect of the informal sector and rural population by formal insurance schemes. There is evidence that CBHI provides financial risk protection against the cost of illness and improves access to needed healthcare among poor workers in the informal sector and households in rural areas of LICs in general and SSA in particular (Jütting, 2004; Msuya et al., 2007; Musau, 1999). However, the effectiveness of CBHI to meet the healthcare needs of the extremely poor in the sub-Saharan Africa (SSA) region is debatable. While some researchers (e.g. Norman et al., 2009; Preker et al., 2002) find that it excludes the very poor from access, others (e.g. Ranson, 2001) found no evidence of exclusion.

Due to its versatility in meeting the financing needs of the vulnerable and those neglected by other insurance schemes, some experts (e.g. Norman et al., 2009) have suggested that it is the most appropriate vehicle for health systems' equity and universal health care (UHC) in SSA. However, by their very nature, it is doubtful that CBHI can be relied upon to ensure equity let alone to deliver UHC to the SSA region. This is because any financial pooling mechanism that targets the low-income in informal employment and, in the rural areas only

pools the risk of people of the same income. And therefore, can only cross-subsidize illness risk and not income risk. Without income cross-subsidies, CBHIs run on a very thin financial base that may not be sustainable in case of chronic illness that requires long-term care or an epidemic outbreak. Because of lack of income cross-subsidization, CBHIs cannot generate enough funds to service the sickness costs of their members sustainably and are, therefore, not financially viable (De Allegri et al., 2009). And because they are restricted, by their very nature, on the number of people they can enroll (Ekman, 2004), they do not have enough risk pool that can enable them to operate efficiently.

However, proponents of CBHI, backed by some research findings, argue that these challenges are not insurmountable. They (e.g. Preker et al., 2002; Ranson, 2001) posit that the small risk pool, for example, can be expanded through re-insurance by formal insurance schemes. Furthermore, they observe that governments can strengthen the CBHI's ability to cover the extreme poor by subsidizing the cost of healthcare for this group through CBHI. They point out that the Self-employed Women Association (SEWA) in India and Mutelle de Santes in Rwanda are good examples where CBHIs have become effective by hooking onto formal insurance schemes and government subsidies.

We note, however, that there is limited evidence that proves that CBHIs can expand risk pools to the extent of offering effective income and illness-risk cross-subsidies. We also note that most research findings show that CBHIs are unable to provide the extreme poor with illness cover. Indeed, empirical evidence suggests that extreme poor are excluded from CBHIs because they cannot afford to pay enrollment fees and regular premiums required to be enrolled with CBHIs. This effectively blunts the argument that they are the best financing option for the poor. Furthermore, there is very little evidence showing that they are efficient at the utilization of premiums they collect from enrollees. We argue that if they are not administratively cost-effective, then they can be welfare-reducing to the extent of the inefficiency caused by the excess administrative cost, even with re-insurance and government subsidies.

2.7.2 Private Health Insurance

Private health insurance (PHI) is the main vehicle of voluntary financial pooling in most countries. PHIs are owned by entrepreneurs, and therefore, unlike CBHIs, PHIs operate with a profit motive. PHIs are the only healthcare financial pooling method that, truly, supports consumer supremacy (Colombo & Tapay, 2003). Proponents (e.g. Colombo & Tapay, 2004; Pauly et al., 2006) of PHI argue that an efficient market, through enhanced private sector participation, can find a more responsive and efficient answer to policy challenges facing health systems. According to them, private sector intervention will enable the government to cut down on public sector costs in healthcare, which ultimately improves overall welfare. According to Pauley et al (2006), PHIs are more cost-effective than publicly funded insurance because they are more dynamic, innovative, and sensitive to individual consumer demands. Publicly funded health insurance is less efficient because they are plagued by bureaucratic slowness and rigidities, furthermore, compared to PHI, they are more exposed to corruption (Pauly et al., 2006).

On affordability of PHI premiums in less-developed countries, Pauly et al (2006) point out that households are already making high OOP payments. Therefore, they should be able to afford some reasonable PHI premiums which can make them spread the high cost of sickness and thereby, avoid impoverishing costs. Additionally, because PHIs operate with a profit motive and are more exposed to competition, they are more likely to employ management strategies that would cut administrative costs compared to other forms of health insurance. Consequently, they should be more efficient and more effective in using resources. As a result, PHIs should lead to a more equitable healthcare system.

However, some experts and some empirical studies have argued that there is insufficient evidence in support of PHI's ability to make health systems equitable. There is no evidence that countries that predominantly use PHI to finance healthcare (e.g., USA, South Africa, France) have lower public health costs to GDP compared to countries (e.g., United Kingdom, Germany, Botswana) that use less PHI. Yet they have higher private healthcare spending compared to countries that use less PHIs (Tollen & Crane, 2002). Indeed, some researchers have not found sufficient evidence that PHIs are more efficient or equitable than other forms of health insurance.

Studies (e.g. by Davis & Cooper, 2003; Woolhandler et al., 2003) have discovered that contrary to expectation, health insurance competition can develop around undesirable activities. Competition, the incentive that drives insurers to be responsive to consumers' needs and to limit cost, also steers them towards enrolling more healthy individuals and to move away from more risky individuals – which raises equity concerns.

Furthermore, while it is easy to effect a single-payer system with publicly finance methods, it is not practical to do the same with PHI due to competition. Davis & Cooper (2003) observe that single-payer systems incur less administrative costs compared with multiple-payer systems. And that there is no evidence that the high administrative cost leads to improved care quality. This means that PHI could be both inefficient and inequitable.

If PHIs concentrate on good risk and incur higher administrative costs, then we argue that they can lower overall welfare. And, to the extent that they lower overall welfare, they cannot be an appropriate means for achieving equity and UHC. However, we note that there is no sufficient empirical research in SSA to either confirm or disconfirm such a conclusion.

2.7.3 Social Health Insurance

Social health insurance (SHI) is a broad-based financial pooling mechanism organized, mainly, by the government to offer protection against the financial risk of illness to as many citizens as possible. In most countries, SHIs are organized in the form of mixed contributions, that is, a mix of public and private healthcare contributions to a common healthcare fund. Most SHIs are organized in such a way that they pool both the health risks of their members on the one hand and the contribution of enterprises and government on the other. As a result, they can cross-subsidize both the financial risk of illness and the risk of insufficient income to cover illness, thereby, protecting both sickly and indigent persons from the excessive burden of paying for ill health (Carrin, 2002; Saltman et al., 2004). As noted by some experts (Carrin & James, 2005; International Labour Organization, 2008; World Health Organization, 2005b) since SHI provides the widest risk pooling of all the health insurance schemes, it should be the most efficient, due to economies of scale. Furthermore, since SHIs are deliberately constructed to be redistributive (Glaser, 1991), they are best suited to deliver progressivity into the health systems of SSA countries. This is because these countries are characterized by high poverty levels and high-income

inequalities. Therefore, from the above discussion, the most appropriate health risk financial-pooling vehicle to deliver equity and ensure sustainability in SSA countries seems to be SHI.

We note that, to some degree, SHI cures the problems that hamper the effectiveness of the other financing methods. For example, because SHIs are, at least in part, compulsory contributions, they are less exposed to the vagaries of market distortions caused by asymmetric information that bedevils private health insurance. And, because they pool resources from several sources (e.g., households, enterprises, and government) they provide a solution to the vexing problem of small risk pools that render community health insurance ineffective. Likewise, because SHIs do not rely heavily on state funding, like tax-based financing methods, they are insulated against erratic fluctuations in funds that are common in tax-financed financing methods and manipulation by politicians.

However, as has been noted by some experts and discovered by some empirical studies, SHI has certain underlying weaknesses that could, potentially, hinder its effectiveness in infusing efficiency and therefore, ensuring sustainable equity in SSA countries' health systems. Using empirical findings, Wagstaff (2010) argues that there is no evidence, even in Europe, showing that countries that predominantly use SHI to finance their health care enjoy better quality of health. Meaning that there is no beneficial correlation between SHI health outcomes. Using the Argentinian case, Hecht (1997) points out that SHIs are more prone to mismanagement and corruption (probably even more than financing methods based on general tax revenue) than any type of healthcare financial pooling method. Which, consequently, adds to inefficiency and high cost of care. Apart from Argentina, rampant corruption has been reported in SHIs in Kenya and Kazakhstan among other countries (Gottret & Schieber, 2006). The higher-than-normal exposure to administrative malpractices not only reduces finances available for healthcare but also increases administrative costs through heightened monitoring costs, thereby impacting welfare negatively.

Furthermore, in the SSA region and other LICs, the cost of enrolling those in the informal sector is usually huge, while the revenue generated as a result is rarely those expected (Giugale et al., 2003; Wagstaff, 2009). Therefore, enrollees from the formal sector are forced to disproportionately bear high costs of administration due

to the inefficiencies generated by the high costs of administering enrollees from the informal sector. SHI experiences welfare-reducing incidences of contribution evasion (Wagstaff, 2007), because the evasion, if not discovered, leads to undeserving people benefiting from the pool which they have not participated in building. Wagstaff (2010) observes that contrary to many assertions, collection costs of SHI premiums are higher than tax collection. He posits that tax collection costs enjoy economies of scale since taxes are collected for many functions. Indeed, if healthcare were financed from the general tax revenue, the cost of collecting the proportion of the taxes used for healthcare would effectively be zero, he argues. Therefore, based on the reasoning, tax-based financing is more efficient, administratively, than SHI.

Given that the reason why experts prefer risk pooling to out-of-pocket (OOP) payment is that, rather than pay high OOP at the point of service, people would prefer to translate these uncertain payments to certain premiums. While the premiums can either be in the form of SHI premiums or extra taxes, some experts prefer the former because, according to them, governments cannot be trusted to use the extra taxes on healthcare nor can the government-controlled system be trusted to deliver improved quality using the extra resources if they are not properly delineated. This position, according to Wagstaff (2010), does not hold due to the fact that the revenue generated by SHI contributions would get eaten up by the additional administrative costs associated with setting up and running the SHI systems. Added to the cost of collecting contribution (which must be incurred in both SHI and taxes, but could be marginally higher per capita in SHI than in taxes due to scale economies), while holding the cost of collecting general taxes and SHI contribution constant, administrative costs of SHI are obviously welfare reducing (Wagstaff, 2010). We note that, while SHIs are supposed to assure citizens of no undue interference from the government, there is no guarantee that the issues that make citizens suspicious of government in the tax-financed method cannot be imported to SHI schemes.

O'Donnell et al (2008) observe that even if we remove all the informal sector workers and collect contributions only from payroll, all the weaknesses of SHI will not have been dealt with. They point out that payroll contributions are often regressive due to contribution ceilings. Which effectively transfers a higher burden of healthcare from the high-income groups to low-income groups. If informal sector workers are included, and

because enrollees in the informal sector are made to pay a flat rate for all incomes and receive the same benefits, to avoid income assessment costs, the progressivity concept is usually sacrificed. Furthermore, where SHI schemes restrict informal sector workers to basic benefits, due to their flat contribution, they are left to bear a substantial cost of their healthcare out-of-pocket, re-introducing the weaknesses of OOP in SHI.

SHIs' contributions are usually not appropriately defined. This is why Wagstaff (2007) insists that most SHIs are not horizontally progressive either. This is because some are designed in such a way that people in different schemes end up paying different amounts for the same benefit packages. Some may be locked up into schemes that do not have the same benefits for the same contribution because of occupation or geographic location. We note also that SHIs can be more exposed to the problem of adverse selection compared to other forms of health insurance. This is because most of those who enroll voluntarily are often people with higher-than-average risk. And, without the warrants employed by private insurance (PHI) to protect the schemes from the effect of adverse selection, SHI may suffer more from its effect compared to PHI.

Some governments pay SHI premiums for the extremely poor so that they can access care without financing hardship. According to Gaviria et al (2006), though noble, this action only helps in consigning this group into a poverty trap. This is because increased earnings by a member of the group may result in the member losing the privilege, therefore, the privilege acts as a disincentive to escape poverty.

Because of the weaknesses articulated above, Wagstaff (2010) concluded that SHI schemes would not be the appropriate path that would lead LICs' in any region to the desired healthcare systems' equity and universal health coverage. We agree that if SHI schemes are inefficient and regressive as has been outlined above, then the SHI financing option cannot make the health systems in SSA equitable. However, we argue that there is still insufficient empirical evidence adduced to support such a conclusion, particularly in the SSA region.

After discussing the place of pooling in the SSA region's healthcare system we now turn our attention to how to manage the cost of healthcare, in general, with the aim of injecting equity into the region's healthcare systems.

2.8 Cost Efficiency and Equity of the Health Systems in Sub-Saharan Africa

A financially equitable health system is where households pay for healthcare according to ability-to-pay (ATP) and access the care according to need. Equity in financing healthcare dictates that ATP should be progressive. That is, those with greater ATP should contribute more to the healthcare system than those with less (Xu et al., 2007). According to health-equity experts, to achieve progressivity, payment for healthcare should be divorced from the consumption of health benefits (Mills et al., 2012). Some experts (e.g. Akazili et al., 2014; Ataguba, 2016; Berman et al., 2010; Van Doorslaer et al., 2008) argue further that an equitable healthcare system is not only vertically progressive – payment is done according to ATP – but should also be horizontally equitable – households with the same ATP should make the same financial contribution to healthcare, regardless of their health status. An equitable health system, therefore, is characterized by the absence of systemic and avoidable disparities in access to healthcare. It also has sufficient financial risk protection on health-related costs that cut across social-economic groups (World Health Organization 2015).

While equity is known to contribute to a just distribution of resources in a society, the nexus between equity and efficiency is less clear. Some experts argue that the two are separate concepts, while others insist that they are homonyms, and if they are not homonyms then they are at least complimentary.

Varian (1975) provided us with a simple but most used meaning of equity, he defined equity as *'the normative that relates to distributive justice'*. From the definition, some experts posit that being a normative term, equity is value-laden and therefore, is not a legitimate economic concern, unlike efficiency. The problem with this position is that it ignores the second part of the Varian definition - *distributive justice*. We hold the view that to achieve distributive justice, the allocation of resources must be done with minimum wastage, that is, efficiently. Therefore, while we do not contradict those (like Le Grand, 1984; Rawls, 2009) who insist that equity is a *value* term, we point out that efficiency, just like equity, is not value-free. Therefore, to address the problem of inequitable distribution, which we both accept causes injustice in society, we must accept that efficient distribution is a good starting point. That is, we must remove all *removable* causes of inefficiency to, properly, address the problem of inequity in society. However, we hasten to add that efficient distribution is not synonymous with, or equal to

equitable distribution. But we do insist that it is impractical to achieve equitable distribution without carrying out the distribution efficiently. Therefore, the way to distributive justice (equity) is paved by efficiency in the distribution effort. And, efficiency in the distribution can only be justified if accompanied by distributive justice.

Apart from the difficulty in defining the relationship between efficient distribution and equitable distribution, we are confronted with another controversy: the relationship between health and healthcare. While some experts (e.g. Daniels, 1982) argue that equity of the health system should focus on good health and not healthcare, others (e.g. Pereira, 1993) posit that so long as good health can be assured, even if only in part, though healthcare, the want for good health can then be, accurately, estimated using healthcare. We concur with the latter school of thought and, therefore, see no contradiction in pursuing an equitable allocation of healthcare rather than good health to achieve equity in the health system. In any case, the pursuit of equity of the health system would be in vain if we focus on the equitable distribution of good health. This is because good health is neither divisible nor transferrable, which would make it very difficult to achieve any meaningful measure of equitable distribution. From the foregoing, our position, therefore, is that efficient use and allocation of healthcare resources contribute to the low wastage of the resources. Consequently, the reduced wastage causes the system to be efficient, subsequently, efficiency in the use of resources leads to an equitable health system. And, an equitable health system leads to increased welfare which is demonstrated through better health outcomes.

In healthcare financing efficiency is measured in terms of how much of the healthcare finances goes to healthcare. This is why the efficiency of health insurance (and other prepayment methods) is determined using the Medical Loss Ratio (MLR). MLR is the ratio of the total premium collected in a year that is used in paying for the cost of healthcare of enrollees (Abraham et al., 2014). MLR is given by:

$$MLR = \frac{\text{Total premiums paid out as claims}}{\text{Total premiums collected}}$$

The higher the MLR the more efficient is the financing arrangement. To improve the efficiency of the health system, and therefore equity, some countries legislate on the minimum MLR. For example, in the USA, where MLR is widely employed to measure the efficiency of health insurance, an MLR of 80% after adding back quality

improvement costs to the numerator is considered a minimum efficiency cut-off point (Yang & Lin, 2017) for private insurance schemes. We note that this measure of efficiency is more suited for health insurance, and may find limited application to other methods of financing healthcare. However, the fundamental reasoning behind MLR is that a health financing method that does not use most of the funds in healthcare and health-related activities is less efficient, and as a result, cannot cause the health systems to be equitable. The reasoning can be used to improve the performance of any other healthcare financing method. As we have stated, wastage that needs to be removed to improve the performance of healthcare funds include unnecessary administrative cost, diversion of funds through corruption and wastage caused by market failure (e.g., moral hazard and adverse selection). We, therefore, argue that an appropriate financing method can fail to deliver on equity not because it is defective, but because of inefficient use of its funds. Therefore, there is need to investigate if the healthcare funds are used efficiently before we can conclude on their effectiveness in improving the health status of the population where it is in use.

We also argue that it does not matter if the payment method is direct or prepayment, or even if it is by private or public means, so long as there is a problem with allocational efficiency the funds will fail to reach Pareto optimality and therefore, will fail to inject equity into healthcare systems.

CHAPTER THREE

3. OVERALL RESEARCH DESIGN AND METHODOLOGY

This chapter discusses the methods that are used to conduct this study. Specifically, it exposes the research methods used in establishing the links between healthcare expenditure and health outcomes and the role of the control variables in this relationship. We discuss the research philosophy that informs the study and the underpinning paradigms. We explain the data the nature of data used in the study, the nature of the variables and the study constructs. On the constructs, we present the theoretical framework and the conceptual framework upon which the empirical specifications of the study models are based.

We present, as well, a detailed description of the research procedure and show how the procedures are used to give valid results concerning the interactions between the study variables.

3.1 Research Paradigm and Philosophy

Research philosophy is broadly defined as the way data concerning a phenomenon is collected and analyzed to assist with making informed decisions about the characteristics of the phenomenon (Bell et al., 2018a; Saunders et al., 2009). There are two major philosophical dimensions used in distinguishing existing research paradigms, ontology and epistemology (Kothari, 2004; Zikmund et al., 2013). Ontology is concerned with how individuals perceive reality. This can either be in the form of objective or subjective reality. While objectivists perceive reality to exist independent of social factors, the subjectivists believe that reality is dependent on social actors and that individuals contribute to social phenomena, subjectively (Bell et al., 2018b).

The objective view, also known as the positivist view, believes in the existence of universal truth, while the subjective (interpretive) view insists that there are many truths, based on individuals' interpretation (Jonker & Pennink, 2010). Since this study is an academic inquiry, it seeks to adduce empirical evidence to support its conclusions. For this reason, it will adopt a positivist paradigm; this is because the paradigm is based on objective inquiry and lends itself to the use of algebraic models (Cohen & Crabtree, 2008; Wacker, 1998). Algebraic models are important for this study since it seeks to make specific predictions about the performance of health systems measured in terms of health outcomes based on expenditures made from different financing sources.

There are three research approaches based on the positivists' paradigm, the deductive, the inductive, and the abductive approaches (B. Allison et al., 2016; O'Gorman & MacIntosh, 2014). The abductive is where the researcher develops new theories or modifies existing theories through scientific methods and reasoning. The deductive approach is where the researchers develop theory and hypothesis which he subjects to a rigorous research test, while the inductive approach involves developing theories from observed empirical data. In this research, the author develops a theoretical and conceptual framework using a deductive approach and subsequently tests them using quantitative data analysis techniques.

3.2 Research Design

The general framework upon which the researcher relies in answering the research questions is outlined in the research design (Kothari, 2004). The design for the present study is twofold, descriptive, and causal designs. We proceed by first, describing the characteristics of our variables using descriptive statistics. That is the extent to which the different variables, health outcomes, and healthcare expenditures, manifest themselves in different countries of sub-Saharan Africa. After which we used causal design to establish the causal effect of the relationship between healthcare expenditure and health outcomes. The causal design was also used to explain the extent to which control variables affect the relationship between the dependent and the independent variables and the extent to which the control variables affect the health outcomes.

The study uses secondary data on healthcare expenditure and health outcomes from the World Health Organization and the World Bank collected using a secondary datasheet. Additionally, the sheet was used to collect data from different databases for the control variables (Table 3.1).

3.2.1 Theoretical Framework

This study is based on the broad economic concept of health production. The concept looks at health system as layers of processes that are designed to produce health. Healthcare is an important component of these processes. The aim of healthcare is the repair of health. More specifically, this study draws from the theoretical framework which is based on the health capital theory developed by Grossman. The theory is part of the wider health production concepts. This means that the theoretical framework is constructed following the

health capital model developed by Grossman in 1972. The specification of this model is based on the human capital model by Becker (1967) and Ben-Porath (1967). While some experts insist that the human capital models are adequate in explaining the contribution of health to human development, Grossman disagrees. Based on his work in 1972, Grossman (2017) argues that health is different from other forms of human capital because, for example, a person's stock of knowledge affects her market and non-market contribution while her stock of health determines the '*.... total amount of time she can spend in producing money and commodities*'. For this reason, he argues that health capital needs special treatment. For purposes of his model, Grossman defined health simply as '*...longevity and illness-free days in a given year*'. This means that health can be proxied by life expectancy and mortality rates.

The principal assumption of Grossman's model is that an initial stock of health can be determined and, that it depreciates with age and can be increased by healthcare through investment in healthcare. He postulates, further, that there is a shadow price (investment) of health. The shadow price depends on other variables other than the price of medical care. These variables are grouped, by Grossman (2017), into three categories: social factors, environmental factors, and economic factors. In developing the health capital model Grossman postulates that the initial stock of health depreciates over time at an increasing rate, at least after some time, in the life cycle. According to Grossman, the health capital model rests on the assumption that the original stock of health can be increased by investment (directly and indirectly) in health. And, death occurs when the stock falls below a certain level.

Since there exists an original stock of health, Grossman developed a health production function that is linear in health investment as laid out below, first starting with a general form:

$$h = f(x) \tag{3.1}$$

Where h is individual health output and x is a vector of individual's inputs to the health production function f . The elements of the vector include all the environmental, social, and economic factors, including the individual's initial health stock, that have a bearing on an individual's health condition. From this micro-level model, Fayissa &

Gutena (2008) developed a macro-level model. In doing this they ensured that the theoretical underpinning in the original model is not lost. They presented the elements of the vector x by using per capita variables.

The result of the modification is the following general specification:

$$H = F(X, Y, Z) \quad (3.2)$$

Where X is a vector of per capita economic variables. The economic variables can be divided into direct investment (expenditure) in healthcare, and indirect investment in healthcare. While direct investments go directly into the repair of health, indirect investments go into items that support health indirectly, for example, sanitary services, clean water, education, and so on. Y is a vector of per capita social variables and Z is a vector of per capita environmental factors. H represents the population's health status. Because there are several variables under each category, we can rewrite equation 3.2 as follows:

$$H = F(x_1, x_2, \dots, x_n; y_1, y_2, \dots, y_n; z_1, z_2, \dots, z_n) \quad (3.3)$$

where $(x_1, x_2, \dots, x_n) = X$, $(y_1, y_2, \dots, y_n) = Y$ and, $(z_1, z_2, \dots, z_n) = Z$, which represents the number of variables in each sub-group.

Because of its linearity, some experts have argued that Grossman's model and any other model derived from it are defective. For example, Case and Deaton (2007) posit that the linearity feature of the model assumes that complete health repair is possible. And that, *biological aging is constant*. They argue that, if these were true then individuals would choose an infinite life. Furthermore, theoretically, the linearity feature implicitly indicates a constant return-to-scale (CRTS). According to Ehrlich and Chuma (1990), this cannot be true. They argue that there is a decreasing return-to-scale (DRTS). Where the health output is less than the investment (input) over time. Therefore, according to these experts, Grossman's model is defective both in practice and in theory.

However, some experts disagree with this argument. For example, Galama (2015), insists that Grossman's health capital model is adequate in estimating the effect of health investment on health outcomes. He points out that the contention that individuals reach a certain 'desired' health stock gradually (i.e., DRTS)

rather than instantaneously (i.e., CRTS) is not correct since there exists *no such desired level of DRTS*. Furthermore, introducing DRTS has little impact on the basic structure and, therefore, the predictive capabilities of the Grossman model (Grossman, 1999). Drawing from the argument by Grossman, Zweifel (2012) asserts that the issue of CRTS or DRTS is not important to warrant vacating or even modifying Grossman's model in any fundamental way during the analysis of the health-production process.

Furthermore, Galama (2015) argues that the argument against the equilibrium health stock, a feature of the model, is misplaced. According to him the condition for equilibrium health stock is, in fact, the first-order condition for health investment. That is the condition should be used to determine health investment, and a dynamic equation for health should be used to determine health outcomes.

We note that the criticisms against the Grossman health capital model are either inadequate, as to lessen its predictive power, or, as Reid (1998) puts it, are unsubstantiated. We, therefore, feel comfortable in employing the model in this study. Moreover, researchers (such as; Arthur & Oaikhena, 2017; Beckfield, 2004; Campbell, 2020; Novignon et al., 2012) continue to use the model in estimating the effect of health inputs on health outputs at both the micro and macro levels of investigations.

Going by the argument (that the model can be used at both micro and macro level studies), a modification of equation 3.1 into 3.2 and 3.3 assumes that health is a shared responsibility between individuals, on the one hand, and society and government on the other. That is why the general model (equation 3.1) is extended to include macro-level factors, where the entire (country-level) health system is considered as a production process where inputs (e.g., health expenditure, nutrition, etc.) are converted into output (e.g., population longevity, reduction in cases of deaths, etc.), which we call health outputs.

Starting from the original Grossman's specification (equation 3.1), we note that the specification follows a typical consumer's intertemporal utility function, which can be stated as follows:

$$U = U(\beta_0 H_0, \dots, \beta_n H_n, Z_0, \dots, Z_n) \quad (3.4)$$

Where H are the stock of health in each time-period defined in years, such that H_0 is the original (inherited) health stock while H_t is the stock of health in time-period t defined in terms of years over the life cycle. β_t is the service flow per unit stock, such that $\beta_n H_n$ is the total consumption of healthcare in the n^{th} year and, $h_t = \beta_t H_t$. Z_t is the total consumption of another commodity in year t . According to Grossman, n , the length of life as the planning date is an endogenous variable in the health capital model, as opposed to being fixed as is the case with the usual intertemporal utility functions. This means that death takes place when $H_t = H_{min}$. Such that the length of life depends on the quantity of H_t that maximize utility subject to certain production and resource constraints. The constraints are outlined hereafter.

If we take that gross investment in healthcare is given by I and gross investment in other (non-healthcare) commodities is given by N . Then investment in healthcare in time t is I_t and investment in other commodities in the same period is given by N_t . We know that I_t and N_t depend on other factors, the household production function for these variables can be stated (separately) as follows:

$$I_t = I_t(M_t, T_t, C_t) \quad (3.5.1)$$

$$N_t = N_t(G_t, P_t, C_t) \quad (3.5.2)$$

Where M_t = goods used in medical care (healthcare), T_t = time spent in healthcare or health production, C_t = the stock of human capital, G_t = goods input in the production of other (non-healthcare) commodities and, P_t = time used in non-health production. Just like a shift in technology changes the efficiency of the production process in the market sector, Grossman's health capital model assumes that a shift in human capital changes the efficiency of the production in the nonmarket sector. It further, assumes that all production functions are homogenous of degree 1 in both the goods and time inputs. Such that the gross investment production function can be stated as follows:

$$I_t = M_t \rho(u_t; C_t) \quad (3.6)$$

Where $u_t = T_t/M_t$, this means that the marginal products of time and healthcare in the production of gross investment in health are:

$$\frac{\partial I_t}{\partial T_t} = \frac{\partial \rho}{\partial u_t} = \rho' \quad (3.7.1)$$

$$\frac{\partial I_t}{\partial M_t} = \rho - u_t \rho' \quad (3.7.2)$$

Since Grossman's model envisages health from the original health stock, investment in stock of health can be defined as gross investment in health less depreciation, such that:

$$H_{t+1} - H_t = I_t - d_t H_t \quad (3.8)$$

Where I_t is the gross investment in health in time t and the rate of health depreciation at the same time -period is represented by d_t . We note that health depreciation is assumed to be exogenous and that it varies with age.

Furthermore, we know that the consumption of non-healthcare products depends on the amount of goods and available time to consume them. If we assume that individuals exercise the right to allocate time to each activity according to their preference (free choice) and to do this, the only constraint imposed upon them is the time available. Then the total available time V should be exhausted by all possible uses, which is:

$$W_t + L_t + T_t + P_t = V \quad (3.9)$$

Where L_t is time lost due to ill health and W_t is working time.

This equation (3.9), according to Grossman, modifies the time budget constraint in Becker's time model (Becker, 1967). He argues that if sick time is not added to the market and non-market time, the total time would not be exhausted by all possible uses. Grossman states further that the model assumes that L_t is inversely related to the stock of health; that is, $\partial L_t / \partial H_t < 0$. Now, if V is measured in days and β_t were defined as the flow of healthy days per unit of H_t , h_t would equal the number of healthy days in a year. Which is:

$$L_t = V - h_t \quad (3.10)$$

We note that sick time as presented here is different from time input in the gross investment function (e.g., the time spent in periodic health checks is not sick time). Therefore, if the rate of health depreciation is held constant, an increase in T_t would increase I_t and H_{t+1} and would reduce L_t . This means that T_t and L_t are negatively correlated.

Apart from the constraints already specified, individuals are also confronted by budgetary constraints. The goods budget constraint is a constraint that equates the present value of expenditure in goods and services to the present value of income over the life cycle, plus the value of initial assets. It is written as follows:

$$\sum_{t=1}^n \frac{X_t M_t + Y_t G_t}{(1+r)^t} = \sum_{t=1}^n \frac{R_t W_t}{(1+r)^t} + A_0 \quad (3.11)$$

Where X and Y are prices, R is the wage rate, r the discount (interest) rate and A_0 is the discounted (current) value of property income.

We can obtain a single wealth constraint by substituting W_t in equation 3.9 into equation 3.11 which would result in equation 3.12 below:

$$\sum_{t=1}^n \frac{X_t M_t + Y_t G_t + R_t (L_t + T_t + P_t)}{(1+r)^t} = \sum_{t=1}^n \frac{R_t V}{(1+r)^t} + A_0 = FH \quad (3.12)$$

The equation shows that the full wealth equals the present value of the earnings of an individual if he spends all his time at work. Which is equivalent, at the macro-level, to the total amount of resources available for providing all public services (total government expenditure, for example, health, policing, defense, education, etc.).

We can now obtain the optimal values of N_t and H_t by maximizing the objective function in equation 3.4. This is because the optimal quantities of gross investment in healthcare determine the optimal quantities of health capital (Wagstaff, 1986). The first-order optimality condition for gross investment in health in period $t - 1$ can be written as follows:

$$\begin{aligned} \frac{\pi_{t-1}}{(1+r)^{t-1}} = & \frac{R_t B_t}{(1+r)^t} + \frac{(1-d_t)R_{t+1}B_{t+1}}{(1+r)^{t+1}} + \dots + \frac{(1-d_t)\dots(1-d_{n-1})R_n B_n}{(1+r)^n} + \frac{Jh_t}{\lambda} B_t + \dots + (1-d_t) \dots (1-d_{n-1}) \frac{Jh_n}{\lambda} B_n \end{aligned} \quad (3.13)$$

$$\text{Thus; } \pi_{t-1} = \frac{X_{t-1}}{P - u_{t-1}p'} = \frac{R_{t-1}}{p'} \quad (3.14)$$

Where $B_t = \partial h_t / \partial H_t = -(\partial L_t / \partial H_t)$, which is the marginal product of the stock of health in the production of healthy days; $Jh_t = \partial U / \partial h_t$, which is the marginal utility in healthy days; λ is the marginal utility of wealth; and π_{t-1} represent the marginal cost of gross investment in healthcare in period $t - 1$.

We note that the constraint imposed in the equations is that $H_t \leq H_{min}$. We also note that, as a result, an increase in gross investment in health in period $t - 1$ increases the stock of health in all future periods.

Grossman (2017) defines these increases as follows:

$$\frac{\partial H_t}{\partial I_{t-1}} = 1, \frac{\partial H_{t+1}}{\partial I_{t-1}} = (1 - d_t), \dots, \frac{\partial H_n}{\partial I_{t-1}} = (1 - d_t)(1 - d_{t+1}) \dots \dots (1 - d_{n-1})$$

Going back to equation 3.13 and equation 3.14; equation 3.13 denotes the optimal amount of gross investment in period $t - 1$, which implies that the present value of the marginal cost of gross investment in period $t - 1$ should be equal to the present value of the marginal benefit. The discounted benefit at age t can be defined as equal to $C_t \left[\frac{R_t}{(1+r)^t} + \frac{U h_t}{\lambda} \right]$, where C_t is the marginal product of health capital, which is the increase in the number of healthy days caused by a unit increase in the stock of health. The discounted wage rate measures the monetary value of one unit increase in the total amount of time available for market and non-market activities. On the other hand, $\frac{U h_t}{\lambda}$ measures the discounted monetary equivalent of the increase in utility due to a unit increase in healthy time. Equation 3.14 shows the condition for minimizing the cost of producing a given gross investment in health.

Equation (3.14) shows that total cost of healthcare is minimized when an increase in gross investment from spending an additional unit amount of money on healthcare equals the increase in gross investment from spending an additional one-unit amount of money on time. And, since we have seen that gross investment production function is homogenous of degree 1 and, the prices of healthcare and time are independent of the level of these inputs, the average cost of gross investment is constant and equal to the marginal cost. Therefore, we can investigate the effect of healthcare investment (expenditure) on health stock (health outcomes) over time.

Because we are interested in the effect that the forces that affect the demand for healthcare have on health, it is important to examine how the forces that affect the demand, and supply (investment) for/of healthcare as explained in Grossman's model. To do this, as explained by Grossman, we have to change, slightly, the format of equation 3.13. If gross investment in health in period t is positive, then we can convert equation 3.13 into equation 3.15 as follows:

$$\frac{\pi_t}{(1+r)^t} t = \frac{R_{t+1}B_{t+1}}{(1+r)^{t+1}} + \frac{(1-d_{t+1})R_{1+2}B_{t+2}}{(1+r)^{t+2}} + \dots + \frac{(1-d_{t+1})\dots(1-d_{n-1})R_nB_n}{(1+r)^n} + \frac{Uh_{t+1}B_{t+1}}{\lambda} + \dots + (1 - d_{t+1}) \dots (1 - d_{n-1}) \frac{Uh_nB_n}{\lambda} \quad (3.15)$$

And, from equation 3.13 and equation 3.15,

$$\frac{\pi_{t-1}}{(1+r)^{t-1}} = \frac{R_tB_t}{(1+r)^t} + \frac{Uh_tB_t}{\lambda} + \frac{(1-d_t)\pi_t}{\lambda}, \quad (3.16)$$

Thus,

$$B_t \left[R_t + \left(\frac{Uh_t}{\lambda} \right) (1+r)^t \right] = \pi_{t-1} (r - \pi'_{t-1} + d_t) \quad (3.17)$$

Where π'_{t-1} is the percentage rate of change in marginal cost between $t - 1$ and t . The equation (3.17) implies that the undiscounted value of the marginal product of the optimal stock of health capital at any time must equal the supply price of capital (Grossman, 1972), which is $\pi_{t-1}(r - \pi'_{t-1} + d_t)$. The equation contains interest, depreciation, and capital gain, which shows the user cost of health capital. The condition in equation 3.16 determines the demand for capital goods that can be bought and sold in a perfect market.

However, as rightly pointed out by Grossman (2017), health capital cannot be sold in a capital market. This means that gross investment must not be negative. Just like any other good that cannot be physically sold in a market (e.g., knowledge), provided that the gross investment is positive, there exists a used cost of capital that in equilibrium must equal the value of marginal cost (Arrow, 2017). This means that changes over time in the stock of health, by the individual, substitute for exchanges in the capital market. That is, suppose an individual wants to increase her stock of health by a unit in period t , then she has to increase her gross investment in health

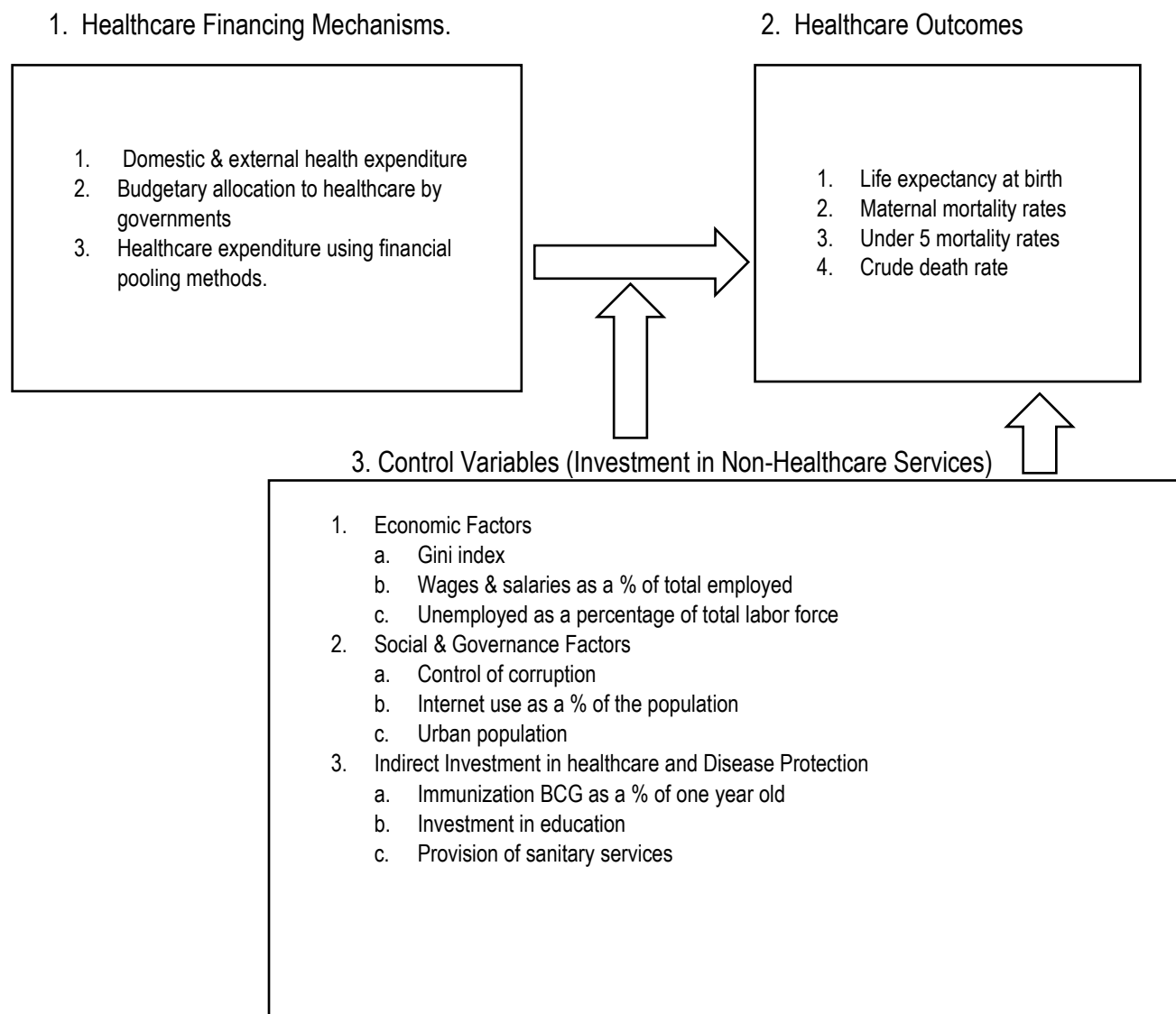
in period $t - 1$ by one unit. Likewise, if she reduces gross investment in period t by $1 - d_t$ units, then she has been involved in a transaction that raises only H_t by one unit. This means that the impact of investment in health can be analyzed algebraically by measuring the unit changes in health outputs per unit investment in health.

Having derived the theoretical framework, we now embark on the conceptual framework before constructing the empirical framework and analytical models which are based on the theoretical framework. We do this because it is important to show the relationship among the study variables before connecting them in the form of cause-effect relationships, which is what empirical framework and analytical models do.

3.2.2 Conceptual Framework

Fig. 3 1 provides a visual representation of the relationships among the constructs of the study. The study's independent variables are shown in the first box, with the heading; health financing mechanisms. In the current study, the financing mechanisms are represented by direct sources of health expenditure. It is the effect on the response variables that this study is measuring. The second box in the conceptual framework (Fig. 3 1) is the response (dependent) variables. The response variables are the health outcomes. And, finally, box number three in the conceptual framework are the control variables. These are the shadow prices or the indirect expenditure on health. According to the framework (Fig. 3 1) we measure both their indirect effect, through their effect on the relationship between health expenditure and health outcome, on health outcome (welfare) and their direct effect on the health outcomes.

Figure 3 1: Conceptual Framework of the Healthcare Systems' Performance as a Result Different Financing Mechanisms



Source: Author's conceptualization

. Based on the study objectives (details provided in Table 3.5) we have three categories of independent variables.

These are:

1. Healthcare expenditure from domestic and external sources financing sources. We use this category to answer the research question in objective one.
2. Annual budgetary allocation to healthcare by governments in Sub-Saharan Africa. The independent variables under this category are used to answer the research question in objective two.

3. Healthcare expenditure using pooled financing sources. Where pooled financing sources refer to prepaid and pooled forms of healthcare finances. The independent variables in this category are used to answer the research question under objective three.

We provide an expanded description of the variables presented in the conceptual framework below.

3.2.2.1 Independent Variables

The regressors for this study are healthcare expenditure. These are the direct financial input into population healthcare. Healthcare expenditure from different sources is used to proxy for healthcare financing sources, that is the source of expenditure is also the financing source. For example, private health insurance expenditure represents healthcare financing from private health insurance firms. The complete list of the independent variables is provided in Table 3 1.

We proceed based on the argument, as put forward by Grossman, that health is the desired output when people invest in healthcare, and therefore the amount invested in healthcare (medical care), represented by health expenditure, is the input. That is, when people purchase (spend on) healthcare, they are not buying health services per se but rather better health. This means that the demand for healthcare services is a derived demand. A demand derived from the demand for better health. It is on the basis of this argument that we measure the effect of health expenditure (health systems' inputs) on health outcomes (health systems' outputs).

According to the health capital model ...*health is a choice variable because it is a source of utility....and because it is a source of satisfaction...it determines income levels* (Grossman 2000). Grossman (2000) argues, correctly, that health is demanded for two reasons, as a consumption commodity and as an investment commodity. As a consumption commodity, it directly enters individuals' preference functions. And, as an investment, it determines the amount of time available for individuals to use in market and non-market activities.

Table 3 1: List of Independent Variables and Objectives

S/N	Objectives	Regressor Variables
1	Objective 1: - This objective investigates the effect of healthcare expenditure using domestic and external resources on health outcomes of the SSA region	i. Domestic government healthcare expenditure per capita (in terms of purchasing power parity (PPP)) ii. Domestic private healthcare expenditure per capita (PPP) iii. External healthcare expenditure per capita (PPP)
2	Objective 2: -The objective investigates the effect of the use of taxes by governments of the SSA region to finance healthcare	i. Government healthcare expenditure as a percentage of general government expenditure ii. Government healthcare expenditure as a percentage of gross domestic product (GDP)
3	Objective 3: The study objective is used to investigate how financial pooling affects the health outcomes of the population of the SSA region	i. Private health insurance expenditure as a percentage of total healthcare expenditure ii. Government financial arrangement in healthcare as a percentage of total healthcare expenditure iii. Social health insurance expenditure in healthcare as a percentage of total healthcare expenditure iv. Other private financial arrangement for healthcare as a percentage of total healthcare expenditure

Source: Authors' Compilation

This means that an increase in the stock of health reduces the amount of time lost from doing these activities, therefore, the monetary value of this reduction is an index of the return on an investment in health (Grossman, 2000). From the investment perspective, we note that population health is a function of health investment. In other words, gross investment is produced by a country's health production function that relates health output to health inputs. In this study, the health input is represented by the health expenditures as outlined in Table 3 1 above.

On the right-hand side of the study conceptualization (Fig. 3 1) are the dependent variables. The dependent variables represent the region's health outcomes (outputs). A brief description of the dependent variables is provided in the following sub-heading.

3.2.2.2 Dependent Variables

The dependent variables used in this study are consistent with those used in studies on the effect of health expenditure on health outcomes (e.g., Novington et al; Rad et al; Raiees et al, Beckfield et al). The selected response variables are life expectancy at birth (LEB), the under-five mortality rate (U5MR), the maternal mortality rate (MMR), and the crude death rate (CDR).

LEB, according to the WHO is the average age in years a cohort of newborns is expected to live if the current mortality rates continue to prevail in a given country. Since it is computed across all ages it reflects the effectiveness of the system over time, which makes it relevant for this study. U5MR on the other hand is the probability of a child born in a certain period (in a country) dying before the age of five years per 1,000 live births in the period. U5MR reflects the social, economic, environmental, and conditions of the country in which a child is born (World Health Organization, 2019a). These are the direct and indirect healthcare factors explained in the Grossman model. MMR measures the number of women who die during pregnancy or within 42 days after the termination of pregnancy per 100,000 live births from any cause related to or, aggravated by the pregnancy or its management in a country. (World Health Organization, 2019a)

Lastly, CDR is defined as the mortality rate from all causes of death for a population. CDR is calculated as the number of deaths during a given time interval divided by the mid-year (average) population of the region per 1,000 inhabitants of the region. This is as opposed to mortality rate (MR) which measures the mortality as a proportion of the population in the country. CDR is a better measure of the effectiveness of healthcare system compared to MR since it captures the underlying death risks (causes of death) better than MR. It gauges how diseases and injuries affect people's lives and, more importantly (for this study), the effectiveness of the healthcare system in dealing with the health risks in a country.

According to the health capital model, apart from direct investment in health, some health investments that are not direct (what Grossman referred to as shadow health investment), but are as important in securing the health of an individual or a population. In this study's conceptual framework (Fig. 3.1) they are the third variables, referred to as control variables.

3.2.2.3 Control Variables

The control variables have been selected based on literature and according to their (suspected) influence on the relationship between the response variables and the regressors. According to health capital theory, apart from direct investment (expenditure) in healthcare, population health stock also depends on the amount invested in non-health activities (Grossman 2000). These are what Grossman termed as shadow prices of healthcare.

According to Grossman, although not directly related to healthcare, population health may suffer if they are lacking. They include indirect investment in healthcare-related items like investment in education, sanitation, clean water, clean sources of fuel, clean working environment, and so on. Shadow prices of health may also include the investment in non-healthcare activities and social factors as outlined in Fig. 3.1. Note that we used two forms of indirect investment in healthcare in this study. These are government expenditures in education as a percentage of general government expenditure (GEEGGE) and the percentage of a country's population with access to managed sanitary services (AMSS). AMSS is used to proxy expenditure in sanitary services'

The current study has grouped the non-health factors in terms of their suspected influence on health outcomes as follows: Economic factors: under which we have selected the Gini index, the percentage of population with wages and salaries (wages and salaried workers as a percentage of total employment) and, the percentage of population above age 15 years with no employment (unemployment as a percentage of total labor force). The Gini index is used by such studies (e.g., Hales et al, 1999; Soobader et al, 1999; Sturn et al 2002) to measure inequality in healthcare. Empirical studies (e.g., by Case & Deaton, 2005; Kakwani et al., 1997; Wilkinson, 1997) have found a correlation between inequality and population health. Although there are various methods of measuring income concentration, in this study, we use the Gini index because it is the more effective measure of income concentration (Sturn et al 2002). We argue that income concentration is an important control variable for this study because countries with high-income concentration have more problems pooling healthcare resources compared to countries with fair wealth distribution. We also argue that high wealth concentration can lead to a distribution of infrastructure that concentrates health benefits on the wealthy few while leaving the majority, who are the poor, without adequate healthcare.

Because population income is determined by the proportion of the population with regular income, and regularity of income determines whether individuals can afford healthcare or not (Asgary 2004) we controlled for regularity of income. To proxy regularity of income, we have selected control variables that speak to levels of employment. The variables selected in this category are:

1. Unemployment as a percentage of total labor force and,

2. wages and salaried workers as a percentage of total employment

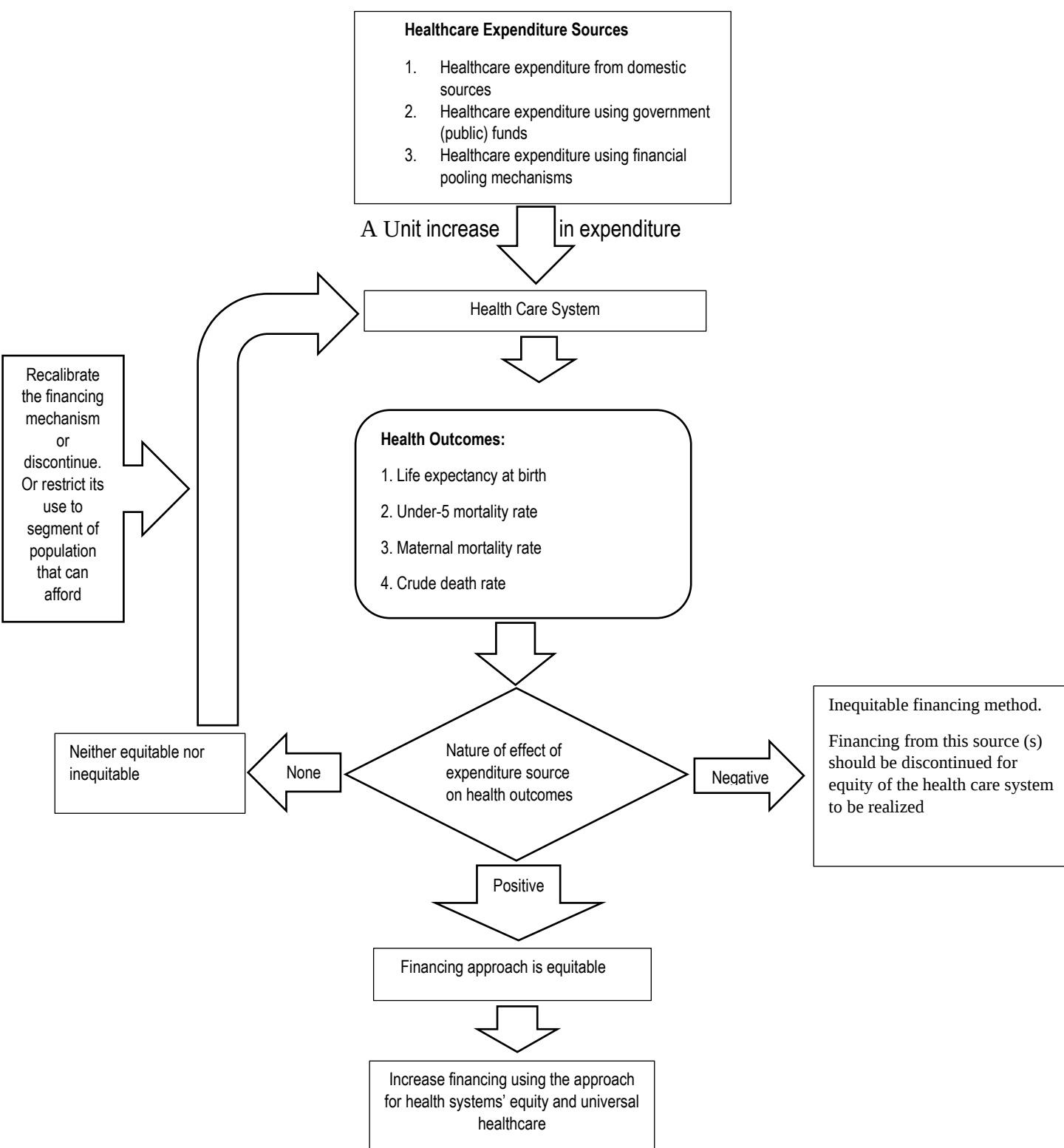
Apart from measuring the ability of the population to afford healthcare as need arises, we also note that the administrative cost of pooled finances is affected by the regularity of a population's income. This is because the cost of enrolling those without regular income (those in the informal sector and those without steady sources of income) in pooled finances is usually high, while the revenue generated is usually lower than expected. Therefore, these variables will also assist in capturing the moderating effect of administrative cost of healthcare finances.

The other non-health factors identified by Grossman are the social factors. Under social factors, we identified control of corruption, the population living in urban areas, and, the population with access to internet services as important because they are important determinants of a population's health stock. Starting with control of corruption. The efficiency with which healthcare funds are applied to the purposes of healthcare depends on the quality of governance (World Health Organization, 2010a). Hsiao & Show (2007) argue that widespread corruption, in most countries in SSA, not only harm the effectiveness with which healthcare finances can meet healthcare goals but also increases administrative cost through intensive monitoring. Additionally, we used control of corruption because according to Kiross et al (2017), corruption affects pool sizes, and therefore, healthcare financing risk diversification. Apart from wealth concentration, another factor that has been identified to affect the distribution of healthcare is the disparity in healthcare infrastructure between the urban and rural areas. To estimate the effect of this disparity on the performance of healthcare expenditure we have selected a control variable that measures the size of a country's population in the urban areas. According to Asgary et al (2004) apart from the higher concentration of healthcare facilities in urban areas, collecting healthcare funds and premiums is more difficult and less cost-effective for the population in rural areas than in urban areas, particularly in low-income countries. This is because of the scattered nature of the rural settlements and the lack of supportive infrastructures. Therefore, the proportion of the population in urban areas should affect, not only the size of the pooled finances but also the amounts available for healthcare. Furthermore, the population in urban settings has more access to healthcare facilities. They may also possess higher levels of health education and more nutritious food.

Information technology (IT) activities are increasingly becoming important to the efficient operations of organizations. According to Yang & Lin (2017), technology leads to efficiency in the administration of healthcare finances. We use the percentage of people connected to the internet because internet usage is not only spreading fast, it also impacts healthcare more than any other form of technology. It can be used to spread information on available healthcare and disease management and speed up enrollment in pooled finances. IT can also be used in distorting healthcare information, as we have witnessed in cases of vaccination. Therefore, it is a good proxy for technology-driven healthcare. We measured the moderating effect of investment in IT activities on the relationship between our dependent and independent variables using the percentage of the population using the internet in a country.

Finally, we measure the effect of protection from health risks and healthcare expenditure risks in a country using immunization and catastrophic expenditure. To proxy for all immunization, we used the bacilli Calmette-Guerin (BCG) vaccination as a percentage of the population of one-year-olds in a country. This is because BCG vaccination is the widest spread vaccination in the world (WHO, 2010). According to WHO it has existed for over 80 years. And because BCG is administered early in life, we expect the BCG vaccination to affect all our dependent variables including the U5MR.

Figure 3 2: Analytical Flow Chart of Expected Effects of Health Expenditure on Health Outcomes



Source: Authors' conceptualization

The analytical flow chart (Fig. 3 2) is premised on the assumption that increases in healthcare expenditure (investment) should lead to improved health outcomes. This is in accordance with Grossman's health capital

model. That is, increased investment (expenditure) in healthcare should be positively correlated with better health outcomes. We use the concept of aggregate population health in the theory of utilitarianism in investigating how different healthcare financing mechanisms contribute to health system's equity and consequently to universal healthcare. Based on the theory of utilitarianism, an equitable health system is that which produces the highest health output per unit expenditure to the largest number of people. We measure health output using the aggregate population health outcomes. This means that the expenditure source that is positively associated with the improvement in aggregate population health outcomes should be strengthened by increasing financing from that source for equity of the healthcare system and, consequently, for universal healthcare. On the other hand, if healthcare expenditure from a financing source is correlated with harmful effects on aggregate population health outcomes, then financing of healthcare using the source should be discontinued for equity of the healthcare system to be realized. A financing source whose effect on aggregate health outcomes is insignificant should be recalibrated, with the aim of finding out if its effect on health outcomes can improve. We note that some healthcare financing methods may have no significant effect on health outcomes because they are inefficiently administered or because the amount of funds from the sources is inadequate to have an impact on aggregate population health outcomes. It is for these reasons that we advise for recalibration of the method. Recalibration means investigating the method to find out if factors outside the financing approach could be responsible for the lack of effect. If this is the case the financing source can be strengthened by addressing the issues and be used thereafter.

We measure the degree of the effect of the independent variables (healthcare expenditure) on the dependent variables (health outcomes) using regression coefficients. This is done by measuring the degree of change in dependent variables that results from a unit change in independent variables. The response by dependent variables as a result of a unit change in the independent variable can either be negative or positive. We have four response (dependent) variables, that is; life expectancy at birth (LEB), under-5 mortality rate (U5MR), maternal mortality rate (MMR) and crude death rate (CDR). We expect that increasing health expenditure (independent variable) should be positively correlated with LEB and negatively correlated with U5MR, MMR and CDR. A positive relation between independent variables and LEB is associated with a positive effect on healthcare

system. And, a negative relation with U5MR, MMR, and CDR is associated with a positive effect on healthcare system equity. We note that the higher the regression coefficient (whether positive or negative) the higher the effect of the independent variable on the dependent variable.

3.2.3 The Empirical Frameworks and Analytical Models

The study's empirical framework is based on Grossman's health capital model (Grossman, 1972). Now, given that according to Grossman's model, the previous investment (in period $t - 1$) in health is important for health stock in the current period t . As stated in the health capital model (equation 3.13 & 3.14), increasing gross investment in healthcare in period $t - 1$ increases the stock of the health of an individual in all other periods. Translating this to the macro-level means that improving the population health in future periods requires investments in healthcare in the current period. And, equation 3.15 shows that individuals can produce health by a process of combining factor inputs, just like in the case of manufacturing firms. Therefore, going by the same reasoning, at the macro-level, population health can be improved by combining factor (health) inputs (Fayissa & Gutema, 2008). The model shows that an individual's health stock is maximized if she employs factor inputs efficiently and effectively. As stated by (Wagstaff, 1986), at the macro-level, population health can be improved in the same way, that is, by an effective and efficient combination of health inputs. To be effective, the distribution pattern should increase access to needed healthcare for as many people as possible. And, an efficient allocation pattern is one that is characterized by minimum wastage. Therefore, an effective and efficient combination of health inputs, implies that population health capital can be maximized if the society, as a whole, employs the available healthcare resources equitably.

Because our interest is to investigate the effect of health expenditure (inputs) on a population's health outcomes (outputs), and consequently health systems' equity, we employ the health capital model (equation 3.15) in this study. To make the model more relevant for the current study, we transform the model following the Cobb-Douglas (Zellner et al., 1966) production model as follows:

$$H = \beta_0 + \beta_1(x_1, x_2, \dots x_n) + \beta_2(y_1, y_2, \dots y_n) + \beta_3(z_1, z_2, \dots z_n) \quad (3.18)$$

where β_0 is the intercept, representing the initial health stock. That is the health status that would have been observed if there was no depreciation or improvement in the population's health stock (condition) due to changes in X, Y and Z . β_1, β_2 and β_3 , are the elasticities.

Because we are using panel data in estimating the effect of health expenditure on health outcomes, the starting point, according to Baltagi (2008), is to specify the variables in a panel regression model (a modification of the Cobb-Douglas production model) of the following form:

$$H_{it} = \beta_0 + \beta X_{it} + \beta u_{it}; i = 1, \dots, N; t = 1, \dots, T \quad (3.19)$$

Where i and t denote countries (cross-section unit) and time (time-series dimension), respectively. β_0 is the scalar, β are the vectors that explain the magnitude of the relationship between regressors and health outcomes (that is $K \times T$ in the panel formation) which ranges from 1, 2, ..., n depending on the number of independent (direct health investments) and control (shadow health investment) variables. X_{it} is the i^{th} observation on the k^{th} explanatory variable. And, u_{it} are the non-direct health expenditure variables (in this case the control variables) that affect the health outcomes.

Therefore, modifying the model (equation 3.19) for our purposes, and, using the health outcomes (in this case life expectancy at birth, under-5 mortality rate, maternal mortality rate, and crude death rates) as the health outputs and healthcare expenditure as the direct health inputs, we can specify the effect of healthcare inputs on the health outputs in the following general model.

$$HOC_{ijt} = \beta_0 + \beta_1 HEX_{ijt} + \epsilon_{jt} \quad (3.20)$$

And, the effect of shadow healthcare prices (control variables) on the relationship between direct healthcare expenditure (inputs) and health outcomes (health system's outputs) using an extension of the model (3.20) stated in the following specification:

$$HOC_{ijt} = \beta_0 + \beta_1 HEX_{ijt} + \beta_3 CTL_{ijt} + \epsilon_{jt} \quad (3.21)$$

Where, β_0 is the constant of the model, β are the vectors of the parameters, HOC_{ijt} are the health systems' outcomes i in country j at time t , HEX_{ijt} is the health expenditure from financing source i in country j in year t . And, CTL_{ijt} are the expenditure from selected control variable i in country j at time t respectively. β_3 are the coefficients of each control variable.

The two specifications (3.20 & 3.21) provide the broad framework upon which specific models that are used to interrogate the effect that expenditure from each financing source has on the health outcomes are based.

The general specification (3.21) is further broken down into the following specifications, based on the study objectives. We provide the summary of the specifications for each objective below:

1. Objective one: The objective investigates the effect of using domestic and externally sourced resources in financing healthcare on health outcomes in the sub-Saharan Africa (SSA) region. to delve deeper into the association between domestic health expenditure and health outcomes, we divided the domestic health expenditure into two categories:
 - a. Domestic government healthcare expenditure per capita (DGHEPCP) and,
 - b. Domestic private healthcare expenditure per capita (DPHEPCP).

The other variable under consideration is the,

- c. External health expenditure per capita (EXHEPCP)

The general specification for the objective is as follows:

$$HOC_{ijt} = \beta_0 + \beta_1 DGHEPCP_{ijt} + \beta_2 DPHEPCP_{ijt} + \beta_3 EXHEPCP_{ijt} + \beta_4 CTL_{ijt} + \epsilon_{jt} \quad (3.22)$$

Where $DGHEPCP_{ijt}$ is the domestic health expenditure from public financing source i in country j at year t . $DPHEPCP$ is domestic private health expenditures per capita, $EXHEPCP$ is external health expenditure per capita. and CTL is the selected control variables.

2. Objective two: The objective investigates the effect of budgetary allocation to healthcare, using public (taxes and external assistance that pass through the budget) resources on the health outcomes in the SSA region. The specific independent variables used are:
 - a. The government expenditure in healthcare as a percentage of general (total) government expenditure (GHEGGE) and,
 - b. The government healthcare expenditure as a percentage of the gross domestic product (GHEGDP).

The general model to investigate the effect of government expenditure on the health outcomes of the SSA region is restated in the Cobb-Douglas format as follows.

$$HOC_{ijt} = \beta_0 + \beta_1 GHEGGE_{jt} + \beta_2 GHEGDP_{jt} + \beta_3 CTL_{ijt} + \epsilon_{jt} \quad (3.23)$$

Where, β_0 is the constant of the model, β are the vectors of the parameters, HOC_{ijt} is the health systems' outcomes i in country j , at time t , $GHEGGE_{jt}$ is the government expenditure in healthcare as a percentage of general government expenditure in country j in year t . $GHEGDP$ is government healthcare expenditure as a percentage of GDP. And, CTL_{ijt} is the selected control variables i in country j at time t respectively, and ϵ_{ijt} is the error term.

3. Objective three: The study uses the objective to investigate the influence that the financial pooling of healthcare resources in SSA has on the health outcomes of the region. We use the following general specification to investigate this relationship.

$$HOC_{ijt} = \beta_0 + \beta_1 FPUTCHE_{ijt} + \beta_2 FPPTCHE_{ijt} + \beta_3 CTL_{ijt} + \epsilon_{jt} \quad (3.24)$$

Where $FPUTCHE_{ijt}$ is health expenditures from publicly pooled financing sources as a percentage of total healthcare expenditure, $FPPTCHE_{ijt}$ is health expenditure from private pooled resources, and CTL_{ijt} is the selected control variable.

The above specifications provide the general framework upon which each objective of the study is investigated. Note that the analysis of the effect is based on the size and direction of the coefficient of the

explanatory variable. The coefficients of the explanatory variables denote the change in health outcomes due to one unit/percentage change in the independent variable in question holding the other variables constant.

3.2.4 Population

The study is based in sub-Saharan Africa. The population of the study is all member countries of the World Health Organization (WHO) from sub-Saharan Africa. The region has 48 countries all of which are members of WHO. Out of the 48 countries, two, Southern Sudan and Somalia have been excluded from the study due to lack of the required data.

3.2.5 Data Sources and Data Integrity

Data for most variables are obtained from the World Health Organization and the World Bank. Additional data is collected from the United Nations. Table (3.2) below outlines the data that is collected for this study and their sources.

Table 3 2: Sources of Data

S/N	Data	Database	Source of Data
1	Health expenditure data	Health Expenditure Database	The World Health Organization
2	Health Systems' outcomes and health-related data	World Development Indicators and Health, Nutrition & Population Databases	The World Bank
3	Income concentration index data	The Standardized World Inequality Database	United Nations Development Programme
4	Inequality Data	World Inequality Index Database	The World Bank
5	Employment data	International Labour Organization	The World Bank

The study uses pooled panel data for 19 years, from 2000 to 2018. The data is from 47 countries in sub-Saharan Africa (SSA). The main source of data is the WHO Health Expenditure Database (WHO-DB), which is the source of all healthcare expenditure – the predictor variables. The other sources of data are the World Bank-World Development Indicator Database (WB-WDI) from where we got our dependent variables, that is, the life expectancy at birth (LEB), the crude death rate (CDR), the under-5 mortality rate (U5MR) and maternal mortality rate (MMR) data. The control variables like the Gini Index data and the after-tax income share held by different levels of socio-economic groups in a country are sourced from the World Inequality Index Database (WIID) of the

United Nations. And, the quality of governance indicators data is sourced from the World Bank Worldwide Governance Indicators Database.

3.2.6 Data Cleaning and Statistical Integrity Tests

The level of significance accepted for all our models is a 5% (0.05) significance level. We conducted various analytical diagnoses on the data before we carried out regression. According to the data sources, sub-Saharan Africa countries operate mixed (i.e., use many methods in financing healthcare) systems of health financing. These included data mining, cleaning, and correlation tests. Our panel analysis shows that the panel variable is strongly balanced, therefore, we can use panel data analysis techniques.

Because our panel data have long time series (19 years) and long cross-sections (47 countries), before each estimation we have to carry out unit root and cointegration tests. We made use of Stata 15 software in making the tests and estimating the models. Based on the results of the Fisher-type unit-root test we rejected the null hypothesis that all panels contain unit-roots for all our regressands since all the p-value results, from the tests, were less than 0.05 for all our specifications.

To control for omitted variable bias due to unobserved heterogeneity, which poses interpretational problems in panel data, such as ours, we conducted fixed and random effect tests. The fixed-effect (FE) model is a statistical model where the model parameters are fixed, meaning non-random. FE is useful for this study because we suspect unobserved confounders. According to Allison (2009) and Schunck (2013) FE is particularly robust against unobserved heterogeneity. What makes FE particularly robust is its ability to wipe out group-specific unobserved heterogeneity thereby, allowing a causal effect to be observed under weaker assumptions (Gangl, 2010). On the other hand, random effect (RE) models assume that all or some model's parameters are random variables. Because FE does not estimate the effect of any variable that does not vary within clusters, the RE provides the solution to this problem (Allison, 2009; Wooldridge, 2010). Furthermore, RE, exploits the time structure of the composite errors and, as a result, becomes more efficient where group means are random if orthogonality conditions are met (Phillips & Sul, 2007). This is because the RE assumes that the individual-specific

effects are uncorrelated with the regressors. It tests whether the unique errors are correlated with regressors or not.

For the current study, the random-effect model was estimated using the Generalized Least Square (GLS) regression and fixed effect using the within-effect estimation. We employed the Hausman specification to compare the estimates of the random effect and fixed-effect models. The Hausman (1978) test (estimation) helps in determining the model (FE or RE) to use in estimating the results of regressions. The null hypothesis in the Hausman test is that the preferred model is a random effect, and the alternative is a fixed-effect model.

We also carried model fitness tests under each model; the F-test for the fixed effect (FE) model and the Wald χ^2 test for the random effect (RE) model for each model. After each regression, we present the results of these tests, in table form, together with the regression estimates.

Although we have included the FE and RE within-group r-squared in our regression extracts, we have also shown the r-square (R^2) from pooled regression after absorbing the panel (country indicators). This is because FE and RE models provide inaccurate R^2 results (Park, 2011). The models estimate within and between-groups variations by computing the differences between observed values and their means, therefore, due to the large degrees of freedom required to do this, the standard errors and consequently, R^2 statistics are incorrect (Park, 2011). As a result, Park recommends the use of R^2 after absorbing the panel. We have also provided an adjusted R-squared for robustness purposes.

Because the governance data from the Worldwide Governance Indicators (WGI) have a narrow range (-2.5 to 2.5) of only 5, which is equivalent to 20% points. To improve the quality of our reporting we decided to transform the data by expanding the range to 100. We did this by first, removing the negative indicators by adding 2.5 to all the WGI data that we used (i.e., control of corruption, regulatory quality & political stability). This action transforms the weakest indicator to (0) zero from -2.5 and the strongest from 2.5 to 5. Secondly, we multiplied the results of our first action by 20, doing this transforms the weakest performance to 0 (zero) and the strongest

performance to 100. However, to facilitate comparison, we present the regression results before and after transforming the data. We note that the results of the two actions are similar.

Where necessary, we carried out logarithmic transformation. According to Berk & Monheit (2001) when data departs substantially from a normal distribution the effect of skewness affects the effectiveness with which computed estimates capture the true population parameters. If this is the case, they recommend logging the skewed data to treat the problem. We carried out a skewness test before log transformation. This means that only data that are skewed (substantially) are transformed using logging.

We also use dynamic modeling techniques to test the robustness of our findings and to improve the quality of our results. We employed two dynamic models, time lagging and the general method of moments (GMM). Although there is no consensus, some experts (e.g., Blakely, 2000; Law et al., 2016; Novignon & Lawanson, 2017) argue that expenditure on social items, such as health and education, and their outcomes are not contemporaneously related. That expenditure impacts health outcomes. for example, after some time. For this reason, they recommend the time lagging of the predictor or response variables. Although the lagging period is not specified, the present study used a year lag of the response variables. We argue that lagging for more than one year may make it more difficult to determine the real effect of health expenditure on health outcomes in a particular period as there could be overlapping effects due to a prolonged lagging period.

The other dynamic modeling technique employed in the present study is the general method of moment (GMM). GMM is part of the Gaussian mixture models used to deal with endogeneity. GMM is particularly robust when dealing with endogeneity in panel data because it removes dynamic endogeneity bias by internally transforming the data (Ullah et al., 2018). GMM is also robust against outliers, unobserved heterogeneity, and simultaneity (Ketokivi & McIntosh, 2017; Ullah et al., 2018; Zaefarian et al., 2017), all of which we suspect can affect the findings of this study due to the nature of the data.

To give more meaning to the effect of healthcare expenditure on health outcomes, we translated some results from the correlation-generated vectors (coefficients of the explanatory variables) to real numbers. This is

in terms of the real number of people represented by the vector. We used the SSA region's total population in 2018, which was estimated at 1.1 billion at the time. For the crude death rate (CDR) the transformation is based directly on the 1.1 billion because crude death is given per 1,000 people in the population. For example, a vector result of 0.005 is equivalent to 5 500 ($0.005 \times 1\,100\,000\,000 \div 1\,000$) crude deaths in actual number.

However, we cannot translate maternal mortality rates (MMR) and under-5 mortality rates (U5MR) in this way because they are given in terms of crude birth rates (CBR) and not in terms of total population. This means that we first have to determine the crude birth rate and then use the total population to transform it into real numbers by multiplying the rate by the total population. Because we are dealing with several years, we decided to use the average CBR in the period. We did this by extracting the portion of the results of the descriptive statistics that speak to CBR. The extract presented in table 3 3 below shows that the mean birth rate in the period is 36.77. According to the United Nations, CBR is the number of live births per 1,000 mid-year population. This means that using the average CBR we can compute the average real (actual) number of births in the study period. We first computed the number of live births using the total population and then used the results to work out the actual effect of independent variables on U5MR and MMR.

Table 3 3: Sub-Saharan Africa Crude Birth Rate

Variable	Obs	Mean	Std. Dev.	Min	Max
Crude birth rate	894	36.768	7.543	10.1	53.541

Source: Authors' Computation

The real average number of births (*ANB*) during the period can be computed using the region's total population of 1.1 billion as follows:

$ANB = TPOP \times ACBR$, where *TPOP* is the region's total population (1.1 billion) and *ACBR* is the *CBR* (36.77) giving us an *ANB* of approximately 40.4 million ($36.77 \times 1\,100\,000\,000 \div 1\,000$) live births. We use this figure (40.4 million) to translate our findings on the effect of independent variables on MMR and U5MR to real numbers by multiplying the regression-generated rates after treatment by the number. We note that U5MR is given in terms of 1 000 live births and MMR is based on 100 000 live births. This means that if our regression results show a vector of 0.005 for U5MR and MMR, then the actual number of under-5 deaths is 202

$(0.005 \times 40\,400\,000 \div 1\,000)$ and, the actual number of maternal deaths is 2.02 $(0.005 \times 40\,400\,000 \div 100\,000)$. Note that we are using the average CBR (40 400 000) and not the population (1 100 000 000) in the case of U5MR and MMR.

CHAPTER FOUR

4. EMPIRICAL ANALYSIS AND RESULTS OF DOMESTIC FINANCING METHOD ON HEALTH OUTCOMES

The chapter concentrates on discussing the results of the investigation that refer only to objective one. We recall the model specifications as stated in chapter three. We provide the regression results on the effect of the financing methods on health outcomes and the interpretation of these results. More specifically, we investigate the effect of the use of domestic resources on sub-Saharan Africa's health outcomes. For purposes of clarity, we refer to the objective in this chapter as 'the study', specifically to the objective headlined under chapter four. Both descriptive and inferential analysis methods have been used in the investigation.

4.1 Purpose of the Study and Model of the Relevant Specification

Objective one of this study reads as follows:

- To establish the effect of using domestic sources to finance healthcare on health outcomes of the Sub-Saharan Africa (SSA) region.

As we had explained earlier, SSA cannot continue relying on external support to finance its healthcare needs. We note that external support has been decreasing and pledges for support from external financing sources have become less reliable (McIntyre et al., 2018; Olakunde et al., 2019). It has, therefore, become increasingly necessary for the region to put more of its domestic resources into the financing of its healthcare needs. We argue that this is the only way to improve the region's health outcomes sustainably.

Three target independent variables were identified to assist with the investigation, these are:

1. The domestic public/government healthcare expenditure per capita (DGHEPCP)
2. The domestic private healthcare expenditure per capita (DPHEPCP)
3. External healthcare expenditure per capita (EXTHEPCP)

To facilitate cross-country comparison the independent variables are reported in the form of purchasing power parity (PPP) and in terms of international US dollar (int. USD)

We generated two research questions for this study, these are:

1. How does increase in the use of domestic public resources affect health outcomes in sub-Saharan Africa?
2. How does increase in the use of domestic private resources affect health outcomes in sub-Saharan Africa?

To answer these research questions, we use the empirical estimation models explained hereafter.

4.1.2 The Analytical Models

The general econometric specification of this objective is in Cobb-Douglas form as restated below from equation 3.1.1:

$$HOC_{ijt} = \beta_0 + \beta_1 DHEPCP_{ijt} + \beta_2 CTL_{ijt} + \epsilon_{jt} \quad (4.1)$$

Where, HOC_{ijt} are health outcomes i in country j in year t , β_0 is the constant of the model, β_s are the vectors of the estimated parameters. $DHEPCP_{ijt}$ is the domestic healthcare expenditure per capita from domestic financing source i in country j at year t and CTL is a vector of selected control variables.

To allow us to carry out the analysis in terms of private and public domestic expenditure as well as external health expenditure, the model in equation 4.1 was, therefore, re-specified as follows:

$$HOC_{ijt} = \beta_0 + \beta_1 DGHEPCP_{ijt} + \beta_2 DPHEPCP_{ijt} + \beta_3 EXHEPCP_{ijt} + \beta_4 CTL_{ijt} + \epsilon_{jt} \quad (4.2)$$

Where $DGHE$ and $DPHE$ are domestic public and private healthcare expenditures, respectively. And, $EXHE$ is external healthcare expenditure.

We estimated the random effect (RE) model by the generalized least square (GLS) and the fixed effect (FE) was estimated by pooled ordinary least square using cross-section weights through GLS.

4.2. Estimation Techniques

To investigate how the use of internally generated resources affects health outcomes of the SSA region, we have used the per capita variables stated in terms of international USD. To have a more complete picture of the association between domestic expenditure and health outcomes we have included expenditure from external sources in the analysis. As we have explained, to our knowledge, there is no empirical study in SSA that has investigated the relationship between domestic healthcare expenditure and health outcomes.

The reason why we disaggregated DHEPCP into public (government) and private healthcare expenditure is to find out more information based on whether the financing is from government or private financing sources.

The model, just like the other related models, used life expectancy at birth (LEB), the under-5 mortality rate (U5MR), the crude death rate (CDR), and maternal mortality rate (MMR) as health status (outcome) indicators (i.e., as the dependent variables). As explained earlier, we used pooled panel data from 2000 to 2018, for 47 countries. The data used for empirical analysis were sourced from the WHO Health Expenditure Database, World Development Indicators Database, and World Bank. As explained in chapter three the data form a balanced panel. We start with a pre-estimation analysis of the data.

4.2.1 Pre-estimation Analysis

Before carrying out the investigations using the described empirical estimation techniques, we conducted various analytical diagnoses on the data as explained in chapter three. These included data cleaning, and correlation tests (Table 3.3). Because our panel data have high time series (19 years) and long cross-sections (47 countries), before each estimation, we carried out unit-root and cointegration tests. Based on the results of the Fisher-type unit root test, we rejected the null hypothesis that all panels contain unit-roots for all our regressands since all the p-value results from the tests were less than 0.05 for all our specifications. We also carried out a log transformation on healthcare expenditure per capita data after determining that these data are positively skewed.

4.3 Empirical Results and Analysis of Findings

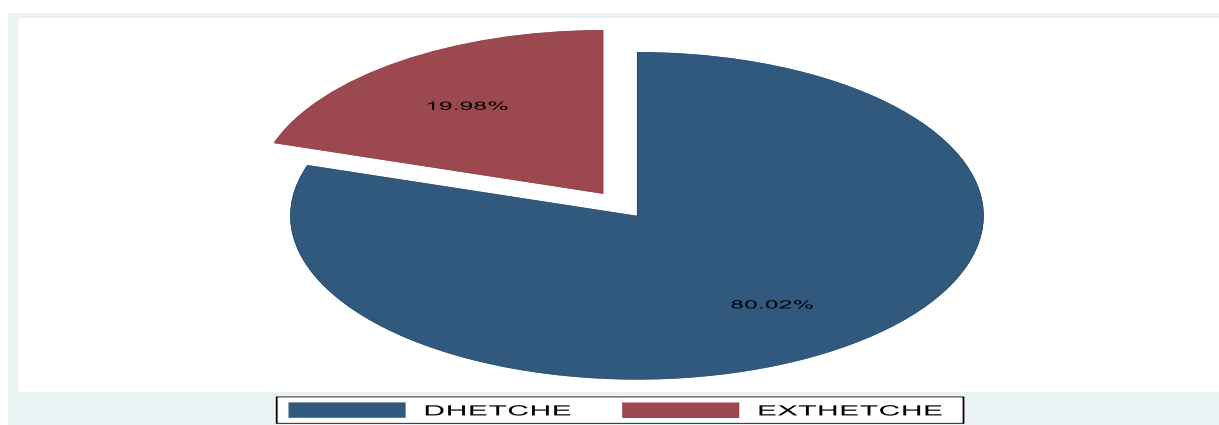
We start the analysis of the effect of domestic healthcare expenditure on health outcomes by describing the nature of the data. We also carry out an analysis of the general relationship between the model's independent variables and the dependent variables using fitted scatter graphs and bivariate correlation analysis and, end the investigation by carrying out a correlation analysis using inferential statistics.

4.3.1 Descriptive Statistics and Trend Analysis

We discuss the descriptive statistics that relate to objective one in this section. Those that refer to other objectives are discussed in the sections that deal with those objectives. Fig. 4.1 shows that during the study

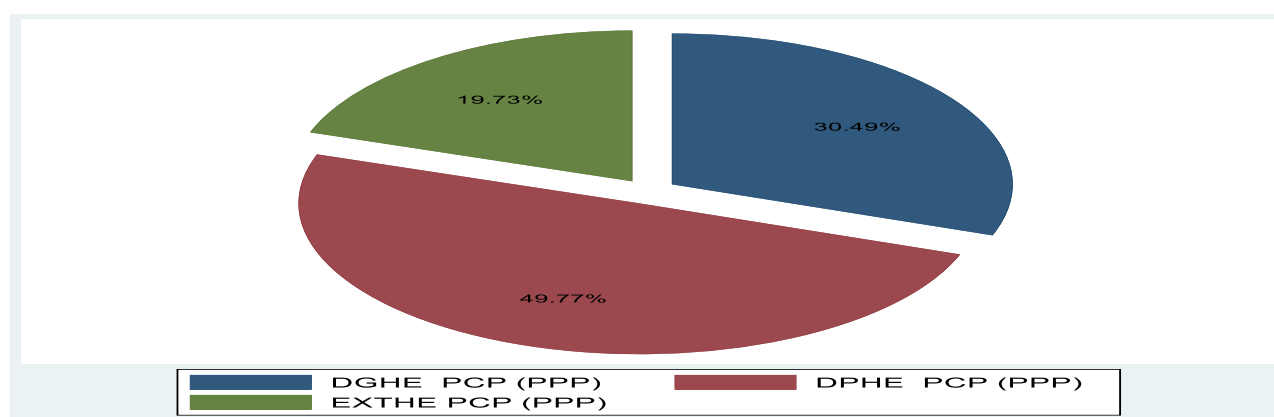
period, the domestic healthcare expenditure (DHE) for the SSA region averaged 80% of the total current healthcare expenditure (TCHE). This means that healthcare in the region is mainly financed using domestic resources.

Figure 4 1: The Ratio of Domestic and External Healthcare Expenditure on Total Healthcare Financing Mix



Out of the total healthcare expenditure per capita during the study period, almost 50% is financed by domestic private (DPHE PCP (PPP)) resources (Fig. 4 2). The other 30% is financed using domestic resources from governments (DGHE PCP (PPP)). The rest (20%) is financed using external assistance (EXTHE PCP (PPP)). This means that most of the region's healthcare needs are financed by private means.

Figure 4 2: Per Capita Domestic Government and Private and, External Healthcare Expenditure and Healthcare Expenditure



After providing the share of each source of healthcare financing in the region's healthcare financing mix, we carried out initial diagnostic tests on the data. The diagnostic tests for skewness show that all the dependent variables are positively skewed (Appendixes 2 – 4). Therefore, we log-transformed the data before carrying out regression analysis. The trend analysis using scatter graphs (Appendixes 5 – 8) shows that the direction of the relationship between domestic expenditure in healthcare and health outcomes is consistent with the a priori expectation of health capital theory. After the initial diagnostic tests, we carried out further trend analysis using bivariate correlation tests. The bivariate analysis provides us with a rough idea of the direction and extent of the effect of each financing method on health outcomes.

Table 4 1: The Fixed and Random Effects of Domestic Private Healthcare Expenditure Per Capita on Health Outcomes.

VARIABLES	Fixed Effect Model				Random Effect Model			
	(1) LEB	(2) U5MR	(3) CDR	(4) MMR	(1) LEB	(2) U5MR	(3) CDR	(4) MMR
Log DPHEPCP (PPP)	5.599*** (0.370)	-37.34*** (2.218)	-3.149*** (0.215)	-186.8*** (13.10)	4.767*** (0.338)	-31.88*** (2.034)	-2.390*** (0.190)	-174.5*** (12.49)
Constant	34.35*** (1.546)	249.0*** (9.274)	24.02*** (0.901)	1,329*** (54.55)	37.79*** (1.648)	226.2*** (9.904)	20.85*** (0.888)	1,279*** (67.67)
Observations	883	883	883	836	883	883	883	836
R ² absorbed panel	0.767	0.772	0.680	0.881	0.767	0.772	0.680	0.881
Adjusted R ²	0.754	0.759	0.662	0.874	0.754	0.759	0.662	0.874
R ² -within	0.216	0.253	0.204	0.205	0.216	0.253	0.204	0.205
F-statistics	229.42 (1 835)	283.45 (1 835)	213.82 (1 835)	203.43 (1 788)	—	—	—	—
Wald χ^2	—	—	—	—	198.55	245.74	158.74	195.12
Hausman test results	Yes	Yes	Yes	Yes	No	No	No	No
Number of Id	47	47	47	47	47	47	47	47

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Key: LEB – life expectancy at birth, U5MR – under-5 mortality rate, CDR – crude death rate and MMR – maternal mortality rate

Hausman's test recommends the use of FE on all estimations of the effect of domestic healthcare expenditure on health outcomes. The FE bivariate results (Table 4 5) on the effect of increasing domestic private healthcare expenditure per capita (DPHEPCP) show that increasing DPHEPCP is significantly associated with improvement in health outcomes. Likewise, the FE results (Table 4 6 and Table 4.7) also show that increasing

domestic government healthcare expenditure per capita (DGHEPCP) and external health expenditures per capita (EXTHEPCP) have similar effects on health outcomes as that of increasing DPHEPCP.

Table 4 2: The Fixed and Random Effects of Domestic Government Healthcare Expenditure Per Capita on Health Outcomes.

VARIABLES	Fixed Effect Model				Random Effect Model			
	(1) LEB	(2) U5MR	(3) CDR	(4) MMR	(1) LEB	(2) U5MR	(3) CDR	(4) MMR
Log DGHEPCP (PPP)	4.443*** (0.268)	-25.57*** (1.680)	-2.330*** (0.159)	-96.45*** (10.25)	4.008*** (0.248)	-23.54*** (1.503)	-1.922*** (0.143)	-99.64*** (9.674)
Constant	41.40*** (0.989)	187.1*** (6.205)	19.43*** (0.588)	905.6*** (37.67)	42.98*** (1.216)	179.5*** (6.962)	17.93*** (0.653)	917.1*** (51.38)
Observations	883	883	883	836	883	883	883	836
R ² - absorbed panel	0.777	0.761	0.68	0.865	0.777	0.761	0.68	0.865
Adjusted R ²	0.764	0.747	0.662	0.857	0.764	0.747	0.662	0.857
R ² -within	0.248	0.217	0.204	0.101	0.248	0.217	0.204	0.101
F-statistics	275.19 (1 835)	231.54 (1 835)	213.71 (1 835)	88.49 (1 788)	—	—	—	—
Wald χ^2	—	—	—	—	260.6	245.44	180.91	106.09
Hausman test results	Yes	Yes	Yes	Yes	No	No	No	No
Number of Id	47	47	47	47	47	47	47	47

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Key: LEB – life expectancy at birth, U5MR – under-5 mortality rate, CDR – crude death rate and MMR – maternal mortality rate

Table 4 3: The Fixed and Random Effects of External Healthcare Expenditure Per Capita on Health Outcomes.

VARIABLES	Fixed Effect Model				Random Effect Model			
	(1) LEB	(2) U5MR	(3) CDR	(4) MMR	(1) LEB	(2) U5MR	(3) CDR	(4) MMR
Log EXTHEPCP (PPP)	2.728*** (0.157)	-18.50*** (0.924)	-1.587*** (0.0905)	-91.40*** (5.327)	2.600*** (0.155)	-17.96*** (0.914)	-1.498*** (0.0890)	-89.98*** (5.298)
Constant	49.80*** (0.467)	146.9*** (2.758)	15.48*** (0.270)	816.3*** (15.77)	50.17*** (0.968)	145.0*** (5.850)	15.22*** (0.475)	810.8*** (47.01)
Observations	875	875	875	828	875	875	875	828
R ² - absorbed panel	0.781	0.794	0.704	0.892	0.781	0.794	0.704	0.892
Adjusted R ²	0.768	0.783	0.688	0.886	0.768	0.783	0.688	0.886
R ² -within	0.268	0.326	0.271	0.274	0.268	0.326	0.271	0.274
F – statistics	303.40 (1, 827)	400.79 (1, 827)	307.32 (1, 827)	294.40 (1, 780)	—	—	—	—
Wald χ^2	—	—	—	—	279.75	386.33	287.57	288.40
Hausman test results	Yes	Yes	Yes	Yes	No	No	No	No
Number of Id	47	47	47	47	47	47	47	47

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Key: LEB – life expectancy at birth, U5MR – under-5 mortality rate, CDR – crude death rate and MMR – maternal mortality rate

We note however, that according to the results of the bivariate models, the size of the coefficients associating DPHEPCP with health outcomes are larger than those associating DGHEPCP and EXTHEPCP with health outcomes. This suggests that increasing per capita domestic private healthcare expenditure may be more beneficial to the region's health equity compared with the use of publicly sourced domestic resources and reliance on external funding.

Before we can draw strong inferences from the bivariate association between health outcomes and the financing of healthcare using domestic resources, we carry out a deeper analysis of the association by using multivariate models whilst controlling for other factors that would ordinarily affect health outcomes.

4.3.2 Empirical Estimations and Results

Guided by equation 4.2 we carry out investigations on the effect of increasing domestic healthcare expenditure on health outcomes using a multivariate inferential statistic. Accordingly, we have included carefully selected control variables, as we explained in an earlier chapter.

We present the results of fixed effect (FE) and random effect (RE) models of life expectancy at birth (LEB), the under-5 mortality rate (U5MR), the crude death rate (CDR), and the maternal mortality rate (MMR) in Table 4.7. The results of the Hausman test show that RE is inefficient in estimating the results of explanatory variables on health outcomes. The results also show that more than 90% of variations in LEB, U5MR, CDR, and MMR are due to variations in explanatory variables used in this model. Both the results of the Wald χ^2 and the F-statistics show that these models are better than the cursory bivariate models we used earlier to explain these relationships.

According to the FE models (Table 4.4) domestic government (public) healthcare expenditure per capita (DGHEPCP) has no significant effect on the SSA region's health outcomes. On the other hand, domestic private healthcare expenditure per capita (DPHEPCP) is significantly associated (in a positive way) with the region's health outcomes. Although showing the a priori expected effect on all health outcomes, external healthcare

expenditure per capita (EXTHEPCP) loses its significant effects posted under the bivariate models on all health outcomes except for maternal deaths (MMR).

Table 4 4: The Multivariate Fixed and Random Effects of Domestic and External Healthcare Expenditure Per Capita on Health Outcomes.

VARIABLES	Fixed Effect Model				Random Effect Model			
	(1) LEB	(2) U5MR	(3) CDR	(4) MMR	(1) LEB	(2) U5MR	(3) CDR	(4) MMR
Log DGHEPCP (PPP)	-0.0601 (0.436)	-2.592 (3.048)	0.251 (0.288)	45.02* (23.87)	0.185 (0.492)	-5.343 (3.552)	0.103 (0.328)	28.79 (27.09)
Log DPHEPCP (PPP)	4.697*** (0.747)	-18.41*** (5.225)	-2.918*** (0.493)	-171.5*** (40.92)	1.906*** (0.737)	-6.148 (5.352)	-1.499*** (0.496)	-104.1** (42.48)
Log EXTHEPCP (PPP)	0.141 (0.355)	-3.015 (2.481)	-0.194 (0.234)	-64.84*** (19.45)	0.873** (0.368)	-8.539*** (2.663)	-0.677*** (0.247)	-79.96*** (20.79)
Immunization BCG	0.0537*** (0.0188)	-0.575*** (0.131)	-0.0338*** (0.0124)	-3.496*** (1.029)	0.0903*** (0.0205)	-0.810*** (0.148)	-0.0592*** (0.0137)	-4.783*** (1.143)
Control of corruption	0.125 (0.921)	-12.04* (6.448)	-0.986 (0.608)	-90.42* (51.87)	0.847 (0.964)	-5.751 (6.973)	-0.802 (0.646)	-88.85 (55.24)
Gini index (x100)	-0.385 (0.278)	9.385*** (1.945)	0.618*** (0.184)	54.98*** (15.25)	-0.661*** (0.158)	3.653*** (1.163)	0.444*** (0.109)	35.56*** (10.16)
Internet usage	0.102*** (0.0266)	-0.187 (0.186)	-0.0342* (0.0176)	-1.502 (1.465)	0.166*** (0.0269)	-0.706*** (0.195)	-0.0778*** (0.0180)	-3.197** (1.521)
Wages & salaries	-0.210** (0.0973)	1.148* (0.681)	0.153** (0.0643)	10.82** (5.369)	0.0422 (0.0636)	-0.120 (0.466)	-0.00303 (0.0433)	-6.606* (3.972)
Urban population	0.601*** (0.0979)	-4.561*** (0.685)	-0.418*** (0.0647)	-35.26*** (5.379)	0.128*** (0.0455)	-0.933*** (0.335)	-0.0966*** (0.0313)	-8.230*** (2.996)
Unemployment	0.223* (0.127)	-2.780*** (0.887)	-0.231*** (0.0837)	-8.829 (7.116)	-0.157 (0.0968)	-0.564 (0.707)	0.0466 (0.0657)	-5.093 (5.916)
Use of sanitation services	0.233*** (0.0724)	-0.879* (0.506)	-0.127*** (0.0478)	6.506 (3.990)	0.00102 (0.0672)	0.156 (0.488)	0.0102 (0.0453)	10.34*** (3.920)
GEEGGE	0.0333 (0.0326)	-0.561** (0.228)	-0.0104 (0.0215)	4.058** (1.858)	0.109*** (0.0353)	-1.158*** (0.255)	-0.0614*** (0.0235)	-0.00167 (2.027)
Constant	24.96* (13.61)	28.89 (95.28)	15.19* (8.990)	265.0 (745.2)	59.84*** (7.554)	138.0** (55.53)	8.759* (5.182)	348.4 (485.7)
Observations	191	191	191	189	191	191	191	189
R ² - absorbed panel	0.952	0.941	0.944	0.957	0.952	0.941	0.944	0.957
Adjusted R ²	0.943	0.930	0.933	0.949	0.943	0.930	0.933	0.949
R ² -within	0.752 40.23	0.731 35.96	0.718 33.83	0.638 23.04	0.686	0.630	0.640	0.553
F – statistics	(12, 159)	(12, 159)	(12, 159)	(12, 159)	-	-	-	-
Wald χ^2	-	-	-	-	325.78	255.65	255.16	176.21
Hausman test results	Yes	Yes	Yes	Yes	No	No	No	No
Number of Id	20	20	20	20	20	20	20	20

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Key: LEB – life expectancy at birth, U5MR – under-5 mortality rate, CDR – crude death rate and MMR – maternal mortality rate

As we stated in chapter 3, some experts (e.g., Novignon & Lawanson, 2017; Zaefarian et al., 2017) recommend the use of dynamic models to improve the quality of findings in a study like this one, we carried out further analysis using dynamic modeling techniques. We used a one-year time lagging and the general method of moment (GMM) techniques. The results of these analyses are shown in Tables 4.5 and 4.6.

Table 4 5: The Multivariate Fixed and Random Effects of Domestic and External Healthcare Expenditure Per Capita on Lagged Health Outcomes.

VARIABLES	Fixed Effect Model				Random Effect Model			
	(1) Lag LEB	(2) Lag U5MR	(3) Lag CDR	(4) Lag MMR	(1) Lag LEB	(2) Lag U5MR	(3) Lag CDR	(4) Lag MMR
Log DGHEPCP (PPP)	0.766* (0.389)	-4.570* (2.561)	-0.309 (0.244)	-6.344 (18.11)	0.698* (0.401)	-4.158 (2.738)	-0.248 (0.253)	-5.467 (18.98)
Log DPHEPCP (PPP)	3.692*** (0.633)	-17.91*** (4.168)	-2.315*** (0.397)	-148.2*** (29.48)	2.675*** (0.614)	-15.35*** (4.246)	-1.889*** (0.391)	-132.9*** (29.82)
Log EXTHEPCP (PPP)	0.768** (0.343)	-5.931*** (2.259)	-0.621*** (0.215)	-75.06*** (15.98)	1.075*** (0.342)	-7.867*** (2.351)	-0.812*** (0.217)	-77.92*** (16.42)
Immunization BCG	0.0396** (0.0167)	-0.527*** (0.110)	-0.0278*** (0.0105)	-3.146*** (0.779)	0.0500*** (0.0172)	-0.569*** (0.118)	-0.0339*** (0.0109)	-3.319*** (0.818)
Control of corruption	-1.400 (0.861)	-1.807 (5.669)	0.197 (0.540)	-40.54 (40.10)	-0.448 (0.857)	-3.626 (5.896)	-0.0861 (0.544)	-62.12 (41.17)
Gini index (x100)	-0.242 (0.251)	5.993*** (1.652)	0.457*** (0.157)	23.80** (11.68)	-0.573*** (0.178)	4.141*** (1.290)	0.455*** (0.116)	24.70*** (9.570)
Internet usage	0.0921*** (0.0251)	-0.00368 (0.165)	-0.0360** (0.0158)	-0.661 (1.170)	0.129*** (0.0233)	-0.339** (0.161)	-0.0626*** (0.0148)	-1.451 (1.133)
Wages & salaries	-0.186** (0.0897)	1.295** (0.591)	0.153*** (0.0563)	11.60*** (4.178)	-0.0315 (0.0655)	0.105 (0.470)	0.0521 (0.0425)	0.324 (3.457)
Unemployment	-0.0952 (0.113)	-0.106 (0.746)	-0.00953 (0.0711)	2.573 (5.276)	-0.181** (0.0917)	0.0405 (0.649)	0.0512 (0.0591)	-1.343 (4.694)
Urban population	0.461*** (0.0840)	-4.557*** (0.553)	-0.352*** (0.0527)	-27.02*** (3.910)	0.212*** (0.0539)	-2.009*** (0.396)	-0.167*** (0.0355)	-13.34*** (2.983)
Access to sanitation services	0.182*** (0.0648)	-0.586 (0.427)	-0.0852** (0.0407)	4.018 (3.018)	0.0981 (0.0622)	-0.391 (0.431)	-0.0435 (0.0396)	4.736 (3.031)
Constant	26.29** (11.59)	151.0** (76.33)	18.27** (7.276)	1,411*** (539.9)	51.57*** (8.243)	151.1** (59.90)	11.37** (5.389)	1,054** (446.0)
Observations	248	248	248	248	248	248	248	248
R-within	0.717	0.701	0.707	0.638	0.699	0.668	0.687	0.614
F- statistics	50.07	46.23	47.69	34.7				
Wald					480.83	394.85	446.79	320.51
Hausman test results	Yes	Yes	Yes	Yes	No	No	No	No
Number of Id	20	20	20	20	20	20	20	20

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Key: lag LEB – life expectance at birth legged by 1 year, lagU5MR – under-5 mortality rates lagged by 1 year, CDR – crude death rates lagged by 1 year and MMR – maternal mortality rates lagged by 1 year

Although we have tested for unit root problems using Fisher-type unit-root test and ruled out the problem. And also took care of omitted variable bias due to unobserved heterogeneity using the fixed (using within effect estimations) and random (using GLS) effect models as recommended by experts (e.g., Gangl, 2010; Phillips & Sul, 2007), as we noted in the previous chapter, dynamic modeling techniques provide additional safeguards (Phillips & Sul, 2007; Zaefarian et al., 2017). Particularly because healthcare expenditure may not be contemporaneously related to health outcomes (Novignon & Lawanson, 2017), or because of endogeneity and simultaneity biases that cannot be effectively addressed through FE or RE modeling techniques (Ketokivi & McIntosh, 2017).

The one-year time lag regression results (Table 4.5) show that although the sizes of the coefficients of DGHEPCP on health outcomes increase after lagging the outcomes by one year, its effect on health outcomes remains statistically insignificant. Likewise, the coefficients of DPHEPCP on health outcomes remain significantly positive on both the lagged FE models (Table 4.5) and unlagged (contemporaneous) FE models (Table 4.4), but the coefficients of lagged FE models have shrunk. We notice a remarkable difference in the results of the effect of EXTHEPCP on health outcomes when response variables are lagged by one year as opposed to when they are not lagged. The results of the contemporaneous impact of EXTHEPCP on health outcomes show that apart from MMR, EXTHEPCP does not affect any other health outcome significantly, while those of lagged models show that EXTHEPCP affects all health outcomes significantly. We also note that the sizes of the coefficients of lagged FE models are larger than those of contemporaneous FE models.

Compared to the results of contemporaneous and lagged FE models, the results of GMM regression analysis (Table 4.6) show that although the effect of DGHEPCP on health outcomes remains statistically insignificant on LEB, U5MR and CDR, it becomes significant on MMR. This is the only instance where DGHEPCP is significantly associated with any health outcomes. On the other hand, although the coefficients of DPHEPCP shrink, they retain their significant effect on all health outcomes except U5MR. The sharp reduction in the size of the effect of DPHEPCP can be because of dynamic endogeneity bias. This is because GMM accounts for dynamic endogeneity bias, a problem that both FE and RE do not account for.

Table 4 6:The Multivariate GMM Effects of Domestic and External Healthcare Expenditure Per Capita on Health Outcomes.

VARIABLES	(1) LEB	(2) U5MR	(3) CDR	(4) MMR
L.LEB	0.860*** (0.00652)			
Log DGHEPCP (PPP)	0.0110 (0.0237)	0.413 (0.256)	-0.00207 (0.0147)	4.844** (2.341)
Log DPHEPCP (PPP)	0.209*** (0.0555)	-1.283** (0.509)	-0.115*** (0.0333)	-10.73** (4.617)
Log EXTHEPCP (PPP)	0.0523*** (0.0199)	0.333 (0.220)	-0.0340*** (0.0125)	4.609** (1.962)
Immunization BCG	0.00605*** (0.000969)	-0.0293*** (0.0108)	-0.00306*** (0.000592)	-0.207** (0.0974)
Control of corruption	-0.0983* (0.0595)	1.311** (0.616)	0.0550 (0.0358)	4.395 (5.666)
Gini index (x100)	-0.173*** (0.0259)	0.731** (0.284)	0.108*** (0.0159)	1.699 (2.239)
Internet usage	-0.00407*** (0.00143)	0.0311** (0.0151)	0.00318*** (0.000855)	0.244* (0.137)
Wages & salaries	0.0109 (0.00695)	-0.157** (0.0687)	-0.00603 (0.00417)	0.339 (0.613)
Urban population	0.0464*** (0.00783)	-0.228** (0.0887)	-0.0161*** (0.00453)	-1.094 (0.689)
Unemployment	-0.0210** (0.00881)	-0.0840 (0.0858)	0.00395 (0.00526)	1.455* (0.819)
Use of sanitation services	0.0409*** (0.00495)	-0.0360 (0.0530)	-0.0214*** (0.00306)	-1.331*** (0.438)
GEEGGE	0.00103 (0.00193)	0.0636*** (0.0212)	0.000426 (0.00119)	0.769*** (0.206)
L.U5MR		0.889*** (0.0104)		
L.CDR			0.866*** (0.00625)	
L.MMR				0.873*** (0.0123)
Constant	11.72*** (1.220)	-5.624 (11.31)	-1.491** (0.675)	54.44 (96.13)
Observations	145	145	145	143
Number of Id	18	18	18	18

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Key: LEB – life expectancy at birth, U5MR – under-5 mortality rate, CDR – crude death rate and MMR – maternal mortality rate

The results of GMM regression also suggest that external health expenditure per capita (EXTHEPCP) significantly affects most health outcomes, but that the effect may be overstated without considering endogeneity

and simultaneity biases. This is because compared to lagged fixed effect models, the sizes of its (EXTHEPCP) significant coefficients (on LEB, CDR & MMR) are smaller in the GMM models. We also note that, unlike the case in lagged FE models, EXTHEPCP is not significantly associated with U5MR. overall the effect of EXTHEPCP on health outcomes is more pronounced in the dynamic models than in the contemporaneous models.

We draw particular attention to the results of the effect of DGHEPCP on health outcomes. Although, to our knowledge, no previous empirical studies have been done on the relationship between domestic healthcare expenditure and health outcomes in the SSA region, previous empirical work (e.g., by Ataguba, 2012; Barasa et al., 2017; Kwesiga et al., 2015; Phiri & Ataguba, 2014) on health systems' equity which has concentrated on whether the financing method impedes or enhance access to healthcare, show that publicly financed healthcare improve access to needed healthcare in better than private financing methods. Special attention has been paid to the direct payment (OOP) method, which is the dominant private payment method in SSA (Eze et al., 2022). The results of these studies show that the OOP method of financing healthcare reduces access to needed healthcare. As a result, to increase access to healthcare, these studies recommend less use of **private** payment methods. The results of the current study show that financing healthcare using domestic private resources performs better than financing healthcare using domestic **public** resources.

Specifically, FE models before and after lagging (Tables 4.4 & 4.5) show that domestic public expenditure (DGHEPCP) on healthcare does effect health outcomes in a statistically significant manner. Indeed, the FE results of lagged health outcomes suggest that, apart from the insignificant effect, increasing DGHEPCP may also affect health outcomes negatively. We suspected that these confounding results may be a result of either endogeneity or simultaneity biases. This is because endogeneity does not only affect the significance and size of a relationship but can even change the direction of the relationship between variables (Zaefarian et al., 2017). As we have explained, to remove the effect of the two biases we performed a GMM regression.

The results of the GMM models show that the effect of DGHEPCP on LEB, U5MR and CDR remains insignificant, and, its effect on MMR though statistically significant is negative. Furthermore, even the direction of its insignificant effect on U5MR is negative. Therefore, we argue that the confounding results are not due to

statistical biases or errors in measurement but may be due to weaknesses in the application of domestic resources in healthcare financing. Furthermore, looking at the results of the FE models for both the contemporaneous and lagged data we see that external health expenditure per capita (EXTHEPCP) affects health outcomes positively. Although, while the FE results of lagged data are significant on all health outcomes, the results of the contemporaneous relationships between EXTHEPCP and health outcomes show that its effects on all, except MMR, are statistically insignificant. The results of the effect of EXTHEPCP may mean that although there is a delayed effect, EXTHEPCP affects health outcomes positively. This further confirms our suspicion that the confounding results on the association between domestic public health expenditure and health outcomes may be due to weaknesses in the financing method and not statistical methods. Apart from confirming the statistical robustness of our analysis, the results also show that external assistance is still necessary to improve the outputs of SSA's health systems.

Overall, given that the previous studies looked at health systems' financing equity from access to healthcare perspective these results may mean that even though domestic public financing methods may increase access to healthcare, it may not necessarily lead to better health outcomes. we argue that this may be due to the quality of healthcare in publicly financed health facilities. However, we argue that before we draw this conclusion, we need to investigate the relationship between domestic public health expenditure and access to healthcare in the region using the same expenditure (the data that have been used to investigate the relationship between expenditure and health outcomes) data to be sure. We note also that apart from using access, the previous studies did not do cross-country analysis. Therefore, apart from assisting with finding out if health expenditure can affect access to healthcare and health outcomes differently, the analysis can also throw some light on cross-country relationship between healthcare expenditure and health outcomes in the SSA region.

To determine if a financing method can increase access to healthcare without bettering the population's health outcomes, we carried out an analysis of the effect of DGHEPCP, DPHEPCP and EXTHEPCP on access to needed healthcare across the region. Because we could not find cross-country data (in the SSA region) on access to healthcare, we used data on births attended to by skilled healthcare workers as a percentage of

pregnant women (BASHW) to proxy access to healthcare. We argue that this is a good proxy for access because pregnancy is common in all countries and attendance by skilled health workers depend on the availability of health facilities, health workers, and funding method. The results of this analysis are presented in Table 4.7 below.

Table 4 7: The Multivariate Fixed and Random Effects of Domestic and External Healthcare Expenditure Per Capita on Access to Healthcare.

	Fixed Effect Model	Random Effect Model
	(1)	(1)
VARIABLES	BASW	BASW
Log DGHEPCP (PPP)	8.609** (3.341)	5.103 (3.305)
Log DPHEPCP (PPP)	14.37*** (4.833)	4.074 (3.350)
Log EXTHEPCP (PPP)	-0.856 (2.893)	2.668 (2.245)
Immunization BCG	0.235 (0.164)	0.322** (0.146)
Control of corruption	1.951 (6.958)	-1.057 (5.587)
Gini index (x100)	-2.771 (2.002)	1.081* (0.657)
Internet usage	0.824** (0.333)	0.438* (0.243)
Wages & salaries	-0.0531 (0.711)	0.360 (0.367)
Urban population	-0.537 (0.802)	0.396** (0.197)
Unemployment	-0.198 (0.717)	0.295 (0.444)
Access to sanitation services	-0.100 (0.527)	-0.174 (0.334)
Constant	95.80 (95.63)	-82.68*** (27.78)
Observations	65	65
Number of Id	19	19
R-within	0.699	0.554
Wald	7.4	
F - statistics		108.67
Hausman test results	Yes	No

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Key: BASHW – Births attended to by skilled health workers as a percentage of pregnant women

The results of the Hausman test for the appropriate regression model show that the random effect model (RE) is not efficient in estimating this relationship, therefore we used the fixed effect (FE) model. The results of

the FE model (Table 4.7) show that apart from external healthcare expenditure per capita (EXTHEPCP), both the domestic government and domestic private health expenditure significantly improve access to healthcare in the SSA region. Although the size of the coefficients of domestic private expenditure (DPGHEPCP) are larger than those of domestic public expenditure (DGHEPCP), they show that a financing method can increase access but fails to improve health outcomes. As we argued, one of the reasons why DGHEPCP is associated with increased access, and insignificantly or negatively associated with health outcomes is because of the quality of care. Indeed findings of some empirical works (e.g. Courtemanche & Zapata, 2014; Wagstaff & Lindelow, 2008) show that public financing methods can lead to poor quality of services. If this is the case then access may not translate to better health outputs as these results show.

4.4 Discussions of Empirical Results

In this section, we discuss the implication of the results of the current study in the context of the findings of similar studies, and in the context of policy and theory. We notice that all the results of the bivariate model of the effect of domestic healthcare expenditure (DGHEPCP & DPHEPCP) on health outcomes show the a priori expectations (negative for U5MR, CDR and MMR and positive for LEB). The multivariate results of this study do not conform to this expectation. Indeed, there is a marked difference between our findings and the findings of similar studies that used access to healthcare as the basis of health systems' equity. While results of similar studies show that private financing methods, particularly direct out-of-pocket (OOP), impede access to needed healthcare which should translate into a negative effect on health outcomes, given that OOP is the predominant domestic private healthcare payment method, the results of the current study's multivariate models show that spending on healthcare using domestic private resources relate favorably with health outcomes, while the use of public resources does not significantly improve health outcomes in the SSA region.

Although similar studies have not investigated the effect of external financing on SSA's health outcomes, we note that the multivariate results of this study show that even where the effect of EXTHEPCP on health outcomes is insignificant (particularly on the contemporaneous FE models), the direction of the relationship shows

the a priori expected positive effect on health outcomes. Going by these results, it means that external sources of financing are important for the region's health systems' equity.

We provide a detailed analysis of these findings in the following subsections.

4.4.1 Discussion of the Findings in the Context of Current Literature

As we have stated, the pattern of research in this area of health system financing equity in sub-Saharan Africa (SSA) has been concentrated on equity of access to needed healthcare, in particular, studies (e.g. by Chuma, Maina, & Ataguba, 2012; Jehu-Appiah et al., 2011; Magadi, Zulu, & Brockerhoff, 2003; Orem & Zikusooka, 2010; Phiri & Ataguba, 2014) have looked at health system's equity in terms of how progressive or regressive (vertical equity) the payment methods are. Others ((e.g., Magadi, Zulu, & Brockerhoff, 2003; Phiri & Ataguba, 2014; Mebratie et al., 2015; Okpani & Abimbola, 2015) have looked at equity in terms of whether the financing method enables the health systems to distribute healthcare fairly (horizontal equity). A few (Ataguba & McIntyre, 2018; Ataguba & McIntyre, 2012) have studied equity in terms of a combination of vertical and horizontal equity. All these studies have looked at the health system's financing equity from the input and process point of view. As we have stated earlier, this current (Ph.D.) work looks at equity from an output perspective. The findings of other equity-related studies that have just been recalled above are mixed and, most of them (e.g. Kwesiga, Zikusooka, & Ataguba, 2015; Makinen et al., 2000; Mtei et al., 2012) show that government input in the financing of healthcare is necessary to improve equity in access to healthcare. Although these studies have not looked at other forms of private healthcare financing (e.g., private health insurance, privately sponsored payment systems (like by employers or NGOs), etc.), they point out that private (particularly OOP) financing method is detrimental to health system's equity.

We note that even though previous works have not looked at the effect of financing healthcare using domestic resources, the findings of this study show that **domestic private expenditure** performs better than **domestic public expenditure**, across all models. As we have explained, most studies that have looked at the relationship between equity (particularly of access) in healthcare and financing methods show that public financing methods perform better than private methods. Therefore, the findings of this study which show that domestic

public financing methods relate adversely or insignificantly with health outcomes and that domestic private financing methods are beneficial to health outcomes may have less support among existing literature. We also note that the results of the effect of **external health expenditure** (EXTHEPCP) on health outcomes are generally positive (insignificantly positive on results of the contemporaneous regression and significantly positive on the lagged regression). Having said that, we argue that the reason why the per capita private domestic healthcare expenditure (DPHEPCP) and external healthcare expenditure per capita (EXTHEPCP) are associated with improvement in health outcomes and the per capita public healthcare expenditure (DGHEPCP) is not, is probably because domestic private finances and external finances are more efficiently managed because stakeholders of these funds demand higher accountability from managers of the funds (e.g. private health insurers, NGOs health funds managers and donors etc.), The consumers of healthcare that are paid for using private means also demand better services from providers than consumers of healthcare that are publicly funded. Furthermore, the results of this study reveal that the control variables that deal with the percentage of population in the urban area (urban population) and income concentration (the Gini index) are significantly and positively associated with health outcomes. We argue that this shows that healthcare in the region is disproportionately distributed in favor of those residing in the urban areas and the rich. Some empirical studies (e.g., by Ataguba, 2016; Marten et al., 2014) show that the distribution pattern of publicly funded healthcare is skewed in favor of the rich and urban areas. They posit that this is because the best public health facilities and healthcare services are located and provided in urban areas, and that most public healthcare funds are locked up in services that favor the wealthy. Because the majority of SSA live in rural areas and are poor (Asgary et al., 2004; W. Hsiao & Shaw, 2007) we argue that health funding that is biased against these groups cannot reach Pareto optimality. This could be the reason why the results of this study show that DGHEPCP does not relate positively to health outcomes.

On the other hand, EXTHEPCP associates positively with health outcomes, this could be because most of them are donor funds, funds that come with donor conditionalities that insist that they should be targeted at the poor, the indigent, and rural population (Wagstaff, 2010). As a result, they fill the gap that is left behind by domestic public healthcare funds. So even if the size of the fund is small, its aggregate contribution to health outcomes can

be significant because it serves the health needs of the majority (i.e., the rural population and the indigent persons).

Therefore, we argue that the solution to the thought around the insignificant effect of domestic public healthcare funds on health outcomes may not lie in reducing healthcare funding from the source or even in discontinuing financing of healthcare from the source, but in increasing fairness in its allocation of the funds. We also argue that to make domestic public healthcare finances more effective in the region, they should be deliberately redesigned to be redistributive in the way that they allocate healthcare. That is, to correct the imbalance by allocating more funds to cater for the health needs of the poor, the indigent persons and those in the rural areas.

4.4.2 Implication of the Findings for Theory and Policy

In this sub-section, we discuss how our findings relate to health capital and other health equity theories and suggest how the findings can help to improve health and healthcare policies in Sub-Saharan Africa (SSA).

Implications of the Findings for Theory

In summary, the models' results show that allocating more domestic public funds per capita (DGHEPCP) to healthcare impacts health outcomes either negatively or insignificantly. And, the association between external funding per capita (EXTHEPCP) and health outcomes is generally positive, more so if the outcomes are lagged by one year. While per capita domestic private healthcare expenditure (DPHEPCP) is significantly associated with better health outcomes across the models. According to the theory of health capital (Grossman, 2017), individuals' health stock and, therefore, population health stock (Fayissa & Gutema, 2008) should improve with improvement in investment (expenditure) in healthcare. The theory's a priori expectation is that an increase in expenditure in healthcare should correlate (significantly) favorably with health outcomes regardless of the source of the fund. We note that the results of DPHEPCP are in accordance with this expectation, while the results of the effect of DGHEPCP are not. Although in terms of significance the results of the association between EXTHPCP and health outcomes are mixed, depending on whether the association is measurement using dynamic or contemporaneous models, the direction of the association conforms to the a priori expectation. Therefore,

because the association between DGHEPCP and health outcomes does not conform to the theory of health capital, we need to elaborate further on these results and their relevance to the theories of health capital, and health equity in the SSA region.

As we have pointed out, according to the results of this work, the poor performance of DGHEPCP can be attributed skewed allocation of domestic public funds either in favor of urban areas or in favor of high-income groups. Such an allocation would result in Pareto inefficiency. According to the theory of utilitarianism, such actions (skewed allocation) reduce utility. Utility, according to utilitarian theory, is maximized with an action that maximizes total benefits while reducing negative consequences for the largest number of people (Harsanyi, 1977). As we have pointed out, because most of SSA's population is either poor or lives in rural areas, skewed allocation in favor of those with high income and those in urban areas reduces utility by targeting the minority (the rich and urban population). The theory postulates that any distribution pattern that benefits a few at the expense of the majority reduces utility and, as a result, welfare (Cookson & Dolan, 2000). If our suspicion is correct, then the underperformance of DGHEPCP can be explained using the theory of utilitarianism and the concept of Pareto sub-optimality.

Implications of the Findings for Policy

Evidence, from empirical research, for example by Atinga, et al (2015), Lagomarsino et al (2012), Marten et al (2014), and Ataguba & McIntyre (2012) show that unless care is taken to ensure fairness in allocation, healthcare funds allocated by governments tend to disadvantage the poor. Furthermore, Ataguba and McIntyre (2013) and Ataguba (2016) pointed out, using the case of South Africa, that government investment in healthcare in the SSA region is done in such a way that locks up most of the investment for the rich. Marten et al (2014) pointed out that in South Africa 45% of public health spending benefits only 16% of the population, mainly the urban population, and the high-income groups. Some experts (e.g., Aidoo, 1982; Mburu, 1981). have argued that the problem of healthcare in SSA is that most and the best health facilities are in urban areas and the best services are available only to those in the urban areas. Given that the findings of this study show that increasing domestic

public healthcare expenditure does not contribute in bettering the region's health status (outcomes) while both the domestic private and external funds do, we recommend policies that would redress this problem below.

Using the empirical research evidence provided above and the findings of this study, we argue that to improve the performance of DGHEPCP, there is a need for a redistributive policy with a bias towards the poor and those in rural areas. Furthermore, because SSA is an extremely unequal region, to improve aggregate welfare, there is a need to ensure that the poor are insulated from excessive cost of healthcare by shifting most of the cost to the rich. This is in accordance with the concept of vertical equity and the egalitarian theory. This can be done by setting up funds using state resources that cater to the healthcare needs of the poor. Such funds should target, particularly, transmittable diseases (like cholera, measles, tuberculosis, etc.) which affect the poor disproportionately and are more prevalent in rural and informal settlements in urban areas. The funds can be collected from luxury goods and services and/or by using sin tax (taxes that are levied on goods that are deemed harmful to society, like tobacco, gambling, etc.) levying method. This is because such taxes have the highest redistributive effect in the face of high-income inequality. We also recommend a deliberate policy directive that directs most domestic public healthcare funds to rural areas until the rural-urban healthcare imbalances are resolved.

CHAPTER FIVE

5. EMPIRICAL ANALYSIS AND RESULTS OF THE EFFECT OF BUDGETARY ALLOCATIONS ON HEALTH OUTCOMES

The focus of this chapter is to investigate the effect of increasing government investment in healthcare on SSA's health outcomes. The source of government investment (expenditure) discussed in this section (chapter) is tax, whether general or defined taxes. We use both descriptive and inferential analysis methods to carry out the investigation as we stated in objective two of the study. We present the results of the investigation into the relationship between sub-Saharan Africa (SSA) governments' expenditure on healthcare, using tax revenue, and health outcomes of the region, starting with the results of the descriptive statistics.

5.1. Specification and Purpose of Objective Two

Although the objective is stated in Chapter One, it is restated here to make it easier to recollect and to be clear about the context of the results discussed in this chapter. The objective is restated as follows:

- To investigate the effect of increased budgetary allocation to healthcare on sub-Saharan Africa health outcomes.

We note that this objective is in line with the Abuja declaration (Sadr-Azodi, 2019) which called upon governments from the SSA region to increase budgetary allocation to healthcare to at least 15% of their total annual budget. Budgetary allocation to healthcare is measured in terms of actual government expenditure in healthcare per year.

To investigate the association of government allocation to healthcare (using public funds) and the population health capital (measured by health outcomes), we have used two independent variables to proxy budgetary allocation. These are:

1. The government healthcare expenditure as a percentage of the gross domestic product (GDP).
2. The government healthcare expenditure as a percentage of general government expenditure

The variable government healthcare expenditure as a percentage of GDP (GHEGDP) shows the proportion of the region's GDP that the region's governments are committing to healthcare. GDP accounts for the total value of goods and services produced/provided by a country. It does not include foreign assistance which can distort

our analysis, because foreign assistance does not capture the commitment by governments to provide their citizens with quality and affordable healthcare.

The second variable measures the governments' allocation to healthcare as a percentage of their yearly budgets. It, therefore, measures the government's commitment to the Abuja Declaration and, more importantly, the place of healthcare in the SSA's government's expenditure priorities. Based on these target independent variables, we generated the following research questions:

1. How does increased budgetary allocation to healthcare as a percentage of total government expenditure affect health outcomes of the SSA region?
2. What is the relationship between increasing budgetary allocation to healthcare as a percentage of gross domestic product and health outcomes in the SSA region?

5.2. Estimation Techniques

Before carrying out investigations into the nature of the relationship between increasing public investment in healthcare and health outcomes in the SSA region by using multivariate inferential analysis techniques, we first investigated this relationship by using descriptive statistics and bivariate analysis methods to generate general information on the nature of this association. As explained in chapter three the inferential estimations are carried out using the fixed and random effect models to account for heterogeneity bias. We also ruled out non-stationarity problems by carrying out unit root and cointegration tests using the Fisher-type unit root test.

Recall that the objective here is to find out how increased public expenditure in healthcare affects health outcomes, where health outcomes are used as proxies for health systems' equity. We restate further that a favorable effect is where increases in expenditure are associated with a positive coefficient on life expectancy at birth (LEB) and a negative coefficient on the under-5 mortality rate (U5MR), and the crude death rate (CDR)

5.2.1 The Analytical Models

The general model to investigate the effect of the use of public resources to finance healthcare in the SSA region as stated in equation 3.2.3 is stated in the Cobb-Douglas format as follows.

$$HOC_{ijt} = \beta_0 + \beta_1 GHEGGE_{jt} + \beta_2 GHEGDP_{jt} + \beta_3 CTL_{ijt} + \epsilon_{jt} \quad (5.1)$$

Where, β_0 is the constant of the model, β are the vectors of the parameters, HOC_{ijt} are the health systems' outcomes i in country j , at time t , $GHEGGE_{jt}$ is the government expenditure on healthcare as a percentage of general government expenditure in country j in year t . $GHEGDP$ stands for government healthcare expenditure as a percentage of GDP. And, CTL_{ijt} are the selected control variables i in country j at time t respectively, and ϵ_{ij} is the error term.

5.2.1 Pre-estimation Analysis

Before estimating the effect of the independent variables on the dependent variables, we carried out tests to determine the right model to use, between the Random Effect (FE) and Fixed Effect (FE) models. The RE model was estimated using the Generalized Least Square (GLS) regression and FE using the within-effect estimation. We employed the Hausman specification to compare the estimates of the RE and the FE models. As explained in Chapter 3, the FE models are used to control for omitted variable bias due to unobserved heterogeneity (Gangl, 2010). Further, we carried out dynamic modeling by lagging the dependent variables by one year. This is because we suspect that there could be a delayed effect of government allocation to healthcare on health outcomes. We also carried out and reported model fitness tests under each model: the F-test for the fixed effect (FE) model and the Wald χ^2 test for the random effect (RE) model.

We used a matrix of correlation (Appendix 9) to determine the extent of correlation between the variables. The results of this test (correlation) helped us to isolate the closely correlated variables and to determine how to treat such variables to avoid the problem of multicollinearity. On the distribution patterns of the dependent variables, we determined by using bar graphs that the distribution patterns of the GHEGDP and GHEGGE (Fig. 5 1 and Fig.5 2) show some skewness. Therefore, we carried out a log transformation to normalize the distributions before regression analysis.

Figure 5 1: Distribution Pattern of Government Healthcare Expenditure as a Percentage of Gross Domestic Product

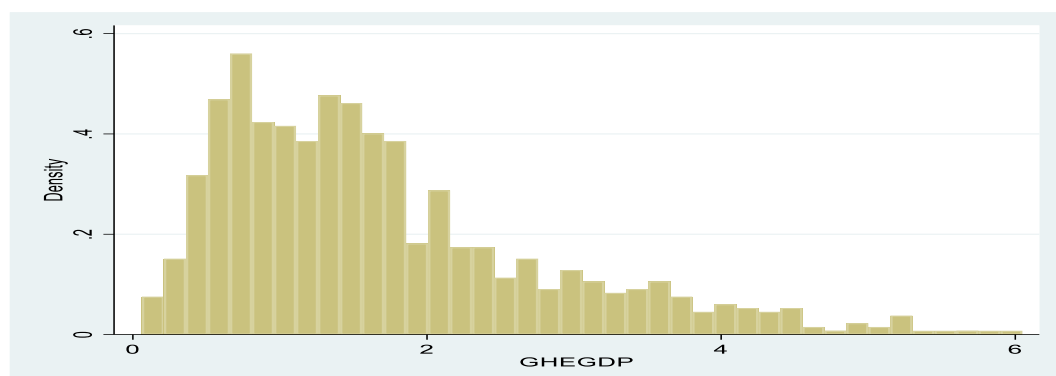
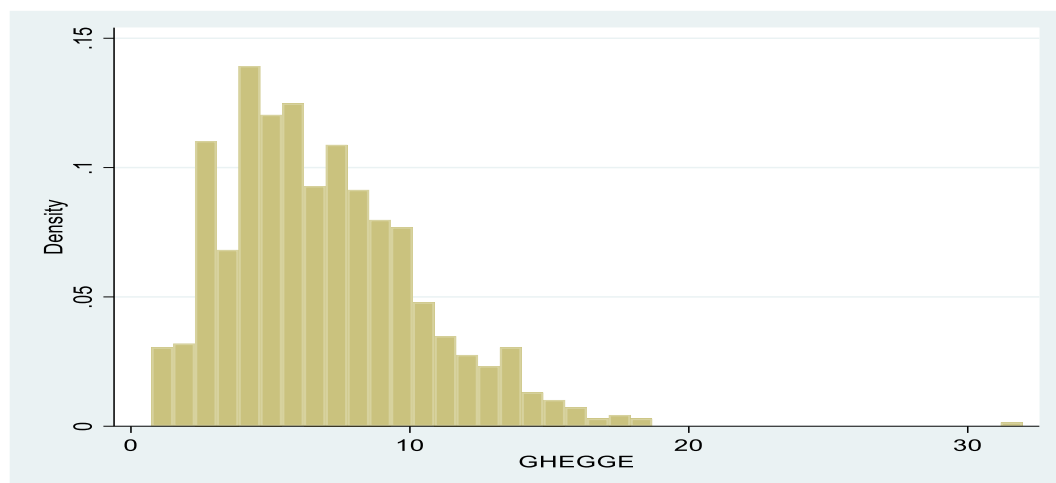


Figure 5 2: Distribution Pattern of Government Healthcare Expenditure as a Percentage of General Government Expenditure



5.3 Empirical Analysis and Results

Just as in objective one, we start the analysis of the effect of budgetary allocation to public healthcare on health outcomes by describing the nature of the data. We also carried out an analysis of the general relationship between the objective's target independent variables and the dependent variables using fitted scatter graphs and bivariate correlation analysis. Later, we investigated the effect of budgetary allocation on healthcare by carrying out a deeper correlation analysis using inferential statistics that specifically deployed multiple regression models.

5.3.1 Descriptive Statistics and Trend Analysis

According to the results of descriptive statistics (Table 5 1) the average government healthcare expenditure as a percentage of the general government expenditure (DGE GGE) for the region, during the study period, is 6.86%. These expenditures have a standard deviation of 3.47%. Cameroon (a country in central Africa)

recorded the lowest DGEGGE during the study period at only 0.734% in 2007. And, Sao Tome and Principe had the highest (31.96%) in 2000. Most countries of the region recorded DGEGGE of below 10% in the entire study period. This means that most countries of the SSA region have not complied with the Abuja Declaration.

Table 5 1: Descriptive Statistics of Domestic Government Health Expenditure and Selected Control Variables.

Variable	Obs	Mean	Std. Dev.	Min	Max
GHEGDP	883	1.685	1.107	.062	6.049
GHEGGE	883	6.862	3.473	.734	31.96
Immunization BCG	893	85.843	13.314	30	99
Control of corruption	846	-.615	.612	-1.826	1.217
Gini Index (x100)	671	46.077	7.203	32.9	66.9
Internet usage	892	9.214	12.704	.006	62
Wages & salaries	874	29.035	21.455	4.87	85.87
Urban population	753	36.984	15.372	8.246	77.777
Unemployment	874	8.115	7.157	.32	35.27

Source: Authors' Compilation

The average government healthcare expenditure as a percentage of GDP (GHEGDP) is 1.7%. This is way below the global average of 9%. The Democratic Republic of Congo used only 0.062% of its GDP on healthcare in 2000. Even though still below the global average, Sao Tome and Principe's healthcare expenditure of 6.05% of its GDP in 2003, is the highest in the period. Other countries with high healthcare expenditure as a percentage of GDP include Lesotho, Seychelles, South Africa, and Namibia. Nigeria, Cameroon, Mali, and Eretria spent, on average, less than 1% of their GDP on healthcare during the study period.

We carried out a trend analysis on the relationship between the objective's target independent variables and health outcomes using fitted scatter graphs (Appendixes 12 – 15). The direction of the fitted line shows that the relationship between government expenditure in healthcare as a percentage of general government expenditure and health outcomes is favorable. Tables 5 2 and 5 3 show the results of a bivariate analysis of the effect of GHEGDP and GHEGGE on health outcomes.

According to the Hausman test results (Table 5.2 & Table 5.3), RE models are efficient in estimating the effect of the two target independent variables (GHEGDP & GHEGGE) on two health outcomes, the life expectancy at birth (LEB) and crude death rate (CDR), and FE is more appropriate in estimating their effect on under-5 mortality rate (U5MR).

Table 5 2: Fixed and Random Effect of Government Health Expenditure as a Percentage of GDP on Health Outcomes

VARIABLES	Fixed Effect Model			Random Effect Model		
	(1) LEB	(2) U5MR	(3) CDR	(1) LEB	(2) U5MR	(3) CDR
Log GHEGDP	0.390 (0.383)	-1.259 (2.359)	-0.0247 (0.222)	0.492 (0.369)	-3.868* (2.260)	-0.0715 (0.210)
Constant	57.58*** (0.174)	93.71*** (1.069)	10.89*** (0.101)	57.54*** (0.849)	94.24*** (4.551)	10.90*** (0.396)
Observations	883	883	883	883	883	883
R- absorbed panel	0.703	0.694	0.598	0.703	0.694	0.598
Adjusted R ²	0.686	0.677	0.575	0.686	0.677	0.575
R ² -within	0.001	0.000	0.000	0.001	0.000	0.000
F- statistics	1.03 (1, 835)	0.28 (1, 835)	0.01 (1, 835)	–	–	–
Wald χ^2	–	–	–	1.78	2.93	0.12
Hausman test results	No	Yes	No	Yes	No	Yes
Number of Id	47	47	47	47	47	47

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Key: LEB – life expectance at birth, U5MR – under-5 mortality rate, and CDR – crude death rate

Table 5 3: The Fixed and Random Effect of Government Health Expenditure as a Percentage of General Government Expenditure on Health Outcomes.

VARIABLES	Fixed Effect Model			Random Effect Model		
	(1) LEB	(2) U5MR	(3) CDR	(1) LEB	(2) U5MR	(3) CDR
Log GHEGGE	-1.478*** (0.422)	13.28*** (2.576)	1.213*** (0.242)	– (0.412)	11.02*** (2.521)	1.093*** (0.234)
Constant	60.34*** (0.766)	69.57*** (4.674)	8.717*** (0.440)	60.08*** (1.128)	73.29*** (6.652)	8.915*** (0.575)
Observations	883	883	883	883	883	883
R ² - absorbed panel	0.707	0.704	0.609	0.707	0.704	0.609
Adjusted R ²	0.69	0.687	0.587	0.69	0.687	0.587
R ² -within	0.014	0.031	0.029	0.014	0.031	0.029
F- statistics	12.24*** (1, 835)	26.60*** (1, 835)	25.02*** (1, 835)	–	–	–
Wald χ^2	–	–	–	10.40***	19.13***	21.90***
Hausman test results	No	Yes	No	Yes	No	Yes
Number of Id	47	47	47	47	47	47

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Key: LEB – life expectance at birth, U5MR – under-5 mortality rate and, CDR – crude death rate.

The bivariate results (Table 5 2) of both the FE and RE models show that increasing GHEGDP does not significantly affect health outcomes of the SSA region. On the other hand, both the FE and RE models (Table 5 3) show that increasing GHEGGE significantly harms all health outcomes. These results seem to contradict the health capital theory (Grossman, 1972) which states that increased investment in healthcare correlates favorably with health outcomes. They are also at variance with existing studies on the subject of public expenditure and health outcomes. However, because these are results of bivariate models, they may not be accurate. Before we discuss the confounding estimates of the bivariate models, we first carry out multivariate regression analysis and see the more statistically robust nature of the relationship between budgetary allocation to healthcare and health outcomes.

5.3.2 Empirical Estimations and Results of Effects of Increased Budgetary Allocation on Health Outcome

We investigate, using the fixed effect (FE) and the random effect (RE) models, the effect of increasing direct government expenditure on healthcare, using taxes, on health outcomes of the SSA region. This study used the Hausman test to choose the right models for the estimations. The results of the test show that RE is inefficient in estimating the effect of the independent variables on the dependent variables therefore, we use the results of the FE models in estimating the relationship between the government allocations to healthcare and health outcomes.

After controlling for the co-explanatory variables, the results of the FE models (Table 5 4) show that although increasing government expenditure on healthcare as a percentage of GDP (GHEGDP) retains the a priori expected positive effect on health outcomes note that its effect gains significance for under-5 mortality rate (U5MR) which it did have under the bivariate model. The multivariate models' results also show that GHEGDP's insignificant effects on LEB and CDR are larger than what was reported by the bivariate models.

Table 5 4: Fixed and Random Effects of Government Budgetary Allocation to Healthcare on Health Outcomes

VARIABLES	Fixed Effect Model			Random Effect Model		
	(1) LEB	(2) U5MR	(3) CDR	(1) LEB	(2) U5MR	(3) CDR
Log GHEGDP	1.252 (0.959)	-14.70** (6.125)	-0.516 (0.626)	1.049 (0.915)	-18.99*** (6.293)	-0.678 (0.618)
Log GHEGGE	-2.535** (1.011)	21.64*** (6.463)	1.480** (0.661)	-2.433** (0.980)	26.70*** (6.737)	1.727*** (0.663)
Immunization BCG	0.0538*** (0.0202)	-0.525*** (0.129)	-0.0314** (0.0132)	0.0736*** (0.0198)	-0.645*** (0.136)	-0.0463*** (0.0134)
Control of corruption	0.837 (1.048)	-15.55** (6.695)	-1.364** (0.684)	0.865 (1.003)	-10.43 (6.916)	-0.944 (0.677)
Gini index (x100)	-0.904*** (0.315)	10.99*** (2.010)	0.989*** (0.205)	-0.882*** (0.206)	6.579*** (1.465)	0.679*** (0.136)
Internet usage	0.120*** (0.0295)	-0.217 (0.189)	-0.0425** (0.0193)	0.159*** (0.0273)	-0.530*** (0.189)	-0.0709*** (0.0184)
Wages & salaries	-0.199* (0.115)	1.277* (0.732)	0.139* (0.0748)	-0.0414 (0.0795)	0.528 (0.562)	0.0562 (0.0530)
Urban population	0.485*** (0.112)	-4.112*** (0.713)	-0.341*** (0.0729)	0.192*** (0.0630)	-1.713*** (0.453)	-0.135*** (0.0416)
Unemployment	0.285** (0.144)	-3.099*** (0.918)	-0.281*** (0.0939)	-0.0167 (0.112)	-1.328* (0.784)	-0.0548 (0.0746)
Use of sanitation services	0.274*** (0.0751)	-1.554*** (0.480)	-0.158*** (0.0491)	0.166** (0.0648)	-1.312*** (0.451)	-0.103** (0.0435)
GEEGGE	0.0819** (0.0375)	-0.827*** (0.240)	-0.0406* (0.0245)	0.123*** (0.0362)	-1.250*** (0.249)	-0.0744*** (0.0245)
Constant	71.82*** (13.96)	-169.7* (89.21)	-15.53* (9.119)	80.85*** (9.009)	-69.85 (64.31)	-9.962* (5.971)
Observations	193	193	193	193	193	193
R ² - absorbed panel	0.936	0.934	0.927	0.936	0.934	0.927
Adjusted R ²	0.924	0.921	0.913	0.924	0.921	0.913
R ² -within	0.667	0.697	0.627	0.645	0.655	0.589
F- statistics	29.45 (11 162)	33.94 (11 162)	24.76 (11 162)	-	-	-
Wald x ²	-	-	-	300.68	277.91	220.83
Hausman tests results	Yes	Yes	Yes	No	No	No
Number of Id	20	20	20	20	20	20

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Key: LEB – life expectancy at birth, U5MR – under-5 mortality rate and CDR – crude death rate

On the other hand, government health expenditure as a percentage of general government expenditure (GHEGGE) retains its negative and significant effect on health outcomes was recorded under the bivariate models. Indeed, the results show that the sizes of the coefficients are larger in the multivariate models compared with the results of the bivariate models. This may mean that the bivariate

models underestimated the magnitude of both GHEGGE's negative effects and GHEGDP's positive effects on health outcomes. While the results of the effect of GHEGDP on health outcomes are in accordance with the a priori expectations of the health capital theory, the results of the effect of GHEGGE are inconsistent with the theory's predictions.

Table 5 5: The Lagged Fixed and Random Effects of Government Budgetary Allocation to Healthcare on Health Outcomes

VARIABLES	Fixed Effect Model			Random Effect Model		
	(1)	(2)	(3)	(1)	(2)	(3)
	Lag LEB	Lag U5MR	Lag CDR	Lag LEB	Lag U5MR	Lag CDR
Log DGE GDP	1.889** (0.939)	-17.62*** (5.906)	-1.002 (0.617)	1.560* (0.894)	-20.87*** (6.029)	-1.023* (0.604)
Log GHEGGE	-2.996*** (0.977)	24.38*** (6.146)	1.852*** (0.642)	-2.761*** (0.945)	28.17*** (6.362)	1.949*** (0.639)
Immunization BCG	0.0326 (0.0224)	-0.368*** (0.141)	-0.0203 (0.0147)	0.0536** (0.0217)	-0.479*** (0.146)	-0.0358** (0.0146)
Control of corruption	0.866 (1.033)	-15.01** (6.502)	-1.320* (0.679)	0.888 (0.989)	-10.75 (6.693)	-0.960 (0.667)
Gini index (x100)	-0.831** (0.319)	10.48*** (2.008)	0.906*** (0.210)	-0.809*** (0.207)	6.119*** (1.472)	0.615*** (0.137)
Internet usage	0.122*** (0.0289)	-0.216 (0.182)	-0.0468** (0.0190)	0.160*** (0.0264)	-0.510*** (0.179)	-0.0750*** (0.0178)
Wages & salaries	-0.193* (0.115)	1.162 (0.722)	0.139* (0.0754)	-0.0642 (0.0791)	0.591 (0.555)	0.0710 (0.0528)
Unemployment	0.289* (0.159)	-2.833*** (0.999)	-0.280*** (0.104)	-0.0492 (0.117)	-1.012 (0.816)	-0.0284 (0.0779)
Urban population	0.440*** (0.114)	-3.899*** (0.719)	-0.319*** (0.0751)	0.189*** (0.0633)	-1.683*** (0.458)	-0.135*** (0.0419)
Use of sanitation services	0.310*** (0.0805)	-1.806*** (0.507)	-0.179*** (0.0529)	0.198*** (0.0688)	-1.636*** (0.472)	-0.120*** (0.0462)
GEEGGE	0.122*** (0.0381)	-0.970*** (0.239)	-0.0707*** (0.0250)	0.158*** (0.0361)	-1.383*** (0.243)	-0.102*** (0.0244)
Constant	70.84*** (14.01)	-162.6* (88.14)	-13.05 (9.202)	78.97*** (9.048)	-60.15 (64.54)	-7.845 (6.013)
Observations	183	183	183	183	183	183
R ² - absorbed panel	0.936	0.934	0.927	0.936	0.934	0.927
Adjusted R ²	0.924	0.921	0.913	0.924	0.921	0.913
R ² -within	0.667	0.695	0.622	0.647	0.656	0.587
Wald χ^2	-	-	-	288.78	268.03	211.48
F -statistics	27.74 (11, 152)	36.51 (11, 152)	22.71 (11, 152)	-	-	-
Results of Hausman test	Yes	Yes	Yes	No	No	No
Number of Id	20	20	20	20	20	20

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Key: Lag – one year lag of the variable, LEB – life expectancy at birth, U5MR – under-5 mortality rate and CDR – crude death rate

The negative effect of GHEGGE persists even when we used dynamic modeling by lagging outcomes by one year (Table 5.5.). On the other hand, GHEGDP gains a significantly beneficial association with both the LEB which it did not have in the unlagged FE and RE models. The findings suggest that if there is a delayed effect of health expenditure on health outcomes, both the positive effect of increasing budgetary allocation as a percentage of GDP and the negative effects of increasing budgetary allocation to healthcare as a percentage of total government expenditure become more pronounced.

While the results of the effect of GHEGGE on health outcomes may seem to contradict the theory, they may reveal a very important aspect of Grossman's health capital theory. That is, pointing out more clearly the possible role of what Grossman refers to as the shadow or indirect investment in healthcare. These are investments in services that support population health production but that do not go directly into the provision of healthcare. Some of them are as important to health production as the direct investment in healthcare. They include (but are not limited to) investment in education, provision of sanitary services, physical exercise services, and clean water. We refer to these items in this chapter as important shadow (price) investments in healthcare. To dig further into the reason for the confounding results documented in Table 5.4, we need to unpack the characteristics of the two independent (GHEGDP & GHEGGE) that could be responsible for their different effects on health outcomes.

Although government healthcare expenditure (the numerator) is common to both variables (GHEGGE & GHEGDP), their denominators (GDP & GGE) are different. We suspect that the difference in the findings is caused by the difference in the denominators. Therefore, a keener look at the difference between the two denominators, the general government expenditure (GGE) and the gross domestic product (GDP) may provide answers to what seems like contrary to expectation results. As relevant parts of the acronyms suggest, GGE refers to total government expenditure while DGP refers to revenue generated from local production processes. Therefore, increasing health expenditure as a percentage of GGE means that the government may be reducing expenditure on other expenditure items. Such items

may include investment in shadow healthcare items. On the other hand, GDP is a revenue item which means increasing GHE as a percentage of GDP does not mean cutting down on any income from health production items. As a result, it does not suffer from the same problem as increasing GHE in the GGE. To provide a more comprehensive analysis of these results we delve deeper into the relationship between health outcomes and shadow investment in healthcare.

As we have pointed out, investments in some shadow or indirect healthcare services are as important to health production just like direct healthcare expenditure. Therefore, cutting down on such items could be the reason why GHEGGE² is associated with deleterious effects on health outcomes. We note that included in the multivariate models are two control variables (government expenditure in education as a percentage of general government expenditure (GEEGHE) and the percentage of the population with access to sanitary services (use of sanitary services)) that are very important to health outcomes. We use them to proxy important shadow healthcare investment during the production of population. We note that even after their inclusion the effect of GHEGGE on health outcomes remains significantly negative as in the bivariate models. We note also that the variables used in this study to proxy for important shadow investment in healthcare (i.e., GEEGGE³ and use of sanitary services) are both significantly positively correlated with health outcomes (Table 5.5) per the theory's prediction. This means that either something else is responsible for the negative effect, or the two variables used to proxy for important indirect investment are an insufficient measure of the effects of all important indirect healthcare investments. We argue, that this negative effect could be the result of some unmeasured shadow prices (investment) of healthcare.

Based on this argument or conjecture, we carried out supplementary analysis using residual variables (from an orthogonality process) to ascertain whether or not our suspicion is correct. The residual

² GHEGGE is government budgetary allocation to healthcare as in a year a percentage of total government expenditure in the financial year.

³ GEEGGE is government budgetary allocation to education in a year as a percentage of total government expenditure in the financial year.

data was extracted from a multivariate regression of GHEGGE (as a dependent variable) against the two proxies of important shadow healthcare investments (i.e., GEEGGE and the percentage of the population with access to sanitary services).

Table 5 6: Fixed and Random Effects of Government Budgetary Allocation to Healthcare on Health Outcomes after Residual Transformation of Shadow Healthcare Data

VARIABLES	Fixed Effect Model			Random Effect Model		
	(1) LEB	(2) U5MR	(3) CDR	(1) LEB	(2) U5MR	(3) CDR
Log DGHEGDP	0.117 (0.933)	-8.521 (5.902)	0.144 (0.605)	0.590 (0.901)	-15.66** (6.235)	-0.404 (0.609)
Log GHEGGE	5.413 (3.686)	-58.00** (23.32)	-2.469 (2.390)	8.947*** (3.472)	-90.80*** (24.04)	-5.189** (2.348)
Immunization BCG	0.0774*** (0.0197)	-0.653*** (0.125)	-0.0451*** (0.0128)	0.0874*** (0.0193)	-0.750*** (0.134)	-0.0550*** (0.0131)
Control of corruption	1.367 (1.072)	-18.44*** (6.783)	-1.672** (0.695)	1.144 (1.004)	-12.05* (6.987)	-1.075 (0.678)
Gini index (x100)	-1.206*** (0.313)	12.64*** (1.979)	1.165*** (0.203)	-0.863*** (0.199)	6.238*** (1.438)	0.646*** (0.132)
Internet usage	0.149*** (0.0293)	-0.378** (0.185)	-0.0597*** (0.0190)	0.176*** (0.0267)	-0.668*** (0.185)	-0.0818*** (0.0180)
Wages & salaries	0.0146 (0.100)	0.111 (0.634)	0.0149 (0.0650)	0.0586 (0.0651)	-0.243 (0.467)	-0.00574 (0.0434)
Urban population	0.411*** (0.113)	-3.711*** (0.717)	-0.298*** (0.0735)	0.177*** (0.0603)	-1.567*** (0.441)	-0.126*** (0.0399)
Unemployment	-0.0252 (0.117)	-1.408* (0.741)	-0.100 (0.0759)	-0.171* (0.0925)	-0.132 (0.653)	0.0434 (0.0621)
Residuals	-6.899* (3.687)	73.93*** (23.33)	3.339 (2.390)	-10.95*** (3.471)	114.5*** (24.04)	6.665*** (2.347)
Constant	74.96*** (15.15)	-126.6 (95.86)	-18.48* (9.822)	62.23*** (11.06)	131.0* (78.78)	2.301 (7.405)
Observations	193	193	193	193	193	193
R ² - absorbed panel	0.931	0.93	0.922	0.931	0.93	0.922
Adjusted R ²	0.919	0.918	0.909	0.919	0.918	0.909
R ² - within	0.641	0.681	0.605	0.624	0.632	0.565
F – statistics	29.15 (10, 163)	34.76 (10, 163)	24.93 (10, 163)	-	-	-
Wald χ^2	-	-	-	286.01	256.91	208.54
Hausman test results	No	Yes	No	Yes	No	Yes
Number of Id	20	20	20	20	20	20

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Key: LEB – life expectancy at birth, U5MR – under-5 mortality rate and CDR – crude death rate

The residual resulting from the regression acts as a balance of important shadow healthcare expenditure. Instead of the two proxies (GEEGGE and access to sanitation services, which we have

determined relate to health outcomes per the a priori expectations of health capital theory), we used the residual (as a proxy for the balance of shadow healthcare expenditure, which arguably would subsume tradeoffs in important shadow healthcare investment to increases in direct healthcare investment). The FE and RE results of this analysis are shown in Table 5.6 above.

The results of the Hausman test show that RE is efficient in estimating the effect of the independent variables on LEB and CDR, and inefficient in estimating their effect on U5MR. After the data transformation and the use of residual data (in place of the proxies for shadow healthcare investment), the effect of increasing GHEGGE on health outcomes turns positive (see Table 5.5) in accordance with the health capital theory's prediction. These results show that the unobserved effect of (important) shadow expenditure was contributing to the adverse relationship between GHEGGE and health outcomes. Therefore, following the health capital theory, just like direct expenditure (investment) in healthcare, important shadow (shadow prices) expenditure contributes significantly to the production of health. Furthermore, these results also show that direct investment in healthcare on its own may be insufficient in improving population health. More importantly, increasing investment in healthcare at the expense of expenditure in other items (shadow health-enhancing factor) that support healthcare indirectly can be counterproductive.

5.4 Discussions of Empirical Findings in the Context of Current Literature

The FE model (Tables 5.4 & 5.5) results show that increasing government investment in healthcare (by way of budgetary allocation) as a percentage of GDP (GHEGDP) is significantly associated with a favorable effect on under-5 mortality (U5MR) and though insignificant, its effect on both crude death rate (CDR) and life expectancy at birth (LEB) is beneficial. When health outcomes are lagged by one year (Table 5.5), the coefficients of GHEGDP not only increase in size but also become significant on U5MR. This suggests that an increase in budgetary allocation to healthcare per capita is generally beneficial to SSA's health outcome. Although, to our knowledge, no study has investigated the association between budgetary allocation to healthcare as a percentage of general government

expenditure, previous studies on the relationship between public expenditure on healthcare and health systems' equity, have posted mixed findings. While most of them (e.g., by Arthur & Oaikhenan, 2017; Frank & Mcineka, 2021; Kiross et al., 2020; Novognon, 2015; Novignon et al., 2012; Nicholas et al., 2016) show that an increase in public expenditure benefits health system's equity, a few (e.g. by Fayissa & Gutema, 2005; Gupta et al., 2002) have argued that the relationship between public expenditure in healthcare and health system's equity is weak.

While the findings on the relationship between an increase in GHEGDP and health outcomes are consistent with the a priori expectation about investment in healthcare and health production, an increase in government expenditure in healthcare as a percentage of general government expenditure (GHEGGE) is not. By looking at the effect of GHEGGE and GHEGDP on health outcomes, this study intended to investigate if increasing budgetary allocation to healthcare is beneficial to health outcomes. and further, to find out if the effect remains beneficial if the increment is done simply by shifting expenditure from other items to healthcare. This is because we suspected that to comply with the Abuja Declaration which requires the SSA government to allocate at least 15% of their annual budgets to healthcare (Sadr-Azodi, 2019), governments can increase the ratio by simply reducing allocation to other items. If the increment is done by reducing expenditure on other items that support population health production indirectly, then we suspect that such an increase may not optimize population health status (out outcomes), and can show in the relationship between health outcomes and healthcare expenditure (in this case GHEGGE).

Just as we suspected, this study made an important discovery on the relationship between budgetary allocation and population health status (health outcomes) in SSA. That is, while an increase in GHEGDP shows the a priori expected favorable correlation with health outcomes, increasing government healthcare expenditure in healthcare as a percentage of general government expenditure (GHEGGE) shows that doing so relates unfavorably with health outcomes. A further analysis (Table 5.6) shows that the reduction in expenditure on items that indirectly support health production (shadow price of healthcare) is the likely reason for the negative relationship between GHEGGE and health outcomes.

This is a significant finding because it indicates that increasing budgetary allocation to healthcare as a ratio of the total budget can be counterproductive to population health outcomes if such an action comes at the expense of other expenditures that are (indirectly) beneficial to population health. We argue, therefore, that an increase in budgetary allocation to healthcare is important, however, it should not be done at the expense of expenditure on products and services that support health indirectly. This means that the argument by Grossman (1972) and later Fayissa & Gutema, (2008) that shadow prices (investment) of healthcare can be as important to an individual and population health production as direct investment is not without merit. This is because the results of this study show that they could be right.

5.4.1 Implication of the Findings for Theory and Policy

In this section, we expand on the relationship between the findings of this study and the economic theories of health and healthcare. We also explain how the findings of this study can be used to improve healthcare policies in the Sub-Saharan Africa (SSA) region.

Implications of the Findings for Theory

As we have stated, we based our analysis and investigations on the health capital theory. Grossman's health capital theory envisages increased investment in healthcare to be correlated with improvement in health status (Grossman, 1972). According to the theory, investment in healthcare involves more than just direct input into healthcare. The results of this study show that while an increase in budgetary allocation to healthcare as a percentage of GDP (GHEGDP) conforms to the theory's a priori expectation, an increase in budgetary allocation as a percentage of general government expenditure (GHEGGE) does not. In the context of this theory, and particularly concerning the association between health outcomes and GHEGGE. We argue that these findings show that improving the health system's financing equity is a multidimensional endeavor. We have shown empirically that this is most likely the case. This means that following the postulates of the theory of health capital, shadow (prices) investment in healthcare plays an important role in improving a population's health stock.

However, we also argue that these findings may also call into question the assumptions of health capital theory. That is, these results may indicate that the ongoing debate on the appropriateness of health capital theory is not without merit. For example, Case and Deaton (2007) argue that the linearity of the model assumes that complete repair of health is possible and that biological aging is constant. According to them, these two assumptions are incorrect in the real world. As a result, the linearity assumption can fundamentally impair the results of models that are based on the linearity assumption. Furthermore, Grossman developed the theory for micro-analysis (individual's health production), but when it was adopted by other health economic experts (e.g., Fayissa & Gutena. 2008), for macro-analysis (population health production), more assumptions were added to the original idea. For example, the assumption that the investment in population health yields a constant return to scale. According to Ehrlich and Chuma (1990), a decreasing return to scale would be a more appropriate assumption. That is, the health system's output (health outcomes) decreases with investment in healthcare over time. Again, this argument may be correct, particularly when analyzing investment in an individual's health stock which we know is affected by aging. This means that it is possible that a model that is based purely on constant return-to-scale can give misleading results.

However, as pointed out by Zweifel (2012), we argue that these reasons are not sufficient to completely impair the theory. Indeed, when they modified the original theory for purposes of macro-analysis, Fayissa & Gutena (2008) pointed out that some social, environmental, and economic factors may play an important role a population health production. These factors should be considered when interpreting the results of models that are based on Grossman's health capital theory, other than depending only on direct healthcare investments. That is, while in the best-case scenario, direct financial investment in healthcare is expected to flow directly into health production, on their own, they are not sufficient in explaining health outcomes. This means that co-explanatory variables should also be used when interpreting the results of models that are based on Grossman's health capital theory.

This is why our analysis included several carefully selected control variables. Based on this argument, we note that even though the models show that GHEGGE correlates adversely with health outcomes, the results also show that co-explanatory variables can explain these confounding results. For example, the variables (percentage of the population with access to sanitary services and government expenditure in education as a percentage of general government expenditure (GEEGGE) used to proxy important shadow price (expenditure) of healthcare are both significantly and favorably associated with health outcomes. This is in accordance with the expectations of the health capital theory. Likewise, other social, and economic co-explanatory variables offer additional important information. For example, an increase in income concentration (Gini index) affects health outcomes negatively. A high income concentration is known to be welfare-reducing; therefore, the expanded theory (Grossman's health capital theory) expects an increase in the Gini index to correlate adversely with health outcomes, which is the case in this study. The other socio-economic factors such as increase in corruption index and urban population also impact health outcomes positively, which are both in accordance with the theory's a priori expectation.

Therefore, we argue these findings do not depart fundamentally from the concepts and expectations of Grossman's health capital theory. However, they show that if silent aspects of the theory are not considered, the interpretation of the results of models based on the theory can be misleading, or even wrong.

Implications of the Findings for Policy

Equity objectives of health systems are achieved when the health system improves aggregate population welfare as evidenced by a population's health outcomes. The insignificant association between GHEGDP and some health outcomes and the negative impact of GHEGGE on health outcomes calls for the rethinking of the current initiatives (e.g., the Abuja Declaration) that require the SSA governments to increase budgetary allocation to healthcare as a percentage of annual budgets. Such initiatives should consider other factors that go into health production. Some of these factors are as

important to a population's health production as healthcare itself. Such factors may include access to sanitary services, clean water services for domestic use, improvement in population nutrition, education and so on. We, therefore, argue that the Abuja Declaration can be improved by adding a clause that prohibits governments from increasing allocation to healthcare by reducing expenditure on shadow health items.

We, therefore, recommend that to improve equity in health systems, SSA's government should not only concentrate on increased allocation to healthcare but should also consider investment in items that support health indirectly. This is because while the policy of increased budgetary allocation is novel, to improve the region's health status (outcomes), it should be tempered with increased investment in indirect health-supporting items.

CHAPTER SIX

6 EMPIRICAL ANALYSIS AND RESULTS OF FINANCIAL POOLING ON HEALTH OUTCOMES IN SUB-SAHARAN AFRICA

This chapter discusses the methods used and the results of our investigations into the effect of prepayment and financial pooling on health outcomes of the sub-Saharan Africa (SSA) region. The objective is based on the World Health Assembly's directive in 2005 to the World Health Organization that its member countries should adopt financing methods with financing risk protection to finance healthcare (World Health Organization, 2010b).

We used both the descriptive and inferential statistics methods of analysis in this chapter's investigation. The fixed effect (FE) and the random effect (RE) models are used to estimate the cause-effect relationship between the relevant independent and the dependent variables addressed in this chapter. After each stage of the investigation, we present the findings and interpretation of the findings. Later we discuss the implications of the findings for policy and theory.

6.1 Purpose of the Objective and Model Specification

The focus of the third objective is to investigate how prepayment and financial pooling methods correlate with health outcomes in the SSA region. We note that the main reason for financial pooling is to reduce the impact of the cost of healthcare on individuals at the point of service. Financial pooling should reduce the risk of suffering healthcare financing difficulties at the point of service when the person seeking healthcare is already unwell. Pooling should do this by shifting the cost (or part of the cost) of healthcare from ill-health status to healthy status (sickness risk) and, by spreading the cost of healthcare among many individuals (income risk). We note that to optimize welfare, a good pooling method should also redistribute income by shifting the cost of healthcare from the poor to the rich. We point out at this juncture that financial pooling techniques are also prepayment methods. However, prepayment financing methods differ in terms of their pool sizes. According to the law of large numbers, a prepayment method

with a large pool size should have a higher risk diversification capability compared with that with a small pool size.

Therefore, we recall at this juncture that the specific objective of this chapter is to:

- evaluate the effect of different financial pooling methods of financing healthcare on the SSA region's health outcomes.

We formulated the following research questions to assist with the investigations of this objective:

1. What is the relationship between publicly managed financial pooling methods of financing healthcare and health outcomes in the SSA region?
2. What is the relationship between privately managed financial pooling methods of financing healthcare and health outcomes in the SSA region?

6.1.1 The Independent Variables

Based on relevant literature and data sources, we identified six different types of prepayment and financial pooling methods in use in SSA. We grouped them into two main categories; public and private financing methods. The public methods are contributions that are fully or partly managed by governments. While private methods are privately managed. Public methods include:

1. Government financial arrangement (GFA): This is a type of healthcare financing method that is run by the government and the healthcare payments come directly from taxes and any external support that passes through the government.
2. Social health insurance (SHI): SHI is a contributory healthcare fund managed by the government. Although in some cases contributions are enforced by law, enrolment into SHIs is supposed to be voluntary. Healthcare can be grouped in terms of benefit packages, where a more generous package requires the enrollee to make a higher contribution compared to a less generous package.

3. Compulsory health insurance (CHI): Just like SHI, CHI is a form of public insurance. But unlike SHI, enrollment into CHI is enforced by law. Enrollees are required to make defined contributions to the fund which are enforceable by state law.

On the other hand, private prepayment methods include:

1. Private health insurance (PHI): PHIs are private for-profit organizations that pool healthcare finances by accepting contributions from enrollees. Enrollees' healthcare needs are paid for from the funds in accordance with the healthcare package that they enroll in. The amounts of contributions that are not paid out to meet enrollees' healthcare needs go into the administration of the fund and profit.
2. Other private financial arrangements (OPFA): OPFA are non-profit private methods of pooling healthcare funds. Some are managed by non-governmental organizations in which all or part of the finances come from donors. Others are community-based health insurance (CBHI), trade-based healthcare insurance funds (TBHI), or, employer-managed healthcare contributions.

Based on the categories of independent variables outlined above, the research questions are empirically examined by deploying the following literature-guided specific independent variables:

1. Government financial arrangement (GFA) as a percentage of total healthcare expenditure
2. Social health insurance (SHI) as a percentage of total healthcare expenditure
3. Compulsory health insurance (CHI) as a percentage of total healthcare expenditure
4. Private health insurance (PHI) as a percentage of total healthcare expenditure
5. Other private financial arrangement (OPFA) as a percentage of total healthcare expenditure

We note that OPFA is an aggregated variable that includes:

- a. Community-based health insurance
- b. Trade-based health insurance
- c. Employer-managed medical cover

- d. Healthcare funds are provided by external donors and managed by NGOs.

Table 6.5 below summarize the categories and relationship between the variables addressed in this chapter.

Table 6 1: Summery of Independent Variables

Fund Type	Variable	Source of Funds
Public	GFATCHE	General and defined taxes
	SHITCHE	Publicly sourced insurance contributions
Private	PHITCHE	Voluntary private contributions
	OPFATCHE	Private voluntary contributions and donor funds

Our interest in this section is to: (1) determine the extent of the application of prepayment financing methods in the sub-Saharan Africa (SSA) region, and (2) investigate the effect of financial pooling as a method of healthcare financing risk mitigation on health outcomes in the SSA region. The following sub-section discusses the analytical methods and the associated findings.

6.1.2 The Analytical Models

The analysis of the effect of independent variables of objective three on health outcomes is based on our original specifications (i.e., equation 3.3) which is restated below:

$$HOC_{ijt} = \beta_0 + \beta_k PHEX_{jit} + \beta_2 CTL_{ijt} + \epsilon_{jt}, \quad (6.1)$$

where HOC_{ijt} are health outcomes i in country j in year t ; and $PHEX$ are the proportions (in percentage) of each health expenditure from financing sources in the current total healthcare expenditure (TCHE); β_k are the coefficients of each pooled financing expenditure in each country, CTL are the selected control variables, and ϵ is the error term.

6.2 Estimation Techniques

This section discusses the methods used to investigate the effect of the prepaid and the direct payment methods of finances healthcare on health outcomes in the SSA region. We also investigate

whether compared to non-pooled, pooled finances affect health outcomes differently. We apply a process of inferential analysis through multivariate regression that uses theoretically derived causal propositions to guide data analysis. As we have explained, the data is arranged in a panel format. The inferential statistics are carried out using the fixed effect (FE) and the random effect (RE) models. Because our panel has a long cross-section and high time series, before the regressions we carried out Fisher type unit-root test and ascertained that our data do not suffer from the problem of unit root.

. The FE models allow a causal effect to be identified under weaker assumptions (Allison, 2009). This is because FE regression is specified on a level of the units and includes group-specific constants, group-specific FE wipes out all group-specific unobserved heterogeneity (Allison, 2009; Schunck, 2013). This means that FE models require only the assumption of no unit-specific unobserved heterogeneity. However, FE does not estimate any variable that does not vary within clusters, which holds for level 2 variables (Allison, 2009). The solution to this problem is to estimate within effect using RE (B. Wooldridge & Gooden, 2009). Moreover, RE models assist in controlling for unobserved heterogeneity when the heterogeneity is constant over time and not correlated with independent variables (Wooldridge, 2010) which FE cannot do effectively. Therefore, by carrying out our regressions using both FE and RE we account for both any type of unobserved heterogeneity as well as the problem of variables that do not vary within clusters. To select the appropriate model for our estimations we carry out the Hausman test as recommended by experts (e.g., Gangl, 2010).

We start our investigations by carrying out a pretest analysis of the data.

6.2.2 Pre-test Analysis

We conducted various diagnostic analyses on the data before we carried out the inferential analysis. According to the data sources, sub-Saharan African (SSA) countries operate mixed (i.e., use more than one method in financing healthcare at the same time) systems of health financing. Apart from the direct out-of-pocket (OOP) method, all the rest qualify to be prepayment financing methods, according to our definition. Because some financing methods are duplicated, to avoid double counting and

duplication of the same variable we carried out a pre-test data analysis. These included data pre-processing to unearth underlying patterns that can affect our analysis, data cleaning, and correlation tests.

We also carried out correlation tests using pairwise correlation analysis (Appendix 16) and determined that there is a high correlation (0.955) between the independent variables government financial arrangement as a percentage of total healthcare expenditure (GFATCHE) and compulsory financial arrangement as a percentage of total healthcare expenditure (CFATHCE). Analysis of the data using cross-checking methods reveals that government financial arrangement (GFA) is part of compulsory financial arrangement (CFA). CFA is made up of GFA and compulsory health insurance (CHI). Because the data for social health insurance (SHI) and CHI are the same for all countries that operate SHI (except for a few years in Rwanda) in the SSA region, CFA is therefore, a composite of GFA and SHI. Details of SHI and CHI are provided later in this section. GFA is a financing method that relies on government efforts to bring together healthcare finances for the population. This can be in the form of taxes or external assistance that goes through the government. CFA on the other hand, are all legally enforceable methods of collecting funds for healthcare by governments. Because CFA is a combination of GFA and CHI, to avoid problems of multicollinearity we drop the use of CFA from further analysis.

Just like GFA and CFA, compulsory health insurance as a percentage of total healthcare expenditure (CHITCHE) and social health insurance as a percentage of total healthcare expenditure (SHITCHE) are also highly correlated (correlation coefficient of 0.988). Cross-checking analysis shows that SHI and CHI data are the same except for a few years in Rwanda. We note that the two schemes are similar in some respects. Briefly, SHI is an insurance-based financial pooling mechanism that is publicly managed. The healthcare finances are pooled from either the entire population or a defined section of the population by the government or its agencies. SHI, by design, is not mandatory, however, it can be administered in ways that make its contributions, by at least a section of contributors, obligatory. For example, the use of check-off systems to pool contributions from those in regular employment. CHI,

on the other hand, is an obligatory public scheme in which payments are enforced by law and therefore mandatory. The payment obligation may be placed on the employers or both the employer and the employee. Therefore, there is a very thin line that differentiates CHI from SHI. And, it seems that in the SSA region, they are operated in many countries as if they are the same healthcare financing method. Therefore, to avoid multicollinearity problems we use only SHI in the subsequent correlation analysis.

Using histograms, we carried out skewness tests to determine the distribution of data within each variable of interest. We did this because pooled healthcare expenditure data tend to be positively skewed (Berk & Monheit, 2001). Positively skewed healthcare expenditure means that a small proportion of the population accounts for a large share of the expenditure (Berk & Monheit, 2001). This may not necessarily be bad because it may be an indication of progressivity in payment for healthcare. That is, that healthcare cost is being paid for per the ability-to-pay. This is particularly true in situations, like SSA, where income is highly concentrated. In which case a few rich people may be meeting the healthcare cost of most poor people. However, for risk pooling purposes, a positively skewed distribution of expenditure may also mean that there are not enough contributors that can lead to the building up of a large financing pool capable of diversifying the healthcare financing risk of all the contributors and/or the population. That is, the amount collected may be too small to meet the healthcare needs of contributors or the population. As a result, the managers of the system may be forced to limit health benefits from the fund (increasing health risk) or pass some cost to beneficiaries (increasing financing risk). Each independently or both actions together result in reduced financing risk protection.

Apart from its effect on the financing of healthcare, Berk & Monheit (2001) posit that, because it departs from a normal distribution, skewed distribution affects the effectiveness with which computed estimates capture the true population parameters. They recommend logging the skewed medical expenditure data to treat the problem. The skewness test revealed that PHITCHE and SHITCHE data are positively skewed (Appendixes 17 and 18). Therefore, we log-transformed the data before carrying out regression analysis.

6.3 Empirical Analysis and Findings

Now, we embark on analyzing the general characteristics of the independent variables' data using descriptive statistics and trend diagrams.

6.3.1 Descriptive Statistics and Trend Analysis

According to descriptive statistics (Table 6 2), the main source of private healthcare financing in sub-Saharan Africa is the out-of-pocket (OOP) financing approach. During the research period, the average OOP was 40.71 as a percentage of total current health expenditure (TCHE). Botswana spent the least in OOPTCHE during the period. We note that Botswana also has some of the best health outcomes in the region. Equatorial Guinea had the highest (84.162 as a % of TCHE) OOPTCHE in 2002, and Comoros' OOP was consistently above 80% of TCHE during the period. Other countries with high OOP during the period include Sierra Leone, Nigeria, DRC, and Cameroon. These countries' health outcomes are also below the SSA region's average for the period, which suggests that there is an adverse correlation between OOP and health outcomes. Because OOP is not a prepayment method it is not a variable of interest for this study, we refer to it only for comparison purposes.

On the other end, the method that is used the least in the region is compulsory health insurance (CHI) and social health insurance (SHI), which is rather surprising given that WHO has been urging member countries to embark on using government-assisted contributory prepayment methods of financing healthcare for equity of the healthcare systems. A total of 21 countries in the SSA region, including Angola, Botswana, Cameroon, Congo, DRC, Eritrea, and South Africa among others, do not use either CHI or SHI. The two sources of healthcare financing are favored by international organizations including the World Health Organization and the United Nations. Gabon and Cabo Verde are the two countries with the highest (averaging 20% of TCHE) use of these two approaches. The highest was 25.717% of TCHE in 2001 by Cabo Verde.

Government financial arrangement (GFA) which relies heavily on taxes from the treasury is present in all the countries of the SSA region. Botswana leads in the use of this method, other countries

that rely heavily on this method are Cabo Verde, Congo, Lesotho, and Seychelles. On the other hand, DRC and Equatorial Guinea have the least application of this method in the financing of their health systems.

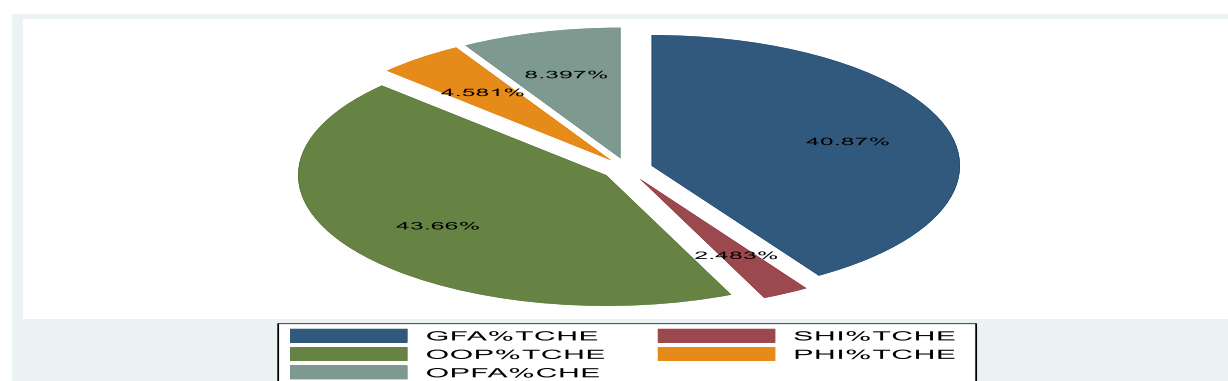
Table 6 2: Descriptive Statistics of Prepaid and Direct Health Expenditure in sub-Saharan Africa

Variable	Obs	Mean	Std. Dev.	Min	Max
OPFATCHE	883	7.829	8.829	0	51.052
OOPTCHE	883	40.71	20.607	2.993	84.162
PHITCHE	883	4.271	8.135	0	50.182
CFATCHE	883	40.482	16.431	4.661	82.887
GFATCHE	883	38.109	15.398	4.661	82.112
CHITCHE	883	2.338	4.838	0	25.717
SHITCHE	883	2.315	4.783	0	25.717
VFATCHE	883	59.078	16.586	17.113	95.339

Source: Authors' Compilation

The breakdown of each component of the financing method in the total healthcare expenditure in Fig. 6.1 below shows that the region's healthcare financing needs are financed majorly from direct government finances (taxes and external support that pass through the government) (44%) and direct out-of-pocket payments (41%). Publicly managed insurance-based contributory methods account for less than 3%. All the insurance-based (PHI and SHI) healthcare financing methods account for a meager 7% of the total healthcare financing mix in the region. And, all the prepayment methods (i.e., OPFA, PHI, and SHI) account for less than 16% of the total.

Figure 6 1: The Proportions of Each Financing Method in the Total Healthcare Financing Mix



Before carrying out multivariate analysis on the effect of financial pooling methods of financing healthcare on health outcomes, we carried out bivariate analysis of the relationship between the dependent and the independent variables to get some idea about the nature of the relationship between the variables.

Starting with privately funded prepayment methods, the bivariate results of RE models (Tables 6.6 & 6.7) show that both PHITCHE and OPFATCHE affect health outcomes positively, even though OPFA's positive effect on LEB is insignificant. We also note that the sizes of the coefficients linking PHITCHE and health outcomes is higher than those linking OPFATCHE to health outcomes, this may mean that private for-profit health insurance contributes more to health system's equity compared to non-profit healthcare contributory funds.

Table 6 3: Fixed and Random Effects of Other Private Financial Arrangements on Health Outcomes

VARIABLES	Fixed Effect Model				Random Effect Model			
	(1) LEB	(2) U5MR	(3) CDR	(4) MMR	(1) LEB	(2) U5MR	(3) CDR	(4) MMR
OPFATCHE	0.0756* (0.0393)	-0.564** (0.242)	-0.0506** (0.0227)	-5.707*** (1.392)	0.0530 (0.0368)	-0.613*** (0.225)	-0.0362* (0.0205)	-5.974*** (1.343)
Constant	57.11*** (0.334)	97.75*** (2.053)	11.28*** (0.193)	597.7*** (11.66)	57.27*** (0.899)	97.95*** (5.366)	11.16*** (0.425)	600.3*** (43.95)
Observations	883	883	883	836	883	883	883	836
R ² - within	0.004	0.006	0.006	0.021	0.01	0.032	0.002	0.064
R ² -absorb. panel	0.704	0.696	0.600	0.853	0.704	0.696	0.600	0.853
Adjusted R ²	0.687	0.679	0.578	0.844	0.687	0.679	0.578	0.844
F- statistics	3.69* (1 835)	5.45** (1 835)	4.96*** (1 835)	16.81*** (1 835)	—	—	—	—
Wald χ^2	—	—	—	—	2.08	7.44***	3.12*	19.77***
Number of Id	47	47	47	47	47	47	47	47
Hausman test results	NO	NO	NO	NO	YES	YES	YES	YES

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Key: LEB – life expectancy at birth, U5MR – under-5 mortality rate, CDR – crude death rate and MMR – maternal mortality rate

Table 6 4: Fixed and Random Effects of Private Voluntary Health Insurance on Health Outcomes

VARIABLES	Fixed Effect Model				Random Effect Model			
	(1) LEB	(2) U5MR	(3) CDR	(4) MMR	(1) LEB	(2) U5MR	(3) CDR	(4) MMR
Log PHITCHE	1.821*** (0.298)	-11.47*** (1.813)	-0.896*** (0.174)	-38.68*** (10.21)	1.412*** (0.273)	-10.29*** (1.652)	-0.613*** (0.149)	-38.59*** (9.775)
Constant	56.69*** (0.227)	100.5*** (1.379)	11.28*** (0.132)	576.4*** (7.551)	57.19*** (0.910)	98.30*** (5.516)	11.06*** (0.400)	566.2*** (47.01)
Observations	782	782	782	739	782	782	782	739
R ² -within	0.048	0.051	0.035	0.020	0.048	0.051	0.035	0.020
R ² -absorb. panel	0.682	0.695	0.574	0.858	0.682	0.695	0.574	0.858
Adjusted R ²	0.663	0.677	0.549	0.850	0.663	0.677	0.549	0.850
F-statistics	37.31*** (1 738)	40.05*** (1 738)	26.60*** (1 738)	14.69*** (1 738)	—	—	—	—
Wald χ^2	—	—	—	—	26.75***	38.79***	16.90***	16.04***
Number of Id	43	43	43	43	43	43	43	43
Hausman test results	YES	NO	YES	NO	NO	YES	NO	YES

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Key: LEB – life expectancy at birth, U5MR – under-5 mortality rate, CDR – crude death rate and MMR – maternal mortality rate

Table 6 5: Fixed and Random Effects of Government Financial Arrangement on Health Outcomes

VARIABLES	Fixed Effect Model				Random Effect Model			
	(1) LEB	(2) U5MR	(3) CDR	(4) MMR	(1) LEB	(2) U5MR	(3) CDR	(4) MMR
GFATCHE	0.0966*** (0.0180)	-0.555*** (0.111)	-0.0463*** (0.0105)	-2.488*** (0.629)	0.0961*** (0.0173)	-0.605*** (0.106)	-0.0430*** (0.00984)	-2.849*** (0.617)
Constant	54.02*** (0.698)	114.5*** (4.303)	12.65*** (0.406)	648.3*** (24.37)	54.04*** (1.064)	116.1*** (6.177)	12.51*** (0.542)	661.2*** (45.62)
Observations	883	883	883	836	883	883	883	836
R ² -within	0.033	0.029	0.023	0.019	0.042	0.134	0.012	0.172
R ² -absorb. panel	0.713	0.703	0.607	0.853	0.713	0.703	0.607	0.853
Adjusted. R ²	0.696	0.686	0.585	0.844	0.696	0.686	0.585	0.844
F- statistics	28.79*** (1 835)	25.00*** (1 835)	19.55*** (1 835)	15.64*** (1 788)	—	—	—	—
Wald χ^2	—	—	—	—	30.95***	32.81***	19.07***	21.31***
Number of Id	47	47	47	47	47	47	47	47
Hausman test results	NO	NO	NO	YES	YES	YES	YES	NO

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Key: LEB – life expectancy at birth, U5MR – under-5 mortality rate, CDR – crude death rate and MMR – maternal mortality rate

On publicly managed prepayment methods, the bivariate regression results show that both the SHITCHE and GFATCHE are significantly beneficial to health outcomes. Based on the sizes of the

coefficients, the bivariate results show that social health insurance could contribute more to health system's equity compared with tax-based methods. And, the insurance-based prepayment methods (PHI & SHI) show better results in terms of their contribution to health system's equity compared with GFA and OPFA according to the bivariate models.

Table 6 6: Fixed and Random Effects of Social Health Insurance on Health Outcomes

VARIABLES	Fixed Effect Model				Random Effect Model			
	(1) LEB	(2) U5MR	(3) CDR	(4) MMR	(1) LEB	(2) U5MR	(3) CDR	(4) MMR
Log SHITCHE	1.532*** (0.280)	-8.949*** (2.034)	-1.015*** (0.158)	-38.25*** (10.16)	1.575*** (0.260)	-10.28*** (1.826)	-1.002*** (0.142)	-38.85*** (9.794)
Constant	57.51*** (0.297)	103.6*** (2.155)	10.98*** (0.168)	567.5*** (10.64)	57.90*** (0.887)	102.2*** (5.340)	10.75*** (0.417)	556.3*** (46.92)
Observations	397	397	397	373	397	397	397	373
R ² -within	0.074	0.049	0.099	0.039	0.074	0.049	0.099	0.039
R ² -absorbed panel	0.672	0.643	0.598	0.804	0.672	0.643	0.598	0.804
Adjusted. R ²	0.651	0.620	0.572	0.791	0.651	0.620	0.572	0.791
F-statistics	29.87*** (1 372)	19.36*** (1 372)	41.05*** (1 372)	14.17*** (1 348)	—	—	—	—
Wald χ^2	—	—	—	—	36.75***	31.66***	49.71***	15.74***
Number of Id	24	24	24	24	24	24	24	24
Hausman test results	NO	NO	NO	NO	YES	YES	YES	YES

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Key: LEB – life expectance at birth, U5MR – under-5 mortality rate, CDR – crude death rate and MMR – maternal mortality rate

Overall, the results of bivariate models show that prepayment methods can be relied upon to inject equity into the health systems of the SSA region. This is because the direction of the results of all the bivariate models shows a favorable correlation between the pooling methods and health outcomes. Having made this observation using bivariate models, we now carry out empirical analysis of the effect of the prepayment methods on health outcomes using a more robust multivariate regression analysis.

6.3.3 Empirical Estimations and Results

In this section, we analyze the joint effect of healthcare financial pooling using public (government-led) methods and private methods on health outcomes. We use multivariate model as outlined in equations 3.3. Using this specification, we intend to find out if there is any difference in the way different prepayment methods impact health outcomes in SSA after the inclusion of control variables.

We also inquire if there is a difference in the way public and private prepayment methods affect health outcomes. We note that the dependent variable, health outcomes, represents the aggregate health outcomes per country. This means that improvement in health outcomes represents improvement in welfare.

And, as we have stated, the a priori expectation is that increase in expenditure from any source of funding should lead to better health outcomes. That is, positively associated with life expectancy at birth (LEB), and negatively associated with under-5 mortality rate (U5MR), crude death rate (CDR) and maternal mortality rate (MMR). The regression results are shown in Table 6.8.

The results of the Hausman test show that RE is inefficient in estimating the results of these associations. In summary, the results of the FE models (Table 6.10) show that increases in government financial arrangement (GFA) and other private financial arrangement (OPFA) are beneficial to health outcomes, even though their association with some outcomes is not significant. An increase in OPFA is significantly beneficial to LEB, while GFA is significant to U5MR. Increase in healthcare financing using social health insurance (SHI) is only significantly beneficial on MMR. The results also show that increase in the use of private health insurance (PHI) is harmful to health outcomes and, particularly to LEB and MMR because its harmful effect is significant. This means that publicly managed and non-profit making pooling methods are largely beneficial to health outcomes in accordance with the expectations of the health capital theory, while the effect of private for-profit health insurance are contrary to the theory's expectations.

Table 6 7: Fixed and Random Effects of Prepaid and Direct Payment Methods on Health Outcomes in Sub-Saharan Africa

VARIABLES	Fixed Effect Model				Random Effect Model			
	(1) LEB	(2) U5MR	(3) CDR	(4) MMR	(1) LEB	(2) U5MR	(3) CDR	(4) MMR
OPFATCHE	0.0829** (0.0315)	-1.051* (0.591)	-0.0320 (0.0246)	-1.837 (1.529)	0.322** (0.144)	-0.671 (1.232)	-0.131 (0.0935)	-4.326 (4.827)
GFATCHE	0.00569 (0.00751)	-0.296** (0.141)	-0.00345 (0.00586)	-0.235 (0.362)	0.110*** (0.0387)	-1.268*** (0.330)	-0.0722*** (0.0250)	-3.693*** (1.295)
Log SHITCHE	0.154 (0.120)	1.788 (2.243)	0.0825 (0.0933)	-15.17** (5.771)	1.090** (0.442)	-9.570** (3.770)	-0.987*** (0.286)	-15.06 (14.82)
Log PHITCHE	-0.201** (0.0936)	2.867 (1.755)	0.0784 (0.0730)	15.24*** (4.513)	0.244 (0.465)	-2.129 (3.967)	-0.176 (0.301)	-4.400 (15.48)
Immunization BCG	0.00523 (0.00421)	-0.133* (0.0789)	-0.00317 (0.00328)	-0.981*** (0.203)	0.126*** (0.0205)	-1.063*** (0.175)	-0.0723*** (0.0133)	-5.330*** (0.684)
Control of corruption	-0.709*** (0.264)	-6.821 (4.942)	-0.231 (0.206)	-50.50*** (12.71)	1.982* (1.140)	1.122 (9.728)	-0.687 (0.738)	-93.53** (38.03)
Gini index (x100)	-1.552*** (0.0878)	25.61*** (1.646)	1.532*** (0.0685)	25.93*** (4.233)	-1.200*** (0.252)	4.952** (2.154)	0.636*** (0.163)	43.45*** (8.408)
Internet usage	-0.00603 (0.00567)	0.423*** (0.106)	0.0245*** (0.00442)	0.539* (0.280)	0.124*** (0.0300)	-0.470* (0.256)	-0.0513*** (0.0194)	-3.194*** (1.021)
Wages & salaries	0.166*** (0.0299)	-2.826*** (0.561)	-0.0504** (0.0233)	-1.953 (1.460)	-0.0336 (0.0555)	1.896*** (0.474)	0.0863** (0.0359)	-5.714*** (1.850)
Unemployment	0.0196 (0.0429)	0.491 (0.804)	-0.00281 (0.0334)	-3.395 (2.110)	-0.291** (0.144)	1.814 (1.227)	0.172* (0.0931)	21.23*** (4.846)
Urban population	-0.129*** (0.0373)	1.857*** (0.699)	-0.0734** (0.0291)	4.791*** (1.806)	0.0539 (0.0497)	-1.649*** (0.424)	-0.0688** (0.0322)	-6.785*** (1.662)
Use of sanitation services	0.875*** (0.0250)	-6.111*** (0.469)	-0.474*** (0.0195)	-19.55*** (1.206)	0.198*** (0.0530)	-1.642*** (0.452)	-0.146*** (0.0343)	9.075*** (1.764)
Constant	107.9*** (3.700)	-867.7*** (69.38)	-41.03*** (2.885)	-248.8 (178.3)	88.55*** (10.15)	87.56 (86.61)	-3.628 (6.572)	-534.5 (338.3)
Observations	101	101	101	100	101	101	101	100
R ² - absorbed panel	0.997	0.983	0.995	0.997	0.997	0.983	0.995	0.997
Adjusted R ²	0.996	0.978	0.993	0.996	0.996	0.978	0.993	0.996
R ² - within	0.989	0.928	0.979	0.952	0.605	0.49	0.528	0.38
F - statistics	574.19 (12, 80)	185.49 (12, 80)	306.69 (12, 80)	131.54 (12, 79)	-	-	-	-
Wald χ^2	-	-	-	-	435.87	355.48	387.4	845.28
Number of Id	9	9	9	9	9	9	9	9
Hausman test results	Yes	Yes	Yes	Yes	No	No	No	No

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Key: LEB – life expectancy at birth, U5MR – under-5 mortality rate, CDR – crude death rate and MMR – maternal mortality rate

More specifically, a 1% increase in OPFA in the region's healthcare financing mix increases the region's aggregate life expectancy at birth by 0.08 years. A similar increase in the ratio of GFA in the financing mix reduces the deaths of children under the age of 5 years by 0.3 per 1,000 live births. An

increase in SHI by 1% reduces maternal deaths by more than 15 mothers for every 100,000 live births. On the other hand, a 1% increase in PHI reduces LEB by 0.2 years and increases maternal deaths by more than 15 per 100,000 live births. We discuss the implications of these findings in the sections that follow.

6.4 Discussions of Empirical Findings in the Context of Current Literature

Although, to our knowledge, no study has investigated the effect of prepayment methods on health outcomes in sub-Saharan Africa (SSA). Some studies (e.g., by Ataguba & McIntyre, 2018, Barasa et al, 2017, Ataguba, 2016) have looked at the contribution of healthcare financing methods and equity of access to needed healthcare. These empirical works conclude that direct payment methods (OOP) impede access to needed healthcare. Even if they did not make a direct conclusion that prepayment methods would solve the problem of access, it is implicitly implied. However, we note that some empirical studies have found no evidence of adverse correlation between access to needed healthcare and OOP. For example, Hercot et al., (2011) found no evidence that the cost of healthcare is lower among countries in Africa that have removed user fees. In studies based in Uganda and Burkina Faso, Orem et al (2010) and Laokri et al (2013) found that the cost of healthcare remains high in these countries even after the removal of user fees. This implies that the use of prepayment methods (which are the alternative to OOP) may not increase access to needed. Which may be interpreted to mean that prepayment and financial pooling methods of financing healthcare do not reduce the cost burden on consumers of healthcare. Therefore, according to these studies, prepayment and pooling methods may not be reliable methods for health systems' equity in Sub-Saharan Africa (SSA).

Studies that have looked at the contribution of financial pooling to equity have concentrated on the strengths and weaknesses of social health insurance (SHI). For example, Atinga et al, (2015) in a study based in Ghana found that SHI's contribution to access to healthcare is impeded by high administrative costs. Agyepong & Nagai, (2011) argue that due to small pool sizes SHI in Ghana is not delivering according to expectations. He argues that Ghana's social health insurance not only leaves out

many households from coverage because they cannot afford the required contributions to benefit, but it has also not increased access to needed healthcare as expected. This argument is also given by Akazili et al., (2014), who went further to state that pooling through SHI underperforms because it does not take care of the healthcare financing needs of the poor. In which case they imply that SHI does not increase aggregate welfare (utility) as it leaves behind the very people who it is meant to assist. These studies cast doubt as to the appropriateness of SHI with regards to health systems equity in SSA. Although we looked at equity in terms of health system's output (outcome) rather than access, our findings do not give a lot of confidence in SHI's ability to inject equity into the region's health systems. This is because the results of this study show that apart from its beneficial effect on maternal mortality, SHI's contribution to health outcomes is largely insignificant. The fear that SHI may not be the right financing method for the purposes of equity in SSA has been expressed by some experts (e.g., Carrin, 2002; Carrin & James, 2005;). They argue that for SHI to be effective and for it to contribute to the optimization of welfare in terms of better population health status, the cost of collecting contributions should be reasonable, which requires a large formal sector. Furthermore, actuarial data needs to be reasonably accurate. They argue that SSA has a small formal sector and lacks the data needed to develop reliable actuarial information. For these reasons, they conclude that any effort to implement SHI in SSA would not favorably impact health systems.

As we have stated earlier, *other private financial arrangements* (OPFA) are made up of several private prepayment methods apart from private health insurance (PHI). These include prepayment methods that are supported by non-profit organizations (e.g., NGOs, development agencies, etc.), or voluntary self-help groups like community-based health insurance (CBHI) and trade-based health insurance. In terms of its contribution to health systems' financing equity in SSA, the most studied form of OPFA is the CBHI. We recall that CBHI is constructed like mutual funds and operates like buyers' cooperatives, managed by elected members or by supporting NGOs on behalf of enrollees. Some researchers (e.g. Ranson, 2001) have found evidence that CBHI increases access to needed healthcare,

particularly to the poor and those with irregular incomes. Indeed, some experts (e.g. Norman et al., 2009) argue that because they serve the healthcare financing needs of the vulnerable and those left behind by formal health insurance schemes, their contribution to welfare and equity is superior compared with other forms of prepayment methods. However, empirical works by Norman et al., (2009) and Preker et al., (2002) found no evidence of increased access to healthcare, particularly among the poor, as a result of CBHI. They concluded that CBHI, to the contrary, contributes to the exclusion of households that are at the bottom of income ladder from needed healthcare.

The results of the present study show that OPFA, of which is an aggregate of prepayment financing methods that include CBHI, contribute significantly in lengthening the region's LEB. And although insignificant, it is associated with favorable effects on U5MR, CDR and MMR. Therefore, we argue that health coverage using private non-profit making prepayment health schemes (such as CBHI, Trade-based voluntary health schemes etc.) are beneficial to SSA's health systems' equity. We argue further that the reason why this study's results show a beneficial relationship between OPFA and health outcomes is because these kinds of prepayment methods optimize welfare through sharing of healthcare costs. And, contrary to the argument advanced by Norman et al., (2009) and Preker et al., (2002), as a form of solidarity, these kinds of prepayment methods could be more appropriate for the region's healthcare financing needs compared to SHI and PHI. This is because, in terms of the size and terms of contributions, they are more suitable to the needs of people with irregular incomes and the poor.

GFA are expenditures for healthcare which are made by governments from national treasury using taxes and donor funds that are channeled through government and governmental agencies. Although its effect is only significant on U5MR, the direction of the multivariate (FE models) results of this study shows that increase in the use of this form of payment is positively correlated with the region's health outcomes. According to some health economists (e.g., Wagstaff, 2010) tax-based pooling is more suited for Africa because of the low administrative cost (cost is spread among many vote heads and mechanisms for collecting taxes already exist) and, because it has a higher redistributive effect than SHI

(Wagstaff, 2010) contributions. Indeed, an empirical study by Mutenga et al (2017) found that compared with other forms of pooling methods, paying for healthcare using taxes has the highest income redistributive effect. This means that GFA diversifies income risk while paying for healthcare better than any other payment method. Therefore, according to these experts, GFA may provide the most realistic path to health systems' equity in SSA.

However, some experts disagree, for example, Pauly et al., (2006) assert that taxes high enough to cover healthcare needs of all in developing countries are not sustainable and would lead to a public sector failure that can be very damaging to these economies. Further to this, empirical studies (e.g., by Dixon et al., 2013) show that use of taxes to finance healthcare do not increase access to needed healthcare. This is because the distribution of healthcare using taxes is prone to political manipulation, bureaucratic delays and corruption (Hercot et al., 2011), all of which are welfare reducing. Due to these weaknesses, these experts argue that equity of the health systems in SSA cannot be based on tax-based financing method.

Although the results of this study show a weak relationship between GFA and health outcomes, the direction of the effect is generally positive (i.e., positive correlation with LEB and negative with U5MR, CDR and MMR). We therefore, argue that if practices that reduce welfare (e.g., misappropriation, skewed allocation etc.) are minimized, tax-based method of financing healthcare can be used to inject equity into the region's health systems.

The last prepayment method in this study is private voluntary health insurance (PHI). PHIs are private businesses that offer healthcare covers. PHIs are profit making organizations. The results of this study's models show that when the ratio PHI is increased in the region's healthcare financing regime, the region's health outcomes suffer. Indeed, the FE results show that PHI is significantly associated with a reduction in LEB and an increase in U5MR. Although we have found no empirical study in SSA on the contribution of PHI to health systems' equity, the results of this study concur with results of some studies

done in other parts of the world. For example, Tollen & Crane, (2002) argued that there is no evidence that countries that predominantly use PHI to finance healthcare have a lower health expenditure to GDP ratio. While there is evidence that they have a higher private health spending, which makes the burden of paying for healthcare higher per person without reducing the burden on the general economy. This shows that use of PHI to finance healthcare reduces welfare. Proponents of PHI (e.g. Colombo & Tapay, 2004; Pauly et al., 2006) argue that because PHI observes the principle of consumer sovereignty, it leads to Pareto efficiency, and as a result, ensures welfare optimization in the allocation of healthcare. According to them this is because consumer supremacy ensures healthy competition which, ultimately, leads to higher health production at a lower cost. However, empirical studies (e.g. by Davis & Cooper, 2003; Woolhandler et al., 2003) have discovered that contrary to expectation, competition in the health insurance market can develop around undesirable activities. That is, competition, the incentive that drives insurers to be responsive to consumers' needs and to limit cost, also steers them towards enrolling more healthy individuals and to move away from more risky individuals. Such competition not only raises equity concerns, but is, obviously, welfare reducing.

Therefore, even though the results of this study on the relationship between PHI and health outcomes are contrary to expectation, there are good reasons why this is the case. In an environment with low regulatory infrastructure, like the SSA region, competition among health insurance providers can even be more damaging to welfare than those that are reported by these studies done outside the region. Furthermore, because of profit motive, contributions to private health insurance schemes are usually too high for low-income groups. Furthermore, in the absence of strict monitoring, most contributions can be locked-up in profit instead of the provision of healthcare. Therefore, unless the regulatory environment is improved to ensure that competition is steered away from welfare reducing practices and a limit is set on the amount of contributions that can be declared as profit (some countries have regulation on amounts that must be used in healthcare by PHI), PHIs cannot be relied upon to inject equity into the healthcare systems of the SSA region.

6.4.2 Implications of the Findings for Theory and Policy

This section discusses the contributions of the findings under the objective to relevant theories and makes policy recommendations based on the findings.

Implications of the Findings to Theory

We restate that the independent variables under objective three are in the ratios of total healthcare expenditure. As long as total healthcare expenditure is not increased, increasing one of them does not mean that there is a real increase in investment in healthcare. This means that care should be taken when relating the findings in this section to the theory of health capital. However, we argue that this does not make the theory less applicable. This is because our analysis is based on increasing financing from one source while holding the total healthcare expenditure constant. This gives us a better picture of the contribution of the source to equity. Apart from the theory of health capital, there are other health equity theories that may apply.

Having made that clarification, we note that out of the four financial pooling methods, increasing healthcare financing by private voluntary health insurance (PHI) is the only action that is significantly detrimental to health outcomes. Increasing financing using the other three methods correlate favorably with health outcomes. We note that PHI is a private for-profit payment system. We also note that the findings on its effect on health outcomes are contrary to Grossman's theory of health capital. The theory that informs this study. The theory states that increase in investment in healthcare should add to the health stock of the population, which means that increase in healthcare expenditure from any source should correlate favorably with health outcomes. Before we conclude on how these findings relate with the health capital theory, we need to first expand on how they relate with health equity theories. This approach will assist in making these results clearer in terms of how they relate with health theories.

As we have stated, PHI is a market driven method of financing healthcare. The other three methods are not. Government financial arrangement (GFA) and social health insurance (SHI) are both state managed methods of financing healthcare. And, other private financial arrangements (OPFA) are

non-profit making schemes. This mean that PHI is the only method that allocates healthcare in accordance with market forces. This is an architype libertarian approach to the allocation of resource. We recall that libertarian theory advocates for the allocation of all resources according to entitlement (Donabedian, 1971). The proponents of the theory argue market forces are the most efficient allocators of resources (Vallentyne, 2014; Pereira, 1993). And taking out any good or services, healthcare included, from market processes leads to inefficiencies which cause Pareto sub-optimality, and ultimately, reduce welfare. Therefore, according libertarians, the allocation of healthcare in any other way, apart from by market forces and in accordance with entitlement, should correlate adversely with health outcomes. Our findings show that PHI correlates negatively with health outcomes which may mean that the libertarian approach is not appropriate in allocating healthcare. This means that the allocation of healthcare in SSA cannot be abrogated to market forces. That is, some form of solidarity with the disadvantaged is required.

The theory that strongly advocates for solidarity with the disadvantaged groups is the egalitarian theory. The theory of equality opposes any form of payment that force the low-income groups to make full or most of the payment for their healthcare. The proponents of egalitarianism (e.g., Dworkins, 2018a) advocate for equalization of health resources through government involvement in healthcare to protect vulnerable groups from healthcare financing hardships. According to egalitarianism, any financing method that do not allocate healthcare according to need cannot increase welfare, particularly, if the proportion of the population left out are the majority. This means that the production of population health cannot be maximized unless the vulnerable are protected from meeting the full price of healthcare. Given that the findings of this study show that GFA and SHI correlate favorably with health outcomes, they confirm that government involvement is necessary to ensure healthcare financing equity in SSA. We also note that OPFA correlate well with the region's health outcomes. This may mean that by spreading the cost of healthcare among many households, such voluntary organizations cushion households from the risk of high cost of healthcare. And, we point out that because OPFA are non-profit making voluntary organizations, they are closer to egalitarian theory than libertarian theory.

Going back to the health capital theory, we argue that not all increases in investment (expenditure) in healthcare leads to the improvement in a population's health stock. Some increases may come from financing methods that lock out part of the population from needed healthcare and, as a result of such exclusion, cause the aggregate population's health stock to reduce. We argue that because PHI is a market-driven method of paying for healthcare, it excludes those who cannot afford the its contributions from healthcare that are made available by it. If these (those who cannot afford) are the majority, like is most likely the case in SSA, then the health capital model reveals it by showing a negative correlation between health status (health outputs) and such a financing method, like in the case of PHI and health outcomes in this PhD work. Therefore, we argue that these findings confirm that the concept of health capital model remains an appropriate method in the analysis of health systems' equity.

Implications of the Findings to Policy

Turning to policy implications, we start by pointing out that the aim of this study was to find out the effect of different pooling methods on health outcomes. Two pooling techniques (GFA & SHI) are public. PHI is a private for-profit method. While OPFA is a pooling method that is made up of different non-profit making healthcare schemes. In terms of public and private, the results of this study show that private for-profit (PHI) method correlate adversely with health status (outcomes). This means that this method of financing healthcare reduces welfare by reducing the aggregate health systems output. As a result, we argue that it can be detrimental to health system's equity in the SSA region. Therefore, for the purposes of health systems' equity, we do not recommend it for the region. The other prepayment method that does not rely on public funding is OPFA. We note that although private, OPFAs are non-profit making healthcare financial prepayment schemes. OPFA correlate well with health outcomes, however, apart from LEB its effect on the other health outcomes is insignificant. We also note that this pattern of correlation is the same with the two public pooling methods. That is, GFA correlate significantly with U5MR, and SHI with MMR. Therefore, before making policy recommendations it is important to explain reasons why their effects on health status tend more towards insignificance than significance.

The reason for financial pooling is to diversify healthcare financing risk. Pooling does this by: 1) shifting the cost of healthcare from sickness days to healthy days, 2) distributing the cost burden across many households and, 3) income redistribution, where high income groups take a larger share of the cost of healthcare compared with low-income groups. And the sizes of the pools determine the extent of cost sharing and income redistribution. This means that pool sizes play an important role in health financing risk diversification. Some experts (e.g., Carrin, 2002) argue that pooling where households are expected to make regular payment into a healthcare pool (e.g. PHI, SHI and OPFA) are not suitable for SSA. This is because the region is characterized by large informal sector, high and scattered rural population and high income concentration. These factors do not only limit the growth of pool sizes but also increase the cost of administering the funds. Low pool sizes and high administration cost could be responsible for the low performance of SHI and OPFA.

To grow pool sizes and reduce administrative costs, we recommend creative methods of collecting contributions. For example, contributions should not be strictly tied to payroll deductions (to net in those with irregular incomes) and, they should be made on irregular basis so long as a set target is reached within a set period. For example, setting a monthly target amount that qualifies enrollees to benefit but accepting remittances at any time so long as the target is reached. This is possible through the use of modern technologies, like cell phone money transfers. Furthermore, use of such technology reduces the administrative cost. Doing this increase pool sizes and reduce administrative cost at the same time. The result of such a policy is increased risk sharing and a higher income redistribution effect, which we argue will optimize welfare thereby increasing the general population health status. Additionally, we recommend for government intervention to grow the pool sizes and to improve the administration standards of these schemes. Government can do this by subsidizing the funds by contributing for the poorest, those that cannot afford the required minimum contributions. And, like happened in Rwanda and now, Ethiopia, the region's government can improve the performance of OPFA (e.g., CBHI) by formalizing enrollment into them, consolidating them into large pools and stabilizing them through financial auditing

of their books. The success of *mutuelle de santes* in Rwanda shows that these informal healthcare contribution schemes may hold the key to SSA's health systems' equity.

Research (e.g., by Atinga et al., 2015; Debpuur et al., 2015) show in the face of wastage, even large pool sizes cannot lead to Pareto-improvement. The significantly high favorable correlation between corruption index and some health outcomes (Table 6.8) shows that wastage of fund through practices that redirect publicly managed contributions away from healthcare could be responsible for the low effect of the public pooling methods (SHI & GFA) on health status in SSA. We therefore recommend for policies that ensures that funds collected for the purposes of healthcare are used for the purpose. This can be done through strict anti-corruption regulations and regular auditing to ensure faster detection of any form of misuse.

Although not directly covered in this study, empirical studies (e.g., by Atinga et al., 2015) show that market failure can also lead to underperformance by public healthcare contributory funds. They identified the negative effect of both moral hazard and adverse selection in Ghana's public health insurance fund. Adverse selection is where high risk individuals self-select into high benefit packages. Doing this leads to low a sickness risk diversification. Which ultimately causes the underperformance of the fund since most of it is consumed by high medical bills of the few high risks. Moral hazard on the other hand. Is caused by the behavior of those that are covered which increases the probability of payout beyond what was calculated for them. Ex-ante moral hazard occurs when the increased risk of payment by the insurer occurs before the medical event. For example. increase in smoking, alcohol drinking and consuming less of disease protection products (e.g., stopping the use of mosquito nets) and so on. ex-post moral hazard is where individuals with cover increase the utilization of healthcare. empirical research (e.g., by Dave & Kaestner, 2009; Debpuur et al., 2015) show that moral hazard is welfare reducing as it takes away funds from those with real needs of healthcare and causes wastage.

To reduce the damaging effect of adverse selection we advocate for government intervention by subsidizing the cost of medication of the high risks. Regulations can also be put in place which encourage co-payment and co-insurance. Those actions assist with spreading the risk of high risks even further. According to Newhouse, (1992) these interventions also assist with the growth of pool sizes. When co-insurance is taken in collaboration with private insurers, it may also assist with the growth of the sector, which taken together will lead to increased welfare. Indeed, as posited by Wilson, (1977) co-insurance can be done through private-public partnership where the public sector offers minimum healthcare packages and passes covers above this minimum to private insurers. According to him, such supplementary coverage represents Pareto-improvement over competitive equilibrium. This means that it represents welfare improvement. Improved welfare contributes to better health output (health outcomes). Finally, Dave & Kaestner, (2009), argue that most forms of moral hazard are caused by ignorance, and can be reduced simply through consumer education. Therefore, we advocate for population education to sensitize the population on the adverse effects of moral hazard behaviors on their healthcare funds.

Overall, we argue that to improve the performance of public and non-profit pooling methods, there is need to consolidate them through government led intervention and targeted legislative framework aimed at reducing fund wastage and increasing pool sizes.

CHAPTER SEVEN

7.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter provides a summary of the motivation for this study. A brief explanation of the analytical methods used for the study is also provided. And it also presents a summary of key findings whose details are in chapters 4, 5 and 6. The chapter also deals with explaining the findings in terms of their impact on policy; and it concludes with suggestions for further research work.

7.1 Purpose of Study

This study investigated how different methods of healthcare financing in sub-Saharan Africa (SSA) affect the region's health systems' equity. Equity of the health systems was proxied using health outcomes. This is because health outcomes represent a health system's outputs and thus focuses on health and not healthcare. To accomplish its purpose, the study investigated the impact of different healthcare financing methods on health outcomes. The health financing methods are represented by healthcare expenditure from different financing sources by a country in a year. The study paid special attention to how public healthcare financing methods perform compared to private healthcare financing methods. The study also investigated the extent to which the domestic financing sources contribute to making the region's health systems equitable. An in-depth analysis was conducted to find out if risk mitigation in health system financing assists in improving health systems' equity. The moderating effect of carefully selected control variables was also analyzed.

. By investigating equity in healthcare financing this study contributes to the search for the right healthcare financing method or regime for equity in the region's health systems. And, as a result, it contributes to welfare through the improvement of population health status and the region's economic well-being. It also contributes to the search for a solution to healthcare-related impoverishment and economic stagnation problems in SSA in the tradition of the few past works that had dwelt on the link between healthcare expenditure and access to healthcare, and between healthcare and economic growth and development.

7.2 Summary of Study Investigation Techniques and Findings

This subsection presents a synopsis of the investigative methods used in this study. The justification for the use of the methods is also provided in the section.

7.2.1 Summary of Investigation Techniques

The study used a panel of secondary data for 19 years from 47 Sub-Saharan African countries, which was collected from relevant governments and multilateral organizations' databases. The data was cleaned and analyzed using MS. Excel and Stata 15. Data exploration was conducted using histograms and descriptive statistics. Because this study's panel used long time series and high cross-section, we carried out unit-root tests and cointegration tests before inferential analysis. And, to examine basic relationships between variables before inferential analysis the study used scatter graphs and correlation matrix.

The study applied a process of inferential analysis through multivariate regression that used theoretically derived causal propositions to guide data analysis. The analytical framework is based on Grossman's health capital theory (Grossman, 1972). Previous empirical works in the area of health systems' equity in the SSA region have concentrated on equity in terms of access to needed healthcare. This study departs from this trend by using health systems' outputs as the basis of health system's equity. We used health outcomes to proxy health system's outputs. As we have argued, we did this because equity in the financing of healthcare should go beyond just equity in access to healthcare. We are interested in this study instead of access because we want to find out if increased expenditure from different financing sources reflects in the region's health outcomes.

In terms of analytical techniques, this study used data arranged in a panel format. According to Kennedy, (1998) panel, data modeling is superior to both time-series and cross-section because it explores more issues. Additionally, panel data also provide more informative data and take care of collinearity among variables (Baltagi, 2008). The panel format is also more robust with the problem of omitted variables bias (Frees, 2004), which can cause problems in a study like this, compared to both

time-series and cross-section formats. Using the panel data, therefore, makes the findings of this study superior to those that relied on either cross-section or time-series analysis.

The study also took advantage of the strengths of both the fixed effect (FE) and the random effect (RE) modeling by employing both techniques in the analysis. Note that FE models are more robust where unobserved heterogeneity among cross-sections may be correlated with the independent variables. On the other hand, the main advantage of RE over FE modeling is that RE allows for the inclusion of cross-section-specific (in this case country-specific) time-variant variables, which may be relevant in explaining the dependent variables. The study employed the Hausman test to choose between the FE and RE models, and thus which model's results are germane for particular tests. Additionally, we carried out further regression analysis using dynamic modeling techniques. More specifically, we used a one-year lag of the dependent variables to account for the possibility of lagged effect, and the GMM regression technique to account for endogeneity. Finally, we carried out data transformation using orthogonalization and log transformation to control for biases that can result from multicollinearity among variables and skewness of data, respectively.

Apart from using better analytical techniques, this study also ventured into areas that have been ignored by previous studies. Notedly, no study, to our knowledge, has investigated the effect of the use of domestic resources on health outcomes in the SSA region. We also note that there is no evidence that a study in the region has investigated the effect of financial pooling and financing risk mitigation on health systems' equity in SSA. Therefore, this study is a pioneer in empirical research on these important relationships.

7.2.2 Summary of Findings

This subsection provides a condensed form of the findings of this research. The details of these findings are given in chapters 4, 5 and 6. The explanation is provided in the context of different explanatory variables.

Effect of Financing Healthcare Using Domestic Resources on Health Outcomes

Starting with the effect of the use of domestic resources to finance the region's healthcare needs, empirical results (Table 4.4) reveal that increasing the financing of healthcare using private domestic resources per capita (DPHEPCP) significantly contributes to better health outcomes. On the other hand, increasing healthcare financing using domestic public resources (DGHEPCP) does not affect health outcomes in a significant manner. While increasing healthcare financing using funds from external sources, though shows the general a priori expected positive association, it is significantly correlated with only maternal mortality on the contemporaneous FE models. Its positive effect becomes significant on all health outcomes when the dependent variables are lagged by one year.

These results show that in terms of domestic and external funding, financing healthcare using private domestic resources performs better than both domestic public and external financing methods in improving SSA's health systems' equity. And external financing performs better than domestic public finances. Although to our knowledge, no study has investigated the contribution of financing healthcare using domestic resources to health systems' equity in sub-Saharan Africa, these results reveal some interesting findings. Most empirical works (e.g. by Chuma, Maina, & Ataguba, 2012; Jehu-Appiah et al., 2011; Phiri & Ataguba, 2014; Ataguba, 2016; Barasa, Maina, & Ravishankar, 2017) that have been done on equity of health systems in SSA from the access perspective, show that direct out-of-pocket (OOP) method impedes access to needed healthcare. Given that the financing of healthcare using private domestic resources is predominated by OOP, these results contradict the findings of access-based research. We counterchecked our findings from an access perspective using the same data and found that domestic public expenditure improves access. This means that a financing method can increase access to healthcare but fails to improve the population's health status.

One interpretation of these results is that equity in access to healthcare does not necessarily translate to better health outcomes. This means that experts (e.g. Pauly et al., 2006) who argue that OOP's contribution to the quality of healthcare is usually underestimated by studies may be right. Proponents

(e.g. Leighton, Becker, Derriennic, & Laurin, 1994; Litvack & Bodart, 1993; Shaw & Griffin, 1995) of OOP and other private financing methods argue that if administered properly, these methods add value to health systems by making available funds that can be used to improve quality of care. And even if they (private payment methods) limit access, the better quality of service resulting from a more strategic deployment of revenue generated by private payment methods, more than compensates for the reduced access, thereby increasing welfare. This may mean that access to healthcare on its own does not mean that individuals receive needed healthcare.

The second interpretation is that public financing is inadequate to meet the healthcare needs of the population of SSA. It may increase access to healthcare. but because it is spread too thin, the amount of healthcare provided may be inadequate to improve healthcare on aggregate. Some experts (e.g., Pauly et al, 2006) insist that domestic public revenue can never be enough to finance the healthcare needs of low-income countries (LICs). They argue that LICs, such as the SSA countries, must rely on external support for equity in their health systems. Otherwise, their health systems will continue to post low outputs. We note that the results of this study show that in terms of health systems' output (outcomes), external funding (EXTHEPCP) performs better than funding using domestic public revenue. This means that Pauly et al (2006)' assertion that LICs' health systems need external funding to function more effectively could be right,

The other interpretation is that funding healthcare using public resources alone does not improve health system's output. This could be because domestic public healthcare expenditures, unlike domestic private healthcare expenditures, do not go directly to supporting healthcare due to corruption, skewed allocation in favor of those with better health and delays in delivery of health services due to bureaucratic red tape. Our findings show that both the Gini index and urban population controls relate positively to health outcomes. which means that the allocation of domestic public healthcare could be favoring the wealthy and urban population. All these cause Pareto sub-optimality, leading to reduced welfare which manifests itself in the form of low or negative aggregate health status.

Effect of Increasing Budgetary Allocation to Healthcare on Health Outcomes

In line with the Abuja Declaration, in this subsection, we provide a summary of the results and the interpretation of the effect of governments' allocation to healthcare on the SSA region's health outcomes. The allocation includes domestically generated resources and external support that are passed through the government or governmental agencies. The investigation into the effect of increasing budgetary allocation on healthcare is conducted using two proxies, namely, the government healthcare expenditure as a percentage of total government expenditure (GHEGGE), and government healthcare expenditure as a percentage of gross domestic product (GHEGDP). The GHEGDP data are in terms of current purchasing power parity.

The results of the regression analysis using both the bivariate and multivariate models (Tables 5.3, 5.4 & 5.5) show that increasing the allocation to healthcare as a percentage of total government budgets (GHEGGE) is negatively related to health outcomes while increasing budgetary allocation to healthcare as a percentage of GDP (GHEGDP) has a positive relation. The a priori expectation is that they should both have a positive effect on health outcomes, per the theory of health capital. However, the theory postulates that there are two types of investment in health, direct investment in health and shadow investment in health, both are important pillars of a population's health stock. While direct investment in healthcare is represented by healthcare expenditure, shadow investment in healthcare is expenditure in services that support health indirectly (e.g., sanitary services, education, clean water, clean sources of energy for home and workplace uses, etc.). As we have explained, we suspected that the reason why an increase in GHEGGE is associated with a reduction in the region's health stock is that such an increase may mean that governments are cutting down on shadow health investments. Although we controlled for shadow investments using two proxies (i.e., government education expenditure as a percentage of total government expenditure (GEEGGE and percentage of population with access to sanitary services) we suspected that these two do not adequately represent shadow investments. To confirm our suspicions, we carried out additional investigations into this relationship. We carried out data

transformation by regressing GHEGGE against the two variables that we used to proxy shadow healthcare investments and extracted residual resulting from the regression as a proxy for shadow expenditure balance.

The results of the models (Table 5.5) using residual data as a balance of shadow health investment that subsumes and trade-off to direct healthcare expenditure increase show that increasing GHEGGE is indeed beneficial to health outcomes. These results confirm our suspicion that an increase in expenditure (investment) in healthcare could be done at the expense of expenditure in services that support health indirectly. And that this can be counterproductive to health outputs. Therefore, while it is important to follow up and to ensure that the region's governments increase budgetary allocation to healthcare in accordance with the Abuja Declaration, these results show that this should be done at the expense of shadow (indirect) investment in healthcare.

Prepayment and Financial Pooling for Healthcare

The sub-section provides a summary of the relationship between financial risk pooling methods of financing healthcare on health outcomes. A brief analysis of the difference in the effect on health outcomes between private and public methods of financial pooling is also provided. Lastly, we provide a diagnostic summary of the performance of different methods of financial pooling.

Empirical results (Table 6.8) revealed that apart from private health insurance (PHI), increasing healthcare expenditure from all the other financial pooling methods does not hurt health outcomes. The results show that increasing social health insurance (SHI) in the region's healthcare financing mix by 1% would cause maternal deaths to significantly drop by 15 deaths per 100,000 live births. Likewise, a 1% increase of government financial arrangements (GFA) in the financing mix, reduces under-5 years' deaths by 0.3 per 1 000 live births. Unlike SHI, increasing GFA in the financing mix is associated with positive effects on health outcomes even where the effect is not significant. On the other hand, results of the two private financial pooling methods, show that increasing healthcare financing from other private financial arrangements (OPFA) is significantly beneficial to life expectancy at birth (LEB), and although

insignificant on the rest of the health outcomes, the effects are beneficial. And, contrary to expectation, adjusting healthcare financing mix in favor of private insurance (PHI) is harmful to health outcomes in SSA. Specifically, increasing PHI in the financing mix by 1%, causes LEB to significantly reduce by 0.2 years and maternal deaths (MMR) to increase significantly by more than 15 deaths per 100,000 live births.

These results show that financial pooling methods that rely wholly on private contributions should not be relied upon to inject equity into the region's health systems. This is because increasing the funding of healthcare by government-supported pooling methods (i.e., GFA & SHI) and the private pooling method (OPFA) that is supported by external funding (e.g., by NGOs and donations from other development partners), are beneficial to at least some health outcomes even if not to all health outcomes. We argue that there are two reasons for these results. One, being profit-making organizations, PHIs could be allocating most of the enrollees' contributions to profit, rather than enrollees' healthcare. Two, because enrollment to PHI is based on the ability to afford, enrollees come from higher income groups. This means that people from low-income groups (the group with more need for healthcare) are left out. Furthermore, by being concentrated on high-income groups, PHI cannot diversify income healthcare financing risk. Because of these weaknesses, increasing the financing of healthcare using PHI may not result in Pareto optimality and thus, cannot optimize welfare. This is the reason why its increase relates negatively to health outcomes.

7.3 Conclusions and Recommendations

The recommendation section is divided into two sub-sections: suggestions for policy and suggestions for further research. On policy, we provide a summary of the contribution of this study to policy. We explain how the findings will contribute to policy debate and dialogue to clarify the role played by financing methods in the realization of health systems' equity and universal access to healthcare (UHC) from the perspective of the outputs of health systems. We provide a nuanced and dialectical view on the contribution of public and private healthcare financing approaches to sub-Saharan Africa's (SSA)

health systems' equity. In the section for suggestions for further research, we explain the gaps identified during this study and recommend how they can be filled by future researchers.

7.3.1 Conclusions and Suggestions for Policy

In this subsection, we use the study's findings to provide suggestions on how to improve healthcare financing for health systems' equity in the SSA region to both public and private policymakers.

Domestic and External Financing Methods and Health Systems Equity

Based on domestic and external funding methods, the results of this study show that on a per capita basis, funding healthcare using publicly sourced domestic finances does not benefit the region's health status. On the other hand, the use of private domestic resources impacts the region's health status positively. Although generally beneficial to the region's health outputs, external health financing methods is only significant on maternal mortality. We argue that this could be because most of the external funding is concentrated on maternal healthcare.

Based on previous studies, particularly the studies that looked at the effect of financing methods on the health system's equity in terms of access to needed healthcare, the a priori expectation of this study was that the financing of healthcare using domestic public resources (DGHEPCP) should perform better than the use of domestic private resources (DPHEPCP). This study shows that this is not the case. We argue that the poor performance of DGHEPCP could be caused by bureaucratic interference in the distribution of healthcare which leads to delays in the delivery of healthcare to those in need of the services. The other reason why DGHEPCP could be performing poorly is due to skewed allocation of domestic healthcare finances in favor of the rich and/or urban areas. The results of the correlation between health outcomes and the two control variables (urban population & the Gini index) show that this could be the case. The percentage of population in urban areas is positively associated with health outcomes and the Gini index affects health outcomes negatively. We argue that, unlike external and private healthcare finances, domestic finances are more exposed to the problem of skewed allocation because of political interference with the allocation. This is because external resources are monitored by

donors. Furthermore, donor funds are generally targeted at the forgotten population in rural and informal settlements. Likewise, when people pay for healthcare from private sources, they demand quality services which they may not demand if the care is paid for using public resources. Skewed allocation leads to disparities in the way the population benefits from healthcare that is provided through the public fund, which causes Pareto suboptimality and, consequently, shows up in the form of poor aggregate population health outcomes.

To ensure that domestic public resources contribute more effectively to SSA's health status, we make the following recommendations.

- a. The removal of bureaucratic red tape in the process of allocation of domestic resources to healthcare. This can be done by establishing special channels and methods of moving healthcare funds from the national treasury to points service. Enacting laws that speed up the procurement of medical products. And, cutting down on reporting levels in the departments that deal with healthcare.
- b. An increase in the war on corruption will also help in ensuring that the funds allocated to healthcare do not get diverted to private use. We argue that even though strict monitoring of how the fund is applied is part of reducing corruption, many layers of oversight not only divert most of the fund to monitoring but could also increase corruption. Therefore, we insist that cutting down on bureaucracy is part of cutting down on corruption.
- c. Lastly, we propose affirmative action in the allocation of domestic public healthcare funds. Affirmative action should be in the form of higher allocation to rural areas and prioritizing the healthcare needs of indigent persons. Although this proposal may seem to be against the doctrine of equity, it is supported by some equity thoughts, particularly in the area of health and healthcare. The egalitarian theory postulates that unequal distribution should be accepted, even encouraged, if it acts to address pre-existing inequalities or if it is aimed at those whose position in society is worse than others. As we have pointed out, studies show that the distribution of

healthcare is currently favoring the rich and, better health facilities are in urban areas. The results of this study affirm that this is the case. Therefore, this policy suggestion is not without merit.

Finally, the results of this study show that external funding (funding from development partners and aid agencies) performs better than domestic public resources, and we note that donors have been rolling back financing healthcare in SSA. These results show that if the roll-back continues it may harm the region's health stock (status), particularly maternal health. Therefore, we welcome continued external support but stress that the donor agencies should insist on more prudent utilization of local resources by public officers. This is because external funding may not be sustainable in the long run. We thus recommend a gradual weaning of the region from donor funds. The weaning can be in the form of external support directed at special health cases like pandemics and special disease projects (e.g., research) like the containment of the spread of HIV and malaria. Normal healthcare needs should be funded by local resources.

Budgetary Allocation and Health Systems Equity

According to the Abuja Declaration, African countries are supposed to increase allocation to healthcare by at least 15% of their annual expenditure. This declaration is aimed at improving the region's health status by increasing public funding of the health system. To find out the importance of the Abuja Declaration to the region's health systems' equity, this study investigated the relationship between increase in budgetary allocation to healthcare and health outcomes.

We used two variables to proxy budgetary allocation, that is, government healthcare expenditure as a percentage of GDP (GHEGDP) and government healthcare expenditure as a percentage of general government expenditure (GHEGGE). The results show that increase in GHEGDP affects health outcomes positively this was our a priori expectation. While an increase in GHEGGE impacts health outcomes negatively, these results were unexpected. Because of the confounding results on the effect of GHEGGE on health outcomes, we suspected that increase in GHEGGE could be happening at the expense of expenditure in indirect health-supporting expenditure items known as shadow health

expenditures (e.g., expenditure in the provision of clean managed water services, expenditure in sanitation services, expenditure in education, expenditure in the provision of clean sources of energy for domestic and industrial uses, etc.). Further empirical analysis revealed that this is most likely the case.

Based on the results of this study we recommend that the region's governments should increase budgetary allocation to healthcare, but not at the expense of shadow healthcare items. This means that the Abuja Declaration can be enriched by adding a caution that an increase in budgetary allocation to healthcare should not take away resources from other activities that are important to population health.

Financing Risk Pooling and Health Systems Equity

In 2005 the World Health Assembly passed a policy resolution for the World Health Organization (WHO) where WHO would use prepayment as a strategy for financing healthcare in low-income member countries. Later, WHO strengthened this resolution by requiring member countries to migrate to healthcare financing methods that have risk protection mechanisms (World Health Organization, 2005c). WHO emphasized the need to protect the vulnerable using healthcare financing methods that have inbuilt financing risk protection mechanisms. In addition WHO recommended that the ideal financing system should not only leave out nobody from needed healthcare but should also be sustainable (World Health Organization, 2010b). Financial pooling is the method of financing healthcare that has been recommended by WHO for this purpose.

To find out the relevance of these recommendations by WHO and other healthcare financing experts to health systems' equity in SSA, we investigated the relationship between different financial pooling methods and SSA's health outcomes. The results of our investigations show that financial risk pooling methods with state involvement and those with donor support, correlate favorably with health outcomes. However, the results show that private pooling methods affect health outcomes negatively.

Therefore, we recommend government participation in pooling for healthcare. This can be in the form of direct payment using taxes for those who completely cannot afford the cost of healthcare. Or

subsidizing contributions for the poor and paying for the indigent into state-sponsored health insurance schemes. We also recommend continued donor support in the funding of self-help private health insurance schemes, like the support that they are currently giving community-based health insurance schemes in some SSA countries.

The results of this study show that even though state involvement in financial pooling leads to a favorable relationship between financial pooling and health outcomes, the positive effect is weak. We suspect that the reason for the weak effect is small pool sizes. Our preliminary investigations using pie charts (Fig. 6.1) show that the pooled finances' pool sizes in SSA are small. Financing risk mitigation theory states that to be effective in mitigating financing risk, the pool sizes of pooled funds should be large.

This is because for financial pooling to be effective, the risk-sharing mechanism should be embedded in the financial pooling arrangement. We note that small pools hamper broad risk spreading. And, larger pools have a higher risk equalization mechanism compared to small pools. A higher equalization mechanism allows the financing method to cross-subsidize enrollees of different risk classes and diversify health financing risk, thereby lowering administrative costs and, ultimately, premiums. To grow pool sizes, we suggest that governments of the region should formulate policies that encourage enrollment in public health insurance. To stimulate enrollment into social health insurance (SHI) and compulsory health insurance (CHI), we recommend the inclusion of individuals from the informal sector. This can be done by accepting contributions on an irregular basis and diversifying the methods of collecting contributions. Although payroll deductions are cheaper to collect this method restricts the growth of pool sizes, due to the inability to capture funds from the informal sector. To diversify collection methods, fund managers can simply specify the target amount that qualifies a person to benefit from the fund within a given period, say monthly or quarterly basis. It should not matter if the contributions are sent on a daily, weekly, or monthly basis. Neither should the amount in each contribution matter. In this way, people with irregular incomes can make their contributions irregularly and still benefit from the pools.

Ethiopia and Rwanda are currently running two classes of nationwide state-assisted health insurance funds. One for those in the formal sector, and the other for those in the informal sector. This model can be adopted by other countries. However, care should be taken to ensure that indigent persons are not excluded because they cannot afford the contributions. This can be done through government subsidies and special contributions for those who cannot afford the contributions. According to empirical studies, Rwanda's government is already doing this with remarkable success. Two, care should be taken to avoid the informal sector's funds running out of money because of low contributions and high transaction costs. This is because the target population has a low contributory capacity. And the transaction cost can be higher than expected because of the lack of risk diversification caused by enrollees coming from the same risk class, and the difficulties of collecting contributions from this sector. We note that risk diversification can be a problem in funds that draw from the informal sector because if contributions are voluntary, only high risks (e.g., people with pre-existing conditions) may enroll. Furthermore, enrollees of the fund may come from the same income class, which reduces the possibility of income risk diversification, thereby impairing the fund's ability to effectively cover the healthcare cost needs of enrollees. All these problems can be addressed by state subsidies.

The low performance of public pooled funds can also be a result of market distortion. Market distortion resulting from moral hazard and adverse selection is welfare-reducing. Both of them have been identified in Ghana's social insurance market by empirical studies (e.g., by Akazili et al., 2014; Atinga et al., 2015; Mills et al., 2012). Where moral hazard is a welfare-reducing phenomenon, people with medical coverage either consume more healthcare than they need or invest less than optimal in sickness-preventive behavior. Adverse selection occurs due to asymmetric information between the insured and the insurer. The insured has better information about his health status than the insurer. The welfare-reducing effect occurs when high-risks enroll in more generous health packages and when such behavior crowds out low risks resulting in the loss of risk diversification.

The effect of moral hazard can be mitigated through population education on the perils of the welfare-reducing habits associated with moral hazard. For example, education on the relationship between excessive consumption of healthcare and increased insurance contributions for everyone. Or education that shows that ex-ante moral hazards, the moral hazards that expose enrollees to the risk of becoming ill, like cigarette smoking, excessive drinking, refraining from the use of disease control measures (like stopping the use of mosquito nets), not only increase premiums for everybody but also endanger the lives of those who get involved in such behavior. Governments can also pass legislation that deters healthcare providers from engaging in supplier-induced demand.

An effective way to reduce the negative effect of adverse selection is through compulsory nationwide health insurance. Compulsory pools are a Pareto improvement over competitive markets with adverse selection (Johnson, 1977). This can be made possible by governments subsidizing the medical cost for the high risks, like the elderly and the terminally ill. It can also be done by governments paying into the schemes an amount that entitles everybody to a basic decent minimum healthcare and requiring individuals to pay from private sources for additional benefits above the decent minimum. The government can also reduce the damage caused by adverse selection by allocating special funds for high-cost procedures. The special funds should be separated from the health insurance fund. For example, a special fund for heart surgery, a special fund for the management of kidney-related complications, a special fund for cancer management, a special fund for mental problems, and so on. This can be done through special levies or defined taxes.

7.3.2 Suggestions for Further Research

This research draws attention to the sub-Saharan Africa's (SSA) health systems' equity. Equity is looked at in terms of how different healthcare financing methods contribute to health systems' outputs. The health systems' outputs are measured in terms of health outcomes. This is different from studies that have looked at the health system's equity in terms of access (vertical & horizontal equity) to healthcare.

Some findings of this study contradict the findings of extant studies that looked at equity in terms of vertical or horizontal equity. For example, on the financing of healthcare using domestic resources, this study finds that private methods perform better than public methods. Most access-based studies have argued that private methods (particularly direct payment methods) are both vertically and horizontally inequitable. Because of the differences between our findings and those of access-based studies, we recommend that more comprehensive studies that incorporate vertical, horizontal, and output-based analyses of health system equity should be embarked upon. Such studies would help with solving the problem of whether healthcare financing methods that increase health systems' equity through access can also ensure equity through the improvement of health systems' outputs, in the form of better population health status.

We noted that the contribution of shadow expenditure (investment) in healthcare, like investment and access to sanitation facilities, investment in and access to education, investment in and access to clean managed water, investment in a clean and hygienic working environment, investment in and access to clean sources of fuel and so on, is important to population health status. Therefore, a deeper analysis of their effect on the equity of health systems can help to strengthen the results of studies (such as this one) that look at health systems' equity. This research only looked at the effect of shadow health expenditure in terms of how they affect the relationship between healthcare expenditure and health outcomes. Their direct contribution to health outcomes is not investigated in this study. Therefore, we recommend a study that would bring out how different levels of investments in shadow healthcare activities affect the region's health outcomes.

On risk pooling, our findings show a negative correlation between private pooling method and health outcomes and a weak link between financial pooling by public means and health outcomes. We speculate that market distortion and administrative costs could be some of the reasons for this. However, the study did not investigate, in detail, the contribution of these factors to health outcomes. We

recommend a study that would bring out in detail the effects of distortions in the region's health insurance market on the relationship between financial pooling and health systems' outputs.

It would also be interesting to find out how different healthcare expenditures (healthcare financing methods) affect low-income countries in other regions compared to the SSA region. A comparative study of different regions like South America and East Asia would assist in understanding the dynamics of healthcare financing methods in relation to health systems' outputs on a broader scale. Such a study may provide alternative explanations that would improve the explanatory power of some of our significant factors. For example, this study finds a weak relationship between social health insurance (SHI) and health system's outputs. One reason attributed to this is that SHIs are just being adopted by the region and, as a result, are too small. A comparative study with other low-income countries with longer experiences with SHIs and larger pool sizes may confirm or discredit this assertion. And, may provide an expanded view of the role of state-managed insurance in relation to health systems' outputs (health outcomes) in low-income countries.

Lastly, we suggest an empirical study into the link between risk diversification and health system performance. Such a study should look at how different types of healthcare financing methods contribute to the diversification of different classes of risk (e.g., sickness risk, income risk, etc.). And, whether the diversification of some classes of risk contributes more to health outcomes than others.

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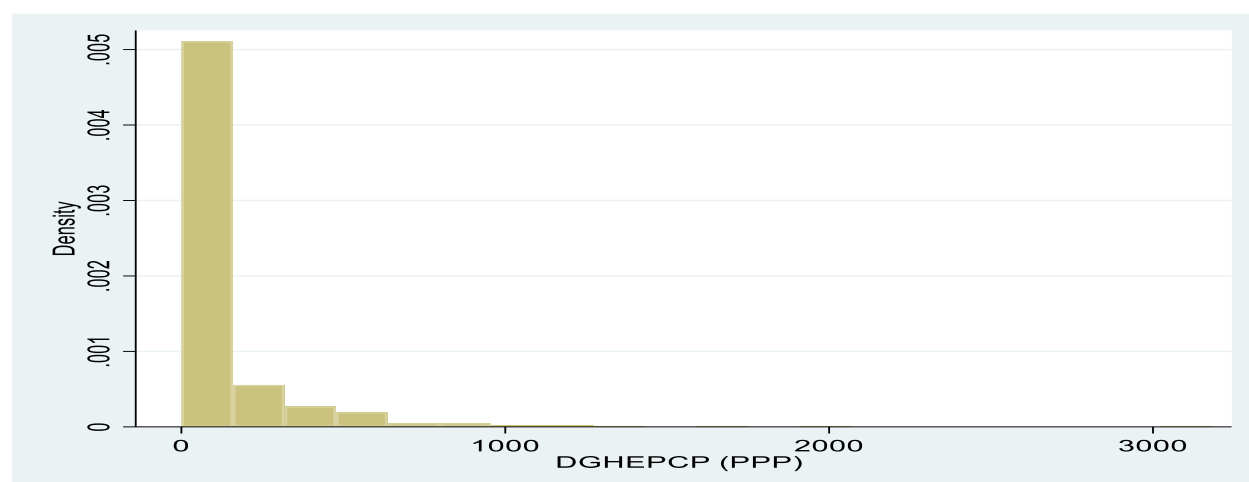
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Appendices

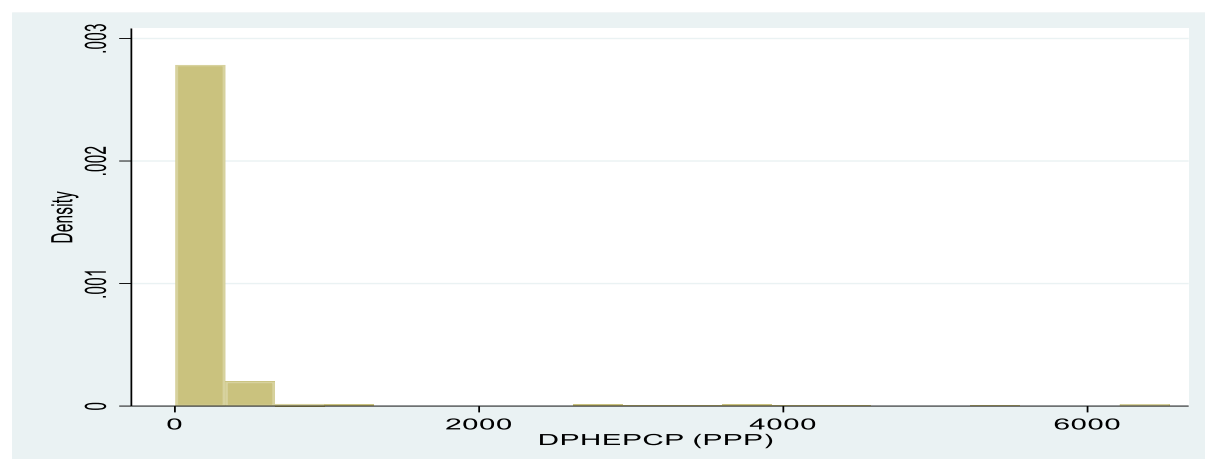
Appendix 1: Matrix of correlations of Domestic and External Expenditure and Independent Variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Log DGHEPCP (PPP)	1.000											
(2) Log DPHEPCP (PPP)	0.347	1.000										
(3) Log EXTHEPCP (PPP)	0.382	0.148	1.000									
(4) Immunization BCG	0.412	0.079	0.488	1.000								
(5) Corruption index	0.539	-0.100	0.200	0.428	1.000							
(6) Gini index (x100)	0.220	-0.059	-0.088	0.162	-0.110	1.000						
(7) Internet usage	0.529	0.357	0.449	0.182	0.123	-0.019	1.000					
(8) Wages & salaries	0.651	-0.041	0.349	0.334	0.353	0.220	0.426	1.000				
(9) Urban population	0.390	0.245	0.380	0.319	0.140	-0.078	0.423	0.471	1.000			
(10) Unemployment	0.581	0.009	0.197	0.361	0.531	0.282	0.283	0.693	0.250	1.000		
(11) Access to sanitation	0.416	-0.046	0.569	0.284	0.063	0.334	0.527	0.658	0.477	0.481	1.000	
(12) GEEGGE	0.136	0.068	-0.121	0.133	0.273	-0.105	-0.118	0.114	-0.210	0.060	-0.315	1.000

Appendix 2: Distribution Pattern of Domestic Government Health Expenditure Per Capita



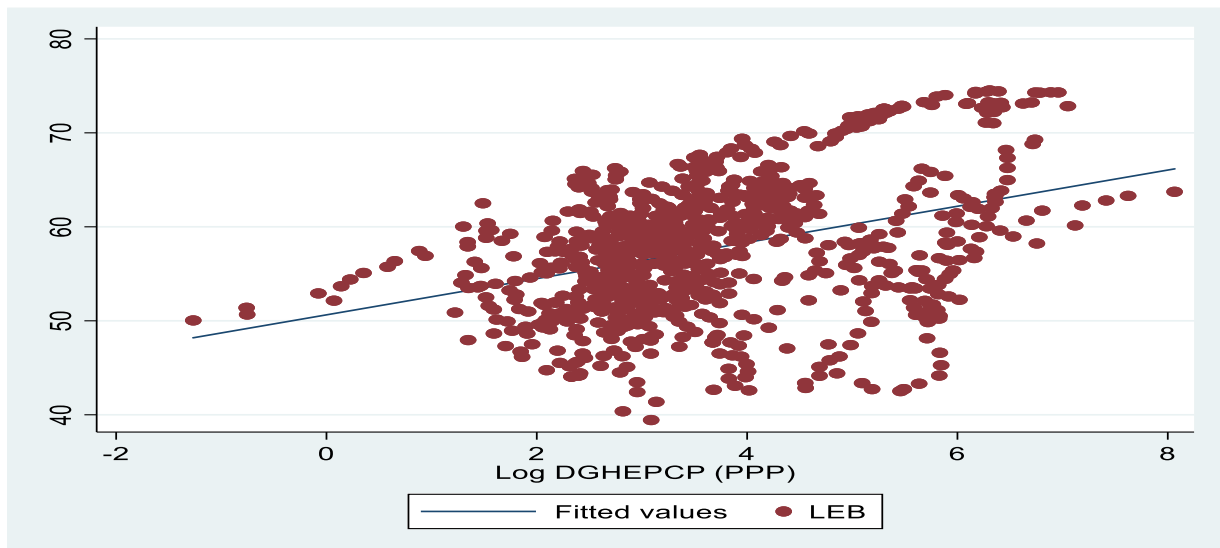
Appendix 3: Distribution Pattern of Domestic Private Health Expenditure Per Capita



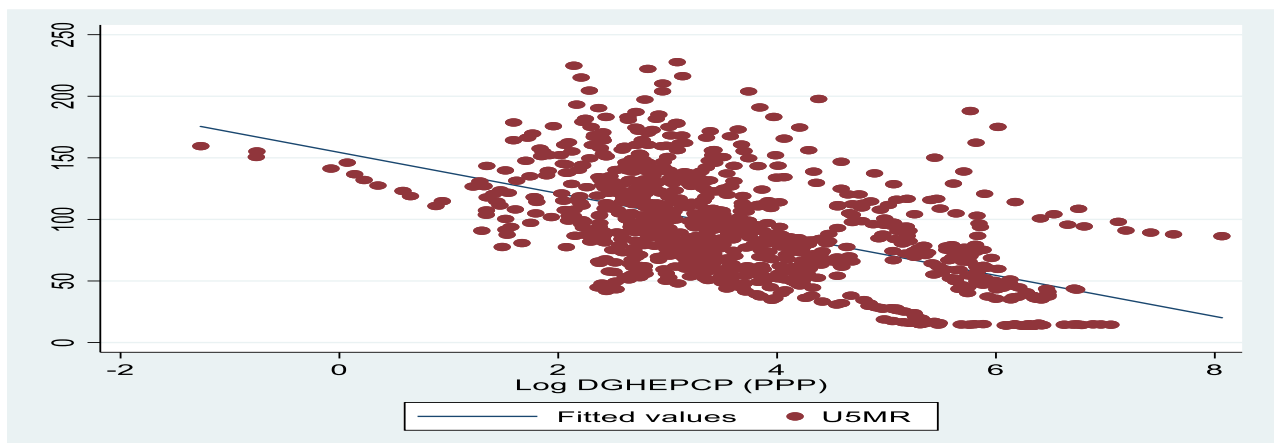
Appendix 4: Distribution Pattern of External Health Expenditure Per Capita



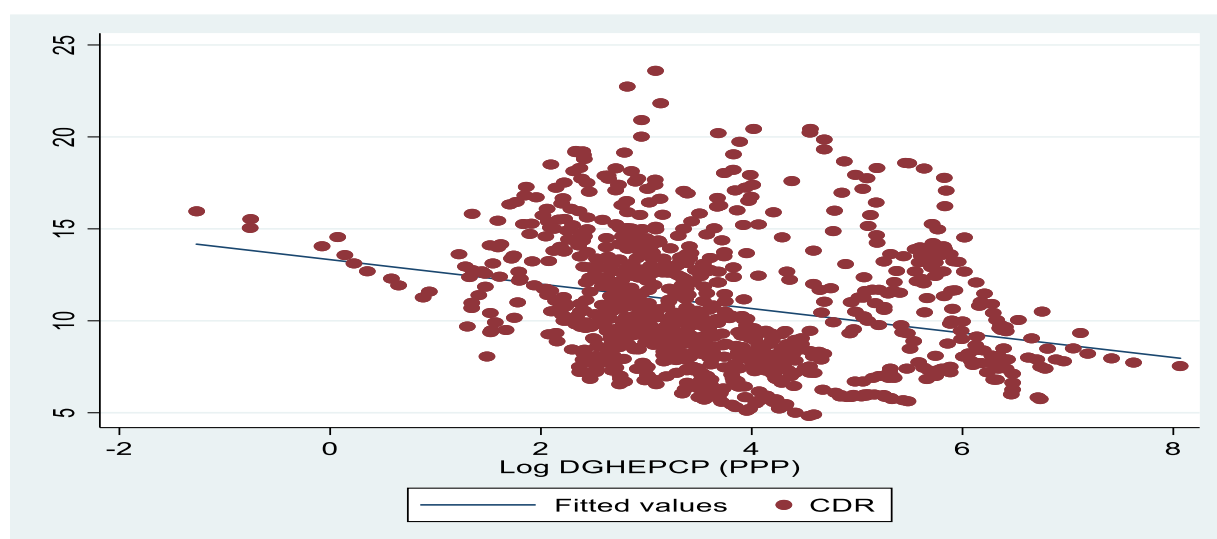
Appendix 5: Effects of Domestic Government Health Expenditure on Life Expectancy at Birth



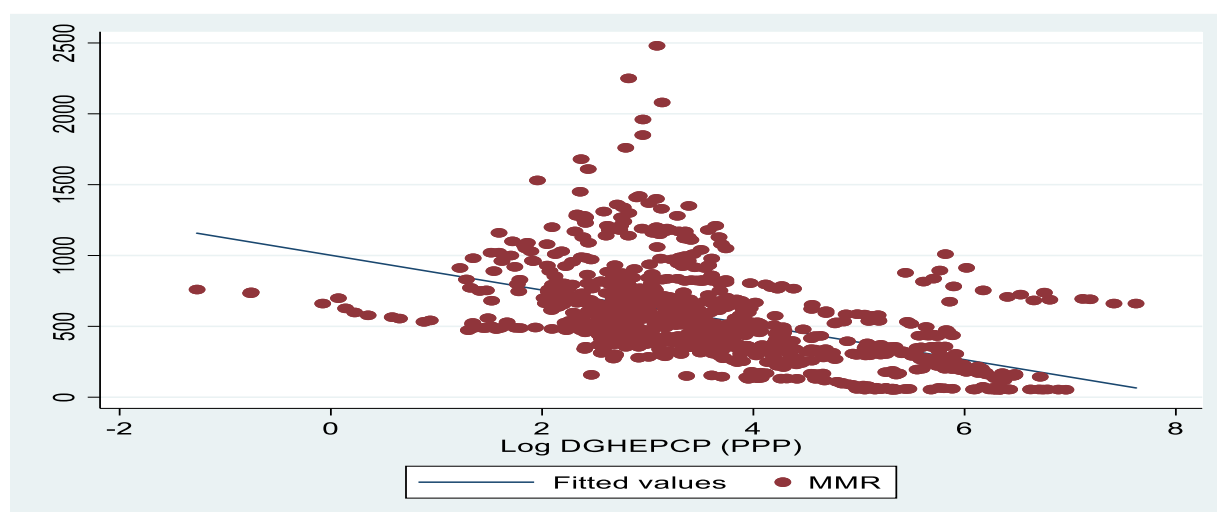
Appendix 6: Effects of Domestic Government Health Expenditure on Under-5 Mortality Rate



Appendix 7: Effects of Domestic Government Health Expenditure on Crude Death Rate



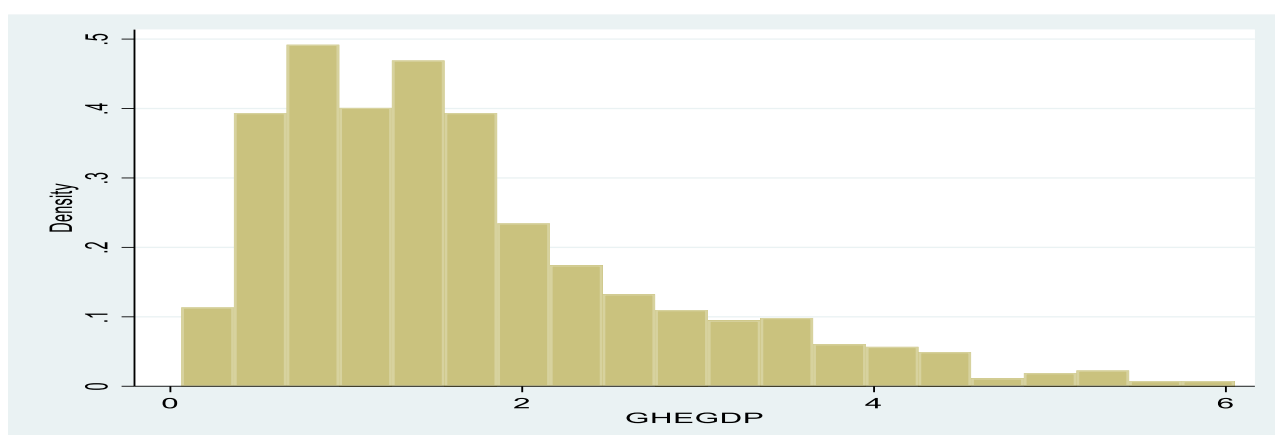
Appendix 8: Effects of Domestic Government Health Expenditure on Maternal Mortality Rate



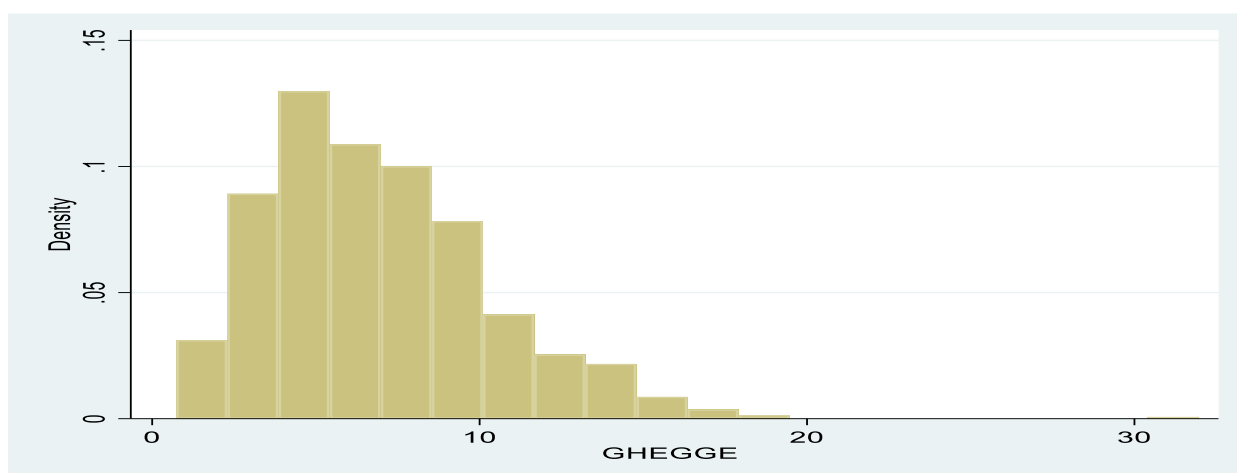
Appendix 9: Matrix of correlations of Government Budgetary Allocation to Healthcare

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) Log DGE GDP	1.000										
(2) Log GHEGGE	0.701	1.000									
(3) Immunization BCG	0.251	0.056	1.000								
(4) Corruption index	0.470	0.210	0.429	1.000							
(5) Gini index (x100)	0.194	0.317	0.161	-0.095	1.000						
(6) Internet usage	0.045	-0.143	0.188	0.121	-0.024	1.000					
(7) Wages & salaries	0.357	-0.063	0.276	0.341	0.223	0.404	1.000				
(8) Urban population	-0.132	-0.247	0.263	0.121	-0.089	0.411	0.476	1.000			
(9) Unemployment	0.454	-0.013	0.333	0.530	0.305	0.257	0.683	0.223	1.000		
(10) Access to sanitation	0.025	-0.081	0.261	0.056	0.324	0.523	0.650	0.480	0.454	1.000	
(11) GEEGGE	0.208	0.118	0.094	0.267	-0.094	-0.127	0.141	-0.188	0.083	-0.306	1.000

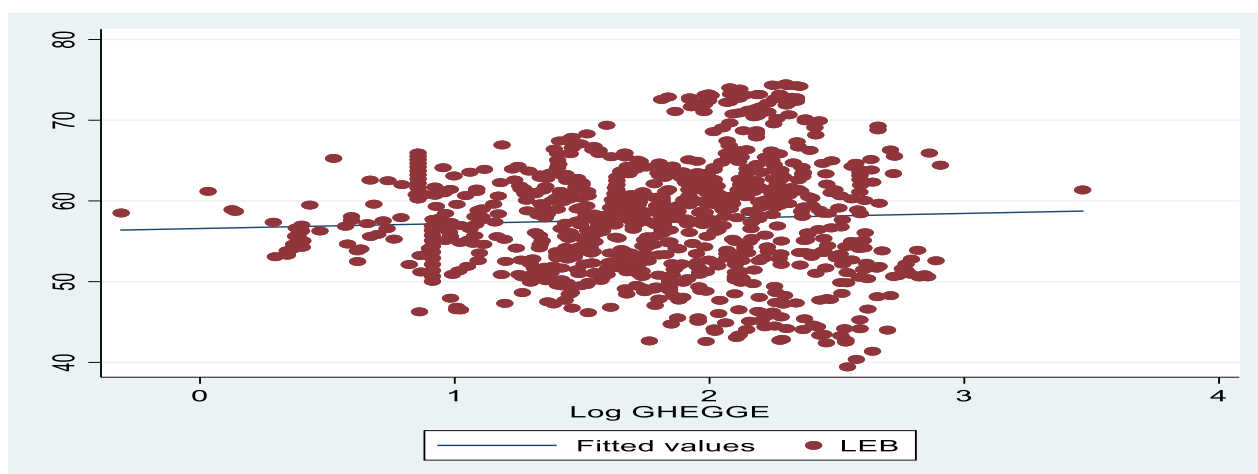
Appendix 10: Distribution Pattern of Government Health Expenditure as a Percentage of GDP



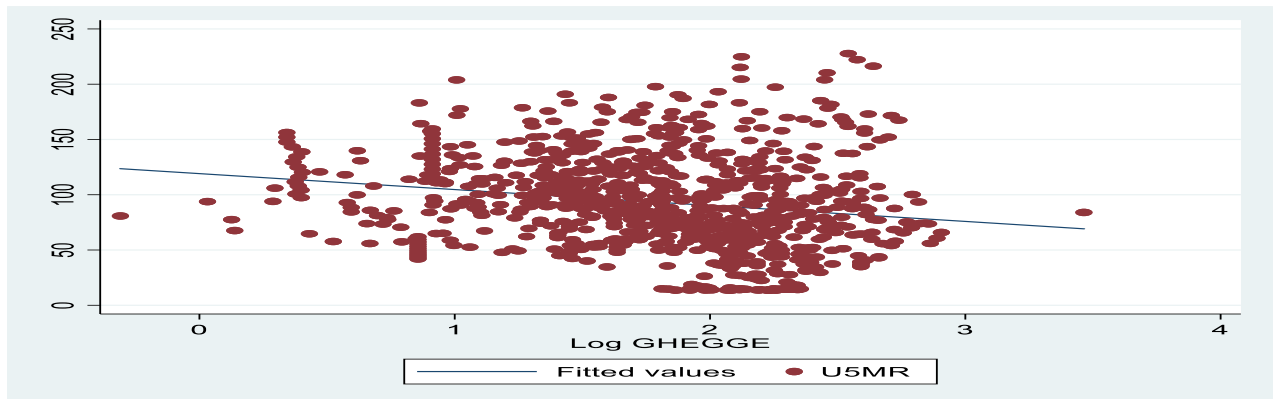
Appendix 11: Distribution Pattern of Government Health Expenditure as a Percentage of General Government Expenditure



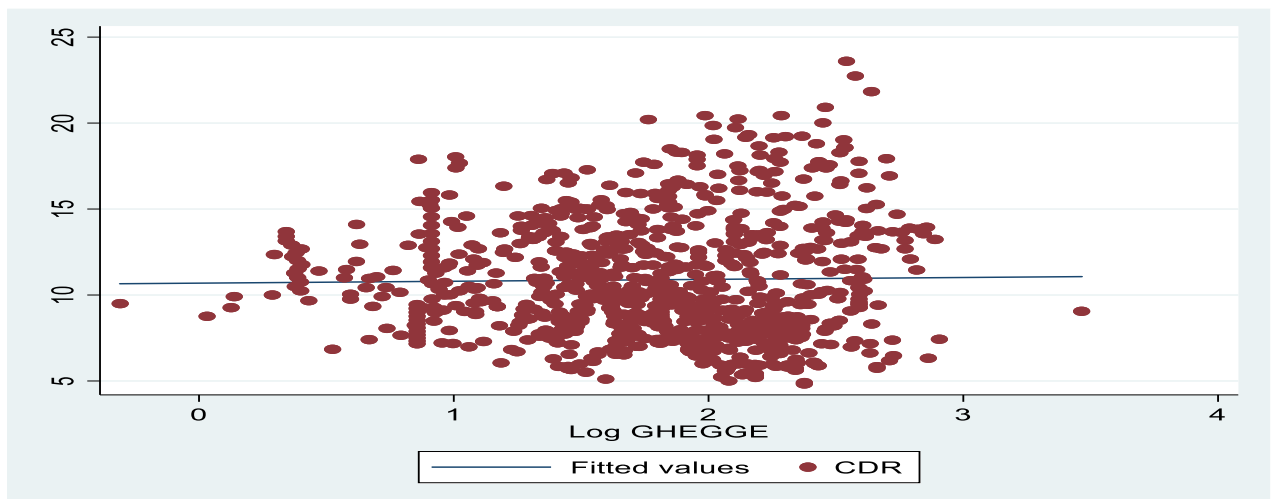
Appendix 12: Effects of Government Healthcare Expenditure as a Percentage of General Government Expenditure on Life Expectancy at Birth



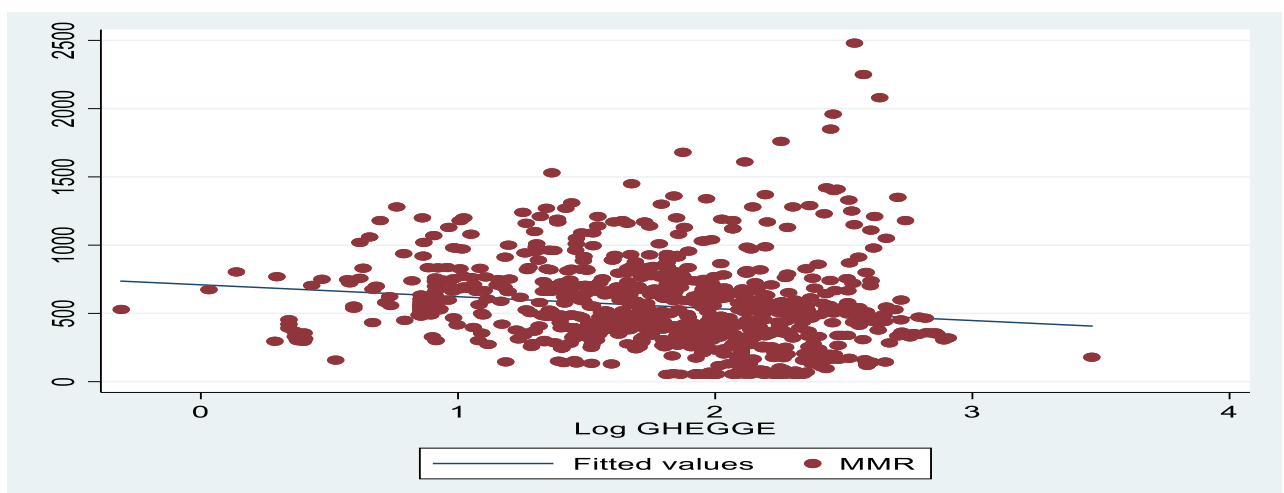
Appendix 13: Effects of Government Healthcare Expenditure as a Percentage of General Government Expenditure on Under-5 Mortality Rate



Appendix 14: Effects of Government Healthcare Expenditure as a Percentage of General Government Expenditure on Crude Death Rate



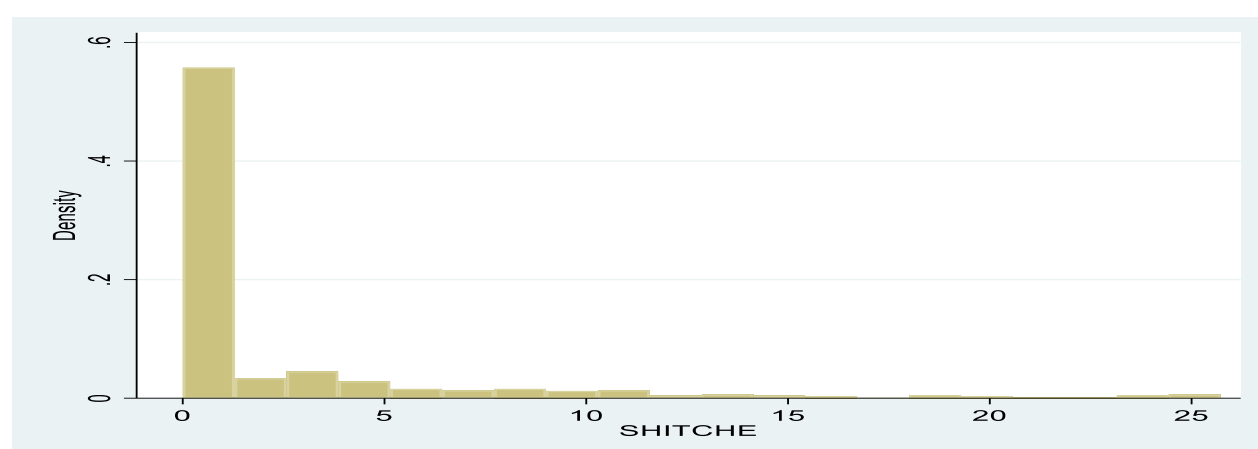
Appendix 15: Effects of Government Healthcare Expenditure as a Percentage of General Government Expenditure on Maternal Mortality Rate



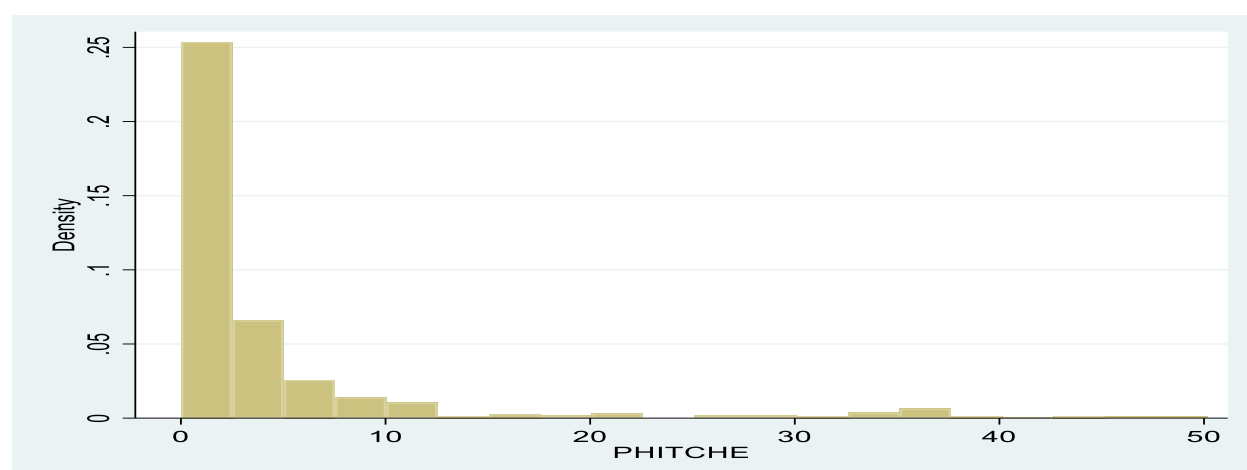
Appendix 16: Matrix of correlations of Pooled Financial Methods

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) PHITCHE	1.000					
(2) CFATCHE	0.087	1.000				
(3) GFATCHE	0.118	0.955	1.000			
(4) CHITCHE	-0.087	0.346	0.054	1.000		
(5) SHITCHE	-0.087	0.345	0.054	0.998	1.000	
(6) OPFACHE	0.858	0.057	0.085	-0.084	-0.090	1.000

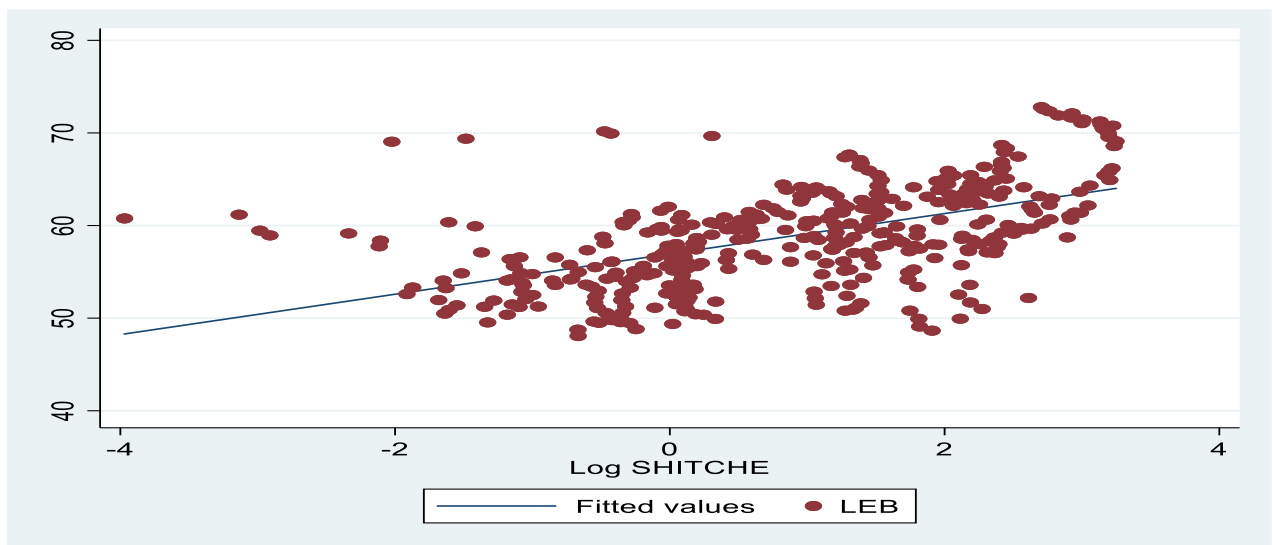
Appendix 17: Distribution Pattern of Health Expenditure by Social Health Insurance as a Percentage of Total Health Expenditure



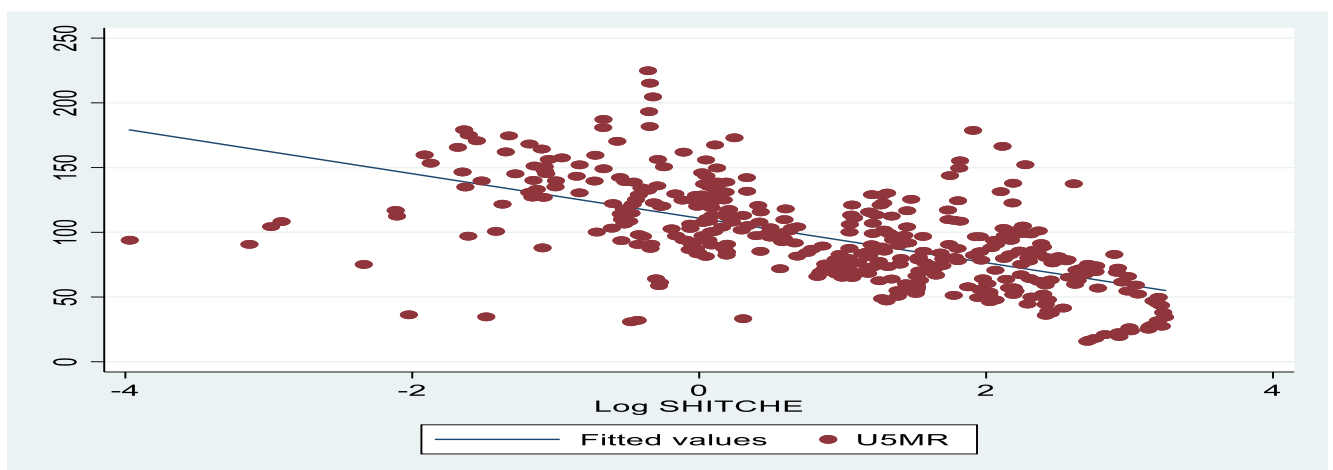
Appendix 18: Distribution Pattern of Health Expenditure by Social Health Insurance as a Percentage of Total Health Expenditure



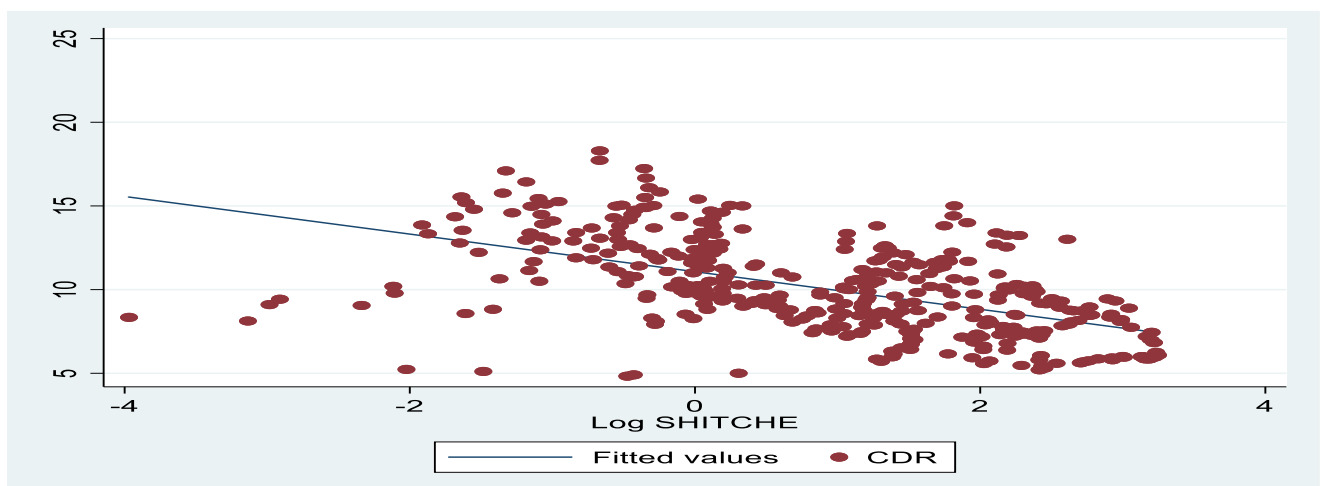
Appendix 19: Effects of Social Health Insurance on Life Expectancy at Birth



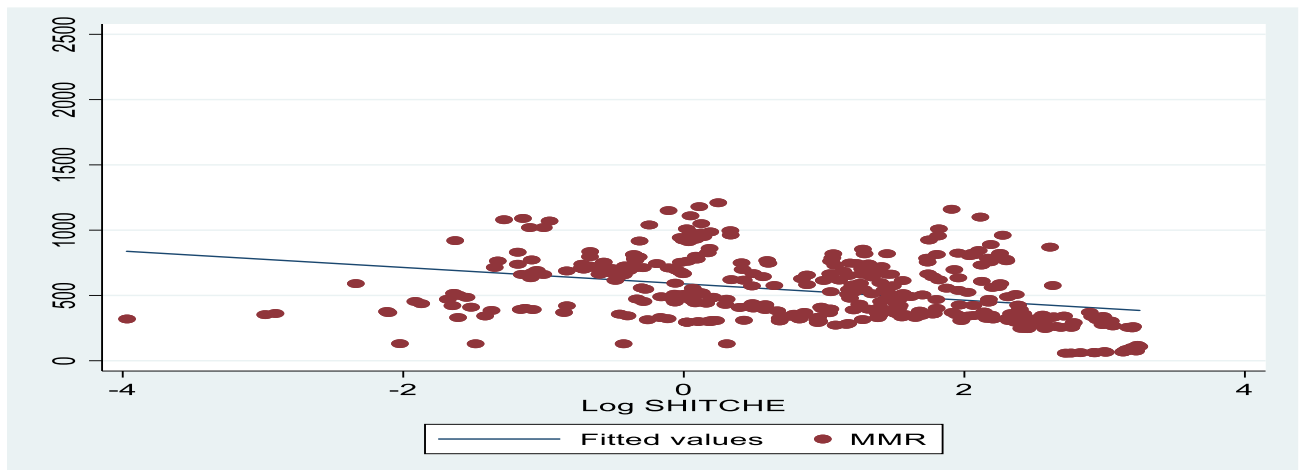
Appendix 20: Effects of Social Health Insurance on Under-5 Mortality Rate



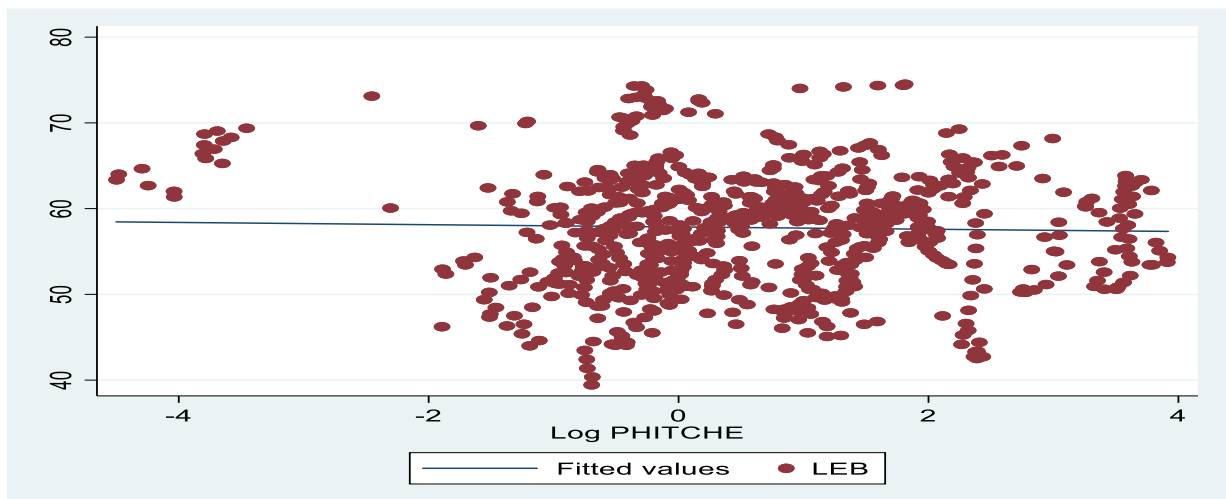
Appendix 21: Effects of Social Health Insurance on Crude Death Rate



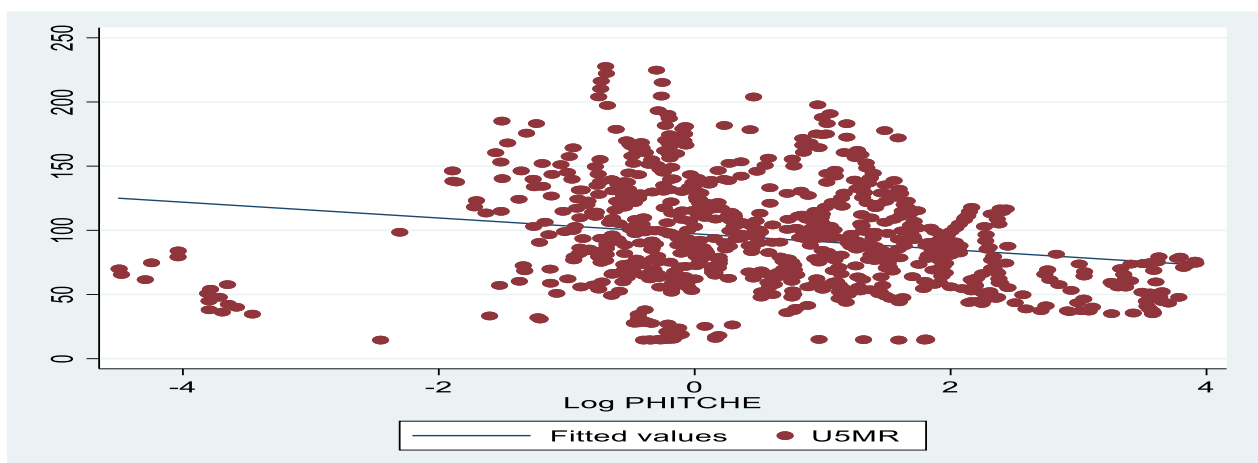
Appendix 22: Effects of Social Health Insurance on Maternal Mortality Rate



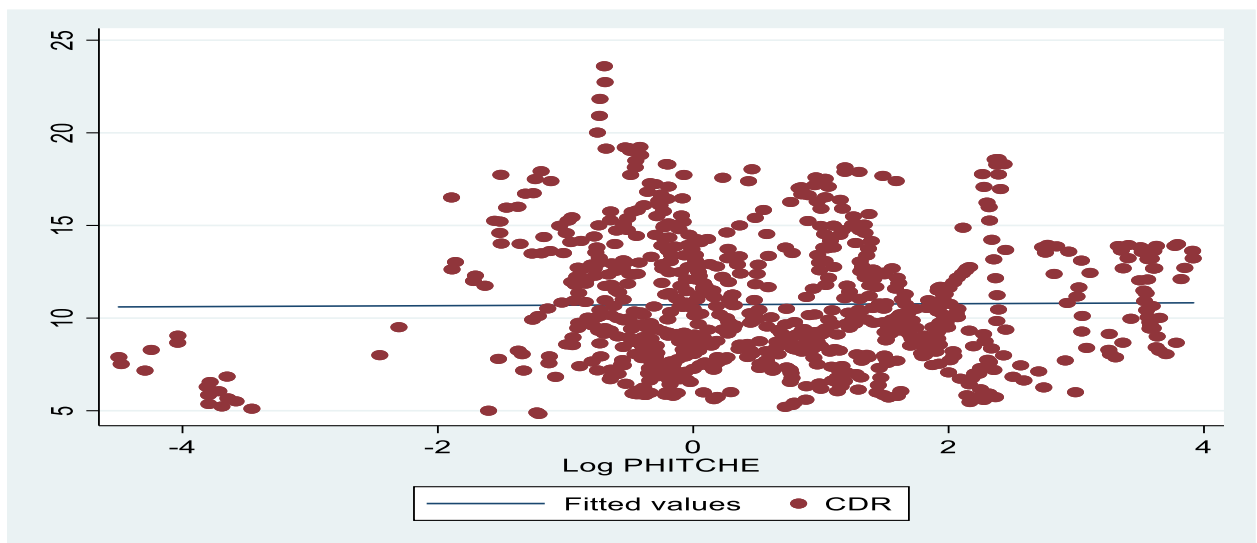
Appendix 23: Effects of Private Health Insurance on Life Expectancy at Birth



Appendix 24: Effects of Private Health Insurance on Under-5 Mortality Rate



Appendix 25: Effects of Private Health Insurance on Crude Death Rate



Appendix 26: Effects of Private Health Insurance on Maternal Mortality Rate

