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Sustaining healthcare financing in Africa: the stakeholder approach

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Abstract

A key challenge in meeting the Sustainable Development Goals (SDGs) by 2030 is the achievement of universal health coverage for all. To achieve this, providing adequate budgetary allocations to create a resilient healthcare system is inevitable. However, many developing countries, particularly in Africa, seem to be inadequately financing their healthcare systems and developing innovative healthcare financing systems to have a positive impact on life expectancy. Adopting a Smart PLS Structural Equation Modelling (Smart PLS-SEM) with a panel data between 2004-2019 and drawing on the stakeholder theory (ST), we examine the cumulative effect of Domestic healthcare expenditure, Out-of-pocket health expenditure, External healthcare expenditure and Voluntary health expenditure on Life Expectancy across 48 African countries. Our data evidence suggests that both Domestic and External healthcare financing sources do not have any impact on life expectancy in Africa. African governments seem to over depend on Central Government Debts to finance their health systems. Secondly, Out-of-pocket payments have a negative impact on life expectancy in Africa. Finally, the current practice and delivery of Voluntary health insurance schemes in Africa seem to have a negative impact on the life expectancy population. However, the employment ratio in Africa has a positive moderating effect on female life expectancy. We, therefore, argue that African countries need to seek much more buoyant and innovative financial resources to increase their budgetary allocations in creating a resilient healthcare system. We conclude by delineating some relevant implications of our study for the theory and practice of health financing policy planning in Africa.

Keywords: *Healthcare Expenditure, Life Expectancy, Stakeholder theory, Sub- Saharan Africa.*

1.1 Introduction

Today, many individuals in Africa are denied access to quality healthcare due to the high cost associated with it, and this tends to defeat all the gains made toward Universal Health Coverage (UHC) over the years. Even in situations where individuals are compelled to make Out-of-Pocket payments (OOPs), quality remains elusive, which has a potential negative impact on life expectancy (Palmer et al., 2004; WHO, 2022). Since the outbreak of the Covid-19 Pandemic in 2019, health financing has experienced dramatic changes due to excessive pressure on all health systems globally. The World Health Organisation (2020) Global Spending Report shows that global health spending increased steadily between 2000 and 2018, reaching US$ 8.3 trillion, or 10% of global GDP. Prior to the adoption of the United Nations Sustainable Development Goals (SDGs) in 2016, the African Union, at its Abuja Declaration in April 2001, pledged to increase government funding for healthcare to at least 15% of the government budget in member states. However, most African governments are far from achieving and sustaining this target (John & Amlani, 2015). For the period under consideration in this study (2004-2019), only a few countries spent between 4%-5% of their GDP on Domestic General Government Health Expenditure (GGHE-D), which is the highest during the period: Botswana (2019, 4.7%), Swaziland (2009, 4.4%), Lesotho (2019, 5.5%), Namibia (2007, 4.6%) Sao Tome and Principe (2004, 5.1%) and South Africa (2018, 5.07%) (World Bank, 2022). The observation currently is that there has been a continuous decline in these allocations over time in most African counties.

Moreover, the need to increase health funding has become more crucial recently in the wake of the Covid-19 pandemic, which has almost ravaged all health resources in both developed and developing economies alike (Khan, Awan, Islam, & Muurlink, 2020). Therefore, healthcare financing has received scholarly attention in recent times due to the current dwindling financial resources, particularly in developing countries and the need to rake in more financial resources to develop a resilient public health sector. In the context of Africa, and of course, in other economies, the achievement of the (SDGs) will be incomplete by 2030 without the achievement of various health outcomes, including reduction of infant, child, and maternal mortality, reduction in HIV/AIDs infections and increased life expectancy in Africa.

Obviously, healthcare financing is an important element of all public health systems that are making adequate progress toward the achievement of Universal Health Coverage (UHC) as well as providing the needed financial protection for the poor (Witter et al., 2017; WHO, 2022).

Health economics have long recognised life expectancy as an essential variable in economic development (Shahbaz, Shafiullah & Mahalik, 2019). This is because life expectancy has an increasing impact on productivity and economic growth in nations. Therefore, understanding the determinants of life expectancy at birth in Sub-Saharan Africa is not only crucial for the sake of delivering health outcomes but also borders largely on national development (Turan, 2020). Thus, life expectancy at birth becomes the most critical determinant of health, enabling individuals to remain productive, leading to economic growth (Wang et al., 2020). However, health financing in Africa, whether through public, private or donor sources, is an essential variable in explaining the population's health status and life expectancy (Nketiah-Amponsah, 2019). As such, health expenditure reflects GDP growth, and this is assumed to measure the income elasticity of healthcare in a country. Against the backdrop of the surge in healthcare expenditure in Africa since the year 2000, this paper seeks to investigate the healthcare expenditure variables which would have a positive impact on life expectancy in Africa. Again, we seek to investigate the conditions under which healthcare financing can be improved in Africa due to the increasing healthcare waste across all African countries.

In light of the above, this study is important for three reasons. First, only a handful of studies have critically examined the proximal factors that directly affect life expectancy in Sub-Saharan Africa. Again, the economic challenges facing the Sub-Saharan African region require a thorough understanding of the determinants of life expectancy since the current economic agenda of the continent depends primarily on it. Also, even though several studies have already investigated the impact of factors such as income, the economic and social environment on life expectancy in Sub-Saharan Africa (Shahbaz, Shafiullah, & Mahalik (2019), the authors have in this study deliberately focused on investigating the impact of healthcare expenditure on life expectancy across Sub-Saharan African countries. Our study, therefore, quantitatively examines the causal factors of this important phenomenon in Sub-Saharan Africa.

Secondly, this study focuses on life expectancy dues to its importance in the well-being analysis of countries. A plethora of researchers, including Di Tella, Haisken-De New, and MacCulloch (2010), argue that income growth in a country provides only a temporal welfare boost to satisfaction, and this gets to a point where additional gains in income levels do not increase

individuals' satisfaction. Thus, beyond basic needs, individuals look for longer life, reducing child and infant mortality (Ebenstein et al., 2015). In a similar study, Easterlin (2003) argues that population satisfaction depends largely on a country's family health conditions. The UNDP also indicated as far back as 1990 that the leading factors for human development are life expectancy, adult literacy, and decent living (UNDP, 1990). Finally, most studies on healthcare expenditure and health outcomes have been on developed economies (Behera & Dash, 2018; De Mendonça & Baca, 2018). Unfortunately, only a few studies on Africa have investigated the current health financing dynamics and its impact on life expectancy. Accordingly, this study seeks to address this gap. The study, therefore, contributes to deepening the understanding of healthcare financing in Africa and the predictive power of healthcare expenditure on life expectancy.

As engaged in this study, the stakeholder theory seeks to provide a collaborative approach to healthcare financing in Africa. Thus, the role of donor institutions, budgetary allocations, faith-based institutions, corporate institutions, provision of health insurance programmes and, in extreme cases, OOPs are necessary for delivering quality healthcare in the region. However, it is important to note that the interests of stakeholders on how healthcare is delivered can lead to conflict, which is likely to result in a negative influence on regulations and policies (Hakoum et al., 2016). Within the delivery of health services, conflicting interests are evident between departments (Nie et al., 2018). On a government level, conflict is likely to arise on how the healthcare budget is allocated (Fantaya & Yaya, 2019; Piatti-Funfkirchen et al., 2018). The complexity of conflicting interests among the stakeholders can therefore compromise the effectiveness of any collaborative effort in quality healthcare delivery (Moodley et al., 2021). Therefore, the theory acts as a critical diagnostic tool to identify any vulnerability or breakdown points among the stakeholders in quality healthcare delivery. It also promotes transparency and accountability, which is vital to the survival and success of the health sector in Africa (Babatunde, 2018). The study progresses in two stages. First, we examine the impact of Domestic Health Expenditure (DOM), Domestic Private Health Expenditure (PVT-D), Voluntary Health Insurance (VHI), Out-of-pocket payment (OOPS), and External Health Expenditure (EXT) on life expectancy at birth (female, male and total). Secondly, with the understanding that a host of country-specific variables can influence healthcare expenditure in Africa, we examine the moderating effect of Central Government Debts (CGDT) and Employment Ratio (ER) on life expectancy at birth (female, male and total). The study is organised into six sections, including the introduction. While section 2 presents the background

to the study, section 3 discusses the theoretical framework and presents the various hypotheses guiding the study. Section 4 offers the research context and methods for the study. Section 5 and 6 present and discusses the results, respectively. Section 7 provides a conclusion to this study.

1.2 Model specification and estimation

The empirical model underpinning this study is stated as follows:

$$LE_{it} = \beta_0 + \beta_1 DOM_{it} + \beta_3 VHI_{it} + \beta_4 OOPS_{it} + \beta_5 EXT_{it} + \mu_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots Eq.1$$

$$LE_{it} = \beta_0 + \beta_k \sum_{k=1}^{n=48} X_4 + \mu_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots Eq.2$$

Where LE_{it} denotes life expectancy at birth, total (year)

DOM_{it} denotes domestic health expenditure (DO) as % of current health expenditure

VHI_{it} denotes voluntary health insurance (VHI) as % of current health expenditure

$OOPS_{it}$ denotes Out-of-pocket health expenditure (OOPS) as % of current health expenditure

EXT_{it} denotes external health expenditure (EXT) as % of current health expenditure

The empirical model is then modified to accommodate two moderating variables: Gross Central Government Debts (CGDT) and Employment Ratio (ER) as follows:

$$LE_{it} = \beta_0 + \beta_1 DOM_{it} + \beta_3 VHI_{it} + \beta_4 OOPS_{it} + \beta_5 EXT_{it} + \beta_8 CGD_{it} + \beta_9 ER_{it} + \mu_{it} \ldots\ldots\ldots\ldots\ldots Eq.3$$

2. Background

2.1 The need for adequate health financing

Health financing has become the fulcrum of the healthcare delivery mechanisms in all countries in the attempt to achieve Universal Health Coverage (UHC). Thus, in achieving the Sustainable Development Goal (SDG) 3, health financing is essential. However, lately, health financing, particularly in developing countries, has been threatened due to the emergence of the Covid-19 pandemic and its associated complexities. Undoubtedly, adequate health financing is crucially beneficial for economic development (Vesely et al., 2015; Raghupathi & Raghupathi,

2020). However, access to healthcare in a country and the availability of public health financial protection are determined by a country's healthcare financing structure which in most cases depends largely on a country's history, culture, politics, and economy (Asante et al.,2020). As argued by Witter et al. (2017), health financing in a country should be considered from three main perspectives: purchasing of health care services, revenue collection and risk pooling. The purchasing of healthcare services entails the pooling and transferring of financial resources to service providers with the mandate to provide healthcare services to the public (Wang et al. (2012). Typically, health revenues are raised through taxes, social security/insurance systems, fees, grants, and loans, among others, to finance the health system.

In contrast, risk pooling entails combining and managing revenue so that individuals in a pool share collective health risks and are, thus, protected from making out-of-pocket payments before accessing healthcare services. The size of a country's gross domestic product (GDP) plays a significant role in both the current level and future growth of its health care spending (McIntyre et al., 2017). Nketiah-Amponsah (2019) posited that as the size of the economy or the per capita income of a nation increases, it is frequently assumed that more money is spent on health care, which, in turn, should lead to better healthcare delivery. Therefore, it is crucial for economies to increase their economic output, which would positively impact their healthcare delivery.

2.2 Healthcare financing in Africa

Health financing in Africa has been woefully inadequate. As a result, even though the evidence suggests that Africa bears a disproportionate percentage of the global disease burden, it is one of the continents classified as having the barest minimum resource allocated to its healthcare sector (Wagstaff et al., 2018; Gouda et al., 2019). This poor healthcare financing in the African continent is also characterised by underdeveloped health insurance schemes, high out-of-pocket (OOP) payments and heavy external or donor financial dependency on healthcare delivery (McIntyre et al., 2018).

The Abuja Declaration, which saw the pledge of African countries in 2001 to raise their health spending to 15% of their annual budgets, was seen as the turning moment for healthcare delivery in Africa (Boachie et al., 2018). Subsequently, the Addis Ababa Action Agenda, adopted in 2015, emphasised mobilising both private sector and national resources to enhance healthcare delivery among the United Nations member states. However, after two decades

since the Abuja Declaration was passed, just a handful of countries in Africa have spent 15% of their annual budgets on their healthcare sectors. In 2019, it was estimated that the average government health spending in Africa is estimated at 7.2%, which is less than half of the Abuja pledge (WHO, 2019). In 2017, the average government spending as a percentage of GDP was 1.9%, compared to the global average of 3.3%. (Xu et al., 2019). In addition, the per capita spending on healthcare for Africa averaged USD 80 in 2016, which is in sharp contrast with the average of USD4,003 within the Organization for Economic Co-operation and Development (OECD) countries (OECD, 2017). Figure 1 below shows a dot plot of the current domestic general government expenditure on health as a percentage of GDP of the 48 countries involved in this study.

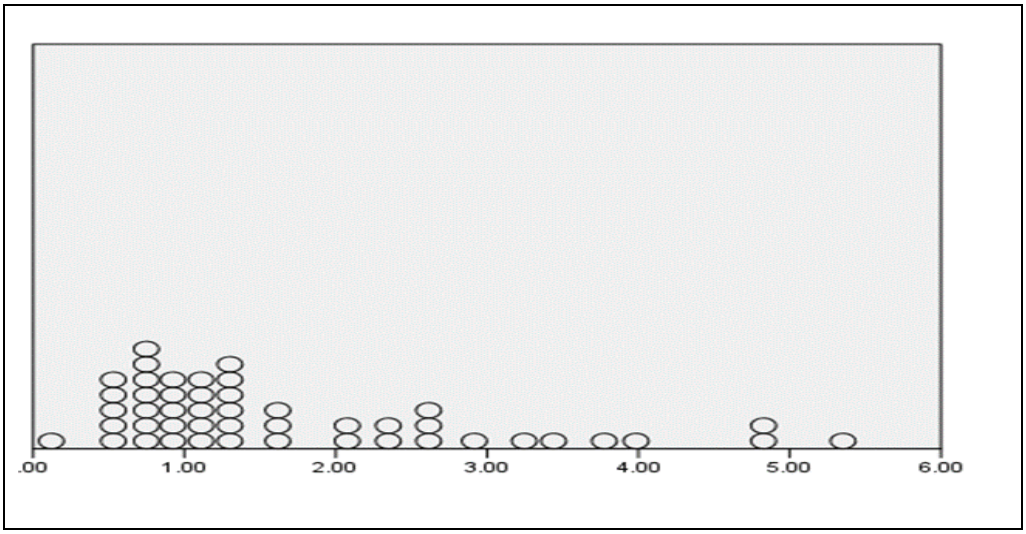

Figure 1: Dot plot of current Domestic General Government Health Expenditure as % GDP in Africa

Due to the limited public health funding in Africa, OOP payments have become a significant source of health financing. As of 2017, OOP health expenditures in Cameroon, Equatorial Guinea, Nigeria, and Sudan were more than 70% of their Current Health Expenditure (CHE) (Jakovljevic et al., 2017). On average, Africa, therefore, has the second-highest OOP health spending per capita in the world, estimated at 36% of CHE compared to the global average of 22% (WHO, 2019). It is estimated that Africa had a total shortfall in its health spending to the tune of $66 billion in 2019 (Chireshe & Ocran, 2020). This fusing shortage has increasingly affected the delivery of quality health outcomes that have led to a dramatic increase in morbidity and mortality rates which have resulted in a low life expectancy over the years (Kiross et al., 2020; Aladdin et al., 2021).

2.3 Donor support and healthcare financing in Africa

Traditionally, in managing the healthcare financing gap, donors have played a significant role in financing health care in Africa (Asante et al., 2020). Currently, even though less than 20% of the current health expenditure in several African countries is catered for by donor funds (OECD, 2017), some of the Sub-Saharan African (SSA) countries such as Malawi and Mozambique still rely on donor sources to cater for about 60% of their CHE (Chang et al., 2019). The majority of donor health funding into the African continent goes to programs addressing specific health issues such as malaria control, tuberculosis, HIV/AIDS, reduction in maternal and child mortality, and, more recently, directed towards the management of Covid-19 (Dieleman et al., 2016; Lucero-Prisno et al., 2021). Notwithstanding the significance of donor support in healthcare financing in Africa, evidence shows that donor health funding sources cannot close the current health funding deficit in Africa. More so, even though new donors such as China are becoming more involved in providing health aid to Africa, these additional funds are unlikely to have the desired impact on the current health financing deficit in the region due to the enormous health challenges facing the continent (Ruckert & Labonté, 2014; Dreher & Fuchs, 2015). Africa, therefore, needs to find various innovative funding sources to provide adequate healthcare to its teeming population.

2.4 Quality of healthcare delivery in Africa

With the current healthcare financing gap and its related challenges in Africa, it is not surprising that health outcomes and life expectancy remain low. According to WHO (2018), the inability to deliver quality healthcare services in Africa is holding back the progress towards the achievement of UHC. The report further indicated that due to inadequate or unsafe healthcare facilities or practices and inadequate training of healthcare staff, quality healthcare delivery remains a challenge in achieving UHC. More so, the persistently low health indicators in most African countries have therefore raised serious questions about the quality of the continent's healthcare systems. The disparity between low- and high-income countries is enormous when it comes to maternal and child mortality and life expectancy rates (Glouberman & Zimmerman, 2016). Quality of healthcare is measured by the degree to which an individual or group of individuals increases the likelihood of receiving desired health outcomes (Varkey & Kollengode, 2011). Thus, health services are expected to be provided to individuals without inflicting further damage to the patient (Runciman et al., 2017). Quality of healthcare delivery also implies the utilisation of time-tested procedures that are both safe and cost-effective while

also reducing the number of deaths, illnesses, and disabilities (Salmond & Echevarria, 2017). Adindu (2012), therefore, argues that quality health care delivery should involve both technical and interpersonal aspects where there is an engagement of current technology as well as building a quality interpersonal relationship between the healthcare practitioner and patients.

2.5 Healthcare financing and the life expectancy nexus

Research evidence indicates a correlation between the quality of healthcare delivery and life expectancy (Harper et al., 2021). Undoubtedly, healthcare quality is primarily determined by the level of financing allocated to its delivery and quality assurance out of a national budget. Even though many other variables impact the longevity of life, evidence shows a relationship between health care expenditure and average life expectancy (Duba et al., 2018; Abdulganiyu & Tijjani, 2021). Therefore, life expectancy at birth is one of the measures of quality healthcare delivery across all countries (Bloom et al., 2015). Even though there is criticism that it does not reveal the relative number of years individuals live in sicknesses, it has been a common practice to use life expectancy not only as a benchmark for comparing countries' social strata or entire healthcare systems but also as a demographic indicator of how effective a nation's healthcare system is and the general well-being of the population (Bloom et al., 2015). Therefore, a country's health and economic standing are reflected in its average life expectancy (Harper et al., 2021). Also, there is a direct buoyancy effect on the economy if people live longer because of better health care (Evans & Stoddart, 2017; Ngangue & Manfred, 2015). The WHO (2010) indicated that a 10% increase in life expectancy contributes an average of 0.35% rise in GDP annually across countries, and it is reckoned in the inclusive sustainable development paradigm that if life expectancy improves because of health investment, then economic growth will follow. It is, therefore, important to investigate life expectancy at birth as a proxy for the quality of health in Africa.

3. Theory and Hypotheses Development

3.1 Stakeholder Theory (ST) and healthcare delivery in Africa

Healthcare delivery is a collaborative activity among a host of stakeholders that contribute to funding and effort in delivering successful health outcomes. The Stakeholder Theory (ST) encompasses the building of relationships with those who can affect or are affected by the objectives of the health sector in any country (Freeman, 1984). ST posits that successful health outcomes are obtained when certain behaviours are adopted to promote efficient, effective, and

ethical strategies for healthcare delivery (Freeman et al., 2007). However, it appears that this approach in Africa is loosely applied compared to developed countries in healthcare delivery. Therefore, the African economies offer an interesting context to study stakeholder relationships and how they impact on quality healthcare delivery and, subsequently on life expectancy at birth. According to Parmar et al. (2010), the ST consists of ethical dimensions that include engaging morals and values when building relationships. These principles promote responsible behaviours because value is created through engaging various initiatives and activities which are directed toward a collaborative effort of healthcare delivery (Barrena-Martinez et al., 2016). This engagement is noticeable in some African countries such as Rwanda, Kenya, Tanzania, Nigeria, and Ghana. These countries have implemented collaborated healthcare delivery systems in the form of National Health Insurance Schemes (NHIS) and Community-Based Health Insurances (CBHI) to promote access to healthcare services (Fenny et al., 2021). However, the literature shows that health insurance schemes in Africa are voluntary and contribute only a small share of the current health expenditure (McIntyre et al., 2018). This is because the low uptake of the national health insurance is significantly linked to unemployment, high poverty levels and poor quality of healthcare services (Barasa et al., 2021). As a result, Africa lacks community engagement and collaboration in supporting health financing reforms to drive a shared strategic vision of improving life expectancy.

External donor participation in various healthcare programmes is quite dominant in Africa (Gautier & Riddle, 2017). Donors such as Bill and Melinda Gates Foundation have supported African countries in fighting diseases such as HIV/AIDS (Hogan et al., 2020). The Global Alliance for Vaccines and Immunisation (GAVI) and the United Nations Children Emergency Fund (UNICEF) have provided Covid-19 vaccinations across various African countries (Loembe & Nkengasong, 2021). This donor participation has led to the overreliance on external funding by African countries which is significantly associated with low government spending and ineffective health systems (McIntyre et al., 2018). The mandate of the ST is therefore contradicted in the sense that each stakeholder is expected to participate actively in creating a sustainable healthcare system in delivering quality health. This way, the value created among the stakeholders through power, influence, and interest will potentially enhance the competitiveness of the health system in Africa (Garriga, 2014; Boaventura et al., 2020).

As discussed above, the relationship between stakeholders is a vital component for the success of delivering healthcare in any country. In African countries, this dynamic approach in building

effective relationships appears to be weak and dysfunctional. This void affects the delivery of quality healthcare, the achievement of UHC and low life expectancy. This study, therefore, hypothesises that there is a positive relationship between healthcare financing and life expectancy at birth. In this regard, we hypothesise that domestic healthcare expenditure (DHE), Out-of-pocket health expenditure (OOP), External Health Expenditure (EXT) and Voluntary Health Insurance (VHI) have a positive relationship with life expectancy at birth in Africa. These hypotheses are further discussed and presented below.

3.2 Domestic healthcare expenditure and life expectancy at birth

In high-income countries, annual health expenditure has increased significantly to $5000 per capita compared to less than $100 per year in low-income countries (Dieleman et al., 2017). To explain this in greater detail, OECD countries account for 19% of the world's population but spend about 85% of the Global Health Expenditure (GHE). This is in sharp contrast with Africa, which accounts for 16% of the world's population but spends only 10% of the GHE. (Ahangar et al., 2019). Increased spending on health per capita could lead to improved access to quality health services which has a direct impact on increased life expectancy at birth. (Linden and Ray, 2017). Rahman et al. (2018) argues for an increase in health expenditure in African countries to improve the population's health status. Even though strategies that address poverty levels and income inequality could improve the individual's socioeconomic status and improve life expectancy, an increase in domestic public health expenditure can support the acquisition of efficient health technology, improve staffing and training, and provide health infrastructure (Rana et al., 2018). As argued by Anyanwu and Erhijakpor (2009), for every 1% increase in total health care expenditure per capita, there could be a 2.1 and 2.2% decrease in under-five and infant mortality rates, respectively. This implies that a well-functioning healthcare system improves health-related outcomes across ages and leads to equitable healthcare access and higher life expectancy at birth (Schneider et al., 2021). The observation currently is that many African counties depend largely on debts to finance their health systems, particularly during the pandemic, and this, even though this has a long-term adverse effect, it has contributed largely to restoring health to a large portion of the African population (Heitzig, Ordu, & Senbet, 2021). Based on the above discussion and evidence in the literature, the following hypothesis is proposed.

***H1**: Domestic healthcare expenditure contributes significantly to life expectancy at birth in Africa.*

***H2**. Central government Debt positively moderates healthcare financing and total life expectancy in Africa*

3.3 Out-of-pocket health expenditure and life expectancy at birth

There must be an adequate amount of prepaid resources for healthcare to ensure access to quality healthcare services and for the pursuit of UHC due to the increasing disparities in healthcare costs across African countries. For example, in 2014, the average healthcare spending across African countries was $120 per capita, ranging from $33 in Somalia to $347 and $791 in Uganda and Tunisia, respectively (Dieleman et al., 2016). Health spending remains disparate, with low-income countries relying heavily on OOPs. Such disparities could prevent many people from accessing quality healthcare, given the increasing prevalence of chronic diseases in the African region. Generally, health financing systems in Africa are characterised by high OOP (Asante et al., 2020). For example, in Cameroon, Equatorial Guinea, Nigeria, and Sudan, OOP health spending surpassed 70% of Current health expenditure (CHE) in 2017 (WHO, 2018). Similarly, OOP health spending averages around 36% of CHE in Africa, which is the second-highest globally (WHO, 2019). However, the overreliance on OOPs for healthcare coverage could be problematic for African countries because citizens in these countries do not have the financial resources necessary for the pursuit of universal health coverage due to abject poverty and persistent unemployment (Perelman, 2017). More so, an OOP health expenditure could be catastrophic when it exceeds a total or non-food household expenditure threshold for poorer households (Gabani & Guinness, 2019). This implies that high OOP payments can deter or prevent many people from accessing healthcare services, which can lead to poor health outcomes and lower life expectancy (Galbraith et al., 2005). Based on the above discussion and evidence in the literature, the following hypothesis is proposed.

***H3**: Out-of-pocket health expenditure contributes negatively to life expectancy at birth in Africa*

3.4 External health expenditure and life expectancy at birth

External or donor healthcare funding has been largely positive in most African countries, but in recent years, some donors have moved away from health sector pooled funding to general budget support (Dieleman et al., 2017). This strategy could be problematic as Africa accounts for a disproportionate share of the global disease burden but allocates the least resources for healthcare funding (Asante et al., 2020). Currently, external funding represents less than 20% of CHE in Africa, with the USA providing about $13·2 billion (33·8% of total Development Assistance for Health); the UK providing about $3·3 billion (8·4%); and the Bill and Melinda Gates Foundation, providing $3·2 billion (8·3%) (Chang et al., 2019). Clearly, without this donor support, healthcare coverage in Africa could have been impacted negatively, causing a drop in life expectancy at birth, particularly for the poor who cannot afford the current increasing OOPs associated with healthcare delivery in Africa. It is therefore vital in this study to examine the impact of external health expenditure on life expectancy at birth. Based on the above discussion and evidence in the literature, the following hypothesis is proposed.

> ***H_4**: External health expenditure contributes significantly to life expectancy at birth in Africa.*

3.5 Voluntary Health Insurance and life expectancy at birth

The demand for financial protection to minimise the impact of the disease burden on individuals and households in Africa has become an important request in recent times. The availability of such financial protection reduces the extent to which households incur catastrophic expenditure (CE), which pushes individuals and households into persistent poverty (Aryeetey et al., 2016). In a related study, the WHO (2010) underscored the importance of public health insurance schemes in Africa as an instrument to provide financial protection and achieve UHC. Health insurance programmes provide cover for healthcare costs in improving the quality of care needed to combat the increasing disease burden (Lagomarsino et al., 2012). However, effective and quality treatment is often not available nor affordable in most African countries. Hence, access to improved quality healthcare through voluntary publicly available health insurance schemes can improve health outcomes with its associated life expectancy significantly (Hendriks et al., 2016). Based on the above discussion and evidence in the literature, the following hypothesis is proposed.

***H_5**: Voluntary health insurance contributes negatively to life expectancy at birth in Africa*

***H_6**: Employment positively moderates the relationship between healthcare financing and female life expectancy at birth in Africa*

The above discussion points to the fact that health expenditure dramatically increases the quality of healthcare delivery and inadvertently increases life expectancy at birth. This is important due to the current disease burden and the health financing gap which currently exists in Africa. Based on the above discussion and considering the major findings from the literature, the following conceptual framework in Figure I below is proposed for this study in relation to the hypotheses presented above.

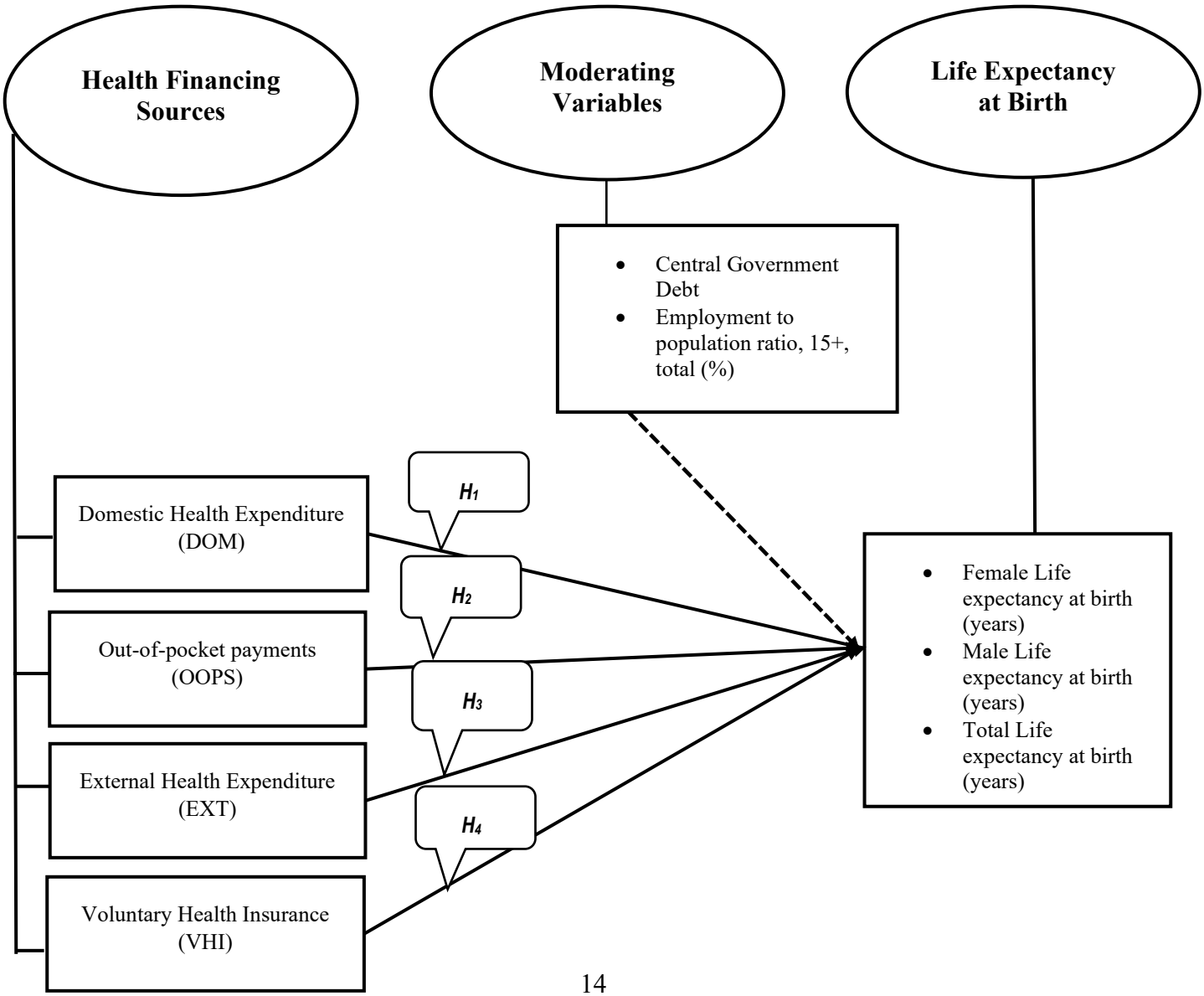

Figure I: A hypothesised model of the impact of health financing sources on life expectancy in Africa

4. Research context and method

4.1 Sample and data sources

This study has adopted a longitudinal research design using a sample of panel data for 48 African countries between 2004 -2019. The study utilised a purpose sampling technique based on data availability on African countries. Across Africa, there exist disparities in healthcare expenditure with its associated variations in life expectancy outcomes. This study has used 3 sets of panel data measuring health expenditure, life expectancy and country-specific characteristics to study the impact of health financing sources and life expectancy at birth. The first set of data measuring four independent variables, namely domestic health expenditure (DOM), Out-of-pocket payments (OOPS), external health expenditure (EXT), and voluntary health insurance (VHI), were drawn from the Global Health Expenditure Database of the WHO (2022). The second set of data measuring three dependent variables, namely life expectancy at birth, female (years), life expectancy at birth, male (years), and life expectancy at birth, total (years) was drawn from the World Bank's World Development Indicators (WDIs) (World Bank, 2022). Finally, the third set of data measuring country-specific characteristics of the 48 countries used as control variables, namely total central government debt (% of GDP) and employment to population ratio, 15+, total (% of total population) were drawn from the World Bank's World Development Indicators (WDIs) (World Bank, 2022). The current health expenditures per capita, which is in US dollars, is measured as the total estimated healthcare goods and services that an individual consumes within a year in a country. Table 1 below provides a summary of the sources and types of data used in this study.

Table I: Summary of data sources and variables

Indicator	*Type of variable*	*Unit*	*Data Source*
Domestic Health Expenditure	Independent variable	% of CHE	Global Health Expenditure Database (2020)
Out-of-pocket payments	Independent variable	% of CHE	Global Health Expenditure Database (2020)
External Health Expenditure	Independent variable	% of CHE	Global Health Expenditure Database (2020)
Voluntary Health Insurance	Independent variable	% of CHE	Global Health Expenditure Database (2020)
Life expectancy at birth, female (years)	Dependent variable	Years	World Bank WDI (2020)
Life expectancy at birth, male (years)	Dependent variable	Years	World Bank WDI (2020)
Life expectancy at birth, total (years)	Dependent variable	Years	World Bank WDI (2020)
Central government debt, total (% of GDP)	Control variable	% of GDP	World Bank WDI (2020)
Employment to population ratio, 15+, total (%)	Control variable	% of total population	World Bank WDI (2020)

4.2 Constructs and measures

4.2.1 Dependent variable

Three outcome variables, namely life expectancy- female (LEF) Life Expectancy-Male (LEM) and Life Expectancy- Total (LET). These three variables are used to measure health outcomes across the 48 countries in Africa. Life expectancy at birth represents a broader measure of a population's health (Bradley, Elkins, Herrin, & Elbel, 2011). These variables have been used consistently in many studies to measure the health status of a country (Shang & Goldman, 2008; Anyanwu and Erhijakpor, 2009; Novignon et al., 2012; Chireshe & Ocran, 2020), and this situates the study in the context of other similar studies. This is an annually weighted

aggregated data which measures how long (years) a newborn would live, provided all conditions at the time of birth remain the same in the future throughout his/her lifetime (OECD, 2022). It reflects the total mortality level of the entire population in each country across all ages each year which is usually reported in a period life table. Life expectancy at birth is one of the most frequently used health status indicators measured by living standards, lifestyle choices, better education, comorbidities, and, more importantly, access to quality health services (Asiskovitch, 2010; Gulati et al., 2011; Hoque et al., 2020). Even though there are many measures of health outcomes in a country, life expectancy remains one of the objective metrics used in health studies to measure the health of a country (Stiefel, Perla, & Zell, 2010).

4.2.2 Independent variables

Based on the conceptual model adopted for this study, four independent variables relating to health expenditure across the 48 countries in Africa have been used. Four identified proxies are used to measure health expenditure which includes Domestic Health Expenditure (DOM, %CHE), Domestic Private Health Expenditure (PVT-D, % CHE), Voluntary Health Insurance (VHI, % CHE), Out-of-pocket payment (OOPS, % CHE), and External Health Expenditure (EXT, % CHE). Similar studies, including Novignon et al. (2012) and Nkemgha et al. (2021), have used similar variables in explaining health expenditure across countries. These four explanatory variables adopted from the health expenditure database of WHO are in the form of aggregate data and expressed as a percentage of current health expenditure in a country. These variables indicate the combination of health financing sources across the countries engaged in this study. The health expenditure estimates in Africa generated by the WHO is based on the framework of the System of Health Accounts (SHA) (2011). The SHA 2011 consistently tracks all health spending in each of the sampled countries to generate comprehensive data on health expenditure to guide evidence-based policymaking.

4.2.3 Description of moderating variables

The study uses Central Government Debt (CGDT) as a % of GDP and Employment Ratio, 15+, total (% of the total population) as moderating variables for life expectancy (total) and life Expectancy (females), respectively. These variables are included in the model because they have the potential to influence the impact of health expenditure on life expectancy in Africa. For instance, an increased income level through the employment of the population would broaden the government's tax revenue by improving its capacity to spend on health service delivery and subsidise health expenditure for households (Chireshe & Ocran, 2020). Also, the

total government's debt burden could influence the extent to which governments can spend on healthcare. This is because an external debt-servicing or debt burden has been a major constraint for public health spending in sub-Saharan Africa resulting in a shift away from adequate health expenditure (Fosu, 2008; Said and Morai, 2020). In other words, public debt does measure to a great extent the quality of the institutions that promote health in a country.

5. Data analysis and results

The study employed Smart Partial Least Square 3 Structural Equation Modelling (PLS-SEM) software which is a variance-based technique to test the predictive power of the structural model proposed in this study as well as to test the various hypotheses. Since this is panel data, only structural factors were assessed for model fit and PLS algorithm indicators. PLS-SEM is an important estimating technique, particularly in complex cause-effect relationships in management research (Gudergan et al., 2008; Hair, Sarstedt, Pieper, & Ringle, 2012). As part of the quality criteria, several tests were conducted, including descriptive statistics, latent variable correlations, discriminant validity tests by cross-loadings and Heterotrait-Monotrait Ratio (HTMT). A path analysis was also executed to test the various hypotheses formulated for this study.

5.1 Descriptive statistics and correlations

The descriptive statistics are presented in Table II below, highlighting the mean, median skewness, kurtosis, and standard deviation. An observation of the statistics shows that VHI having the lowest mean (4.798), provides the least contribution to health financing in Africa whilst DOM (77.618) indicates the highest contribution to health financing in Africa. Also, the mean values of the dependent variables (LET, 57.290; LEM, 60.965; LEF, 59.124) all indicate a suitable central tendency by observing the minimum and maximum values. More so, the skewness of the data shows that the data is neither positively nor negatively skewed with a range between 3.012 and -3.778. Whilst the variable with the highest kurtosis is CGDT (16.798), the variable with the lowest kurtosis is OOP (-12.030) which are all within normal boundaries indicating that no outliers exist (non-normality) in the distribution (Hair, Sarstedt, Pieper, & Ringle, 2012; Sarstedt et al., 2017).

Table II: Descriptive Statistics

Variable	Mean	Median	Min	Max	Standard Deviation	Excess Kurtosis	Skewness	Number of Observations Used
CGDT	24.489	23.602	5.741	176.924	14.700	16.798	2.681	749.000
DOM	77.618	80.518	28.241	100.000	17.067	-0.140	-3.778	749.000
ER	61.572	62.880	36.460	87.820	13.411	-1.088	-0.107	749.000
EXT	22.382	19.482	0.000	71.759	17.067	-0.140	0.778	749.000
LEF	59.124	59.318	42.518	74.515	6.465	0.053	0.052	749.000
LEM	60.965	60.775	44.184	80.200	6.874	0.241	0.306	749.000
LET	57.290	57.782	40.418	71.300	6.131	-0.030	-0.203	749.000
OOPS	39.164	37.382	2.993	84.125	20.599	-12.030	0.120	749.000
VHI	4.798	2.219	0.001	43.956	7.715	9.117	3.012	749.000

The results of the correlation analysis as shown in Table III below indicate that the dependent variables (LET, LEM and LEF) correlate positively with CGDT (0.130), DOM (r = 0.156), the moderating effect 1 *(*r = 0.206) moderating effect 2 (r = 0.182) but negatively with ER (r = -0.134), EXT (r =-0.156), OOP (r =-0.101) and VHI (r = -0.070). Secondly, LEM correlates positively with CGDT (r = 0.169) DOM (r = 0.148), moderating effect 1 (r = 0.231), moderating effect 2 (r = 0.114) and VHI (r = 0.000) but negatively with ER (r = -0.180), EXT (r = -0.1480), and OOP (r = -0.220). Finally, LEF correlates positively with CGDT (r = 0.150), DOM (r = 0.151), moderating effect 1 (r = 0.218) and moderating effect 2 (r = 0.148) but negatively with ER (r = -0.156), EXT (r = -0.151), OOP (r = -0.165) and VHI (r = -0.033). Other intercorrelations do exist among the independent variables. For instance, DOM correlates positively with moderating effect 1 (r = 0.120), OOP (r = 0.424) and VHI (r = 0.237). The three dependent variables also correlate positively: LET (LEM, r = 0.971, LEF, r = 0.992) LEM (LET, r = 0.971, LEF, r =0.993) and LEF (LET, r = 0.992, LEM, r = 0.993).

Table III: Latent Variable Correlations

	CGDT	DOM	ER	EXT	LET	LEM	LEF	Mod. Effect 1	Mod. Effect 2	OOPs	VHI
CCDT	1.000	0.034	-0.205	-0.034	0.130	0.169	0.150	0.410	0.073	0.000	0.014
DOM	0.034	1.000	-0.445	-1.000	0.156	0.148	0.151	0.120	-0.089	0.424	0.237
ER	-0.205	-0.445	1.000	0.445	-0.134	-0.180	-0.156	-0.253	0.183	-0.031	-0.310
EXT	-0.034	-1.000	0.445	1.000	-0.156	-0.148	-0.151	-0.120	0.089	-0.424	-0.237
LET	0.130	0.156	-0.134	-0.156	1.000	0.971	0.992	0.206	0.182	-0.101	-0.070
LEM	0.169	0.148	-0.180	-0.148	0.971	1.000	0.993	0.231	0.114	-0.220	0.000
LEF	0.150	0.151	-0.156	-0.151	0.992	0.993	1.000	0.218	0.148	-0.165	-0.033
Mod. Effect 1	0.410	0.120	-0.253	-0.120	0.206	0.231	0.218	1.000	0.041	0.074	-0.016
Mod. Effect 2	0.073	-0.089	0.183	0.089	0.182	0.114	0.148	0.041	1.000	0.386	-0.724
OOPs	0.000	0.424	-0.031	-0.424	-0.101	-0.220	-0.165	0.074	0.386	1.000	-0.416
VHI	0.014	0.237	-0.310	-0.237	-0.070	0.000	-0.033	-0.016	-0.724	-0.416	1.000

5.2 Measurement reliability and validity

In assessing the suitability of the structural model, a discriminant validity test has been conducted. As shown in Tables IV and V below, the cross-loadings of the variables and the Heterotrait-Monotrait Ratio (HTMT) test were executed. Both results indicate that model used in this study is valid. The cross-loadings of the variables loaded adequately since all the factor loadings are higher than the cross-loadings indicating the presence of discriminant validity. Also, the HTMT results were all below the recommended maximum threshold of 0.85, which established the discriminant validity of the structural model (Benitez, Henseler, Castillo, & Schuberth, 2020).

Table IV: Discriminant validity test by cross loadings

	CGDT	*DOM*	*ER*	*EXT*	*LET*	*LEM*	*LEF*	*Mod. Effect 1*	*Mod. Effect 2*	*OOP*	*VHI*
CGDT	*0.910*	*0.034*	*-0.205*	*-0.034*	*0.130*	*0.169*	*0.150*	*0.410*	*0.073*	*0.000*	*0.014*
CGDT	*0.410*	*0.720*	*-0.253*	*-0.120*	*0.206*	*0.231*	*0.218*	*1.000*	*0.041*	*0.074*	*-0.016*
DOM	*0.034*	*1.000*	*0.845*	*-1.000*	*0.156*	*0.148*	*0.151*	*0.120*	*-0.089*	*0.424*	*0.237*
ER	*-0.205*	*-0.445*	*1.000*	*0.645*	*-0.134*	*-0.180*	*-0.156*	*-0.253*	*0.183*	*-0.031*	*-0.310*
ER	*0.073*	*-0.089*	*0.183*	*0.089*	*0.782*	*0.114*	*0.148*	*0.041*	*1.000*	*0.386*	*-0.724*
EXT	*-0.034*	*-1.000*	*0.445*	*1.000*	*-0.156*	*0.948*	*-0.151*	*-0.120*	*0.089*	*-0.424*	*-0.237*
LEF	*0.150*	*0.151*	*-0.156*	*-0.151*	*0.992*	*0.993*	*0.700*	*0.218*	*0.148*	*-0.165*	*-0.033*
LEM	*0.169*	*0.148*	*-0.180*	*-0.148*	*0.971*	*1.000*	*0.993*	*0.931*	*0.114*	*-0.220*	*0.000*
LET	*0.130*	*0.156*	*-0.134*	*-0.156*	*1.000*	*0.971*	*0.992*	*0.206*	*0.882*	*-0.101*	*-0.070*
OOPS	*0.000*	*0.424*	*-0.031*	*-0.424*	*-0.101*	*-0.220*	*-0.165*	*0.074*	*0.386*	*0.811*	*-0.416*
VHI	*0.014*	*0.237*	*-0.310*	*-0.237*	*-0.070*	*0.000*	*-0.033*	*-0.016*	*-0.724*	*-0.416*	*0.800*

Table V: Discriminant validity test by Heterotrait-Monotrait Ratio (HTMT)

	CGDT	**DOM**	**ER**	**EXT**	**LET**	**LEM**	**LEF**	**Mod. Effect 1**	**Mod. Effect 2**	**OOP**
CGDT										
DOM	0.034									
ER	0.205	0.445								
EXT	0.034	0.301	0.445							
LET	0.130	0.156	0.134	0.156						
LEM	0.169	0.148	0.180	0.148	0.571					
LEF	0.150	0.151	0.156	0.151	0.492	0.293				
Mod. Effect 1	0.410	0.120	0.253	0.120	0.206	0.231	0.218			
Mod. Effect 2	0.073	0.089	0.183	0.089	0.182	0.114	0.148	0.041		
OOP	0.000	0.424	0.031	0.424	0.101	0.220	0.165	0.074	0.386	
VHI	0.014	0.237	0.310	0.237	0.070	0.000	0.033	0.016	0.724	0.416

5.3 Path analysis of the structural model

To understand the nature of relationships (paths) that exist within the structural model, both direct and moderated effects were tested through path analysis. As shown in Table VI below, the results include the path coefficients, standard deviations, t-statistics, p-values, R2 and the model fit indicators. Figure II below also shows the structural model pictorially showing the various relationships among the explanatory constructs and the outcome variables (DOM, OOP, EXT, VHI, CGDT, ER, LEF, LEM, and LET). The model fit result shows a good fit for this study since the Standardised Root Mean Square Residual (SRMR) is 0.0066, which is less than the standard threshold of 0.08 (Hair et al., 2019). The chi-square value (9281.269) which is also above the usual threshold of 0.05, indicates a strong model fit for predicting life expectancy in Africa (Alavi et al., 2020).

Table VI: Path Analysis of health financing and life expectancy in Africa

Path	ß	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Central Government Debts -> Life Expectancy Total-Total	.056	.059	.033	1.698	.090
Domestic Health Expenditure -> Life Expectancy Total-Total	-28336.687	-27776.717	42787.643	.662	.508
Domestic Health Expenditure -> Life Expectancy- Male	-20692.582	-19252.592	43309.940	.478	.633
Domestic Health Expenditure -> Life Expectancy-Female	-24419.471	-23342.449	39843.389	.613	.540
Employment Ratio -> Life Expectancy-Female	-.103	-.103	.041	2.527	.012
External Health Expenditure -> Life Expectancy Total-Total	-28337.079	-27777.108	42787.647	.662	.508
External Health Expenditure -> Life Expectancy- Male	-20693.049	-19253.059	43309.942	.478	.633
External Health Expenditure -> Life Expectancy-Female	-24419.856	-23342.833	39843.394	.613	.540
Moderating Effect 1 -> Life Expectancy Total-Total	.157	.160	.028	5.637	.000
Moderating Effect 2 -> Life Expectancy-Female	.226	.229	.029	7.811	.000
Out-of-Pocket Payments -> Life Expectancy Total-Total	-.419	-.418	.045	9.210	.000
Out-of-Pocket Payments -> Life Expectancy- Male	-.561	-.559	.042	13.259	.000

Out-of-Pocket Payments -> Life Expectancy-Female	-.508	-.507	.042	12.063	.000
Voluntary Health Insurance -> Life Expectancy Total-Total	-.335	-.334	.036	9.267	.000
Voluntary Health Insurance -> Life Expectancy- Male	-.343	-.343	.034	10.154	.000
Voluntary Health Insurance -> Life Expectancy-Female	-.166	-.164	.047	3.526	.000
	R^2	**Adjusted R^2**			
Life Expectancy Total-Total	0.168	0.162			
Life Expectancy- Male	0.193	0.188			
Life Expectancy-Female	0.205	0.199			
SRMR	0.066				
Chi-Square Value	9281.269	Sig. 0.085			

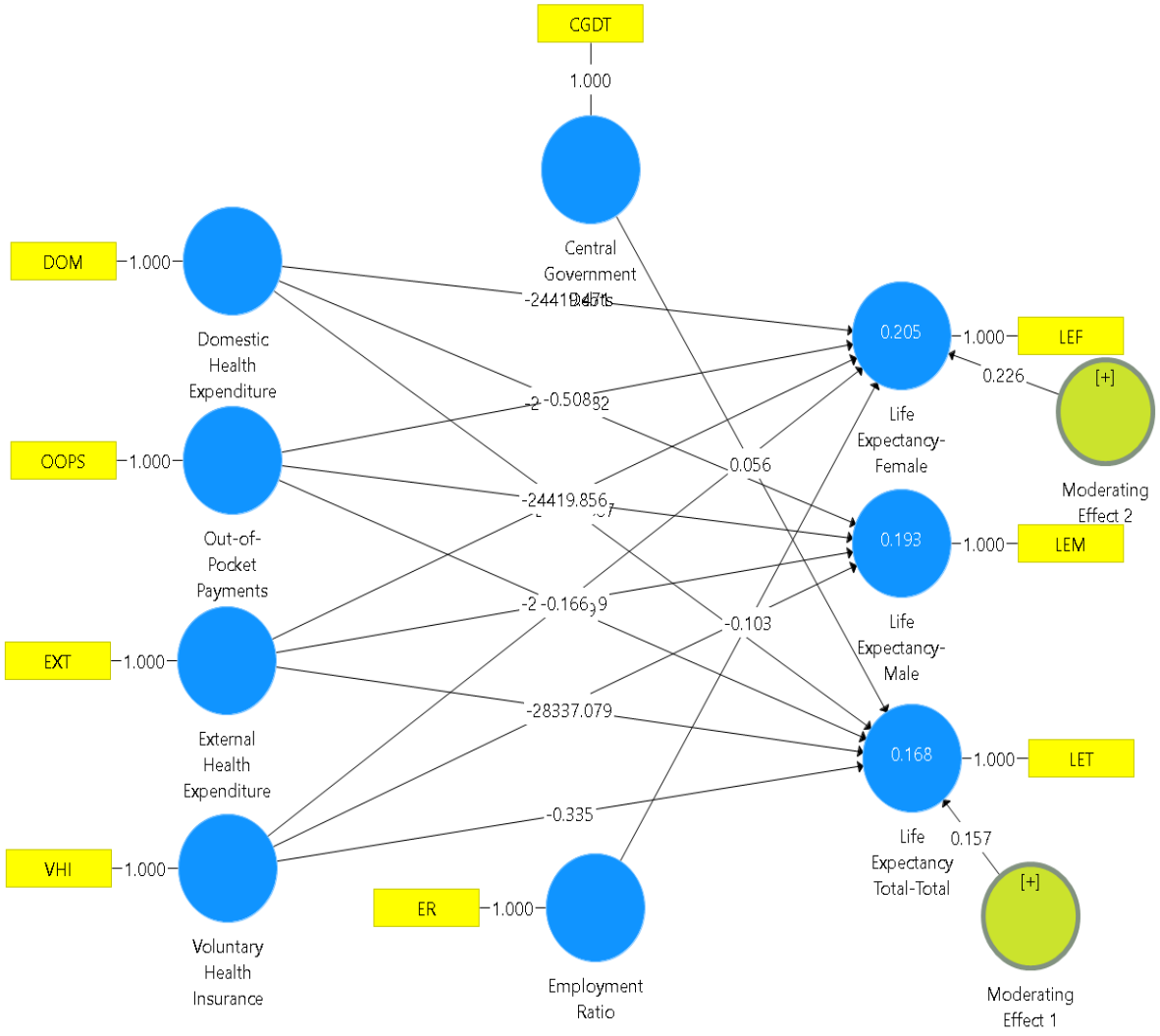

Figure II: The Structural model for the relationship between health financing sources and life expectancy in Africa

Firstly, as shown in Table VI above, the path analysis shows that Domestic health expenditure and total life expectancy and life expectancy for males and females are statistically insignificant (DOM→LET, LEM, LEF). Similarly, External health expenditure and life expectancy for males and females are statistically insignificant (EXT→ LET, LEM, LEF) are statistically insignificant. Therefore, there is no evidence in this study to suggest that both domestic and external health expenditure contributes significantly to life expectancy in Africa. H1 and H4 are therefore rejected and the null accepted. Secondly, out of pocket payments (OOPs) is statistically significant at a 1% level with total life expectancy, male life expectancy and female life expectancy (OOP→ LET, LEM, LEF) (p = 0 .000, β = -.419, p = 0.000, β = -.561, p = 0.000, β = -.508). Thus, a unit increase in OOPs decreases total life expectancy, male life expectancy and female life expectancy by 41.9%, 56.1% and 50.8%, respectively. H3 is therefore accepted. Also, Voluntary Health Insurance is statistically significant at 1% level with

total life expectancy, male life expectancy and female life expectancy (p = 0 .000, β = -.335, p = 0.000, β = -.343, p = 0.000, β = -.166). Thus, a unit increase in the current form of voluntary health insurance schemes in Africa contributes negatively to total life expectancy, male life expectancy and female life expectancy by 33.5%, 34.3% and 16.6%. H5 is accepted.

5.4 Moderation analysis and the predictive power of the structural model

The result of the moderating effect 1 (CGDT→ LET) (p = 0.000, ß = .157) and moderating effect 2(ER → LEF (p = 0.000,.226) shows that both are statistically significant at a 1% level. Thus, whilst CDGT contributes indirectly to total life expectancy by 15.7 %, ER contributes indirectly to female life expectancy by 22.6%. H2 and H6 are therefore accepted. The R^2 and its adjusted R^2 values highlight the overall fitness of the structural model. The R^2 values, as well as its adjusted values for the model, are as follows: Total life expectancy (R^2=0.168, adjusted R^2=0.162), life expectancy for males (R^2=0.193, adjusted R^2= 0.188), and life expectancy for females (R^2=0.205, adjusted R^2= 0.199) respectively. The above results show that the structural model explains the variance in total life expectancy, male life expectancy and female life expectancy by 16.2%, 18.8%, and 19.9 %, respectively.

6. Discussion

Firstly, the findings from the path analysis above suggest that domestic health expenditure and external health expenditure are insignificant in impacting total life expectancy, female life expectancy, and male life expectancy, respectively. This result was to be expected as it is consistent with the findings of Xu et al. (2019) and WHO (2019), as well as Chireshe and Ocran (2020), who demonstrated the insignificance of domestic health expenditure and external health expenditures in determining life expectancy outcomes in Africa. In sharp contrast, this finding is inconsistent with the well-acclaimed role of external health support and domestic health investments touted by previous studies (Asante et al., 2020). To change the narrative, it is expected that African governments and external donors make deliberate policies to innovate and upscale their health investments in Africa in order to instigate the desired outcomes that promote total life expectancy, female life expectancy and male life expectancy (Rahman et al., 2018).

Secondly, as regards the interrelationship between increased central government debt and total life expectancy, the finding from the path analysis notes that the central government's debt is partially significant at 10% level in influencing total life expectancy and correlates positively

with total life expectancy as well. This result implies that an increase in the central government's debt improves total life expectancy by 5.6%. This finding is consistent with the assertion of Boachie et al. (2018) that a renewed commitment by central governments to increase health investments would generate positive total life expectancy outcomes in African economies. Since most African economies have failed to generate the necessary internal revenue to support their health sectors, most of them depend on debt to deliver healthcare, and this remains unsustainable. Nonetheless, the central government's investment in the health sector in Africa remains largely poor, with its attendant negative impact on total life expectancy outcomes (Gouda et al., 2019).

Similarly, in connection with the relationship between employment ratio and female life expectancy, the findings depict a negative influence on female life expectancy such that a unit increase in the employment ratio of the economies in Africa further exacerbates the already yawning female health deficit gap by a whopping 10.3 % with the resultant adverse influence on female life expectancy outcomes. Most females in Africa either find themselves in self-employment or underemployment with very poor livelihood outcomes, which does not yield the necessary financial health cushion. Consistent with the views of Nketia-Amponsah (2019), African governments are entreated to explore creative sources of health funding to accommodate the health demands of the female population coupled with a steady effort to increase the female populations into a formal employment compared to men.

Thirdly, the results regarding the relationship between out-of-pocket payment and total life expectancy, female life expectancy, and male life expectancy show that out-of-pocket payment is significant at 1% in predicting total life expectancy, female life expectancy, and male life expectancy but correlates negatively with total life expectancy, female life expectancy, and male life expectancy respectively. This finding clearly aligns with the postulation of Jakovljevic et al. (2017) that the continuous failure of central governments in Africa to adequately fund healthcare necessitates the emergence and sustenance of out-of-pocket payment as a formidable alternate source of healthcare investment. However, reflecting on the low levels of employment ratios coupled with very low per capita incomes in African economies, out-of-pocket payments adversely impact life expectancy outcomes relating to morbidity and mortality rates (Kiross, 2020; Aladdin et al., 2021). It is expected that pragmatic steps are taken by African governments to allocate reasonable funding to the healthcare sectors to reduce the level of out-of-pocket payments, which undoubtedly are way beyond the expected

threshold. This initiative could go a long way in reducing the morbidity and mortality rates in Africa.

Further, the result regarding voluntary health insurance and life expectancy underscores a negative correlation between voluntary health insurance and total life expectancy, female life expectancy, and male life expectancy, respectively, thus suggesting a 99% confidence level in predicting the impact of voluntary health insurance on total life expectancy, female life expectancy, and male life expectancy respectively. However, voluntary health insurance is found to have a negative impact on life expectancy current across all the African counties sampled in this study. Undoubtedly, this is the case because the current practice of voluntary health insurance in Africa is poorly designed and delivered where hospitals are short of essential medications, unqualified health officers, poor delivery of ambulance services, lack of essential equipment such as hospital beds, demand for out-of-pocket payments at the point of service delivery and many other shortcomings of the insurance schemes in Africa. This finding is consistent with the result of similar studies that contend that flexible access to improved healthcare through subsidised or free but compulsory health insurance programmes elicit positive life expectancy outcomes (Hendriks et al., 2016). More so, the subscription to most voluntary health insurance schemes in Africa are small and, therefore, their contribution to the cumulative health investments in Africa is quite negligible (McIntyre et al., 2018). The expectation is that African governments would upscale the intake of insurance schemes through the creation of the enabling environments to facilitate the creation of jobs and other poverty reduction strategies that financially empower their populations to enrol in these schemes (Barasa et al., 2021).

More so, in relationship with the moderating effect of central government debt and total life expectancy, the result indicates that it positively correlates with total life expectancy and is statistically significant at a 1% level in predicting total life expectancy. The consistent drop in financial allocations to the health sectors by African central governments that are regularly justified by the poor performance of their economies is the reason most of them have no choice but to depend on debts to sustain their healthcare sectors. However, as indicated earlier, this is unsustainable with its high attendant financing cost in the long run. In view of this development, health suppliers are starved of funds because of delays and sometimes absolute refusal of some central governments to pay for health services delivered. To engender superior total life expectancy outcomes, the study's expectation is that central governments in Africa

should widen the healthcare funding sources and lean less on debt, which is unsustainable in improving total life expectancy in their economies (Anyanwu & Erhijakpor, 2009; Ahangar et al., 2019). Therefore, a much more sustainable means of healthcare financing in Africa is urgently needed

Finally, regarding the moderating effect of employment and female life expectancy, the result shows that employment is statistically significant at a 1% level in predicting female life expectancy and correlates positively as well with female life expectancy. This finding implies that employment moderates the relationship between all the health financing sources and female life expectancy by 22.6% in Africa. Thus, if the African government can increase the percentage of women in formal employment, the uptake of voluntary health insurance and the government's ability to raise enough income tax to support the health sector will be higher, and this will eventually have a positive impact on the life expectancy of females. This result is consistent with the views of Linden and Ray (2017), who argued that improved health per capita as a result of female employment promotes female life expectancy. Formal employment will therefore increase the ability of women to afford out-of-pocket payments for health and subscribe to voluntary health insurance schemes.

7. Conclusion

The conceptual model advanced in this study aims to address the research gap in exploring a validated model for healthcare financing and its impact on life expectancy in Africa. The model explicitly confirms the findings of similar studies, which advocate that domestic healthcare expenditure, out-of-pocket health payments, external health expenditure, and voluntary health insurance are critical factors in health financing that are likely to influence life expectancy outcomes (Shahbaz, Shafiullah & Mahalik, 2019). To the best of our knowledge, this is one of the isolated studies in the African health landscape that a panel data of this nature covering a period of sixteen (16) years has been deployed to investigate the healthcare financing and life expectancy narrative in Africa. This study has addressed this gap by advancing knowledge that contributes to the healthcare financing literature through the development of a formidable theoretical model.

Indeed, significant intentional investment in healthcare financing offers numerous gains to African economies in general, as well as the individuals and their households (Witter et al., 2017). In view of this, improved healthcare financing engenders positive life expectancy

outcomes, which further augments the productivity levels of African economies (Wang et al., 2020). Invariably, it is pertinent to underscore the invaluable collaborative role of the key stakeholders who affect and are affected by the policies in the health sectors of the African economies as postulated in the stakeholder theory (Freeman, 1984). The conclusions advanced above demonstrate that deliberate and pragmatic governmental and external donor initiates are crucial for positive life expectancy outcomes in Africa.

7.1 Research implications

Firstly, the study has developed a robust and logical framework that can be deployed in revolutionising healthcare financing programmes in Africa. Therefore, governments in Africa should increase investments in their health systems and reform non-functional out-of-pocket payments systems and voluntary insurance policies to become accessible to the poor. Also, the normative call to external health financiers to increase their investments in the healthcare sectors in Africa since the African government currently seems helpless in financing their own healthcare systems adequately.

7.2 Limitations of the study

The major limitation of this study is that the data series used is interpolated from the annual data series of the United Nations Population Division (UNPD). It may, therefore, not reveal real events compared to observed data. Nevertheless, the source and the data collection techniques have been validated for this study.

7.3 Future Research Direction

This study proffers a deeper understanding of healthcare financing and life expectancy research. It is anticipated that future research could be directed at investigating the nature, dynamics, and impact of existing voluntary health insurance schemes only to identify the best that could be adopted for life expectancy decision-making. Further, since health financing is categorised into various forms ranging from governmental to private and external initiatives with unique economy life expectancy outcomes, future research could thus be directed at country-specific environments instead of an African-wide study. The objective is to compare healthcare financing and life expectancy outcomes of individual African economies.

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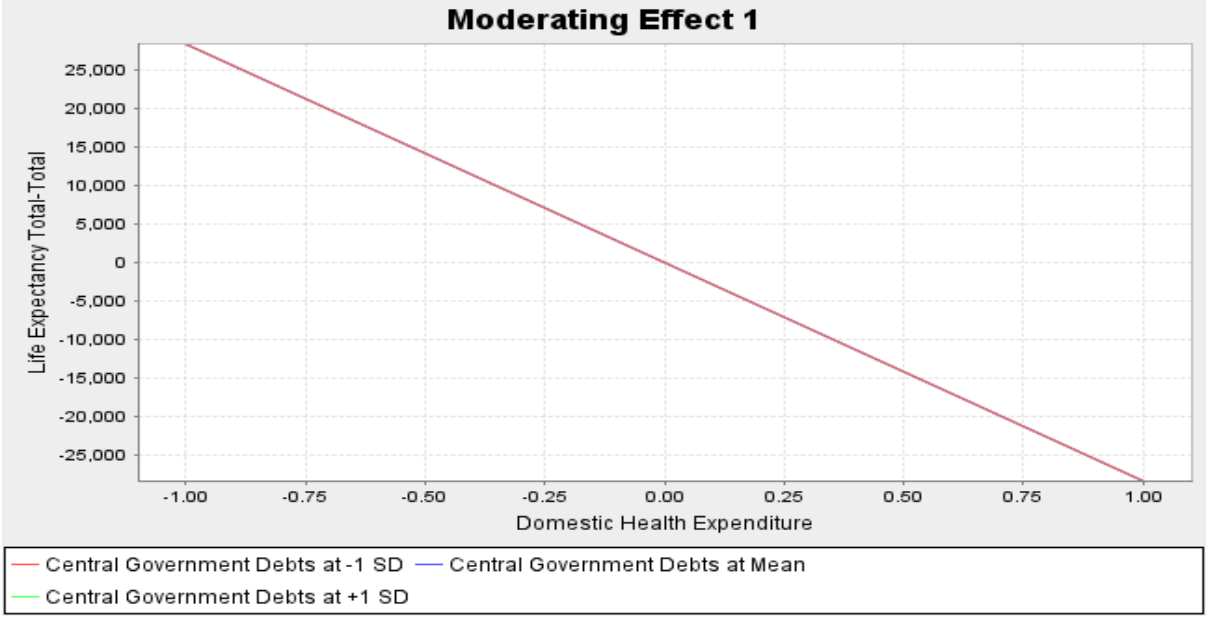
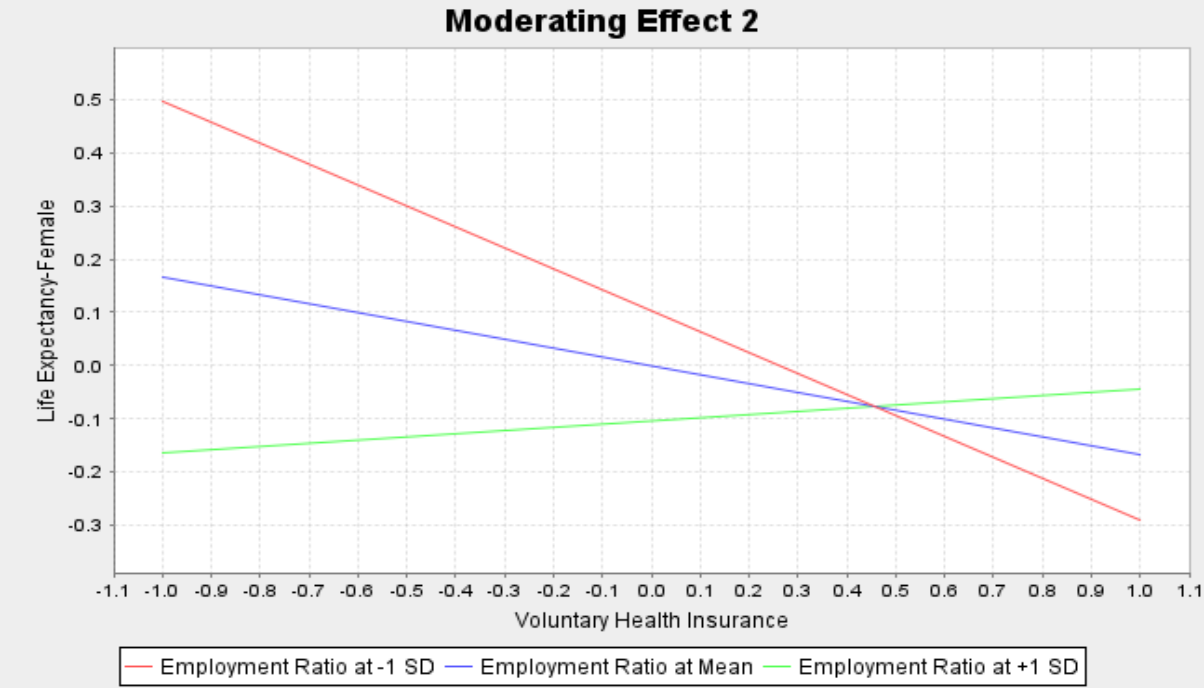
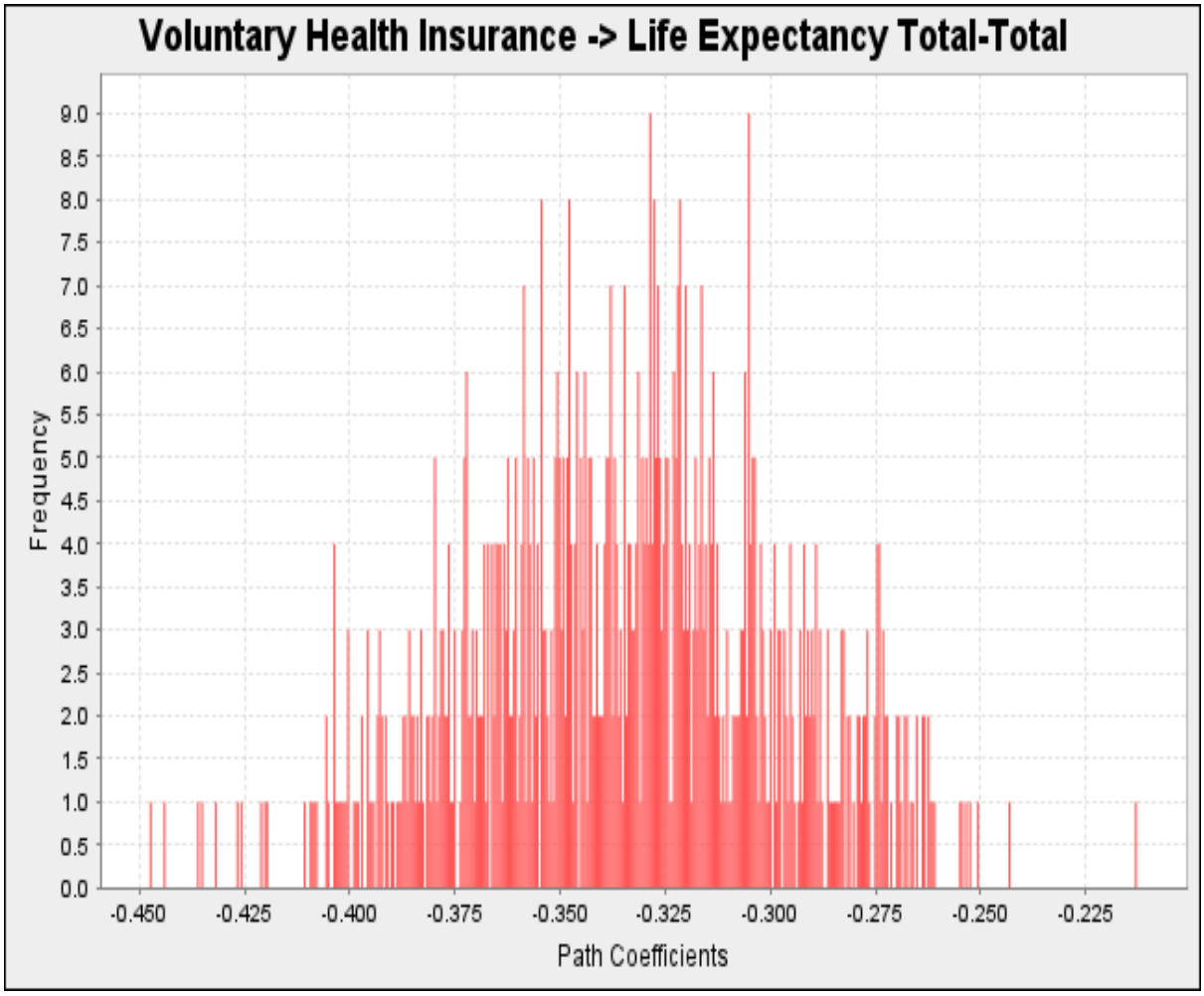
Appendices




Moderating Effect 2
Life Expectancy-Female
0.5
0.4
0.3
0.2
0.1
0.0
-0.1
-0.2
-0.3
-1.1 -1.0 -0.9 -0.8 -0.7 -0.6 -0.5 -0.4 -0.3 -0.2 -0.1 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1
Voluntary Health Insurance
Employment Ratio at -1 SD
Employment Ratio at Mean
Employment Ratio at +1 SD


Voluntary Health Insurance -> Life Expectancy Total-Total
Frequency
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.450 -0.425 -0.400 -0.375 -0.350 -0.325 -0.300 -0.275 -0.250 -0.225
Path Coefficients