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HEALTH EXPENDITURE AND HEALTH OUTCOMES IN EAST AND SOUTHERN AFRICA: DOES GOVERNANCE MATTER?

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APPROVAL

This dissertation has been examined and approved by the department of Economics in partial fulfillment of the requirements of the Master of Arts Degree in Economics.

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Supervisor Date

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HoD, Economics Date

DECLARATION

This study was undertaken between October 2019 and July 2020. This dissertation is my original work and has neither in part nor in whole been submitted for any degree in any other university, with the exception of references to other people's work which have been dully cited.

Author: Cecilia Wambui Njoroge

Signature: …….

Date: …….....

DEDICATION

This work is dedicated to my parents for their endless support, encouragement and prayers.

ACKNOWLEDGEMENTS

I am eternally grateful to the Almighty God for enabling me to go through this programme. My sincere gratitude goes to my distinguished supervisors, Ms. Naomi Setshegetso and Prof. Narain Sinha. Their guidance, enriching comments, invaluable insights, constructive criticism and contribution have enabled me to write this thesis. May they succeed in all their endeavours.

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LIST OF ACRONYMS

2SLS	Two-Stage Least Squares
ASEAN	Association of Southeast Asian Nations
AU	African Union
CPI	Corruption Perception Index
ESA	East and Southern African
FE	Fixed Effects
GDP	Gross Domestic Product
GMM	Generalized Method of Moments
HIV/AIDs	Human Immunodeficiency Virus and Acquired Immune Deficiency syndrome
IPS	Im, Peseran and Shin
IV	Instrumental Variables
LLC	Levin, Lin and Chu
MDGs	Millennium Development Goals
MENA	Middle East and North Africa
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares
OOP	Out-of-pocket
SAARC	South Asian Association for Regional Cooperation

SDGs	Sustainable Development Goals
SSA	Sub-Saharan Africa
TB	Tuberculosis
UHC	Universal Health Coverage
UN	United Nations
WDI	World Development Indicators
WHO	World Health Organization

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ABSTRACT

Good health is important at both individual and macroeconomic levels, and improving health outcomes remains a noble goals as enshrined in Sustainable Development Goals. Generalized Method of Moments is used to examine the relationship between health expenditure and health outcomes and the role of governance in the effectiveness of health expenditure on health outcomes in 18 East and Southern African countries. The study results indicate that total, private and public health expenditure significantly reduce infant mortality, maternal mortality and under-five mortality rate, but increase in life expectancy significantly. Both public health expenditure and private health expenditure have the same impact on health outcomes. However, public health expenditure has a higher impact on health outcomes compared to private health expenditure. In addition, the study results show that poor governance adversely affects health outcomes, and also undermines the effectiveness of public health expenditure on health outcomes. The results suggest the need for governments to increase health spending levels to improve populace health.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The benefits of good health at both individual and macroeconomic levels have widely been acknowledged in literature. Good health yields economic dividends, for instance, individuals are more productive, can effectively take part in the labour market and are able to pursue education and undertake training activities (Grossman, 1972). Undeniably, health contributes value to human life and is a source of human well-being and happiness. Health is also a form of human capital that creates a thriving economy by raising national income (Barenberg, Basu, & Soylu, 2017; Bleakley, 2010). Populations with higher stock of health also tend to have higher life expectancy and increased long-term savings which are essential for economic growth (Asaju, 2012). Improving population health, therefore, is not only desirable but also a key policy concern because improvement in health increases human capital and is a substantial tool in a country's development process.

The need for good health to an individual and its role in the economy have been recognized globally, and with this viewpoint, international organizations continue to champion nations to prioritize health. Attainment of better health outcomes remains a noble goal as enshrined in Sustainable Development Goals (SDGs). Specifically, SDG 3 aims at ensuring good health and promoting well-being for all at all ages through health priorities, substantial increase in health financing, universal health coverage (UHC), strengthening the health capacity of countries and calls for research and development (United Nations, 2015).

Despite this, health status in East and Southern African (ESA) regions, compared to other African regions, lags mainly due to high prevalence of Human Immunodeficiency Virus and Acquired

Immune Deficiency syndrome (HIV/AIDs) that has led to a rise in mortality rates (World Health Organization, 2018). Though ESA countries account for about 4% of the world's population, the countries account for more than 50% of HIV/AIDs infections worldwide. HIV/AIDs infections in ESA countries translate to 20.6 million compared to 5 million in West and Central Africa and 0.24 million in Middle East and North Africa (UNAIDS, 2018). The high HIV/AIDs infections in ESA have plummeted life expectancy at birth. Consequently, the challenge that governments and policymakers face is attaining desired health outcomes, making it a subject of academic interest among researchers.

Farag *et al.* (2013) indicate that improvements in health may result from investments in healthcare sectors. Some development economists view health expenditure as a key input into health production function and thus an important policy tool for government towards improved health status (Arthur & Oaikhenan, 2017; Kofi, Ramu, & Põlajeva, 2018). Increase in public health spending has therefore been advocated for particularly in developing countries, with the most notable call being the Abuja Declaration 2001 (World Health Organization, 2011a). However, some empirical literature does not support the view that increase in health expenditure is important in improving populace health stock. Some studies find that health expenditure has no significant impact, or even worse a negative impact on health outcomes (Muthaka, 2013; Rahman, Khanam, & Rahman, 2018).

Though there have been efforts towards increased levels of public health spending, its key to note that different nations tend to finance their health systems through public, private and/or donor sources. The level of out-of-pocket (OOP) payments in developing countries remains significantly high and accounts for about 50% of the total health expenditure (World Health Organization, 2017). In particular, ESA countries also experience high levels of OOP payments by individuals.

For example, in 2017, the proportion of total health expenditure financed by OOP payments in Kenya was 25%, 75% in Comoros, 49% in Mauritius and 40% in Uganda (World Health Organisation, 2020). Only a few countries (Botswana, Namibia, Rwanda and South Africa) appear to have OOP payments contributing less than 10% of total health expenditure. This is evident that ESA countries are grappling with high levels of OOP payments since about 35% of health spending is paid directly by patients. High level of OOP payments raises the cost of healthcare, making healthcare unaffordable for the vulnerable members of the society and further constrains access to healthcare services and impoverishment. A report by World Health Organization (2010a) also points out that financial hardship through catastrophic health expenditures caused by OOP payments act as a barrier in the achievement of UHC.

The high burden of OOP payments has made some ESA countries to put in place other financing mechanisms with the aim of providing financial protection to individuals and in line with the momentum towards attainment of UHC. For instance, countries such as Kenya, Rwanda and Tanzania have adopted social health insurance schemes, while countries such as Zambia and Uganda have abolished user fees for primary healthcare services. On the other hand, the level of public health spending in ESA countries is still low with most countries spending about 8% of the Gross Domestic Product (GDP) on health (Piatti-Fünfkirchen, Lindelow, & Yoo, 2018). In addition, most ESA countries spend about 8% to 10% of their annual budget on health. This is in comparison to the 15% advocated for in the Abuja Declaration (World Health Organization, 2011a). This becomes a concern as it creates a shortfall in financing healthcare and fails to lever catastrophic health expenditures incurred by households through OOP payments.

While increase in health expenditure is often pursued as an option of improving health, failure to allocate health expenditure on the right health interventions may constrain increase in population

health stock (Odhiambo, Wambugu, & Kiriti-Ng'ang'a, 2015). In addition, even though health expenditure can potentially improve health, increased health spending is not a guarantee in itself (Makuta & O'Hare, 2015). Increased spending on health can improve health outcomes if it enhances people's accessibility to affordable and quality healthcare services. Moreover, population health is also a consequence of healthcare system efficiency and, economic, political and social factors. Mhango and Chirwa (2018) argue that governance has a bearing on the health status of a country as it affects health funding and health spending effectiveness. Governance in health is reflected through polices and interventions that have a direct or indirect impact on the health of the people. Good governance plays a significant role in national development and also acts a prerequisite for donor funds and debt. Due to its role in the economy, attaining good governance has been set as an independent goal in the SDGs (United Nations, 2015).

In both developed and developing nations, a lot of attention has been given to the relationship between health expenditure and health outcomes. However, previous studies are limited in that their focus is on how governance affects health outcomes without providing evidence on how governance, measured by corruption, affects health expenditure effectiveness particularly in ESA countries. Literature on governance, health expenditure and health outcomes is limited and also inconclusive. Thus clear evidence on this issue is needed especially because achievement of SDG 3 needs to be guided by evidence. This study departs from other studies as it explores the role of governance in the effectiveness of public health expenditure in attaining better health outcomes in 18 ESA countries. The study also attempts to differentiate the impacts of private and public health expenditures on health outcomes. Health outcome proxies in this study include life expectancy at birth, infant mortality rate, under-five mortality and maternal mortality. These indicators are chosen because they measure aggregate population health. The focus is on ESA regions as most

of these countries are classified as low and middle income countries by the United Nations (United Nations, 2019).

1.2 Problem Statement

Investment in health is a major component of human capital development in any nation. African countries and global development partners have come up with policies and initiatives to improve the populace health outcomes (Global Fund, 2002; United Nations, 2000, 2015). As a result, health outcomes have improved in East and Southern African countries. On average, infant mortality rate per 1000 live births in ESA countries declined from 56 in 2008 to 47 in 2012 and a further decline to 42 in 2015. Life expectancy at birth increased from 55 years in 2008 to 59 years in 2012 and 62 years in 2015 (World Bank, 2020). Despite the improvement in health outcomes, ESA countries still exhibit low health outcomes due to high mortality and morbidity rates as compared to other Sub-Saharan Africa (SSA) regions (World Health Organization, 2018). Additionally, ESA countries face huge epidemics and account for about 50% of the people living with HIV/AIDs worldwide (Sambo & World Health Organization, 2014).

Governments in Africa have committed to improve health through an increase in the level of government health expenditure. During the Abuja Declaration 2001, African Union (AU) heads of governments pledged to allocate 15% of their annual government expenditure towards health. Government health expenditure in ESA countries has been increasing. For instance, average public health expenditure as a percentage of GDP increased from 2.3% in 2008 to 2.4 % in 2012 and a further increase to 2.6% in 2015 (World Bank, 2020). As a percentage of general government expenditure, public health expenditure increased from an average of 8.9% in 2002 to 9.1% in 2006 and further to 9.3% in 2011 (World Bank, 2020). Despite this, only three of the ESA countries (Rwanda, Madagascar and South Africa) have met the Abuja Declaration essential commitment

(Piatti-Fünfkirchen *et al.*, 2018). These countries, however, have also not consistently maintained the Abuja target. Madagascar is the only country in ESA that has been able to sustain the 15% target. A key issue is whether inadequate and erratic health spending explains the low health outcomes in these countries.

There has been emerging literature on the link between health expenditure and health outcomes. Different studies use different health outcome indicators, using either total, public or private health expenditure as the independent variable. However, the relationship between health spending and health outcomes remains inconclusive (Akinci, Hamidi, Suvankulov, & Akhmedjonov, 2014; Bein, Unlucan, Olowu, & Kalifa, 2017; Muthaka, 2013; Rahman *et al.*, 2018). With this unreconciled empirical evidence, we can speculate that the pathways through which health expenditure impact on health outcomes are not clear cut. Thus, the role of governance in the efficacy of health expenditure in improving health outcomes becomes an important aspect of consideration.

Empirical studies have focused on whether good governance enhances better health outcomes in a country. There is scant evidence on how governance impacts the effectiveness of health spending particularly for ESA countries as previous studies have neglected the issue of corruption. Yaqub, Ojapinwa, and Yussuff (2012) point out that corruption is a key institutional failure and governance aspect that undermines the effectiveness of health spending. Hu and Mendoza (2013) also outline that poor governance threatens the ability of a country to attract donor funding. Thus, the role of governance becomes an issue of concern for formulation and implementation of health policies in ESA countries. This study differs from previous studies by looking at the role of governance, using corruption as a proxy, in the effectiveness of health expenditure on health

outcomes. Further, unlike Bein *et al*. (2017), this study also seeks to examine the separate impacts of private and public health expenditure on health outcomes.

1.3 Objectives of the Study

The broad objective of the study is to examine the relationship between health expenditure and health outcomes in East and Southern African countries.

The specific objectives are;

i. To examine the relationship between total health expenditure and health outcomes.
ii. To determine the differentiated impacts of public health expenditure and private health expenditure on health outcomes.
iii. To examine how governance (corruption) impacts on the effectiveness of public health expenditure on health outcomes.

1.4 Hypotheses of the Study

The study tests the following null hypotheses;

i. There is no relationship between total health expenditure and health outcomes.
ii. There are no differentiated impacts of public health expenditure and private health expenditure on health outcomes.
iii. Governance has no impact on the effectiveness of public health expenditure on health outcomes.

1.5 Significance of the Study

Different scholars have examined the link between health expenditure and health outcomes (Anyanwu & Erhijakpor, 2009; Bein *et al.*, 2017; Muthaka, 2013; Novignon, Olakojo, & Nonvignon, 2012). Different studies use different health outcome indicators but previous studies

have not included maternal mortality on the topic in East and Southern Africa. Bokhari, Gai, and Gottret (2007) point out that maternal mortality is an important indicator of the effectiveness of healthcare system. By using four indicators of health outcomes (life expectancy, infant mortality, under-five mortality rate and maternal mortality), this study provides a broader coverage in assessing health status unlike most studies which have used one or two health outcome indicators.

The previous studies by Bein *et al.* (2017) and Piatti-Fünfkirchen *et al*. (2018) have not considered how governance influences the effectiveness of health expenditure on health outcomes in ESA countries. This study examines the role of governance, measured by corruption, on the effectiveness of public health expenditure on health outcomes in ESA countries. This is important because corruption threatens the ability of health expenditure to translate into significant improvement in health outcomes. In doing so, the study sheds light on the degree to which health outcomes in ESA can be enhanced by raising efficiency levels.

In addition, existing empirical literature has not addressed the issue of endogeneity such as reverse causality between health spending and health outcomes. This study seeks to address endogeneity by applying a more robust dynamic panel estimation technique. The study makes use of Arellano-Bond Generalized Method of Moments (GMM) which takes into consideration the joint endogeneity of the variables in the models. Arellano-Bond GMM estimator also helps to capture health outcome adjustments dynamism (D. R. Roodman, 2006).

Further, this study also seeks to examine the impacts of two components of total health spending, private and public to determine if they are dissimilar. This makes this study different from Bein *et al*. (2017) study which investigated the impact on total health expenditure on health outcomes in East African countries. It is important to differentiate the impacts of public and private health

expenditures on health outcomes because out-of-pocket payments take a large proportion of total health spending in most developing countries.

1.6 Organization of the Study

The rest of the study is organized into chapters two, three, four, five and six. Chapter two outlines the overview of health outcomes, health expenditure, governance and health systems in East and Southern African countries. Chapter three presents literature review, both theoretical literature review and empirical literature review from past studies on the topic. It also gives a synthesis of the literature reviewed.

This is followed by Chapter four which discusses the methodology applied to investigate the relationship between health expenditure and health outcomes in ESA regions, as well as the role that governance plays in this. The fifth chapter presents and discusses the empirical results of the study and lastly Chapter six gives a summary of the study findings, conclusion and policy recommendations.

CHAPTER TWO

OVERVIEW OF HEALTH EXPENDITURE, HEALTH PROFILE, HEALTH SYSTEMS AND GOVERNANCE IN EAST AND SOUTHERN AFRICAN COUNTRIES

2.1 Introduction

This chapter gives an overview of the health systems, governance, trends in health expenditures and trends in health outcomes in East and Southern African countries. Health expenditure is discussed in terms of total, private and public health spending. Health outcome indicators are infant mortality rate, under-five mortality rate, maternal mortality and life expectancy at birth. This is then followed by a discussion on the health systems and governance in ESA countries.

2.2 Health Expenditure in East and Southern African Countries

Health expenditure refers to outlays on activities that are primarily meant to improve, maintain and prevent deterioration of health as well as mitigating against adverse effects of ill-health (World Health Organization, 2011b). Health expenditure is viewed as an investment in the health sector that gives people an avenue to improve their health status. Health can be financed publicly through general taxation and social health insurance, or privately using out-of-pocket and private health insurance. In addition, some countries rely on donor funds to finance their health sectors.

The devastating effects of HIV/AIDs epidemic drew a great deal of attention and external funding in ESA countries starting mid-1990s. International organizations and funding agencies such as Global Fund and World Health Organization increased their financial support to ESA countries. Between the years 2010 and 2018, health resources allocated to the region grew by about 33%, in response to the high prevalence rates of HIV recorded (UNAIDS, 2019). This raised the total resources allocated towards the health sector in the regions.

The High Level Taskforce on Innovative Financing for Health systems in 2008 recommended that a low income country should spend a minimum of US$44 per capita on health (Le Gargasson & Salomé, 2010). This is essential for a country to strengthen its health system and in provision of essential health services. In 2010, World Health Organization put forward that countries needed to ensure that they spend adequately on health so as make progress towards UHC (World Health Organization, 2010b).

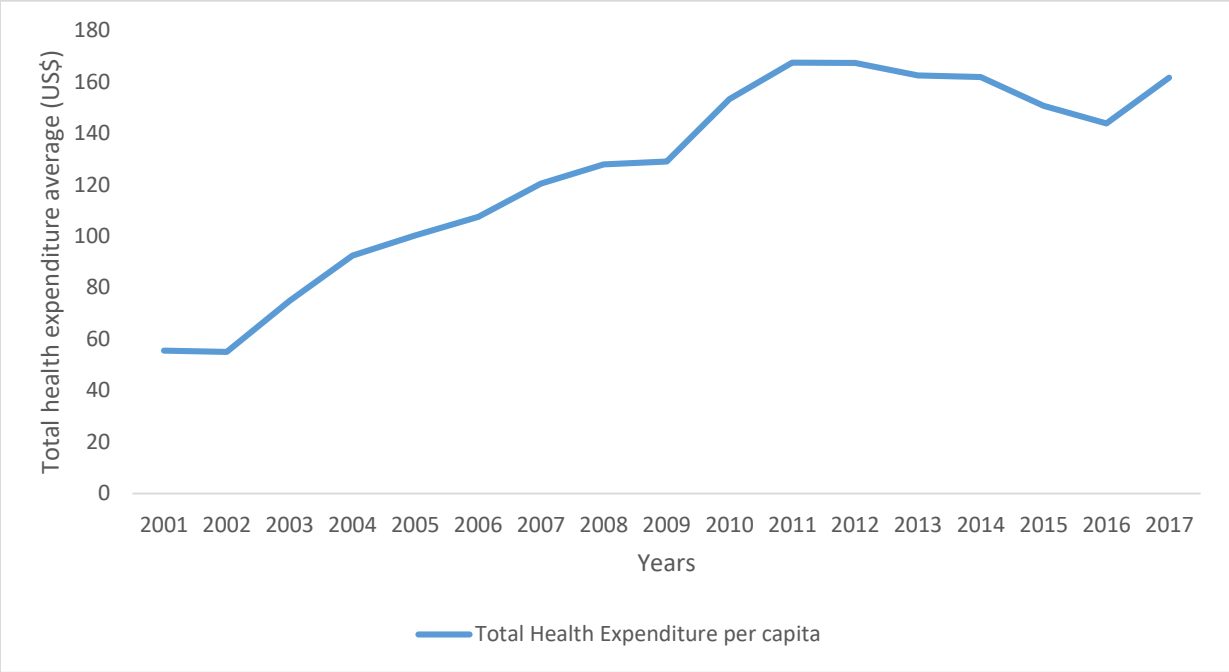
The sustainable development goal 3, that is geared towards health, also reinforces allocation of adequate resources to health sector through calls for substantial increase in the levels of health spending (United Nations, 2015). More recently, Stenberg *et al*. (2017) show that low and middle income countries will need an additional of about $271 billion per year in health spending so as to achieve SDGs health related goals. This translates to an annual increase in total health expenditure per capita by $41 so as to enhance investments in health systems and expansion of healthcare provision in an equitable way. These recent estimates follow in the vein of close efforts under the Millennium Development Goals (MDGs) where 3 of the 8 goals were health related (United Nations, 2000).

Total health expenditure is the sum of both private health expenditure and public health expenditure for a given country. Total health expenditure per capita in ESA averaged US$ 125.35 between the period 2001 and 2017. Though on average ESA countries have met the recommendation of health spending of US$44 per capita, it is worthwhile to note that there is dispersion in the levels of health expenditure in these countries. Some countries are spending on health above the recommended US$44 per capita, while others have total health expenditure below this threshold. Among the countries included in this study, South Africa has the highest total health expenditure per capita at US$410.62 on average. Namibia has the next highest average total health

expenditure equivalent to US$400.53 per capita followed by Botswana with average total health expenditure being US$341.33 per capita. The total health expenditure per capita on average is also high in Mauritius and the figure stands at US$337.52. Mauritius, Namibia, Botswana and South Africa are classified as upper-middle countries in accordance to United Nations (2019), and this may explain the high levels in total health expenditure per capita.

Some of the ESA countries have not met the target of US$44 on health expenditure recommended by High Level Taskforce on Innovative Financing for Health systems. These include Burundi, Malawi, Ethiopia, Madagascar, Mozambique and Tanzania. Ethiopia has the lowest total health spending per capita with an average of US$14.74. The trend in total health expenditure in ESA countries is shown in figure 2.1 below.

Figure 2.1: Total Health Expenditure Trend in ESA Countries, 2001-2017.



Source: Author's computations from World Health Organization (WHO) database.

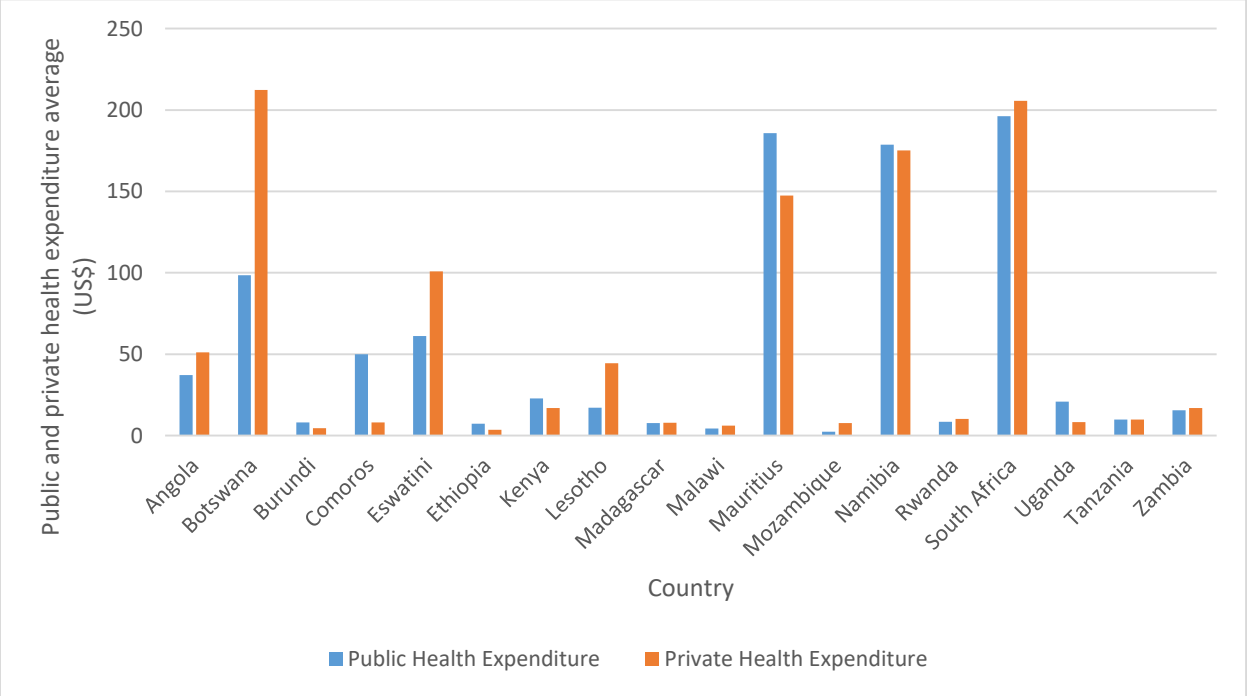
There is an upward trend in the total health expenditure in East and Southern African countries. The average total health expenditure in per capita terms increased from US$55.43 in 2001 to US$100.23 in 2005. This was accompanied by a further increase in total health spending to US$128.98 in 2009, US$ 150.65 in 2015 and US$161.54 in 2017.

Public health expenditure is the recurrent and capital spending by governments from national budgets, external borrowings and social health insurance funds on provision of healthcare services. Government health spending forms a primary component of health financing throughout the world (Jowett, Brunal, Flores, & Cylus, 2016). According to WHO, effective protection of households against financial hardships and catastrophic health expenditures requires governments to spend adequately on health (World Health Organization, 2010b). During the Abuja declaration, African Union heads of states committed to devote 15% of their annual budget to health. This was to encourage governments in the region to increase the amount of resources they allocate towards health and at the same time improve population health. Only a few countries in ESA have met the Abuja target with most countries spending about 8% of their annual budget on health. While countries like South Africa, Rwanda and Madagascar have attained the Abuja commitment, Madagascar appears to be the only country that has been able to sustain this target.

In East and Sothern African countries, there is dispersion in amount of public health spending. On average, the level of public health expenditure per capita was US$ 57.62 between the period 2001 and 2017. South Africa appears to have the highest level of public health expenditure per capita with an average of US$196.22 followed by Mauritius and Namibia with an average of US$185.84 and US$178.77 respectively. Mozambique on the other hand has the lowest public health expenditure per capita with an average of US$2.35. Malawi also has low public health expenditure and the average stands at US$4.37 during the period of the study.

Private health expenditure on the other hand consists of user fees and out-of-pocket payments by individuals when seeking medical care services. The average of private health expenditure per capita between 2001 and 2017 in ESA countries is US$51.77. The country leading in terms of average private health expenditure per capita is Botswana with an average of US$212.26. This is accompanied by South Africa whose average is US$205.73 and Namibia with an average of US$175.25. Ethiopia and Burundi have the lowest amounts of private health expenditure per capita with averages equal to US$3.48 and US$4.55 respectively. The figure below shows private and public health expenditures in the selected ESA countries during the period of the study.

Figure 2.2: Public and Private Health Expenditures in ESA Countries, 2001-2017.



Source: Author's computations from World Health Organization (WHO) database.

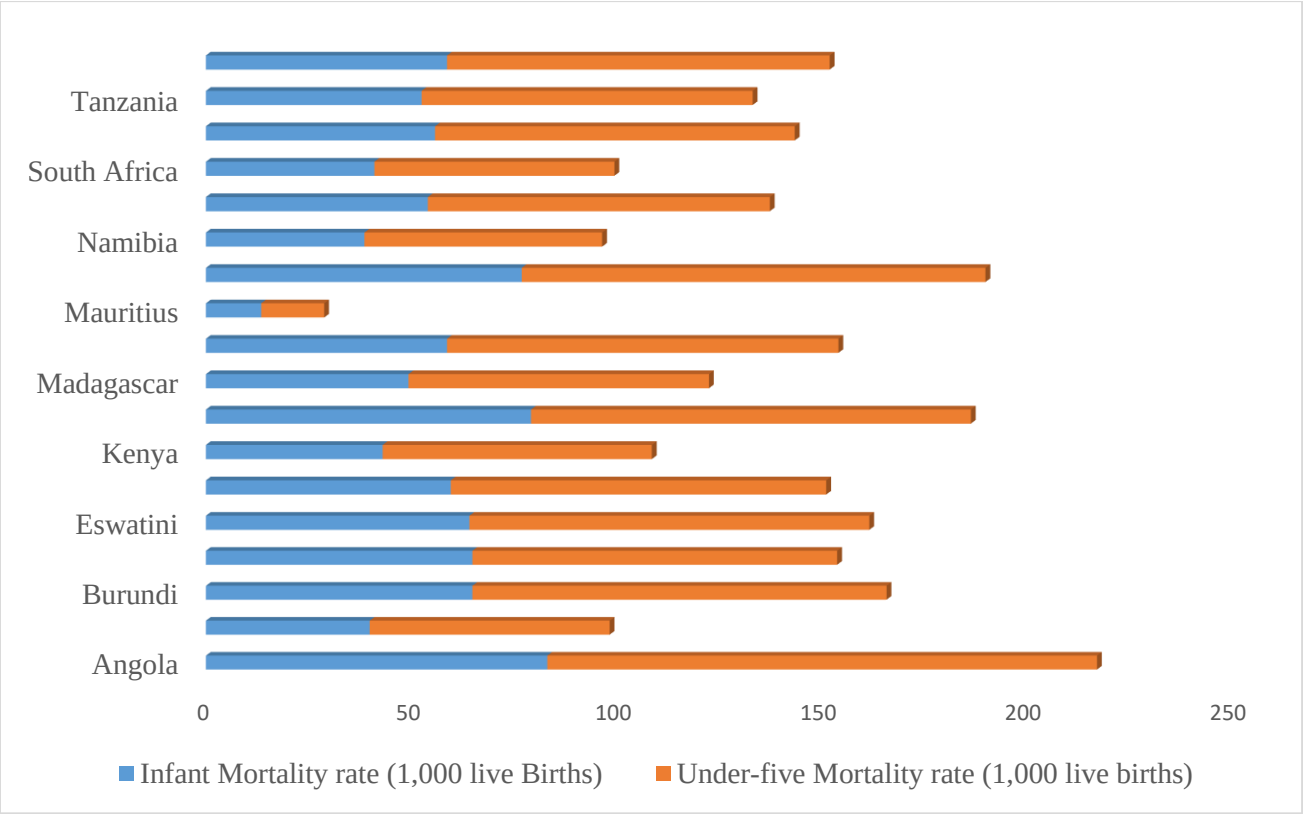
2.3 Health Outcomes in East and Southern African Countries

East and Southern African are the regions hardest hit by HIV and remain a home for about 54% of the total number of people living with HIV in the world. The regions also face other

communicable diseases such as tuberculosis (TB). In 2016, World Health Organization classified 10 of ESA countries among the 30 countries in the world having the highest burden of TB (World Health Organisation, 2018). The high burden in TB and high prevalence of HIV has resulted to increase in the number of deaths in the region. Though there has been in a decline in the number of deaths that arise from TB, ESA regions still account for more than 50% of TB-related deaths among the people living with HIV (World Health Organisation, 2018).

Infant mortality rate shows the number of children who die below the age of 1 year while under-five mortality rate shows the number of children who die below the age of 5 years and these two mortality rates are measured per 1,000 live births. Angola has the highest infant and under-five mortality rates on average at 83.04 and 133.77 per 1,000 live births respectively. Lesotho follows with infant mortality rate of 79.07 on average and Mozambique with an average of under-five mortality rate of 106.99. On the other hand, Mauritius has the lowest record in both infant and under-five mortality rates at 13.45 and 15.32 per 1,000 live births respectively.

Figure 2.3: Infant and Under-five Mortality Rates in ESA Countries, 2001-2017.

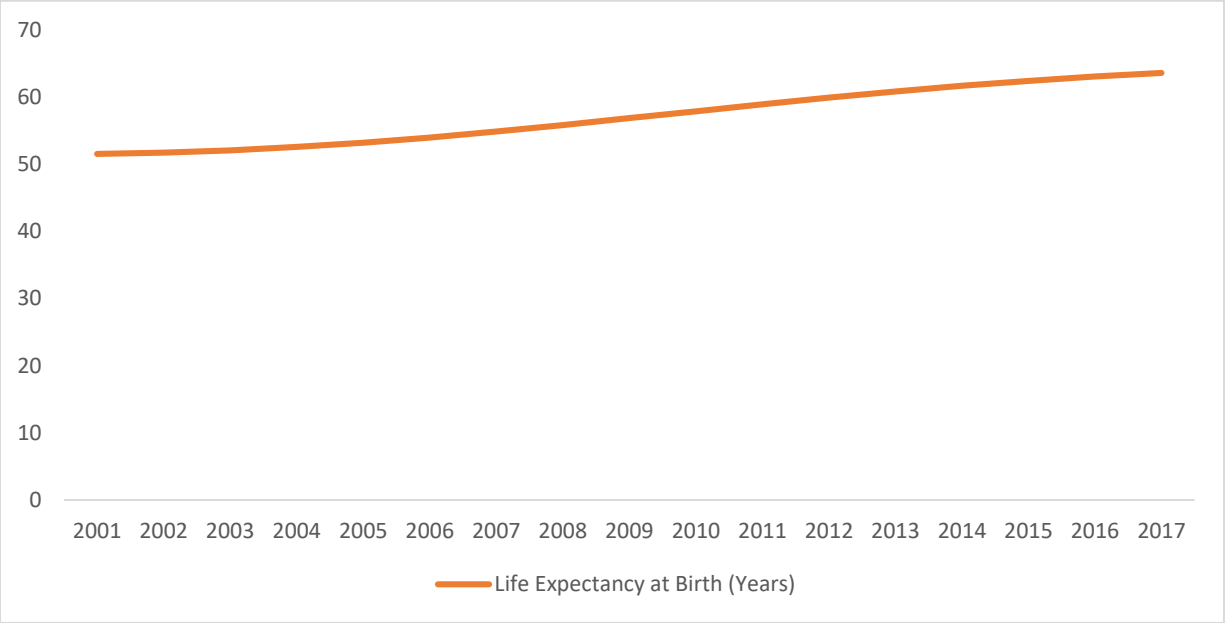


Source: Author's computations from World Development Indicators (WDI) database.

Life expectancy has been increasing in ESA countries as shown in figure 2.4. In 2001, life expectancy on average is 51.53 years. This increases to 53.22 years in 2005 and to 57.90 years in 2010. Further, there is an increase in average life expectancy at birth to 61.70 years in 2014 and to 63.63 years in 2017. Mauritius has the highest level of life expectancy at 73.09 years followed by Madagascar at 62.90 years and Comoros at 61.56 years. Lesotho and Eswatini on the other hand have the lowest life expectancy at birth with an average of 46.29 years and 47.93 years respectively. This can be explained by the high prevalence rates in HIV recorded in these two countries. However, most ESA countries have life expectancy at birth that is below the world

average of 70 years (World Bank, 2020). Only Mauritius has an average of life expectancy that is above the world's average of 70 years.

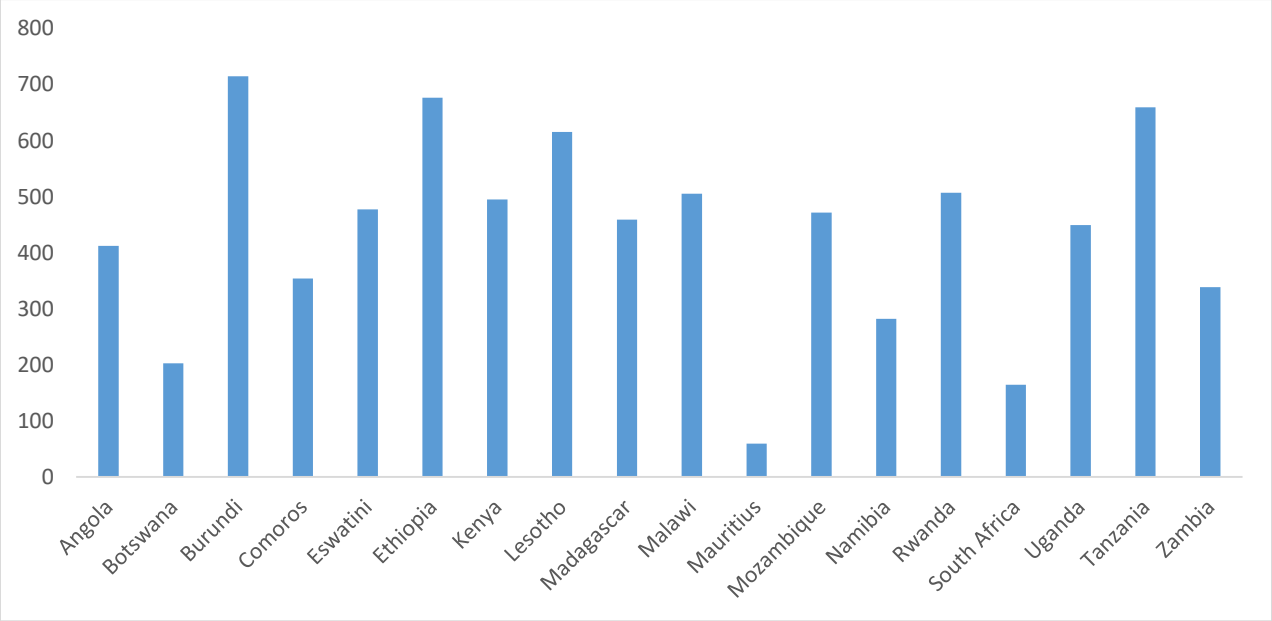
Figure 2.4: Trend in Life Expectancy at Birth in ESA Countries, 2001-2017.



Source: Author's computations from World Development Indicators (WDI) database.

Maternal mortality is measured per 100,000 live births and shows the number of women who die from pregnancy-related causes while pregnant or within 42 days of pregnancy termination. Between 2001 and 2017, maternal mortality rate in ESA countries averaged 436 per 100,00 live births. Burundi has the highest maternal mortality with an average of 714.71 per 100,000 live births while Mauritius has the lowest average maternal mortality at 59.35 per 100,000 live births. The average maternal mortality rates in selected ESA countries between the years 2001 and 2017 are shown in the figure below.

Figure 2.5: Maternal Mortality Rate in ESA Countries, 2001-2017.



Source: Author's computations from World Development Indicators (WDI) database.

2.4 Health Systems and Governance in East and Southern African Countries

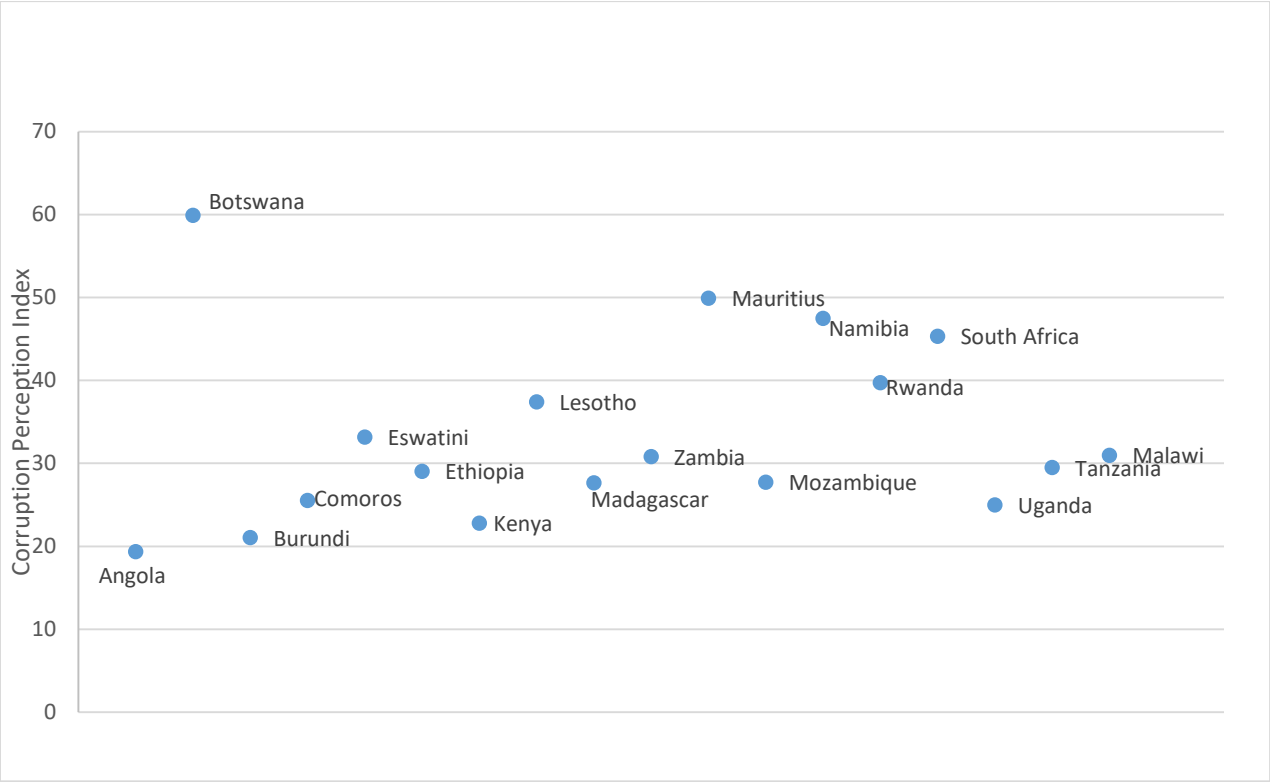
Health sector in East and Southern African countries involves both the private and the public sectors in the provision of healthcare services. Health policy makers in ESA continue to put in place policies and initiatives that will allow the population to have access to quality and affordable healthcare services (Piatti-Fünfkirchen *et al.*, 2018). These initiatives include implementing social health insurance and abolishment of user fees. This is in line with the need to strengthen the health systems in the countries and making progress towards the SDG 3 and universal health coverage. The main threat to attainment of better health outcomes in ESA is the HIV pandemic since the countries account for a large number of people living with HIV in the world. According to Levers, Magweva, and Mpofu (2007), the HIV pandemic has weakened health systems in ESA countries and further contributed to the challenge of access to equitable and affordable healthcare services.

The devastating impacts that HIV has on efforts geared towards improved health outcomes has made HIV and AIDs to be addressed as a stand-alone cross-cutting issue.

Improving the national delivery capacity of healthcare services so as to ensure a sustainable future remains paramount to policy makers. This does not only call for increased financing but also improved efficiency in the health sector. In any given country, there is need to ensure that the health system is strengthened and efficient in the utilization of resources allocated. Governance is an important indicator of the quality of institution and plays an important role in how the resources allocated to the health sector are allocated. Further, governance also influences how a country prioritizes its development goals. Corruption perception index differs across ESA countries as shown in figure 2.6 below.

In most ESA countries, there is poor governance as evidenced by high levels of corruption. Between 2001 and 2017, Botswana appears to have the highest corruption perception index on average at 60. This implies that Botswana has better governance. Mauritius on average has the next highest corruption perception index of 50. Most countries in ESA score a corruption perception index below 30. This is an indication of poor governance in these countries.

Figure 2.6: Transparency Corruption Perception Indices in ESA Countries.



Source: Author's computations from Transparency International Corruption Perception Index database.

Poor governance may negatively impact on the efficiency of the health systems in ESA. This is because corruption leads to embezzlement of funds meant for health. In addition, poor governance leads to misuse of health resources such as drugs and medical equipment, encourages absenteeism of healthcare workers, hiring off unqualified healthcare workers and misallocation of health resources.

CHAPTER THREE

LITERATURE REVIEW

3.1 Introduction

This chapter outlines texts of scholarly papers and studies that are helpful to health expenditure and health outcomes with an aim of understanding substantive findings in this area as well as theoretical and methodological contributions. The chapter is divided into theoretical literature which discusses theory on human capital and the Grossman model of demand for health, and empirical literature that outlines studies and findings by other researchers on this area. Lastly, the chapter outlines the synthesis of literature.

3.2 Theoretical Literature Review

3.2.1 Human Capital Theory

Human capital theory pioneered by Schultz (1961) postulates that health is a good which an individual wish to consume and maximize subject to his budget constraint. Different definitions of human capital exist as outlined by different scholars. Human capital is made up of skills, knowledge and abilities of people employed in an organization (Schultz, 1961). It is defined as knowledge, information, ideas and skills possessed by a person and also the health of individuals (Becker, 1985). Individuals' health and well-being is an eminent factor and relates to the contextual development of human capital as a factor that combines intelligence, proficiency, know-how and level of expertise to give the organization some distinctive features (Bontis, Dragonetti, Jacobsen, & Roos, 1999). From the various definitions of human capital, the concept of human capital can be categorized into three perspectives of different academic fields.

First, human capital is propounded on different aspects of an individual. Schultz (1961) recognizes that human capital is what brings about productive capacity of human beings resulting from skills and artistry of an individual. A number of the researchers have accepted this thought and view human beings' capacity as closely linked to knowledge ingrained in an individual (Beach, 2009). Second, is on how the accumulation process of human capital takes place, such as through education and training activities. Third, the context is linked to the production-oriented view of human capital. Since human capital is substantial in improving the productivity of individuals, individuals invest in themselves so as to increase their economic performance and productivity.

Nixon and Ulmann (2006) show human capital theory by applying the investment model of demand for health where health is viewed as a capital good that is inheritable and tends to depreciate over time. Investment in health propagates ways in which medical care, with a combination of other factors, aid in production of new health that partly offsets the process of deterioration in health stock. If new health is not produced, the health stock tends to zero, and finally results to death.

3.2.2 Grossman Human Capital Model

The human capital model of demand for health was put forward by Grossman (1972). In this model, Grossman (1972) argues that health capital is different from other forms of human capital and health is both a consumption good and an investment good. An individual is born with a given level of health stock and since health is a capital good, it depreciates over time. Thus, an individual has to invest in health so as to replenish depreciated health and make sure that his level of health does no go below the minimum stock of health.

Grossman presents a health production function where health is an output. Inputs into the health production function include medical care services, time, environmental factors and education. An individual's health, therefore, is not exogenous but tends to depend on the resources into the health production function. In his approach, Grossman (1972) argues that investment in human capital is derived from expenditures in health and education and the wealth accumulated by households over time.

Health as human capital increases the productivity of individual in the market sector of the economy where they produce monetary earnings and in the non-market sector where they produce goods that enter their utility functions. Increased productivity may lead to more income which may in turn lead to increase in wealth which can further result in poverty reduction. Health is both a capital and consumption good that enables individuals to take part in the labour market thereby contributing to production of goods and services (Fayissa & Gutema, 2005). Increase in good health allows people to work for longer hours and hence increase labour supply and earn more (Mwabu, 2007). In terms of education, health may be positively related to the level of educational attainment (Bleakley, 2010). Thus, healthy children are expected to demonstrate less school absence and school drop-out. Since healthy individuals are able to work for more hours, they are inclined to have more savings than individuals with poor health (Ajakaiye & Mwabu, 2007). Savings will eventually increase investment opportunities and hence have future influences on income. Thornton and Rice (2008) analyze health status through a health production function. In this case, health is an output of inputs into the health system and health expenditure which proxy medical care being the input.

3.3 Empirical Literature Review

Considerable studies have investigated the link between health expenditure and health outcomes using different indicators of health outcomes.

Rahman *et al.* (2018), for instance, focus on examining the impact of total, private and public health expenditure as a percentage of GDP on life expectancy at birth, infant mortality and crude death rate in South Asian Association for Regional Cooperation (SAARC) and Association for South East Asian Nations (ASEAN) region. While controlling for Gross Domestic Product per capita and sanitation, the study finds that total, public and private health expenditures reduce infant mortality rate. While results show a positive relationship between private expenditure and crude death rate, public health expenditure shows a negative relationship. The results show no significant relationship with health expenditures and life expectancy. The study uses data for 1995-2014 and data is analysed using fixed effects, random effects and Generalised Method of Moments (GMM). Using 30 countries from Organisation for Economic Co-operation and Development (OECD), Rana, Alam, and Gow (2018) found a positive relationship between public health expenditure and health. Their study used pooled least squares regression.

Using panel data for 2000 to 2014, Bein *et al*. (2017) find a positive association between healthcare expenditures and life expectancy but a negative impact on neonatal deaths, infant and under-five mortality rates in 8 East African countries. The study applies standard panel analysis tools; fixed effects and random effects. In a study in 40 Sub-Saharan African countries between 1995-2014, evidence shows that total health expenditure improves life expectancy and reduces infant and under-five mortality rates though inelastic (Arthur & Oaikhenan, 2017). The study applies pooled Least Squares, random and fixed effects with population structure, HIV/AIDs prevalence, urbanization and immunization as the control variables.

In relation to positive relationship between health expenditure and health outcomes, Novignon *et al.* (2012) study shows that health expenditure improves health status by rising life expectancy and reducing death and infant mortality rates in 44 countries in Sub-Saharan Africa (SSA). The results are based on fixed and random effects on 1995-2010 panel data. Further, Akinci *et al.* (2014) show that both government and private health expenditure improves health in terms of infant mortality rate, under-five mortality and maternal mortality in Middle East and North Africa (MENA) region. The study analyses 1990-2010 panel data for 19 countries using pooled ordinary least regression, random effects and Hausman-Taylor instrumental variables (IV) models.

At a country specific level, Muthaka (2013) investigates the impact of public health expenditure on child mortality rate in Kenya. Using micro data for the period 2005 to 2006, the study finds that public health expenditure has a negative impact on child mortality rates. Grigoli and Kapsoli (2013) also find no significant impact of public health expenditure on health outcomes in 80 emerging and developing economies. The study also finds that African economics had the lowest efficiency levels as they were dominated by Asian and Western Hemisphere economies. This study covers the period between 2001 and 2010, and applied a stochastic frontier model.

In a separate study, Yaqub *et al.* (2012) carried out a study in Nigeria to investigate the link between public health expenditure and health outcomes and how quality of governance impacts on this relationship. The study uses data for the period 1980-2008 that is analysed using Ordinary Least Squares (OLS) and Two-Stage Least Squares (2SLS). The study finds that public health expenditure has a negative impact on life expectancy, infant and under-five mortality rates when governance indicators are not included. When governance, measured by corruption, is included in the models, public health expenditure impacts positively on life expectancy, infant and under-five

mortality rates. The study thus concludes that quality of governance should be improved by reducing corruption level so as to improve health status.

Mhango and Chirwa (2018) investigate the effect of government health expenditure on infant mortality in Malawi while examining how quality of governance affects efficacy of healthcare expenditure. The study finds that corruption worsens health outcomes while public health spending improves health outcomes. However, in the presence of corruption, public health expenditure worsens health outcomes.

The studies reviewed above indicate that the debate on the relationship between health expenditure and health outcomes is inconclusive.

3.4 Synthesis of Literature

In the Grossman model, healthcare is an input into health production function. Access to healthcare services tends to be linked with better health (Mackenbach, Meerding, & Kunst, 2011). The theoretical arguments put forward in regards to health investment and production are useful for this study and fits well into the problem. Government and individuals would wish to improve health through healthcare access but they face a budget constraint. The effect of budget constraint (health spending) is reflected through health outcomes, in this case life expectancy, infant, under-five and maternal mortality rates. Since Grossman (1972) is a micro model, this study uses per capita variable to transform the model into a macro model of health production.

While the reviewed studies are important in shedding light on the relationship between health expenditure and health outcomes, research gaps still exist. First, the methods used have some limitations and a study that uses a more robust estimation technique is needful. Second, there is still more evidence needed by paying attention to ESA countries where evidence on the

relationship between health expenditure and health outcomes is limited. In addition, the issue of how governance impacts on the effectiveness of health expenditure on health outcomes has received less attention. Previous studies, particularly for East and Southern African countries have ignored the issue of corruption in their analysis. Hence, to add to the existing stock of knowledge on health expenditure and health outcomes, this study includes governance variable in examining the relationship between health expenditure and health outcomes. Health outcomes are proxied by infant mortality rate, under-five mortality, maternal mortality and life expectancy at birth. In addition, the study analyses the different impacts of private and public health expenditure on health outcomes while controlling for real income per capita, medical personnel and access to basic sanitation. Further, the study examine how governance measured by corruption, affects the effectiveness of public health expenditure and health outcomes. This is important because poor governance leads to wastage of public resources and this may hinder attainment of better health outcomes.

CHAPTER FOUR

METHODOLOGY

4. 1 Introduction

This chapter outlines the methodology adopted in achieving the objectives of this study. It includes theoretical framework based on the Grossman (1972) model of demand for health, empirical models specification, followed by definition, measurement and expected signs of variables. In addition, the chapter outlines the data type, scope and source. Lastly, the chapter discusses the econometric techniques applied in estimating the data.

4.2 Theoretical Framework

The theoretical framework of this study is based on the Grossman (1972) model of demand for health. According to Grossman (1972), gross investments in health capital are brought about by households' production functions of healthcare. The direct health production inputs are expenditure on medical care, housing, exercise and diet. The household health production function is also dependent on other environmental and socio-economic variables with the most relevant being the level of education which influences efficiency of production process. Grossman (1972) in his model of demand for health, outlines that the health of individuals is not exogenous and instead depends partly on the amount of resources allocated towards its production.

Utility of a household is a function of his health and consumption of other goods, given as;

$$U = U(\phi_0 H_0, \dots, \phi_n H_{n,} Z_0, \dots, Z_n) \qquad \dots\dots (4.1)$$

Where $\mathbf{H_o}$ is health stock inherited, $\mathbf{H_i}$ is health stock in the i^{th} time period, $\boldsymbol{\phi}$ is the service flow per unit stock, $\boldsymbol{\phi_i H_i}$ is an individual's total consumption of health services and $\mathbf{Z_i}$ is an individual's total consumption of other commodities in the i^{th} time period.

Consumers produce gross investment into health according to a household function given as;

$$\mathrm{I}_i = \mathrm{I}_i\left(M_i, \mathrm{TH}_{i,}\, E_i\right) \quad \ldots\ldots (4.2)$$

Where $\mathbf{M_i}$ is medical care sought; $\mathbf{TH_i}$ are time inputs; $\mathbf{E_i}$ is exogenous stock of knowledge. The production function is assumed to be homogenous of degree one in both the goods and time inputs.

Health production function is then specified as;

$$H = f(X) \quad \ldots\ldots (4.3)$$

Where **H** is an individual's health status and **X** are inputs to the specified health production function. Specifically, the health production function adopted in this study is expressed as:

$$H = f(HE, CRP, X) \quad \ldots\ldots (4.4)$$

Where **H** is health outcomes (proxied by life expectancy at birth, infant, under-five and maternal mortality rates); **HE** is health expenditure (total, public and private health expenditures) as the proxy for healthcare; **CRP** is corruption level used to measure governance quality; **X** is a vector of control variables. X is made up of variables that have socio-economic characteristics. The variables in X include access to basic sanitation **(SAN)**, female labour participation **(FLP)** and HIV prevalence rate **(HIVPR)**.

Health expenditure influences health outcomes by expanding access to quality and affordable healthcare services, availing trained healthcare workers and facilitating availability of drugs and medical infrastructure. Governance determines the level of transparency and accountability in public institutions. High levels of corruption lead to wastage of health resources and leakages that may undermine the effectiveness of health expenditure. Further, governance has an impact on the ability of government to secure funding either in terms of loans or donor funds.

Assuming a Cobb-Douglas health production function, equation 4.4 is expressed as:

$$H_{it} = (HE_{it})^{\beta} * (CRP_{it})^{\alpha} * (X_{it})^{\mu} \quad \ldots\ldots (4.5)$$

To transform equation 4.5 into a linear model, we take natural logarithms. This gives rise to a linear model:

$$lnH_{it} = \beta\ lnHE_{it} + \ \alpha\ lnCRP_{it} + \ \mu\ lnX_{it} \quad \ldots\ldots (4.6)$$

4.3 Empirical Models Specification

The empirical models specified to attain the objectives of this study are in regards to the theoretical framework outlined. The study specifies a linear dynamic panel model where a lagged value of the dependent variable, in this case health outcome, is included as one of the regressors. Following closely specification by Hilaire (2016), this study adopts five models. The first model gives a baseline model for examining the impact of total health expenditure on health outcomes without including the governance variable which is measured using the corruption perception index. This model is specified as:

$$lnH_{it} = \beta_1 lnH_{i,t-1} + \beta_2 lnTHE_{it} + \beta_3 lnX_{it} + \varepsilon_{it} \quad \ldots\ldots (4.7)$$

The second model examines the relationship between total health expenditure and health outcomes including governance measured by corruption levels. This allows the study to examine how the coefficient of total health expenditure changes when governance is included in the model. Further, this model allows the study to capture the direct impact of governance on health outcomes. This is specified as:

$$lnH_{it} = \beta_1 lnH_{i,t-1} + \beta_2 lnTHE_{it} + \beta_3 lnCRP_{it} + \beta_4 lnX_{it} + \varepsilon_{it} \quad \ldots\ldots (4.8)$$

Total health expenditure (THE) is made up of public and private components of health spending. The total health expenditure in the second model is disaggregated into the two components. This enables the study to determine if there are differentiated impacts between public health expenditure and private health expenditure on the health outcomes. The empirical models are specified as:

$$lnH_{it} = \beta_1 lnH_{i,t-1} + \beta_2 lnPBHE_{it} + \beta_3 lnCRP_{it} + \beta_4 lnX_{it} + \varepsilon_{it} \quad \ldots\ldots (4.9)$$

$$lnH_{it} = \beta_1 lnH_{i,t-1} + \beta_2 lnPRHE_{it} + \beta_3 lnCRP_{it} + \beta_4 lnX_{it} + \varepsilon_{it} \quad \ldots\ldots (4.10)$$

In order to examine the role of governance on the effectiveness of health expenditure on health outcomes, corruption is interacted with public health spending. This interaction is to capture the indirect role of governance on the efficiency of public health expenditure in improving health outcomes. Interacting health expenditure and governance has been applied by Hilaire (2016) and Odhiambo *et al*. (2015) to determine beyond the significance of governance on the efficacy of health expenditure. The empirical model is specified as follows:

$$lnH_{it} = \beta_1 lnH_{i,t-1} + \beta_2 [lnPBHE_{it} * CRP_{it}] + \beta_3 lnPHBE_{it} + \beta_4 lnCRP_{it} + \beta_5 lnX_{it} + \varepsilon_{it} \quad \ldots\ldots (4.11)$$

Where $\mathbf{H_{it}}$ is health outcome for a country i at time t. These health outcomes include infant mortality rate per 1,000 live births **(IMR)**, under-five mortality rate per 1,000 live births **(U5MR)**, maternal mortality rate per 100,000 live births **(MMR)** and life expectancy at birth in years **(LEAB)** for a country i at time t. These health outcomes measure the health status at national level and also indicate the performance of a country's health system.

$\mathbf{H_{i,t-1}}$ is lagged (previous) health outcome that helps to account for the dynamics of adjustment for a given health outcome. **THE** is total health expenditure; **PBHE** is public health expenditure; **PRHE** is private health expenditure; **CRP** is corruption. **X** is a vector of control variables which

are female labour participation, access to basic sanitation and HIV prevalence rate. **CRP*lnPBHE** is the interaction between public health expenditure and governance, and measures the indirect impact of governance on health outcomes. β_1, β_2, β_3, β_4 and β_5 are elasticities. ε_{it} is the error term that is made up of two orthogonal components; fixed individual effects (α_i) and idiosyncratic shocks (μ_{it}).

4.4 Definition, Measurement and Expected Signs of Variables

Table 4.1: Definition, Measurement and Expected Signs of the Variables.

Variable Name	**Definition**	**Measure-ment**	**Expected sign**
Infant mortality rate (IMR)	Number of children who die before reaching one year occurring among live births in a certain geographical area in a given period, usually a year.	Per 1,000 birth lives	Dependent variable
Under-five mortality rate (U5M)	Number of children who die before reaching 5-years occurring among live births in a certain geographical area in a given period, usually a year.	Per 1,000 birth lives	Dependent variable
Life expectancy at birth (LEB)	Number of years a newborn infant would live if existing patterns of mortality at the time of birth were to remain constant the whole of its life.	Years	Dependent variable

Maternal mortality (MM)	Number of women who die due to complications during childbirth, pregnancy-related causes while pregnant or within 42 days of pregnancy termination.	Per 100,000 live births	Dependent variable
Public health expenditure (PBHE)	Current fiscal health expenditure on healthcare goods and services consumed in each year with an aim of providing and improving health status of individuals in a particular country.	Per capita (USD)	Positive (+)
Private health expenditure (PRHE)	Amount paid directly by households to health service providers from their own pockets when seeking health services.	Per capita (USD)	Positive (+)
Total health expenditure (THE)	This is total amount of public and private health expenditure that the provision of both preventive and curative health services, family planning activities, nutrition activities, and emergency aid designated for health aid.	Per capita (USD)	Positive (+)
Access to basic sanitation (SAN)	Proportion of the population that has access to basic sanitation services, that is, improved sanitation facilities that are not shared with other households.	Percentage of population	Positive (+)

Female labour participation (FLP)	Percentage of women who actively take part in the labour force. Labour force comprises of people of aged 15 and older who meet the International Labour Organization's (ILO) definition of the economically active population.	Percentage	Positive (+) or Negative (-)
HIV prevalence rate (HIVPR)	The percentage of people aged between 15 and 49 years that are infected with HIV.	Percentage	Negative (-)
Corruption perception(CRP)	Corruption perception index (CPI) that measures governance quality. The CPI focuses on corruption in the public sector and defines corruption as the abuse of public office for private gain.	Perception Index	Negative (-)

Health expenditures (total, public and private) are expected to have a positive sign because they expand access to healthcare, increase supply of medical equipment, healthcare workers and adoption of medical technology which improve health. Corruption perception index is measured between 0 and 100, 0 being the most corrupt while 100 implying corruption free. Corruption is expected to have a negative impact on health outcomes because it leads to wastage of resources allocated to the health sector, encourages absenteeism of health workers and also adversely affects the ability of government to seek donor funds. Access to basic sanitation would have a positive impact on health outcomes.

Female labour participation generates more income that increases access to healthcare and adoption of healthier lifestyles. On the other hand, more females taking part in the labour market

may imply that children and families are neglected leading to health deterioration. HIV prevalence rate is expected to have a negative impact on health outcomes.

4.5 Data Type and Sources

This study utilizes secondary panel data for the period between 2001 and 2017, in which there is consistent and comprehensive data for East and Sothern African countries. The data scope is also considered as some key policies that are geared towards health were implemented. These, for example, include the Abuja Declaration (2001) that was put in place to stir an increase in the level of government health spending by African Union states with a minimum target of 15% of their GDP. In addition, during this period, the Millennium Development goals, where three of the eight goals were geared towards health, had gained momentum among countries. Therefore, this period of analysis is important as it explores the extent to which these key policies motivated governments to allocate more resources and prioritize population health as they aimed to attain better health outcomes.

Since the study covers multiple countries, panel estimation is suitable. This study uses a balanced panel covering 18 ESA countries and 17 years. Panel data has advantages over time series or cross-sectional data. For instance, panel data controls for omitted variable bias, and different periods of data can be used for different countries (unbalanced panel). In addition, panel data takes into account country-specific unobserved effects.

Data used in this study is sourced from World Bank Development Indicators (WDI), Transparency International Corruption Perception Index and World Health Organization (WHO) National Health Indicators.

4.6 Estimation Techniques

Panel data estimation techniques range from Fixed Effects (FE) model, Random Effects (RE) model and Generalized Method of Moments (Wooldridge, 2010). According to Wooldridge (2012), endogeneity may result from measurement errors, simultaneity and omission of variables correlated with a regressor. Health expenditure is potentially endogenous owing to the fact there could be measurement errors and reverse causality. Other factors that affect health expenditure such as changes in economic factors, as well as composition and size of the population may be excluded. Endogeneity results to inconsistent and biased estimates (Gujarati, 2009; Wooldridge, 2012). This becomes a concern in estimation of a health production function where health expenditure is a key input.

It is therefore important to apply a panel estimation technique that takes into account endogeneity of the regressors. GMM is an important tool of estimation as it uses Instrumental Variables (IVs) and thus yields consistent and unbiased estimates. In addition to this, GMM helps to account for robust dynamics of adjustments for health outcomes, unobserved heterogeneity and also allows one to estimate extensions of basic unobserved effects. This study applies Arellano and Bond GMM estimator. This is because the models specified assume a linear relationship, countries of study are more than the time period (N>T) and also include a lagged dependent variable as one of the regressors.

Arellano-Bond GMM allows instruments to be generated internally based on previous explanatory variables and also allows inclusion of external instruments. Arellano and Bond (1991) suggest the Sargan over-identification test that helps to determine if the instruments applied are valid and the Difference-in-Hansen test for testing if the subset of instruments used are exogenous. In addition to these two tests, Arellano and Bond (1991) also put forward the Arellano-Bond test for

autocorrelation. Prior to these specification tests, the study conducts panel unit root tests using Levin, Lin, and Chu (2002) and Im, Pesaran, and Shin (2003).

The study specifically conducts two-step Arellano-Bond GMM. This is because two-step estimation results to estimates that are more efficient compared to one-step estimation (D. Roodman, 2009)also used Fixed effects model that controls country-specific unobserved effects. This is to draw a comparison between the results obtained using a dynamic panel model and a static panel model.

CHAPTER FIVE

ESTIMATION AND DISCUSSION OF FINDINGS

5.1 Introduction

This chapter presents the results from estimating the empirical models. This section starts by outlining the descriptive statistics, followed by unit root tests, correlation between variables, diagnostic and specification tests and finally the empirical models estimation results.

5.2 Descriptive Statistics

Descriptive statistics give a summary of the data on the variables used for analysis. The descriptive statistics contained in Table 5.1 below give a summary of 18 East and Southern African countries for the period between 2001 and 2017. The variables employed in this study include; infant, under-five and maternal mortality rates, life expectancy at birth, total, private and public health expenditures, proportion of the population with access to basic sanitation, corruption perception index, HIV prevalence rate and female labour participation.

The summary statistics of these variables show the mean, maximum, minimum, standard deviation values and number of observations for each as contained in Table 2. Infant mortality rate per 1,000 live births average is 55.37, and range between 12.5 and 118.9. The mean for under-five mortality rate is 81.97 per 1,000 live births while that of maternal mortality rate is 425.75 per 100,000 live births. Life expectancy averages 57.67 years with a minimum of 42.54 years recorded in Eswatini and a maximum of 74.52 years recorded in Mauritius. Total health expenditure per capita average is US$ 125.35. The average for private health expenditure per capita is US$ 57.62 which means the government health spending is about 46% to total health expenditure. Private health expenditure has a mean of US$ 51.77 implying that private spending on health is about 42% of total health expenditure.

Table 5.1: Descriptive Statistics

Variable name	Mean	Std. Dev.	Mini-mum	Maxi-mum	Obser-vations
Infant mortality rate (1,000 live births)	55.37	20.81	12.5	118.9	306
Under-five mortality (1,000 live births)	83.31	35.44	14.3	299.7	306
Life expectancy at birth (years)	57.13	7.30	42.52	74.52	306
Maternal mortality (100,000 live births)	426.00	209.63	53	1100	306
Total health expenditure per capita (US$)	125.35	153.63	5.23	599.70	306
Public health expenditure per capita (US$)	57.62	80.39	1.29	352.52	306
Private health expenditure per capita (US$)	51.77	71.37	1.58	337.67	306
Access to basic sanitation (% of the population)	36.99	22.97	3.64	95.51	306
Corruption perception index	33.49	11.69	15	65	306
HIV prevalence (%)	9.49	8.65	0.1	28.2	306
Female labour participation (%)	65.21	16.41	32.04	87.75	306

Source: Author's computations from WDI and WHO data.

Private health expenditure is mainly composed of out-of-pocket payments that form a proportion of at least 70% in 14 out of the 18 countries being studied. This may be an indication of catastrophic health expenditure in the regions and some households may be pushed to poverty when seeking healthcare. The average value female labour participation is 65.21% while for HIV prevalence is 9.49%. The average for corruption perception index is 33.49. This means that corruption is evident among the ESA countries because an index of 0 denotes very high corruption while 100 denotes a government free of corruption.

5.3 Panel Unit Root Tests

In this section, the study tests for the presence of unit root in the variables using panel unit root tests. The panel unit root tests carried out are Levin *et al*. (2002) and Im *et al.* (2003) that allow for individual specific effects as well as dynamic heterogeneity across groups. In addition, the two tests allow for serial correlation in residuals. However, unlike Levin *et al*. (2002) where unit root testing is based on standardization of residuals, Im *et al*. (2003) test is based on averaging individual unit root test statistics for panels. The panel unit root test results are displayed in table 3. The unit root tests show that all variables in the models are stationary at levels.

Table 5.2: Panel Unit Root Test Results

	Levin,Lin and Chu (LLC) Test		Im, Peseran and Shin (IPS) Test		Order of integration
Variable	Statistic	Number of lags	Statistic	Number of lags	
lnthe	-14.9827***	1	-7.6077***	1	I (0)
lnpbhe	-8.4067***	1	-3.386***	1	I (0)
lnprhe	-10.5897***	1	-4.5639***	1	I (0)
lnimr	-12.0968***	1	-2.8134***	1	I (0)
lnu5mr	-12.6951***	1	-3.5886***	1	I (0)
lnleab	-26.3554***	1	-35.4003***	1	I (0)
lnmmr	-7.6559***	1	-1.0157	1	I (0)
lnsan	-7.4833***	1	-21.6307***	1	I (0)
lnflp	-6.3123***	1	-2.5245***	1	I (0)
lnhivr	-5.795***	1	0.6297	3	I (0)
lncpr	-7.3938***	1	-3.6418	1	I (0)

Source: Author's computations from WDI and WHO data using STATA 15.1.

*Note: (1) The asterisks ***, ** and * denote 1%, 5% and 10% levels of significance respectively. (2) I(0) denotes integration of order zero.*

5.4 Correlation between Variables

This gives the correlation coefficients between variables. The Pearson correlation coefficients reveal the strength and direction of the relationship between variables included in the models. According to (Gujarati, 2009), a correlation matrix can be used to show linear dependence between variables. A correlation coefficient above 0.8 shows that variables are highly correlated and severe multicollinearity may be present. The table below shows the correlation matrix.

Table 5.3: Correlation Matrix

	lnthe	lnpbhe	lnprhe	lnimr	ln u5mr	lnleab	lnmmr	lnsan	lnflp	ln-hivpr	lncpr
lnthe	1.000										
lnpbhe	0.958	1.000									
lnprhe	0.931	0.859	1.000								
lnimr	-0.549	-0.494	-0.539	1.000							
lnu5mr	-0.566	-0.512	-0.549	0.790	1.000						
lnleab	0.197	0.114	0.718	-0.789	-0.750	1.000					
lnmmr	-0.741	-0.689	-0.708	0.737	0.785	-0.615	1.000				
lnsan	0.685	0.638	0.618	-0.413	-0.430	0.145	-0.591	1.000			
lnflp	-0.661	-0.552	-0.734	0.300	0.334	-0.053	0.492	-0.501	1.000		
lnhivpr	0.328	0.400	0.109	0.090	0.104	-0.510	0.026	0.259	0.016	1.000	
lncpr	0.663	0.675	0.520	-0.578	-0.592	0.270	-0.619	0.418	-0.335	0.364	1.000

Source: Author's computations from WDI and WHO data using STATA 15.1.

The above correlation matrix shows that there is no severe multicollinearity in the data. The logged forms of total, public and private health expenditures have high coefficients. However,

these variables are being used separately and will thus not inflate the standard errors of the regression coefficients.

5.5 Diagnostic and Specification Tests

The study carries out diagnostic tests on the models which include autocorrelation test, Hansen test, Wald criterion test as well as Sargan test. Under Arellano-Bond GMM, this study carries out the Wald criterion test to check for joint significance of the dynamic models coefficients. The study also conducts Sargan tests to check for the validity of the instruments, difference-in-Hansen test for examining if the subset of instruments is exogenous and the Arellano-Bond autocorrelation test.

The Wald test on all the models is significant and thus rejection of the null hypothesis that there is no joint significance in the estimated coefficients. The study thus concludes that there is joint significance of the coefficients in the models. The autocorrelation test, that is AR (2), has probability values greater than 0.1 for all models, indicating that the null hypothesis of no second serial correlation cannot be rejected. This shows that there is no second serial correlation at 1% level of significance. In addition, all the regressions pass the Sargan test for over identification of instruments. This null hypothesis of validity of instruments is not rejected at 1% level of significance. This confirms that the instruments used in running GMM models are valid. The difference-in Hansen test also reports large probability values. Thus, the subsets of instruments used in running the models are exogenous. The GMM estimator satisfies the specification tests.

Under the Fixed Effects method, the F-test is carried out to determine the joint significance of the model coefficients. The probability values of the models are found to be significant at 1% which confirms that there is joint significance of the model coefficients.

5.5 Estimation Results

Data is analyzed using difference Generalized Method of Moments (GMM) and Fixed Effects (FE) method. GMM is suitable for controlling endogeneity such as reverse causality between variables. The dependent variables include infant mortality rate, under-five mortality rate, maternal mortality rate and life expectancy at birth. Explanatory variables are lagged dependent variable (for each health outcome), population with access to basic sanitation, female labour participation, HIV prevalence rate, corruption perception index and total, private and public health expenditures. The Arellano-Bond GMM is run to obtain the model results. In comparison, we run a static Fixed Effects model that helps to capture unobserved heterogeneity.

5.5.1 Total Health Expenditure and Health Outcomes Excluding Corruption

This section presents results of the first model which does not include corruption perception index as a regressor. The GMM estimated coefficients of total health expenditure are negative for infant mortality rate, under-five mortality and maternal mortality but positive for life expectancy at birth. These coefficients are significant at 1% level of significance. Specifically, an increase in total health expenditure by 1% lowers infant mortality and under-five mortality by 0.02%, and maternal mortality by 0.03%. These results conform to findings by Rahman *et al*. (2018), Bein *et al*. (2017) and Kilanko (2019). Life expectancy at birth increases by 0.02% when there is an increase in total health expenditure by 1%, consistent to the findings by Bein *et al*. (2017).

Female labor participation significantly reduces infant mortality but significantly increases under-five mortality. This can be explained by the fact that as more women take part in the labour market, they are able to generate income that allows them to have access to healthcare and thus a reduction in infant mortality. However, more females working imply that children are left under the care of a third party who may not attend to the children with the care that is needed.

Table 5.4: Effects of Total Health Expenditure on Health Outcomes Excluding Corruption.

	Infant Mortality		Under-five Mortality		Maternal Mortality		Life Expectancy	
Regressors	Two-step GMM	Fixed Effects	Two-step GMM	Fixed Effects	Two-step GMM	Fixed Effects	Two-step GMM	Fixed Effects
Lagged Health outcome	0.959*** (0.000)	-	0.899*** (0.000)	-	0.869*** (0.000)	-	0.969*** (0.000)	-
lnthe	-0.015*** (0.000)	-0.279*** (0.000)	-0.024*** (0.000)	-0.335*** (0.000)	-0.032*** (0.000)	-0.285*** (0.000)	0.019*** (0.000)	0.872*** (0.000)
lnsan	-0.009 (-0.795)	-0.320*** (0.000)	-0.040 (0.178)	-0.452*** (0.000)	-0.016 (0.794)	-0.354*** (0.000)	0.012** (0.043)	0.140*** (0.000)
lnflp	-0.058*** (-0.004)	-0.649*** (0.001)	0.281* (0.054)	-1.322*** (0.000)	0.323 (0.311)	-0.532** (0.023)	-0.011 (0.317)	0.510*** (0.000)
lnhivpr	0.110 (0.343)	0.405*** (0.000)	0.181** (0.021)	0.509*** (0.000)	0.298*** (0.006)	0.411*** (0.000)	-0.076*** (0.000)	-0.157*** (0.000)
Constant	-	8.244*** (0.000)	-	11.933*** (0.000)	-	9.88*** (0.000)	-	1.328*** (0.000)
F Test	-	121.37 (0.000)	-	94.27 (0.000)	-	91.04 (0.000)	-	41.35 (0.000)
R^2	-	0.7020	-	0.6984	-	0.6224	-	0.6541
Wald Test	8543.3 (0.000)	-	21248.3 (0.000)	-	9366.0 (0.000)	-	5628.7 (0.000)	-
Sargan Test	6.80 (0.870)	-	5.98 (0.644)	-	14.82 (0.251)	-	15.02 (0.240)	-
AR (2) Test	-0.95 (0.340)	-	-0.21 (0.837)	-	1.07 (0.285)	-	2.47 (0.141)	-
Hansen Test	5.07 (0.828)	-	7.94 (0.634)	-	12.67 (0.243)	-	12.44 (0.190)	-

Source: Author's computations from WDI and WHO data using STATA 15.1.

*Note: (1). The asterisks ***, ** and * denote 1%, 5% and 10% levels of significance.*

(2). Probability values (p-values) are shown in parentheses for GMM and Fixed Effects coefficients, F-test, Wald test, Sargan test, Hansen test and AR(2) test.

(3). Instruments are lnthe, lnsan, lnflp and lnhivpr.

(4). AR is the Arellano-Bond autocorrelation test.

HIV prevalence rate increases under-five mortality and maternal mortality, but lowers life expectancy significantly. Access to basic sanitation reduces the mortality rates, though the coefficients estimated are insignificant, but significantly increases life expectancy at birth. Arellano-Bond specification tests confirm that there is no second serial correlation, the instruments are valid and subset of instruments applied are exogenous. Compared to fixed effects model, all regressors yield significant and expected signs.

5.5.2 Total Health Expenditure and Health Outcomes (Including Corruption)

The second model includes corruption so as to capture the direct impact of governance on the health outcomes. The estimated coefficients of total health expenditure for infant, under-five and maternal mortality rates are negative and significant at 1%. Precisely, a 1% increase in total health expenditure results to a decline in infant mortality rate by 0.01%, under-five mortality rate by 0.02% and maternal mortality by 0.03%. This is similar to what Kilanko (2019) and Rahman *et al.* (2018) found. The estimated coefficient of total health expenditure for life expectancy at birth is positive and significant at 1%. An increase in total health expenditure by 1% increases life expectancy by 0.03%, consistent to findings by (Ray & Linden, 2020). Though the results are similar to those obtained under the first model, including corruption perception index lowers the magnitude of total health expenditure coefficients.

Corruption perception index has a negative and significant impact on infant mortality, under-five mortality and maternal mortality, but a positive impact significant impact on life expectancy at birth. When corruption perception index increases by 1%, which implies better governance, infant mortality rate, under-five mortality and maternal mortality decline by 0.02%, 0.02% and 0.05% respectively. Life expectancy significantly improves by 0.02%. These findings are similar to what Odhiambo *et al*. (2015), Yaqub *et al*. (2012) and Mhango and Chirwa (2018) found.

Table 5.5: Effects of Total Health Expenditure on Health Outcomes Including Corruption.

	Infant Mortality		Under-five Mortality		Maternal Mortality		Life Expectancy	
Regressors	Two-step GMM	Fixed Effects	Two-step GMM	Fixed Effects	Two-step GMM	Fixed Effects	Two-step GMM	Fixed Effects
Lagged Health outcome	0.897*** (0.000)	-	0.908*** (0.000)	-	0.830*** (0.000)	-	0.983*** (0.000)	-
lnthe	-0.010*** (0.000)	-0.256*** (0.000)	-0.022*** (0.000)	-0.305*** (0.000)	-0.027*** (0.000)	-0.266*** (0.000)	0.025*** (0.000)	0.076*** (0.000)
lncrp	-0.017** (0.011)	-0.240*** (0.000)	-0.021*** (0.000)	-0.302*** (0.000)	-0.053*** (0.000)	-0.195*** (0.000)	0.022* (0.065)	0.113*** (0.000)
lnsan	-0.036 (0.419)	-0.287*** (0.000)	-0.021 (0.466)	-0.410*** (0.000)	-0.085* (0.075)	-0.37*** (0.000)	0.018 (0.839)	0.124*** (0.000)
lnflp	-0.177 (0.238)	-0.560*** (0.003)	0.195*** (0.000)	-1.210*** (0.000)	-0.300 (0.276)	-0.460** (0.049)	-0.041 (0.465)	0.468*** (0.000)
lnhivpr	0.233** (0.031)	0.382*** (0.000)	0.172*** (0.002)	0.478*** (0.000)	0.328*** (0.000)	0.392*** (0.000)	-0.077*** (0.000)	-0.146*** (0.000)
Constant	-	8.532*** (0.000)	-	12.291*** (0.000)	-	10.115*** (10.20)	-	1.191*** (0.000)
F Test		100.22 (0.000)	-	74.40 (0.000)	-	75.79 (0.000)	-	35.34 (0.000)
R^2	-	0.7291	-	0.7150	-	0.6317	-	0.6809
Wald Test	25514.3 (0.000)	-	21430.1 (0.000)	-	8234.2 (0.000)	-	19279.5 (0.000)	-
Sargan Test	6.67 (0.879)	-	5.98 (0.644)	-	14.43 (0.274)	-	15.02 (0.240)	-
AR (2) Test	-0.25 (0.800)	-	-0.31 (0.755)	-	1.09 (0.275)	-	2.47 (0.141)	-
Hansen Test	6.34 (0.706)	-	6.04 (0.736)	-	3.94 (0.268)	-	4.74 (0.192)	-

Source: Author's computations from WDI and WHO data using STATA 15.1.

*Note: (1). The asterisks ***, ** and * denote 1%, 5% and 10% levels of significance.*

(2). Probability values (p-values) are shown in parentheses for GMM and Fixed Effects coefficients, F-test, Wald test, Sargan test, Hansen test and AR(2) test.

(3). Instruments are lnthe, lnsan, lncpr, lnflp and lnhivpr.

(4). AR is the Arellano-Bond autocorrelation test.

HIV prevalence rate significantly deteriorates health outcomes by increasing mortality rates and lowering life expectancy at birth. Access to basic sanitation and female labour participation have insignificant impacts on life expectancy and infant, under-five and maternal mortality rates. The models also satisfy the specification tests of valid instruments, no second serial correlation and exogeneity of subset of instruments applied. There is also joint significance of the variables included in models as shown by the Wald test. The fixed effects model gives rise to statistically significant coefficients and all independent variables have the expected signs.

5.5.3 Public health expenditure and Health Outcomes

The results indicate that public health expenditure is significant in improving health outcomes by reducing infant mortality, under-five mortality and maternal mortality, while raising life expectancy at birth. When public health expenditure is raised by 1% increase, infant, under-five and maternal mortality rates reduce significantly by 0.01%, 0.02% and 0.03% respectively. Life expectancy on the other hand increases by 0.02%. These findings are similar to findings documented by Nwankwo (2015), Kofi *et al*. (2018) and Novignon *et al*. (2012).

The estimated coefficients of corruption perception index are negative for infant, maternal and under-five mortality rates but positive for life expectancy. To be precise, when corruption perception index increases (better governance), life expectancy significantly increases 0.17%. Infant mortality rate reduces by 0.02%, maternal mortality by 0.05%, and under-five mortality by 0.02%. HIV prevalence rate significantly increases infant mortality, under-five and maternal mortality, and also lowers life expectancy at birth.

Table 5.6: Effects of Public Health Expenditure on Health Outcomes.

	Infant Mortality		Under-five Mortality		Maternal Mortality		Life Expectancy	
Regressors	Two-step GMM	Fixed Effects	Two-step GMM	Fixed Effects	Two-step GMM	Fixed Effects	Two-step GMM	Fixed Effects
Lagged Health outcome	0.992*** (0.000)	-	0.879*** (0.000)	-	0.712*** (0.000)	-	0.764*** (0.000)	-
lnpbhe	-0.014* (0.054)	-0.163*** (0.000)	-0.024* (0.014)	-0.206*** (0.000)	-0.026* (0.069)	-0.182*** (0.000)	0.017* (0.052)	0.052*** (0.000)
lncrp	-0.017** (0.011)	-0.239*** (0.000)	-0.022*** (0.005)	-0.287*** (0.000)	0.053*** (0.000)	-0.287*** (0.000)	0.062*** (0.001)	0.108*** (0.000)
lnsan	-0.251 (0.465)	-0.420*** (0.000)	-0.254** (0.379)	-0.560*** (0.000)	-0.071** (0.634)	-0.455*** (0.000)	0.173** (0.012)	0.161*** (0.000)
lnflp	0.054 (0.793)	-0.731*** (0.000)	1.072*** (0.004)	-1.397*** (0.000)	1.501*** (0.000)	-0.619** (0.000)	0.108 (0.165)	0.513*** (0.000)
lnhivpr	0.119* (0.069)	0.447*** (0.000)	0.445*** (0.000)	0.552*** (0.000)	0.650*** (0.000)	0.454*** (0.000)	-0..151*** (0.000)	-0.164*** (0.000)
Constant	-	9.024*** (0.000)	-	12.781*** (0.000)	-	10.514*** (0.000)	-	1.077*** (0.000)
F Test		85.78 (0.000)	-	66.76 (0.000)	-	73.13 (0.000)	-	34.85 (0.000)
R^2	-	0.6910	-	0.6931	-	0.6317	-	0.6809
Wald Test	1978.1 (0.000)	-	3408.9 (0.000)	-	969.29 (0.000)	-	1336.61 (0.000)	-
Sargan Test	7.89 (0.723)	-	16.08 (0.188)	-	11.05 (0.601)	-	14.54 (0.337)	-
AR (2) Test	-1.01 (0.314)	-	2.23 (0.206)	-	1.48 (0.117)	-	2.72 (0.107)	-
Hansen Test	6.28 (0.959)	-	8.61 (0.474)	-	5.39 (0.336)	-	8.26 (0.176)	-

Source: Author's computations from WDI and WHO data using STATA 15.1.

*Note: (1). The asterisks ***, ** and * denote 1%, 5% and 10% levels of significance.*

(2). Probability values (p-values) are shown in parentheses for GMM and Fixed Effects coefficients, F-test, Wald test, Sargan test, Hansen test and AR(2) test.

(3). Instruments are lnpbhe, lnsan, lncpr, lnflp and lnhivpr.

(4). AR is the Arellano-Bond autocorrelation test.

Sargan test confirms that the instruments used are valid since the p-value is greater than 0.1. In addition, the difference-in-Hansen test shows that subset of instruments used in estimation are exogenous. There is no serial correlation as shown by the Arellano-Bond autocorrelation test. Estimating the model using FE method results to all independent variables having coefficients with the expected signs and that are statistically significant.

5.5.3 Private health expenditure and Health Outcomes

The estimated coefficients of private health expenditure for infant, under-five and maternal mortality rates are negative and significant. Private health expenditure impacts positively and significantly on life expectancy. Specifically, an increase in private expenditure by 1% results to a significant increase in life expectancy at birth by 0.01%. Infant mortality rate, under-five mortality and maternal mortality on the other hand decline 0.01%, 0.02% and 0.02% respectively. These results are in line with findings by Nicholas, Edward, and Bernardin (2016), Odhiambo *et al*. (2015) and Novignon *et al.* (2012).

Corruption perception index has a significant negative effect on infant, under-five and maternal mortality rates, but a significant positive effect on life expectancy. As CPI increases, it means that the quality of governance improves. Therefore, a 1% increase in quality of governance lowers infant, under-five and maternal mortality rates by 0.02%, 0.02%, and 0.05% respectively at 1% level of significance, while life expectancy significantly increases by 0.03%. HIV prevalence rate significantly deteriorate health by reducing life expectancy at birth and raising infant, maternal and under-five mortality rates. Sargan test confirms that the instruments used are valid since the p-value is greater than 0.1. In addition, the difference-in-Hansen test shows that subset of instruments used in estimation are exogenous. There is no serial correlation as shown by the Arellano-Bond autocorrelation test.

Table 5.7: Effects of Private Health Expenditure on Health Outcomes.

	Infant Mortality		Under-five Mortality		Maternal Mortality		Life Expectancy	
Regressors	Two-step GMM	Fixed Effects	Two-step GMM	Fixed Effects	Two-step GMM	Fixed Effects	Two-step GMM	Fixed Effects
Lagged H_{it}	0.729*** (0.000)	-	0.775*** (0.000)	-	0.868*** (0.000)	-	0.921*** (0.000)	-
lnprhe	-0.010** (0.043)	-0.185*** (0.000)	-0.022*** (0.000)	-0.210*** (0.000)	-0.023*** (0.000)	-0.203*** (0.000)	0.014*** (0.000)	0.048*** (0.000)
lncrp	-0.016*** (0.005)	-0.379*** (0.000)	-0.016*** (0.001)	-0.471*** (0.000)	0.046*** (0.000)	-0.337*** (0.000)	0.026*** (0.009)	0.123*** (0.000)
lnsan	-0.394*** (0.000)	-0.430*** (0.000)	-0.069* (0.081)	-0.589*** (0.000)	-0.051** (0.281)	-0.468*** (0.000)	0.018** (0.011)	0.172*** (0.000)
lnflp	-0.139 (0.322)	-0.536** (0.011)	0.508*** (0.002)	-1.205*** (0.000)	0.317 (0.167)	-0.412 (0.104)	0.098*** (0.000)	0.477*** (0.000)
lnhivpr	0.287*** (0.004)	0.436*** (0.000)	0.292*** (0.002)	0.549*** (0.000)	0.343** (0.000)	0.443*** (6.65)	-0.057*** (0.000)	-0.165*** (0.000)
Constant	-	8.829*** (0.000)	-	12.741*** (0.000)	-	10.337*** (0.000)	-	1.040*** (0.000)
F Test		77.99 (0.000)	-	59.08 (0.000)	-	72.33 (0.000)	-	29.44 (0.000)
R^2	-	0.6534	-	0.6516	-	0.6801	-	0.6920
Wald Test	8702.83 (0.000)	-	6497.50 (0.000)	-	18082.7 (0.000)	-	15073.8 (0.000)	-
Sargan Test	7.25 (0.828)	-	14.58 (0.265)	-	11.03 (0.504)	-	12.29 (0.240)	-
AR (2) Test	0.22 (0.828)	-	1.49 (0.137)	-	1.10 (0.273)	-	1.82 (0.169)	-
Hansen Test	5.54 (0.785)		6.78 (0.402)		10.59 (0.305		10.90 (0.283)	

Source: Author's computations from WDI and WHO data using STATA 15.1.

*Note: (1). The asterisks ***, ** and * denote 1%, 5% and 10% levels of significance.*

(2). Probability values (p-values) are shown in parentheses for GMM and Fixed Effects coefficients, F-test, Wald test, Sargan test, Hansen test and AR(2) test.

(3). Instruments are lnprhe, lnsan, lncpr, lnflp and lnhivpr.

(4). AR is the Arellano-Bond autocorrelation test.

5.5.4 Role of Governance (Corruption) in the Effectiveness of Public Health Expenditure on Health Outcomes.

The analysis takes into consideration an interaction of public health expenditure and corruption perception index. The GMM estimated coefficient of public health expenditure for maternal mortality and under-five rates is negative, at 5% significance level in the short-run. An increase in public health spending by 1% significantly reduces under-five mortality by 0.11% and reduces maternal mortality by 0.21% in the short-run. Though public health expenditure reduces infant mortality rate, the impact is not significant.

When public health expenditure is interacted with corruption perception index, the coefficients of the interaction term are negative and insignificant for infant mortality and under-five mortality. The interaction term between public health expenditure and corruption perception index yield a negative significant coefficient for maternal mortality. HIV prevalence rate, access to sanitation and female labour participation have insignificant effects on infant, maternal and under-five mortality rates.

The estimated coefficient for life expectancy is positive and significant at 5%. To be precise, 1% rise in public health expenditure increases life expectancy at birth by 0.02% in the short-run. With the interaction term, the coefficient is positive and significant for life expectancy at birth. Access to basic sanitation also increases life expectancy in a significant way, such that an increase in access to sanitation by 1% results to an increase 0.03%. Corruption level has a negative impact on life expectancy, though insignificant. HIV prevalence rate and female labour participation reduce life expectancy at birth.

Table 5.8: Effectiveness of Public Health Expenditure on Health Outcomes.

	Infant Mortality		Under-five Mortality		Maternal Mortality		Life Expectancy	
Regressors	Two-step GMM	Fixed Effects	Two-step GMM	Fixed Effects	Two-step GMM	Fixed Effects	Two-step GMM	Fixed Effects
Lagged Health outcome	0.997*** (0.000)	-	1.003*** (0.000)	-	0.974*** (0.000)	-	0.892*** ((0.000)	-
lnpbhe	0.069 (0.110)	-0.186*** (-5.74)	-0.111** (--1.96)	-0.211*** (-5.16)	-0.211*** (-2.46)	-0.265*** (-6.82)	0.016** (0.041)	0.038*** (0.000)
lnpbhe *cpr	-0.002 (0.000)	-0.001 (0.160)	-0.004 (-1.89)	-0.001 (0.13)	-0.008 (-2.50)	-0.003*** (2.69)	0.001** (0.021)	0.001 (0.145)
lnsan	-0.018 (-0.28)	-0.426*** (-9.09)	-0.036 (-0.60)	-0.561*** (-9.52)	-0.103 (-0.89)	-0.475*** (-8.47)	0.019 (0.125)	0.157*** (0.000)
lnflp	-0.066 (-1.08)	-0.811*** (-3.70)	-0.184 (-1.17)	-1.411*** (-5..13)	-0.025 (0.71)	-0.897*** (-3.43)	-0.024 (0.287)	0.466*** (0.000)
lnhivpr	0.074 (1.36)	0.437*** (7.95)	0.165 (1.01)	0.550*** (7.75)	0.055** (0.71)	0.419*** (6.37)	-0.081 (0.105)	-0.169*** (0.000)
lncpr	-0.211 (-0.41)	-0.315*** (-3.01)	-0.338 (-1.66)	-0.300*** (-2.29)	-0.647 (2.31)	-0.442*** (-3.54)	0.074 (0.272)	0.164*** (0.000)
Constant	-	9.637*** (8.88)	-	12.889*** (9.45)	-	12.631*** (9.73)	-	1.440*** (0.000)
F Test		85.60 (0.000)	-	66.48 (0.000)	-	74.75 (0.000)	-	34.91 (0.000)
R^2	-	0.6624	-	0.6732	-	0.6617	-	0.6554
Wald Test	5193.33 (0.000)	-	4288.51 (0.000)	-	873.79 (0.000)	-	2383.14 (0.000)	-
Sargan Test	5.95 (0.964)	-	12.53 (0.404)	-	10.56 (0.648)	-	15.92 (0.192)	-
AR (2) Test	-0.09 (0.932)	-	0.90 (0.367)	-	0.19 (0.849)	-	1.70 (0.190)	-
Hansen test	6.87 (0.445)		4.56 (0.545)		3.24 (0.323)		4.98 (0.332)	

Source: Author's computations from WDI and WHO data using STATA 15.1.

*Note: (1). The asterisks ***, ** and * denote 1%, 5% and 10% levels of significance.*

(2). Probability values (p-values) are shown in parentheses for GMM and Fixed Effects coefficients, F-test, Wald test, Sargan test, Hansen test and AR(2) test.

(3). Instruments are lnprhe, lnsan, lncpr, lnflp and lnhivpr.

(4). AR is the Arellano-Bond autocorrelation test.

To compute the net effectiveness of public health expenditure, the study combines the coefficients of public health expenditure and the interaction term between public health expenditure and corruption perception index. From the descriptive statistics, the mean, minimum and maximum values for corruption perception index are 33, 15 and 65 respectively. The study makes use of these values to show how the effectiveness of public health expenditure varies at different levels of corruption. This allows the study to show how good or bad governance affects the effectiveness of public health expenditure.

Table 5.8: Effectiveness of Public Health Expenditure on Infant Mortality Rate

	Two-step GMM			**FE model**		
CPI	Min (15)	Mean (33)	Max (65)	Min (15)	Mean (33)	Max (65)
lnpbhe	-0.069	-0.069	-0.069	-0.186	-0.186	-0.186
lnpbhe*cpr	-0.030	-0.066	-0.130	-0.015	-0.033	-0.065
Net Value	-0.099	-0.135	-0.199	-0.201	-0.219	-0.251

Source: Author's computations based on results in Table 5.7

From estimates in Table 5.8, it is evident that corruption perception in ESA undermine the effectiveness of public health spending on infant mortality rate. As corruption perception increases (which implies that there is improvement in governance), the net impact of public health expenditure increases. When CPI is 15, governance is poor and an increase in public health expenditure by 1% reduces infant mortality rate by 0.1% in the short-run and by 0.20 in the long-run. When CPI is 65, a 1% increase in public health expenditure causes a decline in infant mortality by 0.2% in the short-run and 0.3% in the long-run.

Table 5.9: Effectiveness of Public Health Expenditure on Under-Five Mortality Rate

	Two-step GMM			**Fixed Effects**		
CPI	Min (15)	Mean (33)	Max (65)	Min (15)	Mean (33)	Max (65)
lnpbhe	-0.111	-0.111	-0.111	-0.211	-0.211	-0.211
lnpbhe*cpr	-0.060	-0.132	-0.260	-0.060	-0.132	-0.260
Net Value	-0.171	-0.243	-0.371	-0.271	-0.343	-0.471

Source: Author's computations based on results in Table 5.7

Corruption perception in ESA undermines the effectiveness of public health spending on under-five mortality rate. As corruption perception increases (which implies that there is improvement in governance), the net impact of public health expenditure increases. When CPI is 15, governance is poor and an increase in public health expenditure by 1% reduces under-five mortality rate by 0.2% in the short-run and by 0.3 in the long-run. When governance is better and CPI is 65, a 1% increase in public health expenditure causes a decline in under-five mortality by 0.4% in the short-run and 0.5% in the long-run.

Table 5.10: Effectiveness of Public Health Expenditure on Maternal Mortality Rate

	Two-step GMM			**Fixed Effects**		
CPI	Min (15)	Mean (33)	Max (65)	Min (15)	Mean (33)	Max (65)
lnpbhe	-0.211	-0.211	-0.211	-0.265	-0.265	-0.265
lnpbhe*cpr	-0.120	-0.264	-0.520	-0.045	-0.099	-0.195
Net Value	-0.331	-0.474	-0.731	-0.310	-0.364	-0.560

Source: Author's computations based on results in Table 5.7

From estimates in Table 5.10, it is evident that corruption perception in ESA undermine the effectiveness of public health spending on maternal mortality rate. As corruption perception increases (which implies that there is improvement in governance), the net impact of public health expenditure increases. When CPI is 15, governance is poor and an increase in public health expenditure by 1% reduces maternal mortality by 0.3% in both the short-run and the long-run. When CPI is 65, a 1% increase in public health expenditure causes a decline in maternal mortality by 0.5% in the short-run and 0.4% in the long-run.

Table 5.11: Effectiveness of Public Health Expenditure on Life expectancy

	Two-step GMM			**Fixed Effects**		
CPI	Min (15)	Mean (33)	Max (65)	Min (15)	Mean (33)	Max (65)
lnpbhe	0.015	0.015	0.015	0.138	0.138	0.138
lnpbhe*cpr	0.015	0.033	0.065	0.015	0.033	0.065
Net Value	0.030	0.045	0.080	0.153	0.171	0.203

Source: Author's computations based on results in Table 5.7

From estimates in Table 5.11, it is evident that corruption perception in ESA undermine the effectiveness of public health spending on life expectancy at birth. When CPI is 15, governance is poor and an increase in public health expenditure by 1% increases life expectancy at birth by 0.03% in the short-run and by 0.2% in the long-run. When CPI is 65, a 1% increase in public health expenditure causes an increase life expectancy at birth by 0.08% in the short-run and 0.3% in the long-run.

5.6 Concluding Remarks

The above section presents and discusses the results of this study. The study makes use of Arellano-Bond GMM and compares the results with Fixed Effects model estimation. The results indicate that the two methods of analysis yield different results. Some coefficients that appear to be insignificant under GMM are significant under FE. This is suggestive of the differential in the findings by other similar studies. GMM, however, is useful in addressing endogeneity and yields consistent and efficient estimates.

CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This chapter gives a summary of the findings of this study, study conclusion and policy recommendations that can be drawn from the study.

6.2 Summary of the findings

The study explores the relationship between health expenditure and health outcomes in East and Sothern African countries. Specifically, the study examines the impacts of total, public and private health expenditures on health outcomes (infant mortality rate, under-five mortality rate, maternal mortality and life expectancy at birth). The study also examines if governance plays a role in the efficacy of public health expenditure.

The study reveals that total health expenditure has a significant impact on health outcomes. The study shows that total health expenditure reduces infant mortality rate, under-five mortality rate and maternal mortality rate but increases life expectancy at birth. A 1% rise in the level of total health expenditure significantly lowers infant mortality rate by 0.01%, under-five mortality rate by 0.02% and maternal mortality by 0.03%, but increases life expectancy at birth by 0.03%. When corruption is included in the model, the coefficients of total health expenditure have the same impact on the health outcomes, but with lower magnitudes. This suggest that governance has both a direct and an indirect impact on health outcomes.

Public health expenditure also impacts positively on health outcomes and the impact is also significant. Specifically, the study shows that when public health expenditure is raised by 1%, infant, under-five and maternal mortality rates reduce significantly by 0.01%, 0.02% and 0.03%

respectively. Life expectancy on the other hand increases by 0.02%. Private health expenditure also improves the health outcomes significantly. Private health spending has a positive significant impact on life expectancy and a negative significant impact on infant mortality rate, maternal mortality and under-five mortality. Infant mortality rate, under-five mortality and maternal mortality on the other hand decline 0.01%, 0.02% and 0.02% respectively due to a 1% increase in private health expenditure. Life expectancy increases by 0.1%.

Corruption perception index, which is used to capture governance, also affects the level of health outcomes. Corruption negatively affects infant mortality, maternal mortality and under-five mortality but improves life expectancy at birth. Poor governance, shown by lower corruption perception index, also impact negatively on the effectiveness of public health expenditure on health outcomes.

6.3 Conclusion and policy recommendations

Based on the findings of the study, it can be concluded that there is a positive relationship between health expenditure and health outcomes in East and Southern African countries. Total health expenditure significantly improves health outcomes. Public health expenditure and private health expenditure also result in a significant improvement in the level of health outcomes through a reduction in mortality rates and increase in life expectancy at birth. The study thus concludes that there are no dissimilar impacts of public health expenditure and private health expenditure on health outcomes. However, the public health expenditure has a higher impact on health outcomes compared to private health expenditure. This is because public health expenditure yields coefficients with a higher magnitude compared to those of private health expenditure. This may be explained by the fact that public health expenditure provides access to healthcare to a large proportion of the population including the vulnerable members.

Governance plays an important role in improving health outcomes. The direct impact of governance on health outcomes show that poor governance adversely affects the level of health outcomes. Infant mortality, maternal mortality and under-five mortality reduce as governance improves, while life expectancy increase with good governance. The study also concludes that governance plays a key role in the efficacy of public health expenditure on health outcomes. High levels of corruption, implying poor governance, undermine the effectiveness of public health expenditure on health outcomes. At low levels of corruption (better quality of governance), public health expenditure has a higher magnitude impact on health outcomes.

Governments in ESA countries should put in place measures and policies that enhance sustainable health expenditure to improve the health of the population. Policymakers should aim at increasing public health expenditure so as to reduce the burden of health care on the households. Vulnerable members of the society are subject to catastrophic health expenditure and thus the need for more efforts to protect them against financial hardships. East and Southern African countries should also aim at enhancing the quality of governance. Attaining good governance will increase the efficacy of health sector resources resulting to improved health of the population.

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APPENDICES

Appendix 1: List of Countries

	Country	Region
1.	Kenya	East Africa
2.	Tanzania	East Africa
3.	Uganda	East Africa
4.	Rwanda	East Africa
5.	Burundi	East Africa
6.	Ethiopia	East Africa
7.	Botswana	Southern Africa
8.	South Africa	Southern Africa
9.	Malawi	Southern Africa
10.	Namibia	Southern Africa
11.	Angola	Southern Africa
12.	Zambia	Southern Africa
13.	Lesotho	Southern Africa
14.	Eswatini	Southern Africa
15.	Madagascar	Southern Africa
16.	Mozambique	Southern Africa
17.	Comoros	Southern Africa
18.	Mauritius	Southern Africa

Appendix 2: Public Health Expenditure as a % of General Government Expenditure in East and Southern African countries, 2001 to 2017

Country	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Angola	5.97	4.19	4.26	5.66	4.82	4.72	4.52	4.06	5.78	4.25	4.58	4.20	4.58	3.62	4.56	5.43	5.43
Botswana	8.18	8.18	8.18	8.18	8.18	8.18	8.18	7.64	6.25	8.06	9.63	10.68	11.93	10.96	10.42	11.21	14.32
Burundi	6.66	6.38	3.70	5.80	6.22	6.48	6.31	3.78	5.47	4.86	8.23	7.11	4.43	8.09	9.20	8.52	8.52
Comoros	5.58	7.32	7.46	7.54	6.68	5.96	5.11	3.65	3.53	3.51	7.51	3.44	3.80	3.80	3.80	3.63	3.37
Eswatini	9.28	9.19	11.40	9.74	12.61	12.62	12.37	13.34	13.33	13.76	14.28	12.65	11.66	8.51	8.73	7.82	10.02
Ethiopia	8.98	8.37	8.49	5.72	7.55	5.08	6.49	2.74	5.30	5.11	2.09	6.41	6.19	4.09	5.57	5.02	4.79
Kenya	7.11	7.11	7.05	7.02	6.91	6.82	7.04	7.18	7.26	7.32	7.61	7.53	7.32	7.52	7.75	7.95	7.98
Madag-ascar	12.27	14.38	12.91	10.10	10.57	10.18	11.71	8.87	9.88	15.21	13.94	12.94	10.27	13.92	15.27	17.49	15.02
Malawi	7.07	7.07	7.66	5.01	6.06	5.31	3.54	6.62	5.26	5.79	6.78	5.08	7.04	8.48	9.68	9.78	9.78
Lesotho	9.03	7.87	7.55	8.21	5.84	7.29	9.83	8.30	7.53	8.65	9.01	9.58	9.77	12.43	11.28	10.90	11.82
Mauritius	7.02	7.25	7.12	7.99	7.36	7.30	6.84	6.12	6.28	8.30	7.36	8.32	8.01	10.53	9.46	9.99	9.97
Mozam-bique	13.22	12.90	12.50	12.87	15.83	12.65	9.16	5.00	2.45	2.24	1.26	4.42	4.66	4.66	4.66	4.66	4.66
Namibia	15.98	17.18	16.82	17.39	16.27	15.75	17.98	14.55	10.82	11.91	10.64	11.05	10.91	9.29	9.65	10.47	10.65
Rwanda	3.66	3.71	15.45	10.79	8.09	7.20	7.79	8.08	8.43	8.56	8.90	8.36	8.30	7.98	7.91	8.88	8.88
South Africa	10.72	9.27	9.31	11.08	9.77	11.53	11.74	11.57	11.34	15.45	13.22	13.59	13.33	13.37	13.34	13.34	13.34

Uganda	9.87	9.93	9.55	13.25	14.19	16.29	16.67	12.84	13.60	7.60	7.84	8.02	7.72	5.60	5.14	5.14	5.14
Tanzania	8.80	9.79	9.71	11.55	12.62	13.51	10.88	12.22	7.47	7.26	6.82	6.03	6.29	6.94	7.33	9.52	9.52
Zambia	11.11	10.73	8.94	10.38	8.16	8.76	4.91	2.98	2.46	4.66	6.17	6.03	5.51	7.70	7.44	7.13	6.86