The determinants of government expenditure on education and health in SADC countries: A panel data approach

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ABSTRACT

Government expenditure on education and health are considered to be significant for SADC development and growth. Majority of economies in SADC region experience extreme poverty which is less than US$1.25 per day according to the international standard (UN 2017). Health system in the region is the poorest in the world where children and adults die from diseases which can be easily cured such as malaria, TB, HIV and so forth. Furthermore, education in the region is not widely provided to everyone who deserve it (UN, 2017). All this challenges stated above transpire while the economies in SADC spend larger portions of their national budget on both education and health. Therefore, it is crucial to examine the factors that are responsible of their variation. This study explores the essential determinants of education and health expenditure using annual data covering the period 1997 to 2016 for SADC countries. Which include Angola, Botswana, and Democratic Republic of Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia, and Zimbabwe

This study applies Levin, Lin and Chu (2002), and Im, Pesaran and Shin (2003) to test for unit panel root in the series. These two test are most recent tests in panel unit root test, with Levin et al (2002) assuming a common unit root process, and Im et al (2003) assuming individual unit root process, that is first order autoregressive parameters differ among the cross section. All variables were stationary at level except for education expenditure, health expenditure, life expectancy, and tertiary enrolment. Panel cointegration is applied using Pedroni, and Kao cointegration tests. In both Pedroni, and Kao cointegration confirms cointegration among the variables.

FMOLS and DOLS are applied to estimate the parameters of each variable understudy. Granger causality is also applied to test for causality between the dependents and independent variables. It was established that both the methods of Dynamic OLS and Fully Modified OLS were consistent on most variables. On education expenditure model, both DOLS and FMOLS showed there is positive and significant relationship between health, population and education expenditure. Furthermore, on education expenditure both DOLS and FMOLS showed that there is negative and significant relationship between economic growth, corruption and education expenditure. However, tertiary enrolment results were not consistence between the estimators. DOLS showed negative and insignificant relationship between tertiary enrolment and education expenditure, whereas, FMOLS showed the opposite.

On health expenditure model, life expectancy was found to be positive and insignificant related with health expenditure for both FMOLS and DOLS. Education expenditure was found to be positive and significantly related with health expenditure. Economic growth was found to be negative and significant related with

health expenditure under FMOLS, while the opposite was found under DOLS. Population growth was found to be positive and significant relation with health expenditure under FMOLS, while is insignificant related under DOLS. Corruption was also found to be positive and negative, and significant related to health expenditure under FMOLS and DOLS respectively.

On education expenditure, Granger causality test revealed that there is one way causality running from corruption to education expenditure at 1% level of significant. Furthermore, causality was found running from population growth to government expenditure on education at 1% level of significant, in SADC countries. On health model, causality was found running from education expenditure to health expenditure at 1% level of significant.

On health expenditure, this study recommends for SADC governments to implement policies that increase education expenditure and improve measures which reduce corruption in addressing health problems. On education expenditure, this study recommends that the government of SADC implement policies that are pro economic growth, and measures that discourages corruption and population growth control policies to improve education expenditure.

***Keywords*:** Government Expenditure, Government Expenditure on Education, Government Expenditure on Health, Corruption, Economic Growth, Population, Panel data, SADC.
JEL classification: H51, H52, D57, 04, P23, C23, F36.

DECLARATION

I, **Mhlari Horisani**, student number **23037717**, the signatories, hereby declare that this dissertation is my own unique work with the exclusion of quotations and references of which the sources are acknowledged. This dissertation has not been submitted, and will not be offered at another Institution of higher education for the conferring of a related or any other degree award.

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DEDICATION

This dissertation is dedicated to my late Father, Joseph Khazamula Mhlari. I wish he was here to experience this achievement with me. May your soul rest peace.

LIST OF ACRONYMS AND ABBREVIATIONS

SADC : Southern African Development Community

OLS : Ordinary Least Squares

FMOLS : Fully Modified Ordinary Least Squares

DOLS : Dynamic Ordinary Least Squares

MDGs : Millennium Development Goals

MENA : Middle East and North Africa

UNESCO : United Nations Educational Scientific and Culture Organization

GDP : Gross Domestic Product

OEDC : Organization of Economic Development and Cooperation

NDP : National Development Plan

EFA : Education for All

SACU : Southern African Customs Union

IMF : International Monetary Fund

IDC : Industrial Development Corporation

SADCPAC : Southern Africa Development Community Protocol against Corruption

SUR : Seemingly Unrelated Regression

OEDC : Organization for Economic Cooperation and Development

LDCs : Less Developed Countries

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CHAPTER ONE: ORIENTATION OF THE STUDY

1.1 BACKGROUND OF THE STUDY

Studies on government expenditure on education and health have recently attracted much attention in emerging, and developed economies, however limited in developing economies. This emanates from the notion that higher education and health expenditures are key drivers of economic competitiveness, economic growth and economic development. China, makes a good example of government which deliberately seek to foster capacities for higher level skills development and to align them with national economic strategy objectives. Like Asian economies, Southern African Development Community (SADC) countries spend more on education and health as a way to improve its human capital. According to SADC (2017) the economies in SADC region spend on average, 23% and 10% of their national budget on education and health respectively. In the past defense expenditure was very high in SADC relative to education and health expenditure because of civil wars and political instabilities (ORSB, 2015).

There are a number of policies in place to address the education and health problems in SADC economies. In 1997 SADC countries signed education protocol which address the quality and cohesion of education within the members states. The protocol acknowledged the need to develop the human resource capacity of the community, and the purpose of the Protocol is to overcome the difficulties faced by individual economy in their attempts to build successful education systems. However, there are still challenges that prevent total access of education in the region. The SADC countries faces prominent challenges in the provision of education, with regard to financing system, management and human resources (SADC, 1999).

Millennium development goal (MDG) number one is to eliminate hunger and extreme poverty in the world. According United Nations (2015) this goal has been achieved by most developing economies excluding sub-Saharan Africa. Moreover, more than 40% of the population in Sub-Saharan Africa still lives at extreme poverty, where more than 50% of the people resides in SADC. That been said, thus is of paramount important to understand the source of poverty and provide remedies to the problem. Empirical studies have revealed that education has a negative and significantly related with poverty (Barro, 2013; Busemeyer, 2007; Kraak, 2008). Therefore, one possible tool to use to fight poverty in SADC is education.

Health service is the most important element for human survival and ultimately existence. Health care is the major element of human capital investment, thus rising national expenditure on health will increase life quality, labour productivity, and general well been of the people (Culyer and Newhouse, 2000). In 1999, SADC signed health protocol aimed among other, to create a joint strategies to address the health problems for children, women, and other defenceless populace (SADC, 1999). SADC economies spend an average

of 10% of their national budget on health, which is the second highest in the budget following education (SADC 1999). However, health and social indicators are the worst in the region. According to the SADC (2015) majority of the people residing in the region suffer mainly from preventable illness which could be prevented at little cost. Thus, it is important to study and understudy the government expenditure on health patterns of the region.

This study will attempt to resolve some of the Africa's major problems through Southern Africa Development community (SADC) reason been that the community has been proven to be the productive party of Africa excluding North of Africa. SADC was launched in 1980 as Southern African Development Coordination Conference (SADCC), in 1994 was then renamed to SADC. To date SADC has 15 members which include, Angola, South Africa, Namibia, Lesotho, Malawi, Swaziland, Zimbabwe Mozambique, Botswana, Zambia, Tanzania, Madagascar, Mauritius, Seychelles and the republic of Congo. Initially SADC was designed to relax the supply side constraints throughout the regional cooperation.

SADC has enjoy positive economic growth recently. According to the World Bank (2010) indicators SADC economies recorded 2.20% growth in 2009 and rose to 5.14% in 2011. Service sector has been widely cited as the main contributor of increase in gross domestic product in the region. However, growth rate is below macroeconomic convergence rate of 7% per years. SADC has an average growth rate is 5.7% and the largest contributors to that average is Botswana and Mozambique for the period 2001 to 2010. For the latter mention period Botswana had uncontested growth rate of 12% followed by Mozambique with 8%. The least performing economy for the 2001 to 2010 is Zimbabwe and Swaziland, Zimbabwe with negative 8% and eSwatini 'formerly known as Swaziland' with 2%. Therefore to sustain economic growth and enhance productivity member economies must invest in infrastructure, education and technology to raise the productivity level to the global standards (SADC, 2017).

Corruption is growing at a geometric rate in the SADC region, most government in the region blame past racial segregation for the presence of corruption in their respective economies. According to Gumede (2010)corruption comes in two forms: firstly, what he calls big time corruption, when public official change the rules to propel patronage to relatives. Secondly, is what he called quite corruption, when government servants intentionally neglect their responsibilities to deliver public service. One major cause of inefficiency the SADC economies is corruption. The presence of corruption in the economies inflate government expenditure to the high level than it would have been at the absent of corruption. It would be easy for government officials to collect or pay bribes for huge infrastructure projects like the construction of national roads and bridges (Akanbi and Schoeman, 2010). This study will apply the corruption index set

by the international monetary fund to quantify corruption which is complex to quantify. Notwithstanding that the level of corruption is high in less developed economies and is very high in developing economies (Mauro, 1998). Corruption has always been seen as invertible or the way of life in many countries, Zaire has been cited as the highest corrupt economy followed by Haiti in the world. Conversely, Singapore has been widely cited widely as a country with minimal corruption that is according to World Bank 2017.

Population of SADC economies is youthful, where 76.4% of the population is below the age of 35 (SADC, 2011). Nonetheless, education theory is paradox as far as population growth is concern for developed and developing countries. Literature shows that in developed economies as population grow, the aging will increase political pressure to move the composition of social expenditure in favour of the elderly, but sacrificing other government expenditure such as education. The aging population demand health more rather than education, which suggest the trade-offs between education and health. Nonetheless this theory is likely not to hold in SADC, since youth dominate this region. Therefore, in SADC we can suggest that the youth will increase political pressure to move the composition of social expenditure in favour them such as education expenditure.

1.2 PROBLEM STATEMENT

Majority of economies in SADC region experience extreme poverty which are families living on less than US$1.25 per day according to the international standard (UN, 2015). Health system in the region is the poorest in the world where children and adults die from diseases which can be easily cured or managed such as malaria, TB, HIV/AIDS and so forth. Furthermore, education in the region is not widely provided to everyone who deserve it (UN, 2015). All this challenges stated above transpire while the economies in SADC spend larger portions of their national budget on both education and health. This can raise the question of effectiveness of the public spending on education and health expenditure in the region.

Southern Africa development community has signed education protocol in 1997, aiming to attain the equivalence, harmonization and standardization of the education and training systems in the Region as a tool to reduce poverty in the community. In 1999 health protocol was signed in SADC which was aimed at developing common strategies to address health related matters. However, this two protocol signed in the region has bared no fruits at all. Therefore it is significant to have a clear understanding of the determinants of government expenditure no education and health for SADC economies.

Middle East and North Africa (MENA) region, unlike SADC, have impressive health and education status (Akala and El-Saharty, 2006). In 2000, MENA countries also signed on to the Millennium Developed

Goals, and most countries have meet most of the goals. However, health outcomes are generally worse between the poorest countries relative to rich countries (Hillhouse and Wartman, 2014). Unlike, SADC, MENA have better education outcomes, correlated with high education expenditure. Similar to SADC, MENA education expenditure as percentage of government expenditure varies. However, the countries have developed numerous methods intended at making expenditure more equitable such as school grants and formula funding (Kanalan and Celep, 2011).

Most studies on public expenditure on health and education can be grouped into three groups. Firstly, most studies applied time series data to analysis the determinants of government spending on education for a specific country (Al-Yousif, 2008; Busemeyer, 2007; Chakrabarti and Joglekar, 2006). Secondly, a group of studies conduct a panel study in non-Africa countries and assumes that what happened in Asian or Europe will happen in Africa (Annabi, Harvey and Lan, 2011; Harris, Kelly and Pranowo, 1988; Loto, 2011). Lastly, the last group uses panel data to study government expenditure on education in Africa in general with little attention on SADC member state (Nyamongo, 2008).

Given the gap by literature, this study will be the first to analysis the determinants of government expenditure on education and health in SADC economies. This study will further assist policy makes in understanding whether the spending on education and health will increase economic growth in each member state. Moreover, whether there is any relationship between government expenditure on education or health and corruption. Lastly, whether corruption in the region is the cause of increased government expenditure on education and health. Therefore this study has momentum to solve all the problem mention above in the region.

1.3 GENERAL OBJECTIVES

The general objectives of this study are to examine the factors that determines the government spending on education and health in SADC economies. Thus, the general objectives will be attained with the specific objectives:

- To identify the pattern of government expenditure on education and health, in SADC economies.
- To examine the determinants governments' expenditures on education and health in SADC countries.

1.4 RESEARCH QUESTIONS

This study will answer the following questions

1. What has been the evolution of governments' education and health expenditures in SADC Countries?
2. What are the determinants of governments' education and health expenditures in SADC countries?

1.5 JUSTIFICATION OF STUDY

This study is expected to contribute to the body of knowledge in Microeconomic and public economics. Moreover, to provide the knowledge and policy recommendation in southern South development community. The determinants of government expenditure have been examined in other blocs extensively. However, there is a minimal studies which addresses the problems mentioned in this studies for SADC countries, which motivate this study. This study can also help regional and national policy makers to make informed decision, when making regional and national policy in order to solve the fiscal imbalances which disfigure the region.

1.6 STUDY LIMITATION

This study is confined by two major limitation. Firstly, there is limited studied on the determinants of government expenditure on health and education in the Africa. Secondly, the unavailability of data confine the scope of the study. The latter problems have an adverse impact on results. According to Baltagi (2008) more observation mean more information. The study was intend for 1500 observation and more conversely only 285 observation is available (1991-2016).

1.7 ORGANISATION OF THE STUDY

This study is made of six chapters, and there are structured as follows: chapter one is orientation of the study, which set the problem, the background of the variables of the study and also state that objectives of the dissertation. Chapter two, provides the overview of public expenditure on education and health in SADC economies. Chapter Three reviews the theoretical and empirical studies on the impact and causal association among government expenditure on health and education and its determinants. Then, Chapter Four presents the empirical model specification and estimation technique; which comprises the latest panel unit roots test, cointegration and Granger causality test. Chapter Five deliberates empirical results. Finally,

Chapter Six concludes the study by providing a general summary of the study, policy recommendation and implications, and proposed areas for further research.

CHAPTER TWO: OVERVIEW OF THE STUDY

2.1 INTRODUCTION

Southern African Development Community (SADC) was launched in 1980 as Southern African Development Coordination Conference (SADCC), in 1994 was then renamed to SADC. SADC is an inter-governmental association headquartered in Gaborone, Botswana. To date SADC has 15 members which includes, Angola, South Africa, Namibia, Lesotho, Malawi, Swaziland, Zimbabwe, Mozambique, Botswana, Zambia, Tanzania, Madagascar, Mauritius, Seychelles and the republic of Congo. Initially SADC was designed to relax the supply side constraints through regional cooperation.

The founding document of SADC knowns as SADC Treaty spells out the main purposes of SADC namely: to achieve development and economic growth, alleviate poverty and enrich the standard and quality of the people of Southern African. Recently however, the goals of SADC includes to further socio-economic cooperation, integrations as well as political and security cooperation within the member states (SADC, 1992). Following the latter objectives SADC economies has signed protocol on education in 1997, protocol on health in 1999 and in 2001 protocol on corruption was signed.

This chapter provide the general overview of the determinants of government expenditure on education and health in Southern Africa Development Community (SADC) economies, with special focus on population, economic growth and corruption. This chapter is organized as follows: the first section will give a brief economic overview of SADC with respect to all the variables understudy. In the second section, government expenditure on health and education; population; corruption and Economic growth, trends and behavior for each economy will be discussed and criticized. The last section of this chapter will give a concluding remarks.

2.2 SADC HEALTH EXPENDITURE

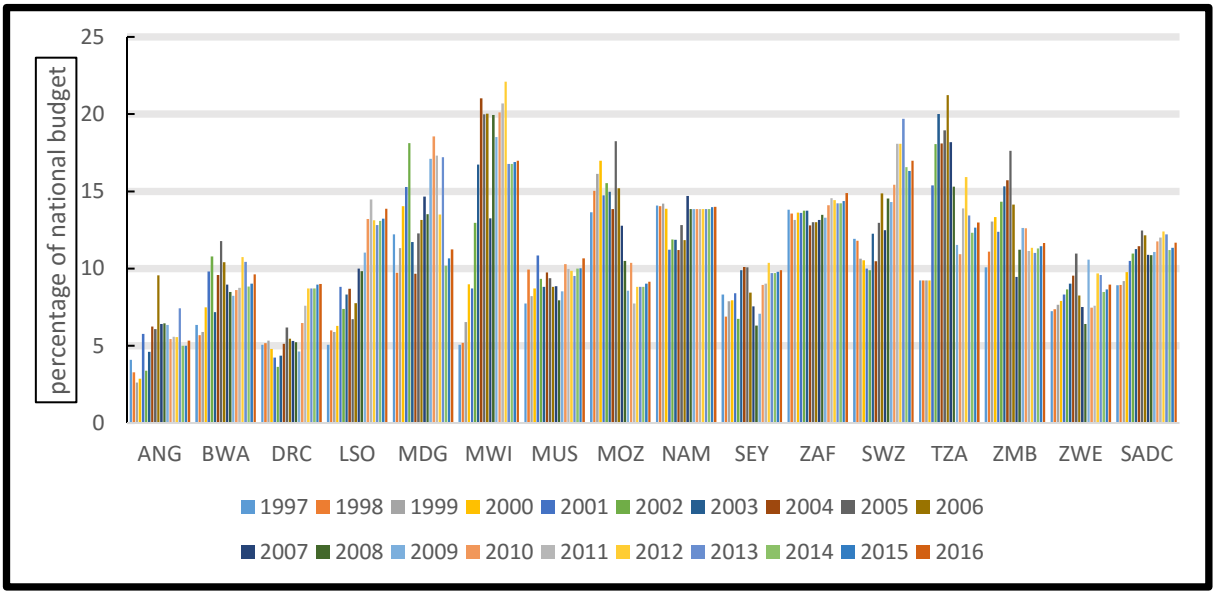
Health is progressively receiving recognition as a vibrant feature of economic and human development in African economies. Economies are increasing investment in reforms and actions to advance health outcomes and accelerate progress to achieve the health Millennium Development Goals. The political determination of state leaders to put health at the forefront of development has been echoed at the continental level through actions such as the 2008 Ouagadougou Declaration on Primary Health Care and health systems in Africa; the Addis Ababa Declaration of 2006 on community health in the African Region; the Abuja Declaration in 2002 on increasing government funding for health.

In 1999, SADC member states signed the protocol on health, under the following principles striving for creation of regional health policies, commitment to principal health approach and stimulating health care of all through better access to health services. The objectives of the protocol is; (I) to create a common strategies to address the health need for the children, women, other helpless groups; (II) to promote and co-ordinate the development, education, training and effective use of health workers and facilities; (III). To collaborate and co-operate with other relevant SADC sector. In short, the protocol calls for uniform health standard in SADC.

The determinants of public health expenditure has been studied extensively in some SADC economies, however the results varied from economy to economy (Ranchod, Erasmus, Abraham, Bloch, Chigiji and Dreyer, 2016; SADC, 1999; SADC, 2017). There are two benchmarks that dictates the sufficient expenditure levels of government expenditure on health. In 2001, world health organization commission (WHO) on macroeconomics, concluded that US$34 per capital was sufficient to meet the millennium development goals on health. In 2002 at a special summit held in Abuja Nigeria, where African head of states committed themselves to assign 15% of their national budget for health for the purpose of millennium goals. The study consider the Abuja target as a tool of measuring how adequate is the expenditure on health for SADC economies.

Out of 15 SADC economies only three has met the Abuja declaration target. Figure 2.1 shows the public expenditure on health of SADC countries as percentage total public spending and SADC average expenditure from 1997 to 2016. The primary vertical axes shows public spending as a percentage of total public expenditure and the horizontal axes show SADC countries and SADC average. Figure 2.1 reveal that Malawi has surpassed Abuja target from 2003 which is the highest in the block, followed by Tanzania. Eswatini has met the Abuja target from 2008, and its expenditure is above the Abuja target on average. Followed by Madagascar which met the target in 2010. Nonetheless South Africa is the closer to meet the target by less the 0.1% for the period shown below.

Figure 2.1: Government Expenditure on health in SADC economies 1997 -2016



Source: World Development Indicator data

There are poor performing economies when it comes to Abuja target in particular Angola and Zimbabwe, DRC, Lesotho and Mauritius will the average below 10%. The other economies have not met the target but are close to 15%. Namibia is the economy worth noting because for the period 1997 to 2016, had fixed value of 13.89%. The aggregate government expenditure on health in SADC is below the Abuja target, from 1997 to 2016 government expenditure on health in SADC had an upward trend however, declined in 2014 from 12.59 to 11.56. Most countries which are closer to or met the 15% of Abuja target have meet the millennium development goals on health. The next subsection will analysis the individual economy health expenditure trend.

Health facilities in Angola are very poor, this was the results of insignificant spending on health sector in the economy during the civil war. To date Angola is facing challenges in providing health service to its citizens. Currently, only 35% people have access to government provided health service. Malaria has been widely cited as the cause of death in the economy whereas, about 35% morality in children under age of five prevail in the economy. Government expenditure on health is funded both domestically and international, with the former contributing 97% and the latter 3% of the total expenditure on health (Frøystad, Mæstad and Villamil, 2011). Government expenditure on health has not meet the Abuja target which resulted in a failure of the economy to meet the Millennium development goal on health in 2015.

The Botswana government has made a major stride toward the attainment of health related development goal (MDGs) during national development plan (NDP) 10. Botswana achieved the MDGs on health without

meeting the Abuja target. Public spending on health reached 12% of the government expenditure which is the average in the region. Public spending on health was assisted by the private health expenditure in Botswana to achieve the MGDs in 2015. The plan aim was to achieve its objectives with private investment, therefore less government expenditure on health was needed for NDP 10. In 2009/10 financial year planned government expenditure was surpassed the estimated government expenditure by 2.5% (NDP 11).

Government spending on health has stayed stagnant in the Congo. DRC has also failed to meet the Abuja target, resulted in the economy failing in meeting the millennium development goal on health in 2015. Nonetheless, DRC government spending on health has been volatile for the period 2008 to 2014, with the highest value of 18% in 2009 and the lowest value of 7% in 2011. Government expenditure on health in DRC was not affect by the economic downturn of 2008/2009. This is indicated by the continuously increasing in government expenditure on health in than latter period. However, to data government of DRC spend 19% on their total national budget on health which shows large improvement.

Lesotho health sector is funded proportion between public and private sectors. Lesotho has a fee free policy on basic healthcare serves and minimum fee was set at a high level (Lesotho, 2013). In 2006, the government of Lesotho engaged in public-private partnership (PPP) which was aimed to improve the health sectors of the country as required by the constitution of the economy. Government spending on health has increase over time in Lesotho. Nonetheless, Lesotho met the MDGs on health without meeting the Abuja target. The government of Lesotho is spending an average of 8% of the central government's on health. Moreover, after the introduction public-private partnership agreement the expenditure on health started to show an increasing trend.

Health indicators in Madagascar has fallen dramatically since the political crisis of 2009 (Madagascar, 2014). The occurrence of chronic malnutrition among children under the age of 5 is one of the highest in the Africa. Furthermore, maternal mortality ratios also have remained relatively high and stagnant over the last ten years. The health sector of Madagascar has is funded heavily by third parties, whereas government contribute very little on health. For example, 80% of health expenditure in Madagascar was funded privately while the government only contribute 20% for the period 2009 to 2013(Madagascar, 2014). General government expenditure on health is very high compared to other SADC economies. Even though Madagascar has met the Abuja target on health, the country has failed to meet the MDGs on health. This serve has example that the Abuja target is sufficient but not necessary condition for MDGs on health.

Early in 1997, Malawi spend very little on health, nonetheless, their expenditure showed an increasing trend to 2014. Despite the increasing trend the country failed to meet the MDGs on health in 2015. Malawi has

met the Abuja target on health in 2005 after it was introduced. Health sector of Malawi is largely finances by external donors, which makes the economy to be vulnerable to the external donors. In 2001, sector wide approach partnership (SWAP) was formed to receive support of from external sources. This caused a large increase in government expenditure from 2002 to 2004, where government expenditure in health raised from 14 billion MKW to 72 billion MKW in 2004. Nonetheless the presence of corruption in the economy has resulted in large drop in donor's aid.

Health services is Mauritius is delivered by private and public sectors. Where private sector provide 50% of health serves in the economy and the rest by government. This is the results of high fee levied by private sector on health to households (World Bank 2015). Mauritius government provide health serves for free to all its citizens. This has significant impact on the aggregate government expenditure, with respect to the magnitude of expenditure on health. Mauritius spend very little on health in terms of the Abuja target. Disrespecting that fact, Mauritius has met MDGs on health sector. Figure 2.1 reveals that Mauritius spend on average of 9% of the total government expenditure and the maximum of 10%.

In Mozambique health services is delivered by public and private sectors, where private sector provided this services to high income class and public sector provide for the poor. Government account for 80% of the total health services in the economy, this service is provided for free to the citizens of Mozambique. Mozambique had failed to meet the MDG on education, where there still high infant mortality and low maternal mortality ratio. Mozambique has developed Health Sector Strategic plan (HESS 2014-2019) as policy fight the above mentioned challenges. Expenditure on health is consistence at 10%, due to a decline in foreign aid. Moreover, government spending on health as percentage of GDP has been consistence from 2008 by the average of 4.5%.

Government account for 54% on health and private sector accounting for 38% in Namibia. The government of Namibia spend sizeable amount of money on health sector. The government aligned the national budget on health to the requirements of National Health Policy Framework (NHPF) 2010 to 2020. The main aim of the policy is to attain universal health coverage. In 2007, the government of Namibia decided to increase government expenditure on health as a tool to tilt growth to high level. Government expenditure on health has been consistence at 13% closer to the Abuja target. This graph shows that Namibia has not met the Abuja target since it was introduced.

Health sector in Seychelles is the second biggest sector in terms of the workforce and government budget allocation. In Seychelles the government provide health service for free to its citizens. This free services translate into high cost to government, thus the government of Seychelles allocate a larger portion to health

as the percentage of GDP (Seychelles, 2014). Seychelles has long met the MDGs on health notwithstanding the fact that Seychelles has not reached the Abuja declaration, with the highest value of 10%. Seychelles lives as a proof that the Abuja target on health is not a sufficient condition for attaining the MDG on health. The government provided 93% and private 7%. However, government has reduces its expenditure on health from 96% to 93% in 2015. The international donors has decrease from 6% in 2012 to 0.3% in 2015 (Seychelles, 2013).

Health services is South Africa is provided by both private and public sector. Government provide 50% of health services while private sector the other half. Government of South Africa provide health service for free to citizen, whereas private sector provide health services at inflated prices (USAID, 2016). Private sector provide its services to small population the medium and high income group's at high price, government provide for the large poor population at a low price. The government of South Africa also receive income from external source, however, this source has reduce over time. Government of South allocate a large portion for health sector as a percentage of total national budget. Figure 2.1 shows that government of South Africa spend on average 13% of government expenditure on health. South Africa has not met the Abuja declaration target of 15% of total national budget since it was introduced.

The formal health is provided by government, private sector, churches and NGOs in Swaziland. The government of Eswatini provide 40% of the health services and private sector providing 60%. Moreover, more than 50% of medical practitioner are employed by private sector (Ministry of health and social welfare, 2008). Despite the fact that government is spending less on health, expenditure on health as percentage of GDP has decreased dramatically. Eswatini meet the Abuja target in 2010, but still failed to meet the MDG on health in 2015. The government has recently given much attention to the health sector, relative to education, unlike most SADC economies. From 2006, expenditure on education was increased to an average 15% to 2014. In addition, the expenditure on health for Eswatini is showing a continuously increasing trend. In Eswatini 88% of health budget goes to salaries and wages of the employees (Ministry of Health and Social Welfare 2015). Eswatini national AIDS programme takes about 86% of the total budget on health (Ministry of Health and Social Welfare, 2016).

The government of Tanzania provide health services to its citizens for free, which was introduced in 2000. United State of America, as a main funder of health in Tanzania, contribute 23% to the total national health of Tanzania. Other main funders of health expenditure for Tanzania are Canada with 5%, Irish with 7% and Danish with 4% governments. Tanzania has failed to meet the MDGs on health in 2015 report, which was the results of declined expenditure on health for the period 2007 to 2013.Tanzania has met the Abuja target

on health from its introduction, however dropped in 2009. This can be the contributing factor to the failure to meet the MDGs on health in 2015 report. Tanzania allocated 28% to health sector since 2006, which is almost double the Abuja target. In 2006, the government of Tanzania received huge amount of money from donors, which resulted in high expenditure by the department (West-Slevin and Dutta, 2015).

Zambia has signed to universal health coverage which can be defined as providing everybody in the country with financial security of any cost related with health services (WHO, 2010). That been said, the government of Zambia has introduced free basic health service to its citizens. The introduction of the policy conveyed extra cost to the health sector in Zambia. The government finance 57% of health services in the economy and private sector account for 43%. Out of the 57%, government contribute 52% and donors account for 42% (Filakati and Biha, 2017). Zambia is close to meet the Abuja target of 15% of total national budget.

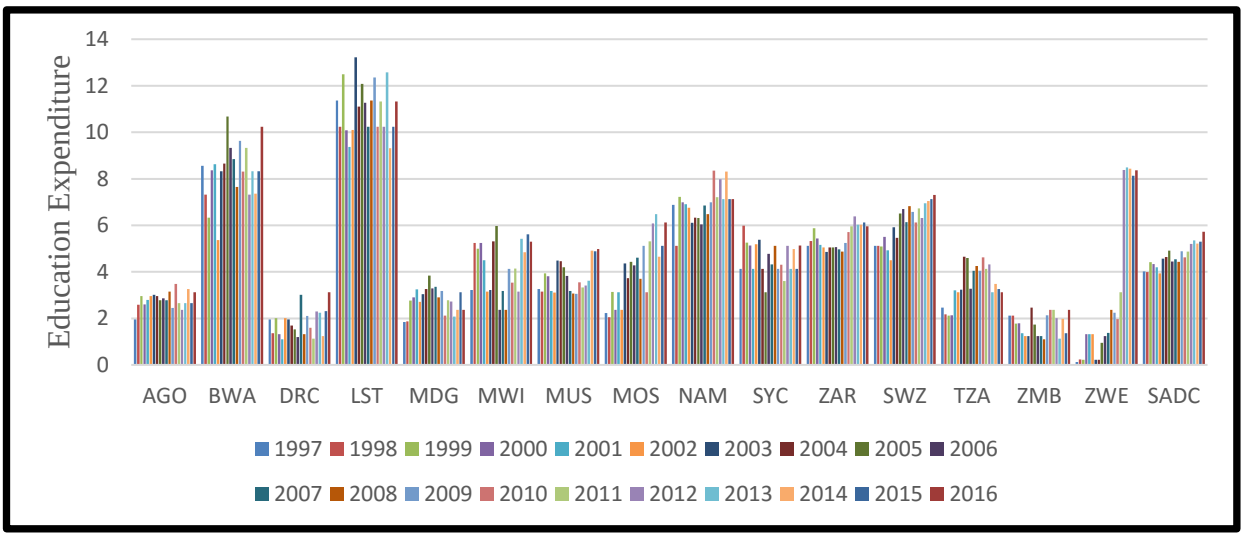
Prior independency Zimbabwe has the good health indicators, despite the fact that larger portion of government expenditure on health was channeled to the white minority. Post independency the new elected government of Zimbabwe to a vow to increase its expenditure on health. This came to end after the introduction of Economic structural adjustment program 1990-1995 (ESAP), which was designed to industrialize and modernize the economy (Dhoro, Chidoko, Sakuhuni and Gwaindepi, 2011). The government provide 65% of health expenditure in the economy (government of Zimbabwe 2014). Large amount of government spending on health is spent on salaries and wages of the workers. Private sector also played an important role in providing health services in the economy. According to world health Organization private sector of Zimbabwe provided 56% of health service in 1997.

2.3 SADC EDUCATION EXPENDITURE

Expenditure on education is given too much attention in SADC countries. Most SADC economies spend large amount on education relative to health expenditure (Nyamongo, 2008). SADC economies spend a bigger portion of their national budget on education relative to other government departments, because increased or high education expenditure is expected to have positive impact on economic growth and development (Government of Malawi, 2014). Moreover, the Millennium development goals has long encourage developing economies to invest more on education as a way to eradicate poverty and hunger. SADC government has increase their spending on education has a plan to increase economic growth and economic development. This study is motivated by the increase in government expenditure on education or high budget allocation in education department in SADC, in attempt to find the gist of the ideal.

There are two international benchmarks on government expenditure on education: one, government should spend 6% of their gross domestic product on education: two, government should spend 20% of their overall budget allocation on education (Martin and Walker, 2015). Lesotho, Malawi, Mozambique and Zimbabwe has met the GDP percentage target, while Madagascar and Zimbabwe has met the percentage of expenditure target. Nonetheless, high budget allocation in education does not necessary translated into better education outcomes (Anja Baum, Engstrom, Soto, Eugster, Imam and Oestreicher, 2017). Therefore, the other 10 members have not met neither the percentage of GDP nor the percentage of total national budget expenditure. However, some countries which did not meet neither of the above mentioned requirements have meet the MDGs on education and have good education outcomes. Figure 2.2 shows government expenditure on education for SADC economies for the period 1997 to 2016 as percentage of gross domestic product. The vertical axis shows education expenditure as a percentage of gross domestic product.

Figure 2.2: Education Expenditure in SADC (1997-2016)



Source: UNSECO data

Government expenditure on education has been increasing recently in SADC region. This indicates the general motive to reduce poverty and improve the standard of living in the region. Despite increase government expenditure on education there are still voluminous report about poor education in the region (Cooray, 2009; De La Maisonneuve and Martins, 2013; Delgado, 2013; Devkota, Chaulagain and Bagale, 2016). SADC economies spend large amount of money on recurrent expenditure rather than capital expenditure. This results in little improvement in education infrastructure.

The government of Angola provide basic and compulsory primary education until the age seven. Nonetheless before 2003 the country has less education equipment, where learners had to bring their own

equipment such as chairs. To date government of Angola spend 8% of the national budget on education unlike 4% during civil war. Like other SADC economies Angola spend large amount of money on recurrent expenditure rather than capital expenditure. Teachers and administrators salaries takes 80% of the education budget, which leaves very little for schools building and equipment. In 2009, 7.86% of the budget was assigned to the sector, of which roughly 80% was kept for secondary and primary education**.**

Government of Botswana is giving significant attention to education sector. The government of Botswana fund education from primary to high education. Nonetheless, high education expenditure has failed to translate into high economic growth and development (Bosupeng, 2015). In 2016, Botswana spend 27% of the government spending on education which the highest in the region. Botswana also spend large amount of money on recurrent expenditure like any other SADC economies. The graph show education expenditure is been consistent for the period under study, which was above 20% the international benchmark.

DRC faces a numeral challenges in the education sector. The economy has the highest population of youth who cannot read and write (Gwang-Chol Chang, 2010). The country has also a basic free primary and compulsory education economic policy. Nonetheless, the government has been reluctant in financing such policy. Education in DRC is funded largely by households, followed by government and other sources respectively. According to Feda, Savrimootoo, Miningou and Kalindula (2015) the household contributed 73% of the total education expenditure. The government contributing 23% to education with donors contributing 4%. In 2010, the republic allocated 1.6% on education as percentage of GDP, an increased in 2013 to 2.4% of GDP. This little funding of education in DRC has adverse effect on the quality of education with regard to qualified teachers and the ability to sustain the required standard of teaching (Gwang-Chol Chang, 2010). For example, according to Gwang-Chol Chang (2010) only 67% of the teachers in DRC are on the official payroll of the department of education.

Education in Lesotho was guided by Education Sector Strategic Plan (ESSP) 2005-2015. The objectives of this policy was aimed at access, equity, quality, efficiency and relevance at all levels of education. Through this plan, Lesotho has made much progress in education such as the attainment of universal primary education in 2000 and other education indicators such as adult literacy and teacher pupil ratio (African Economic Outlook, 2012). Education expenditure in Lesotho is chiefly financed by government, community and foreign donors respectively. Government been the key funder of education in Lesotho. Lesotho has meet the international benchmark on education that is 6% of each country gross domestic product. To date Lesotho spend more than 12% of its GDP on education thus Lesotho has made a noteworthy progress in education in SADC region.

Government of Madagascar spend 21% of their national budget on education, which is 3% of their GDP on average. Government expenditure on education is divided into two parts; the recurrent and capital expenditure. Recurrent expenditure takes 80% of the department's budget, where 90% of that goes to teachers and 10% on other recurrent expenditure. Only 20% of the national budget on education goes to capital expenditure which including infrastructure and school building. Madagascar has not met the millennium goal on education of achieving universal primary education, however the government spend 55.3% of the national budget on primary education. Nonetheless, government expenditure reached 4% in 2014, the beginning of new elected democratic government.

In Malawi education account for a larger share of total public spending, which reveals that the government of Malawi is giving priority to education as tool for development. Education spending accounted for 23% of total public expenditure, 7% of GDP, for the financial year 2015/2016, followed by agriculture and health respectively. Furthermore, education expenditure has been increasing at a fast rate relative to other government expenditure (Malawi, 2014). For instance, the growth rate of education expenditure in Malawi is 36%, which is much greater than the average growth in the aggregate expenditure of the economy. Nonetheless, there are a number of reports about the efficiency of government expenditure on education in Malawi.

Mauritius has made much progress on education as it has done on health. The economy has achieved MDG two in 2014, with net enrolment rate of 98% in primary education. However, Mauritius has not met the international benchmark of 6% of GDP on education. Mauritius public expenditure on education is divided into sector recurrent and capital expenditure. Recurrent expenditure is allocated 80% of the total budget on education and capital expenditure receive 20%. Therefore 80% of the budget goes to salaries and stationaries, which dilute the values of money spend on education in the economy.

In 2004, the government of Mozambique removed fees in all public primary school. This resulted in a rise in public expenditure on education. Moreover, resulted in increase in primary education attainment from 40% to 60 % in 2014. Nonetheless Mozambique is still behind on MDG on education. In 2012, the government of Mozambique has developed Education Strategic Plan (2012-2016). The plan was designed to achieve three objectives: one, make certain inclusion and equity in access to and maintenance in school; two, improving student learning and three, assuring good governance of the system. During the period of this the government of Mozambique general increased government expenditure on education in the economy with expenditure above 20% of the national budget.

The government of Namibia has also given significant attention to education. Namibia spend 18% of its government expenditure on education which is very high compared to other SADC economies. Namibia has achieved the MDG on education in 2013. However, the dropout rate in high school was very high in 2014 (Namibia 2014). In 2016, the government of Namibia start to also provide free secondary education. Thus the government will need to increase government expenditure on education. In 2016 budget government of Namibia increased government expenditure on education to cover for free secondary education proposed in 2015.

Education is Seychelles is provided by the government for free both primary and secondary, where primary education is compulsory. Seychelles is a small country in terms of population, with 50% of the population been adult, therefore expenditure on education is target to a small group of learners. This also allow the department to have a closer look at each school need, and take corrective measures if required (Seychelles, 2017). The government of Seychelles invest best in capital expenditure rather than recurrent expenditure unlike most of the SADC economies. according to Mein, Tamatave and Labiche (2016) the government of Seychelles spend 46% on compensation of employees, and 36% on consumable good and services, and 16% for capital expenditure. Figure 2.2 shows that Seychelles spend on average of 22% of national budget on education which is over the international benchmark on education as recommended by Martin and Walker (2015).

Education has been the primary concern for the South African government since the development of government of national unity in 1994. Since 1994, impressive progress has been made in the education sector of the economy (OECD, 2009). By 2030, South African ought to have access to education and training of the best quality, leading to significantly improved learning outcomes(NDP, 2014) .The government of South Africa provide both primary and secondary education at no cost in public school, which translate into high budget expectation by the department. According to the constitutions of South Africa very South African citizen has the right to basic education, therefore the government must fund education from public revenue to ensure the rights of all learners.

The constitution of Eswatini define education as a human right to all children in the economy. In addition, the government of Eswatini also signed the Dakar declarations, to introduce Education for All (EFA) in the economy in 2005. Thereafter, in 2010 the government of Eswatini introduced free and compulsory basic education at primary level. This policies had a significant implication on government expenditure on education, resulted in a need for the government to increase expenditure on education. Government expenditure on education has been inconsistent for the reporting period. This was the results of fiscal

imbalances and the fluctuating in revenues received in SACU (Ministry of Education, and Training 2015). The ministry of education receives the bigger portion for the national budget in Swaziland.

Education in Tanzania is one of the six priority sectors for state budgeting and has been one of the key sectors of the government. In 2015, the government of Tanzania has removed school fees in all primary and low secondary school (RBA, 2015). The scraping of fees by the Tanzanian government reflect the countries commitment on covenant on social, economic, and cultural rights. The government of Tanzania allocated the highest share to education. The government of Tanzania spend 18% of their national budget on education, which is the highest in the national budget (RBA, 2015). Furthermore, education expenditure has enjoyed high growth rate at 19.5% per year, compared to other government department.

In the past the Government of Zambia has displayed a strong commitment to educational development, by allocating a reasonably large piece of government budget to education sector. Nonetheless, education has decreased, to date Zambia spend less than 10% of total government expenditure on education. The focus of education spending steadily moved from basic education to achieve the Education for All commitment to secondary and post-secondary education. The government of Zambia has a unique expenditure system on education, where by the educators are paid direct from the minister of finance. Like other SADC economies, Zambia introduced basic free education in 2002 which include primary and secondary schools.

Education of Zimbabwe is informed by the manifesto of ZANU-PF of 1980. Nonetheless, there was a dichotomy between the education policy plan and general economic plan (ESAP), which resulted in drastic cut of education budget from 1990 to 1995. Recently spending on education in Zimbabwe is about 29% of the national budget, which indicates a change in government policy toward education. The education system is provided by both public sector and private sector in Zimbabwe. To date, the government provide 60% of education service in the economy while, private sector only provide 40%. Like most SADC economies Zimbabwe education expenditure is spent on recurrent expenditure rather capital expenditure.

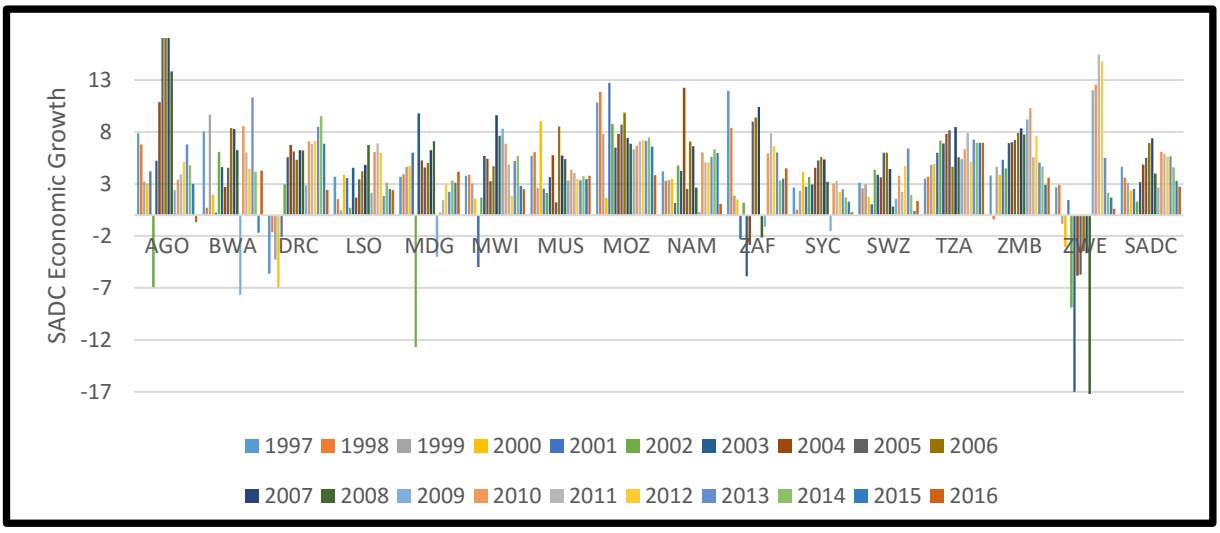
2.4 SADC ECONOMIC GROWTH

According to IMF the world economic growth is expected to slow down in the last quarter of 2017. This was caused by United States of America weak start of 2016 calendar year, resulted from Mr. Trump policy stance campaign on tax, trade, investment and immigration. Mr. Trump economic policy took a protectionism and nationalist course which affect the global economy significantly negative (IDC, 2016). Africa continent was also affected by the global economic outturns as well as SADC region. SADC

economies are affected largely by external macroeconomic shocks such as the economic downturn on commodity prices and a decline in global economic growth.

The optimal level of economic growth in the SADC economies was hailed in a number of academic works and SADC conferences (Eita, 2014; Maleleka, 2007). SADC proposed that at least 7% growth rate was sufficient for macroeconomic convergence in the region. Nonetheless, very few SADC economies managed to achieve and maintain the set growth rate. Figure 2.3 show economic growth rate of SADC for economies, where the primary vertical axes shows the growth in percentage and the horizontal axes shows the growth of each SADC economies and the average of SADC. SADC region in experiencing downward trend in economic growth for the period 2008 to 2016 however there are economies which are performing exceptionally well. For instance, Angola performed exceptional well in 2008 with the growth rate of 12% which is the highest for the period understudy. Followed by Zimbabwe in 2010 to 2012 (10.6 to 10.9 %) despite the instability of the economy.

Figure 2.3: Economic Growth in SADC (1997-2016)



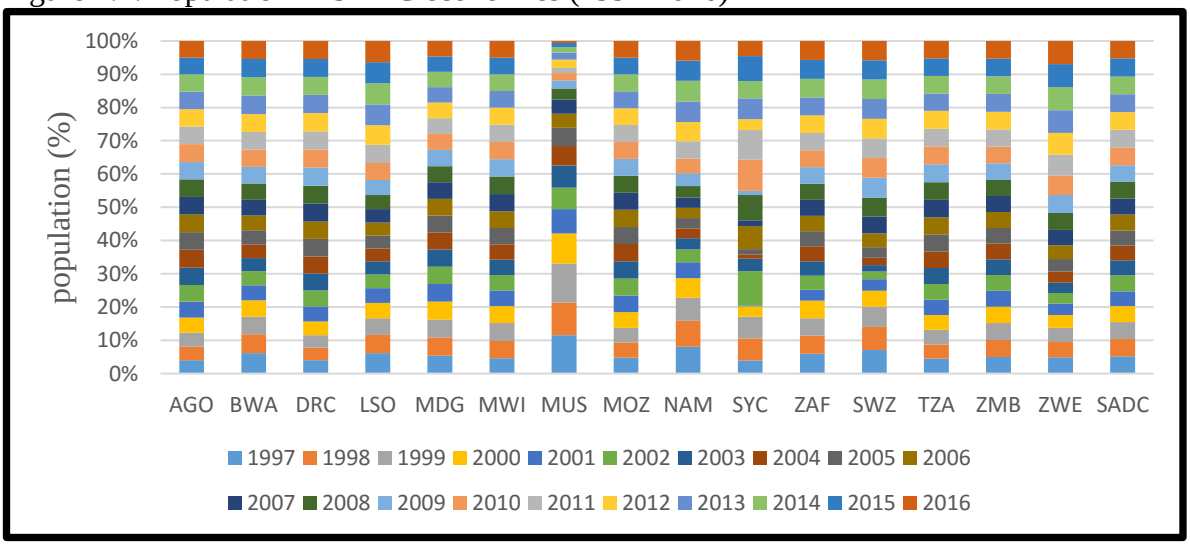
Source: World Bank

Zambia and Botswana followed with 10.2 and 9, 23% in 2013. Mozambique also performed exceptional well, with an average of 7.1% which is above the SADC macroeconomic convergence rate. The graph also shows that most economies performed poorly in 2009, such as Botswana with -7.65, Madagascar with -4 01, South Africa with -1.9 and Seychelles with -1.5. This was the result of the great recession of 2008 which affected most economies in 2009. SADC in aggregates recorded growth rate of 2.3 in 2009 and increase to 5.89 in 2010 and decreased onward to 3.30 in 2015. However, this growth rate is below the macroeconomic convergence rate of 7% years. Therefore SADC economies need to improve their economic strategies.

2.5 SADC POPULATION

There is bidirectional association among population, health and education. Under population studies, is well cited that education has strong relationship with demographic behavior. According to Chamie (2003) wide spread of education all over the society has revealed to be the central significance of long term demographic transition from high to low fertility and mortality. Moreover, the researcher added that fertility will drop to zero if high level of mass education consumption is attained. Figure 2.4 shows the population growth in SADC economies, where the primary vertical axes shows population in millions of people. The horizontal axes shows the SADC economies and the aggregate SADC population. This graph reveals that the population of SADC stable, with and growth rate of 15% per year. The total population increase in the economies from 2009-2015 by 90.95 millions of people. At the current growth rate, the population will be expected to reach 530.6 million people in 2050.

Figure 2.4: Population in SADC economies (1997-2016)



Source: World Bank data

In 2009, HIV/AIDS prevalence in the region has caused decline in population growth. In 2013, the region experienced the largest increase in population in the region, with the average of 2.48% growth rate. Economies which contributed largely on growth of population in the region is Democratic Republic of Congo, Tanzania and South Africa respectively. The lowest contributing countries on population growth is Seychelles, Lesotho and Mauritius respectively. Thus, population is growing at a faster rate relative to economic growth which has negative effect on economic development in the region.

2.6 CORRUPTION IN SADC

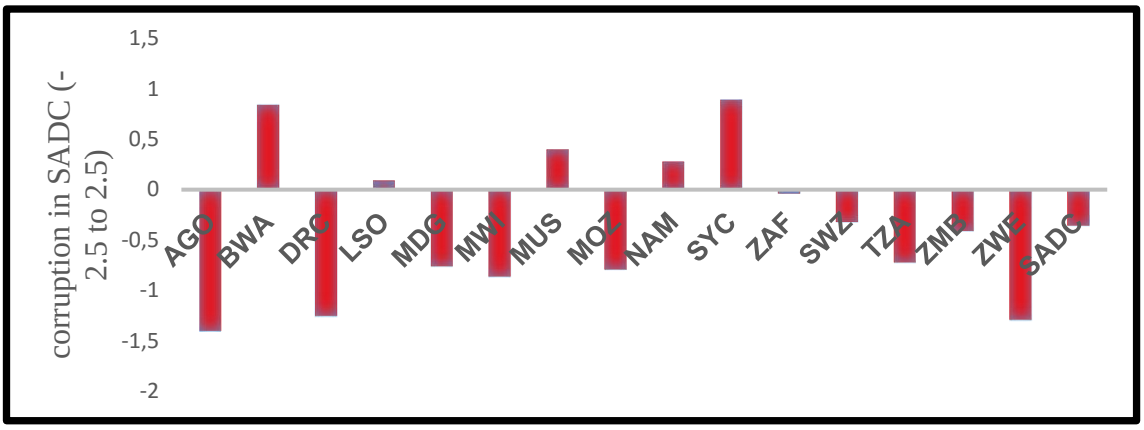
Corruption can be defined as an abuse of public office for private material gain (Heidenheimer, Johnston and LeVine, 1970; Heyneman, 2004; Matti, 2010; Theobald and Williams, 1999). Literature reveals that corruption is likely to be high in less developed economies unlike developed economies. In that regard, SADC is included in the hypothesis as it falls under sub Saharan Africa. SADC has taken an initiative to fight corruption in the region. In 2001, SADC Protocol Against corruption (SADCPAC) was adapted in Blantyre, Malawi. However, only three countries has ratified the protocol including South Africa. The protocol criminalize the bribery of foreign officials and also provide a number of preventive measure. One, to develop code of conduct for public officials, two transparency in public procurement of goods and services lastly the protection of whistle blowers (Fraser-Moleketi and Boone, 2003). Nonetheless, corruption has been growing rapidly in the region, with only few economies with better corruption indicators. This study is under the huge limitation, which is, the absence of studies on corruption in education and health sector in SADC region or in the world (Chêne and Nyasulu, 2015; Hallak and Poisson, 2001).

According to Heyneman (2004) corruption can be defined specifically for education sector, as an abuse authority for personal and material gain. Education sector receive first or second largest budget item in both developed and developing economies, which provide enormous opportunities for corruption practices (Meier, 2004). Moreover, according to Tanaka (2001) where there is funds there is corruption; even when there is no funds corruption exists. Corruption in education sector takes a number of forms: one, examination papers sold in advance; two, 'ghost teachers' where salaries are drawn for staff which is no longer employed by the school(s); three bride auditors not to disclose the true results of financial statement; politician can allocate resources to particular school for political gain during election. Corruption happens at all levels of government until it reaches the classroom. Corruption has a number of effect on education sector and the economy has whole. First corruption can lead to high dropout rates, poor teaching quality resulting in below average achievement, worsening the inequality between the rich and the poor.

Health sector also receive first or second largest share of government expenditure in most economies depending on country's needs. Therefore large amount of government revenue is either spend on education or health. Nonetheless according to encyclopaedic report of transparency international, health sectors is more vulnerable to corruption in all countries at all levels of government to patient themselves. Corruption in the health sector takes a different forms such as; fraud, since the health sectors is high depended on electronic payment which allow space for falsifying payments documents (Sparrow, 1996); bribes, in most

Africa economies health workers demand bribes from the public to provide them with health services (Muhondwa, Nyamhanga and Frumence, 2008).

Figure 2.5: Corruption Control Index in SADC



Source: world Bank data

This study will apply the aggregate corruption indicators of each economy, since the data on health and education corruption indicators is not available (Lewis, 2006). Figure 2.5 shows the level of corruption in SADC region. The value on the vertical axes indicates the level of the present of corruption in the region. Where the value far less than zero indicating the presences of high corruption but maximum of -2.5, while the value far greater than zero indicating less corrupt government but maximum of 2.5. The figure show that SADC region is corrupt on average, which SADC average value of -0.356 almost all countries in SADC are corruption. The leading country is Angola, with the corruption estimate value of -1.4, the second country Zimbabwe with -1.29 and DRC with -1.25. However, there are few countries with less corruption in the region led by Seychelles with the corruption estimated value of 0.89. Botswana takes the second position with corruption estimate value of 0.84, followed by Mauritius, Namibia and Lesotho respectively.

2.7 CONCLUSION

This section revealed most SADC economies are improving their health and education expenditure. The general growth rate of the region is very low, with below the expected convergence target. Moreover, SADC economies are not diversified as required, where most economy depend on either agriculture or mining sectors for survival. Corruption is found to be high in both education and health sectors in SADC economies. Therefore, corruption is a major determinants government expenditure on health and education in the region. The population growth in the region is very low but in line with the world population growth at 1.5% per year, affected by both mortality and fertility.

CHAPTER THREE: LITERATURE REVIEW

3.1 INTRODUCTION

This chapter is separated into two main sections. Section 4.2 is the theoretical framework, which will provide a general theoretical analysis on the determinants of public expenditure on education and health. This section will discusses economic theories that explain the growth of government expenditure. Then section 4.3 provide empirical perspective on government expenditure and its determinants. The last section will provide conclusion remarks of the chapter.

3.2 THEORETICAL FRAMEWORK

This section provide in depth investigation of the theoretical determinants of public expenditure on education and health. There are four dominant model which are: the pure theory of government expenditure, Wagner's Law, displacement effect by Peacock and Wiseman and the median voter hypothesis.

3.2.1 THE PURE THEORY OF PUBLIC EXPENDITURE

The theory of public expenditure was brought to existence by Paul Samuelsson in 1954, in his study the pure theory of public expenditure. This theory divides the national budget into two sections consisting algebraic taxes and transfers, known as income redistribution which can be changed until the society is moved to optimal condition. The second section is the provision of the collective goods. Samuelsson defines collective goods as goods that are consumed by everyone in common. Therefore the consumption of this goods and services does not by any way reduce the consumption of this good to the next person. In other words, Samuelsson believed that public expenditure on services are not rationed in the sense that good used by one does not convey a cost to the next. This conclusion emanates from the fact that public goods has special features of joint and non-excludability in consumption. Therefore, the decentralization of pricing system cause the growth of public spending especially in the service sector.

Samuelson (1954) further extended the theory specifically to cover for government expenditure on education. He acknowledge the fact that education is private consumption service which can be divided equal between individuals. He added, that education is the only instrument in which the have-not can build up their capital. Samuelsson put his argument in this form:

''The provision of public education is a reflection of the political power of the property- less classes. Education becomes a government end, but its inclusion in this set is an outcome of a working compromise of relationships among conflicting social groups. If the individualistic model were appropriate to the state

in the case of public education, we should have a demand by the property less for an income redistribution so that they could then purchase the amount and type of education they wish.''

Furthermore, the theory claimed that government expenditure on education especial on high education serve the interest of government better, because it makes the youth or student to be more compliant citizens. He further contend the government expenditure on education will give the government additional powers to control education system in the economy.

There are numerous limitation of the pure theory of government expenditure brought forth by Margolis (1955) and Shibata (1971) against Samuelsson (1954). According to Margolis (1955) Samuelsson's claim that collective goods are not rationed is not true. Margolis believed that in public services such as hospital, education and highways congestion may reduce or cut the consumption of this services to other part. Moreover, for example, the congested calendar of the courts surely will implies the use this service by one party will make it less available to the next part. Margolis (1955) further say that the Samuelsson theory can only hold on national defence and the Lighthouse.

Shibata (1971) add on the limitation brought forth Margolis in 1955. Shibata (1971) claimed that Samuelsson's work was the duplication of the work of the bilateral monopoly. For example, the possibility of securing a unique equilibrium solution by voluntary measure is parallel to the bilateral monopoly procedures. Finally, pure theory of government expenditure like bilateral monopoly, will give multiply equilibrium solution unless non-economic variables are introduced in the model. Thus theory will inherit all the weakness of bilateral monopoly.

3.2.2 WAGNER'S LAW

Adolph Wagner (1835 – 1917), a German economist, in 1877 theorised a well-known association among the growth of the economy and relative growth in public expenditure activities. The law state that as per capita gross national product raise public expenditure will increase. That is, as income rises, the demand for goods and services provided by the state increases more than in proportion, mainly because of the technological requirements of industrialization and urbanization that supplement the income growth. Furthermore, Wagner thinks of government expenditure as the endogenous factor that is initiated by economic growth rather than exogenous factor. Wagner provides three explanations for the growth of the public sector expenditure as income escalates. Firstly, when this services provided are needs, such as administration, education, protection, law and order, health, redistribution of income, and capital expenditure that complement the process of industrialization and which must be delivered by the state.

Secondly, a significant expansion of cultural and welfare expenditures, with respect to education and income redistribution, takes place as income increases. Lastly, Wagner argued that the changes in technology and the increasing scale of investment required in many activities in an industrializing economies would create an increasing number of private monopolies. Adolph Wagner did not explicitly put forwarding testable hypothesis about his law. However, Michas (1975) developed a model that can explain Wagner's hypothesis, which was defined as follow:

$$\varepsilon = d \frac{\left(\frac{G}{GNP}\right) \Big/ \left(\frac{G}{GNP}\right)}{\left(\frac{GNP}{POP}\right) \Big/ \left(\frac{GNPP}{POP}\right)} > 0 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3.1$$

Where ε is the elasticity of the share of public expenditure, and G is government spending, GNP is the gross national product, and POP is the population growth. Therefore, Wagner's law states that elasticity of government spending in gross national product with respect to per capita gross national product is greater than zero.

Abizadeh and Gray (1985) tested for Wagner's law under cross sectional, and time series data for 53 economies clustered into three groups; poor, less developed, and developed economies by means of the physical quality of life Index (PQLE). Wagner's law was tried for each group in a model concerning the growth of public expenditures to numerous measures of economic development. The theorised association among economic development and the growth of public expenditures was discovered to hold for less developed economies. The developed economies group government expenditure decrease as level of economic development increase.

Bird (1971) provided with three condition in which Wagner's law will operate effectively; One, the situation where per capita income is increasing, Two where there are technological and institutional changes of a particular type. Three situation where democratization of the polity, in the sense of broader partisan participation.

The theory also gone through some criticism, According to Peacock and Wiseman (1979), Wagner's theory neglects the effect of social upheavals is a serious shortcoming. For example, war is one of the supreme realities of life in the twentieth century, as result any theory of public sector growth that ignores wars and their related expenditures leaves out a very significant factor. According Seeber and Dockel (1978), Wagner's law is founded on Wagner's normative assumptions about the nature of the state and its conduct. The law, thus, symbolises a judgement on what should to transpire as an economy becomes industrialized.

Furthermore, the empirical content of the law is unsure since it is not clear that the role of the government should essentially escalate through its takeover of private monopolies if they happen, nor is it clear that some goods and services delivered by the state are luxuries.

3.2.3 PEACOCK AND WISEMAN DISPLACEMENT EFFECT

The displacement effect was developed by Peacock and Wiseman (1979) in their study in British for public spending from the period 1890 to 1955. Peacock and Wiseman (1979) took into account the point made by Wagner (1975), that government expenditure explicitly depend on revenue collected through taxation. Therefore, for the government to continuously provide goods and services, it will require that the government increase tax. Peacock and Wiseman believed that for vote elastic government, tax will not be increase, respecting the wishes of majority, however tax will be increase when the economy is in the state of emergence or social upheavals such as war related expense and disease outburst (Peacock and Wiseman, 1979).

The latter authors believe that national crises of high magnitude may cause increase in government spending because the government would convince the public that high taxes is essential for national disaster prevention. The government will be expected to return the prices of pre-crises after the crises has lapsed however, the government will be tempted to maintain the during crises prices. Peacock and Wiseman pronounces this occurrence as the displacement effect because some of government expenditure such as outbreak and war related expenses has displaced other private and public expenditure which are not related to such outbreak.

Gupta (1967) was the first author to assess the existence of the displacement effect brought forth by peacock and Wiseman. The author used the per capita government spending as the dependent variable which disregarded war related expenditure but excluding defense spending national income per capita was used as the independent variable.

Bird (1972) unleashed a number of criticism upon Peacock and Wiseman displacement effect hypothesis. Firstly, the displacement effect does not answer the question of why government is all under pressure to increase the ratio of government expenditure over time (Bird, 1972). Secondly, the displacement effect fails to describe the slow gradual expansion of the size and scope characterizing the government functions. Finally, the author claim that the displacement effect cannot used because proper hypothesis has not yet been rigorously formulated and tested. Gupta (1967) analysis has inherited the same ambiguity of Peacock

and Wiseman about the peacetime defense spending and the precise mechanism of displacement (Bird, 1972).

3.2.4 BAUMOL'S UNBALANCED PRODUCTIVITY GROWTH

William Baumol in 1967 developed microeconomic model called unbalanced productivity growth. In his model, the author believed that public expenditure raise can also be caused by an increase in price of goods used by the government as inputs. For example, the labour costs that increases every year. Baumol divided the sectors of the economy into two; firstly, is Progressive sector which known as the technologically progressive activities such as capital formation and economies of scale that subsidize toward an increase in the level of output produced in the economy. Secondly non-Progressive sector, on the other hand, only allows sporadic changes a productivity (Baumol, 1967).

This theory is constructed under several assumptions. Firstly, the economy is divided into two sectors where in sector (A) the productivity of Labour is constant and in sector (B) output per person grows cumulative at a constant rate. Secondly, the wage difference in the two sector are assumed to be the same, because high wages in one sector would give an incentive for the works to live one sector to another (Baumol, 1967). The theory contended that services sector can be called non-Progressive sector, because in this sector play a pivotal role which mostly is provided by the government such as education, health, law and order. Baumol also argued that is service sector has cumulative raising cost for the non-progressive sector. Twenty five years later after publishing the later article, William Baumol further narrowed his scope of analysis with a special focus on both public education and health expenditure. Baumol believed that sectors which are affected by cost disease are does with high level of human touch such as education and health sectors Baumol (1993). Therefore, the key determinants of health and education expenditure is low rate of productivity growth in this sectors.

Baumol's model is also not excepted from criticism, Baumol has undermine the opportunities for technological improvement in the service sector of government departments (Black, Calitz and Steenekamp, 2012). Unbalanced growth that was presented by of low productivity growth it is vague since it depends on the collaboration of increasing relative prices and decreasing relative productions. Moreover, Baumol occasionally assumed that demand would be price inflexible, and low productivity growth would lead to increasing shares of nominal production in motionless sectors particularly services industries (Nordhaus, 2006).

3.3 EMPIRICAL EVIDENCE

Government spending has attracted too much attention given its public policy significant. There is no universal answer of what actual determines the government expenditure, the results of determinants of government expenditure on education and health vary from study to study (Busemeyer, 2007; Cogan, Cwik, Taylor and Wieland, 2010; Corsetti, Meier and Müller, 2012; Kotera and Okada, 2017; Loto, 2011; Masenyetse and Motelle, 2012; Musaba, Chilonda and Matchaya, 2013; Paul and Furahisha, 2017; Thamae, 2013). This section is divided in three parts, the first part discusses the empirical literature that was conducted based on general government expenditure, followed the literature on government expenditure on education. Concluded with literature on government expenditure on health.

3.3.1 LITERATURE ON PUBLIC EXPENDITURE

In the study, is government expenditure volatility harmful for growth, a cross-country study (Furceri, 2007). The study used the Hodrick-Prescott (HP) filter developed by Hodrick and Prescott in 1997, which decomposes the series into a recurring component and a trending component by minimizing with respect to government expenditure. The study shows that government expenditure fluctuation has a significantly effects on long run growth for less developed, whereas is has insignificant effect on OECD countries.

In analysing micro economic model and the growth of government spending in Lesotho, Thamae (2013) applied multivariate cointegration techniques. Multivariate cointegration techniques was applied to assess the long-run association between micro economic model and government spending. The results indicated that public expenditure is positively correlated to income and population growth. Moreover, the author found that internal and external shock are of less significant to determine the growth of public spending in Lesotho.

The relationship between economic growth and public spending was assessed by Lamartina and Zaghini (2011), in the OECD countries. The researcher used the Pooled estimates of the long-run elasticity and the adjustment coefficient. The practical evidence offers sign of a structural positive association between government expenditure and GDP per head, which is consistent with Wagner's law. A long-run elasticity larger than one proposes a more than proportional increase of public spending with respect to economic activity. In addition, according to the essence of the law, the authors found that the association is usually higher in countries with lower per head gross domestic product, suggesting that the catching-up time is characterized by a tougher development of government activities with respect to economies in a more advanced state of development.

Christiano, Eichenbaum and Rebelo (2011) studies the size of government expenditure multiplier and contended that the magnitude of public expenditure multiplier can be greater than one, if the nominal interest are not changed to respond to an increase in government expenditure. The researchers claimed that the alternative to increasing government expenditure to deal with the zero lower bound difficult is to control the demand for goods by changing the time profile of investment consumption levies. The author used the Taylor rule to achieve the results.

Baseline regression was used to assess the connection among public expenditure and gross domestic product by Bose, Haque and Osborn (2007) for less developed economies. To estimate the public spending categories on GDP, the authors applied time series data from 1980 to 1990. The outcomes showed that public spending has a positive and significant relationship with economic growth within the developing economies. Moreover, the results also showed the government investment in education and total government expenditure are the only outlays which significantly relation to economic growth in developing economies.

In 51 developing economies, short and long term association among government spending and economic output was assessed (Akitoby, Clements, Gupta and Inchauste, 2006). The authors used both the cross sectional and time series aspects of developing country data using an error-correction framework. This method allows one to differentiate between the short term effect and long term effect between variables understudy. The results revealed evidence of consistent with cyclical voracity and ratcheting, indicating tendency for government spending to increase over time. Moreover, the results showed that output and government expenditure are cointegrated for at least one of the expenditure aggregates in 70% of economies, suggesting a long-term relation between government expenditure and output consistent with Wagner's law.

Eboh, Amakom and Oduh (2006) conducted study titled budget and public expenditure across Nigerian states. This authors placed more focus on government expenditure, spheres of government and source revenue. The research finds that government revenue plays a significant role in growing the government expenditure. Moreover, is of paramount importance to establish sustainable agenda for fiscal coordination among the three sphere of government. Government's budget and fiscal institutions need to be reinforced for the adoption of best practices in budget and fiscal management.

In investigating the determinants of the structure of government expenditure in selected African countries, Nyamongo (2008) used a panel data from 1980 to 2006. The objective of the study was to identify and explain the structure of government expenditure in Africa The study used the iterative seemingly unrelated

regression (ITSUR) procedure. The author results revealed the following: first is that economies with less corruption will tend to spend more on education, health and social welfare departments, whereas more corrupt government will tend to spend more on defence and general public services departments.

In examining the relationship between government expenditure, governance, and economic growth, Cooray (2009) extended the neoclassical production function to include two dimensions. These are the size and quality of public sector, where the size is a proxy for government expenditure and quality is the proxy for governance. The empirical reveals that together the size and quality of the government are off paramount importance for economic growth. Moreover the researcher argued that investing in the capability for improved governance is a priority for the better growth performance of the economies understudy. Odhiambo (2015) studied the relationship among government spending and economic growth in South Africa for the period 1980 to 2013. The study used the newly developed auto-regressive distributed lag model (ARDL)-bounds test method to examine the connection. In order to address the exclusion of variable bias, the study incorporated unemployment as an intermittent variable between economic growth and public expenditure, thus creating a simple multivariate model. The results of the study showed that, government spending and economic growth Granger-cause each other in the short run, however in the long run, economic growth that Granger-causes government spending.

The viability of Wagner's law in Indian was tested by Narayan, Rath and Narayan (2012), using panel cointegration, and panel Granger causality analysis. They uncovered robust evidence that support Wagner's law in Indian states. Moreover, the researchers find that the Wagner's law relationship is consumption related rather than capital spending driven in Indian states. This is a fresh revelation and our results are robust to different model specifications. Menyah and Wolde-Rufael (2013) investigated the connection among public expenditure and gross domestic product in Ethiopia to test Wagner's Law, which posit that as real income rises there is a tendency of a share of public expenditure to increase relative to national income. The authors used the bounds test approach to investigation cointegration. They uncovered strong evidence of a long-run relationship between public expenditure and economic growth. Furthermore, a modified form of the Granger causality test, revealed a unidirectional running only from economic growth to government spenign. Thus supporting the Wagnerian hypothesis public sector increasing.

Kotera and Okada (2017) examined the effect of democratisation on government expenditure, using 127 countries for the period 1972 to 2010. The researchers used the political regimes to achieve the results and developed tools for democratisation grounded on the democratisation movement and conduct an influential variables estimation to address endogeneity difficulties. The results revealed that democratization has little

impact on government expenditure however, democratization has a significant influence on health and education spending and adverse effect on defence spending.

In the study public expenditure, corruption and total factor productivity, Wu, Li, Nie and Chen (2017) examined factors that increase government expenditure. The authors used the dynamic spatial autoregressive (SAR) model and a panel threshold model to assess the theoretical hypotheses constructed on regional panel data from 2007 to 2014. The outcomes demonstrate that "U" shape curve correlation exist among public spending of administrative service, safeguard governance and total factor productivity, and inverted "U' shape for the relationship among the public spending structure and total factor productivity. Moreover, the results suggested that increased corruption levels can decrease regional total factor productivity and that the effects of the proportions investment development expenditures, and of administrative service expenditures.

In Summary, aggregate government expenditure is clearly determined by government revenue income, economic growth, corruption, and population growth. Majority of the studies supports Wagner's law. One concern with the existing empirical studies on total government expenditure is that minority use panel data approach, relative to time series. None of these studies have used FMOLS and DOLS model as their estimation techniques.

3.3.2 LITERATURE OF GOVERNMENT EXPENDITURE ON EDUCATION

Education spending and gross domestic product was investigated by, Quan and Beck (1987) in the Northeast Sunbelt region. The results revealed that there is positive connection among economic growth on education spending in the region. Moreover, evidence showed that the effects of education spending on the levels of wages and employment vary in the Northeast and Sunbelt. Education spending have positive and significant effects on the levels of wage and employment in the Northeast, while the opposite is found in the Sunbelt.

Sylwester (2000) studied income inequality, education expenditure and economic growth in African economies. The author used least squared regression analysis to attain the set objectives. The results showed that economies with a higher level of income inequality also have higher successive spending on public education with respect to economic growth. Moreover, income inequality has adverse effect on economic growth in Africa countries and education expenditure has a positive relationship with economic growth. The author further suggested that government of Africa countries should increase government expenditure on education to increase economic growth and reduce income inequality in the continent.

Thereafter, Canagarajah and Ye (2001) assessed government expenditure on health and education in Ghana. The author used primary data from Ministries and household survey data from the Ghana Statistical Service. The study outlined the reduction in government expenditures on education sector in 1990 was the results of low growth in Ghana. While health expenditure has a positive impact on economic growth which was increased for the period understudy. Furthermore, the results revealed the government expenditure on both health and education is not efficient, lest should be redirected to improve the lives of the people of Ghana. Donkoh and Amikuzuno (2011) analyzed the determinants of education spending in Ghana. The cross sectional data used from Ghana Living Standards Survey Round Five (GLSS-V) for 2007 to achieve the set objectives. Their results showed that high education expenditure does not automatically mean high probability of education spending.

Error correction model and Johansen cointegration approach were applied by, Musila and Belassi (2004) in investigated the impact of economic growth on education in Uganda for the period 1965 to 1999. The results indicates that there is positive connection gross domestic product and education expenditure in Uganda for the period understudy. They further suggested that government of Uganda should increase government expenditure on education and donor community to affect gross domestic product of the economy.

Blankenau and Simpson (2004) assessed public spending on education and gross domestic product. The authors used the endogenous growth model to assess the connection among education expenditure and economic growth in which public investment is an input to human capital accumulation. The results shows that the response of economic growth to government expenditure on education may be changing over time. The connection depends largely on the level of public spending, the tax arrangement. Thereafter, Blankenau, Simpson and Tomljanovich (2007) assess public expenditure on education, taxation and economic growth. The study used a panel data from 23 developed economies over the period 1960 to 2000. The results showed that there is a positive correlation among public expenditures on education and long run economic growth. A clarification of these results is that studies that fail to regulate the method of finance undermine the role of public spending on education.

In analyzing public expenditure on education, health, and poverty in rural china, Gustafsson and Shi (2004), used household data from 18 provinces. The results discovered that public expenditure on both education and health has declined over this period, while the share of disposable income has increased largely. Furthermore, poverty in china has declined dramatic, nonetheless there are still some signs of poverty in poor areas in the west of china. The results also suggested that there is positive connection among

economic growth and disposable income, whereas adverse connection among gross domestic product and health and education expenditure was discovered.

Eboh *et al.* (2006) conducted study budget and public expenditure across Nigerian states. The study placed more focus on government expenditure, spheres of government and source revenue. The researcher finds that government revenue plays a significant role in growing the government expenditure. Moreover, is of paramount importance to establish sustainable agenda for fiscal coordination among the three sphere of government. Government's budget and fiscal institutions need to be reinforced for the adoption of best practices in budget and fiscal management. In the same year, Chakrabarti and Joglekar (2006) examines the determinants of government spending on education for 15 states in India. The study was based on 20 years period, during old economic policy and the new economic policies on education, using panel based regression analysis and elasticity. The results showed that per capita income elasticity of less than one which reveal that income is a significant determinants of education expenditure at all levels. Moreover, the results showed that privatization of education exert adverse significant impact on education expenditure in the region.

In evaluating the trade-offs between public expenditure on education and government spending on health, Harris *et al.* (1988) applied longitudinal regression and cross sectional anaylsis. These models test for the existence and strength of such trade-offs. Longitudinal regression analysis showed that less countries which spend less on defence spend more on either education or health. Finally, cross section analysis of government expenditure reveals that for twelve Asian countries, there is little proof of trade-offs between government spending on health and government expenditure on education. Yildirim and Sezgin (2002) studied defense, education, and health expenditure in Turkey for the 1924 to 1996, the period in which was the era of republican in Turkey. The purpose of the study was to examine the likelihood of trade-offs between the variables understudy. The author studied the relationship among health expenditure, education expenditure and military expenditure using a multi-equation framework employing seemingly unrelated regression (SUR) estimation method. Their results revealed that the spending decision in defense department are carried out independently to both education and health expenditure. Furthermore, the results also suggest that there is high competition between government expenditure among education and health expenditure.

Game theory model was applied by Stasavage (2005), in assessed the impact of democratic multiparty government on public expenditure on education. Game theory model, which proposes that the need to attain an electoral majority may have prompted African governments to dedicate greater resources to primary

schools. The suggestion is tested using panel data on electoral competition and education expenditure in 35 African economies. The results revealed that certainly democracy is related with large amount of money been spent on primary education rather than other items in the education budget.

De and Endow (2008) investigated public spending on education in India. The results revealed that expenditure increased in 1990 it has been stagnated since then, as a proportion of economic growth, government spending on education has been less than 4%. The investigation discovered that the central government has been playing significant role in state education finance. Centrally pay for schemes, which are partially supported by external aid, have been a critical part of central to state transfers. Spending trends in seven states are studied to explore the possible impact of expenditure on education outcomes. It shows that for the less developed economies latest changes in education spending have better access, nonetheless maintenance and learning accomplishments remains low.

Thereafter, Wolf and Zohlnhöfer (2009) studied the determinants of private and public education spending in 26 Organization for Economic Co-operation and Development (OECD) economies. The authors used both sectional regression model and pooled regression model. Their empirical findings revealed that socio-economic, supply related and demographic factors impact on overall health care expenditure and a decentralized education sector setting entails upper public health expenditure. The results also suggested that Federalism and fiscal decentralization clearly stimulate private investments in all categories of education. Nonetheless Christian democratic government participation exerts adverse effects on private and public education expenditure which are considerable.

Johansen cointegration techniques was applied by Loto (2011), in studying government expenditure of Nigeria at a sectoral level for the period 1980 to 2008. In particular, five sectors of government which are security, health, education, transportation, and communication. To test stationarity and cointegration amongst the variables the author used ADF and Johansen cointegration techniques. The result revealed that in the short-run, expenditure on agriculture is negatively connected to gross domestic product, furthermore, the author found that education was negatively and insignificantly connected to gross domestic product. However, health care expenditure was found to be positive and significantly connected to gross domestic product.

Investigating Asian and pacific countries government expenditure on education, Maitra and Mukhopadhyay (2012) studied the association among public expenditure on education, health and economic growth. Cointegration was confirmed to be present in six countries and absent on the other six countries using Johansen cointegration test. Education was discovered to have a positive significant

connection with economic growth in Tonga, Nepal, Vanuatu Bangladesh, Fiji, Kiribati, Maldives, Singapore, and Sri Lanka. However, education was found to contribute negatively in Philippines. Health expenditure was found to be positive and significant related with economic growth in Bangladesh, Nepal, the Philippines, Singapore and Sri Lanka. Whereas, it was found to be negative related with economic growth in Malaysia and South Korea.

In Vietnam, Huy (2012) assessed the determinants of private expenditure on education. The author used the cross section data from Vietnamese Household Living Standards Survey (VHLSS) from 2006, collected by general statistic office of Vietnam. The findings revealed that income, household heads' level of education and the statistics of primary and secondary school-age children are the key factors determining the total amount of households' expenditure on education. Furthermore, the results showed that families with higher income spend more on education. These results show that households with more incomes and superior human capital are those who are capable to devote additional resources on education.

Nyamongo and Schoeman (2010) studied the effect of quality of governance and education expenditure in Africa countries. Pay attention to corruption, political stability or instability and democracy. The authors used both bivariate and multivariate estimation analysis to achieve the objectives set. Their results indicated that corruption has an adverse effect on education, where most corrupt developing economies devote a small share of government expenditure on education. Moreover, political instability has also a negative impact on education, and democracy will have no impact on education plans. Baskaran and Hessami (2010) assessed globalization and the composition of education expenditure, based on the assumption that globalization induces a change from primary to tertiary education expenditures. The results showed that globalization reduce the share of government expenditure on primary education, while increase the share of government expenditure on higher education. They further claimed that globalization increases income inequality in the long run due to its impact on education policies.

Two stage least squares (2SLS) was deployed by Akanbi and Schoeman (2010), in studying both the determinants of government expenditure and expenditure on education in selected African countries 1995 to 2004. The results revealed that there is positive correlation among government spending and education expenditure in selected Africa countries. The results indicated that education expenditure is resilient to economic shocks in all countries understudy. Furthermore, education is not significantly affected by allocative changes resulting from corruption intentions. Urhie, Ewetan and Okodua (2016) conducted a comparative study on national income, government spending on education and education attainment for 91 economies that reported data on education in 2011. The objectives of the study was to determine the

relationship between education expenditure and national income. The study deployed the correlation analysis to determine how public expenditure on education differs with national income groups over time. The results reveled that there is positive association among government expenditure on education and national income at a global level over time. The further suggested that national income is the major determiner of public expenditure on education among this countries.

In emerging and developed economies, Grigoli (2014) conducted a hybrid study assessing the efficiency of public expenditure on education. The hybrid approach accounts for the influence of the level of development on education results by building different efficiency frontiers for lower and higher income countries. The results showed efficiency in the education department is of paramount important than an increase in government expenditure on education. Mussagy and Babatunde (2015) studies the relationship among public expenditure on education and economic growth in Mozambique using quarterly data from 1996 to 2012. The researchers used Johansen Cointegration approach to study the long run correlation between the variables and the error correction was used to evaluate the short run adjustment dynamics. The results revealed that government expenditure on education in Mozambique is very low, and have an adverse effect on economic growth. The researchers further suggested that the government of Mozambique should increase government expenditure on education in order Devkota *et al.* (2016) assessed public expenditure on education sector for Nepal. This authors used qualitative observation, interviews and technological accepted model to as an instrument to achieve the objectives. The results revealed that income inequality in the economy was is very high, where there poor cannot afford education in the economy and the rich do not use the public education system of the country. Nonetheless the results also showed that an increase in government expenditure on education increase will improve economic growth and economic development in the country. The authors further suggested that proper management of education infrastructure is of paramount important to minimize the cost in education sector.

In providing synthesis on studies focusing on education expenditure; economic growth, income inequality, corruption, and government expenditure are the prominent determinants of government expenditure on education. The dominant estimation technique is Johannsen cointegration, with little on panel cointegration technique. None of the above studies applied the FMOLS or DOLS. There is no studied that focused on SADC or SADC countries, with exception to Mozambique.

3.3.3 LITERATURE ON GOVERNMENT EXPENDITURE ON HEALTH

Public expenditure on health has received considerable attention in both developed and developing economies. Given its significant contribution to the welfare of the economies particularly on productivity

of the labor force. Literature reveal that there is a number of determinants for health expenditure such as national income, federalism, economic growth, population and so forth. All this determinants has been backed by strong theoretical and empirical frameworks and econometrics techniques has been provided as evidence. Nonetheless there is little consistent on empirical findings on the determinants of health expenditure see (Angko, 2013; Chaabouni and Abednnadher, 2014; De La Maisonneuve and Martins, 2013; Guisan and Exposito, 2010).

Using cointegration approach and ordinal least square econometrics techniques, Hansen and King (1996) examined the determinants of health expenditure for 16 developed economies. The empirical results revealed that there is long run correlation between government expenditure on health and economic growth. Whereas, government expenditure on health had positive relationship with income per capita, despite that the non-stationarity was found on income per capital at level. Therefore, economic growth and income per capita are the key determinants of economic growth. The authors further, recommended that government of this economies should increase government expenditure on health to improve economic growth in the regions.

Time series and cross sectional data was applied in the study by Hitiris (1997) in assessing public health expenditure and integration for European Union (EU) economies. The authors used both ordinary least squares and generalized least squares since they account and correct different aspect problems that originate in both time series and cross sectional data. The results revealed that results there is long run positive significant relationship between public health expenditure, national income, population, inflation and the share of public expenditure on health. This results suggested that common health policy in the community is possible. Roberts (2000) commented the model which was studies by in Hitiris (1997), the determinants of health expenditure in EU economies. The author re-examined his data with standard unit root procedures and cointegration testing procedures. According to Roberts (2000), Hitiris's finding was plagued by a spurious regression problem. After re-estimating the model the results revealed that the income is the key determinants aggregate health care expenditure, but propose a short run income elasticity is significantly less than one.

Giannoni and Hitiris (2002) analyzed how regional integration impact on health expenditure in Italy. Aimed at answering the following questions, one whether regionalism exist in Italy in health care spending; two, whether the 1990s transformations in Italy's National Health Service have moved the health are towards interregional equality. The findings revealed that the key factors manipulating government expenditure on health are: per capita income, ageing population, structural features, relating to economies

of scale and productivity and regional characteristics. Di Matteo and Di Matteo (1998) investigated the determining factors of provincial public expenditure on health in Canada. The authors used the pooled times series and cross sectional regression analysis to achieve the objectives for the period 1965 to 1991. The results showed that the determinants of provincial determinants of government expenditure on health are real provincial per capita income, the proportion of the provincial population over age 65 and real provincial per capita federal transfer revenues. Health expenditures in Canada show an income elasticity of 0.77 and thus imply that provincial government health expenditures are a necessity rather than a luxury good.

Generalized least square was applied by Karatzas (2000), in assessing the determinants of health expenditure in Unite States with special attention on economic growth, demography structures and health stock. The author used generalized least squared to attain the set objectives. The results indicated that there is positive relationship between economic growth and demography structures with health expenditure. Under demography structure population was the major determinants of health expenditure. Whereas, the capital stock of the health department has a positive insignificant relationship with public expenditure on health. Di Matteo (2005) further examined the macro determinants of public health expenditure in Canada and United States. In this study the focus was on income, population and time, and using states data for the period 1980 to 1998 for Unite state and 1975 to 2000 for Canada. The findings suggest that public health expenditures has positive significant correlation with wages and population. Where population growth had key impact on provincial government health expenditure in both countries. This suggest that population is a major determinant of public expenditure in Canada and United State, with wages having little impact.

Panel data from 1984 to 1995 was applied in studying government expenditure on health and education by Gupta and Verhoeven (2001) in 38 Africa countries. The study used regression analysis to achieve the objectives. The study revealed that African countries are less efficient relatively to the Asian and western hemisphere countries and that African countries spending on education and health was efficient for the period under study. They further suggested that educational attainment and health output requires more than high national budget on the departments. Subsequently, Toor and Butt (2005) examined the determinants of health care expenditure in Pakistan using time series data. The authors used the OLS regression model, which allow for trending data set and intercept and a trend in cointegration relationship. Their study applied time series data on OLS regression and cointegration which was first in Pakistan. The results revealed that health expenditure in Pakistan is determined by gross domestic product per capita, urbanization, education and crude birth rate. Moreover, the proportion of government expenditure spend on health is an important determinants of health outcome in the economy. Their also suggested that

government should increase the level of government expenditure on health to improve the lives of the people living in Pakistan.

In OECD economies, Dreger and Reimers (2005) assessed the determinants of health expenditure, using panel unit root and cointegration techniques to achieve the objectives. The results revealed that there is positive significant relationship between economic growth, income and health expenditure. This suggested that economic growth and income are the key determinants of health expenditure in this economies. However, the authors claimed, that this results showed that health expenditure in this economies is not only determined by per capita income and economic growth rather the medical progress such as life expectancy, infant mortality and the population age structures in this economies.

Chang and Ying (2005) on their study human capital investment, economic growth and health spending the case of OECD economies. Using the Solow growth model, developed to discuss the health and economic growth. Their finding showed that there is convergence between developing and developed economies with regard to the physical and health capital. Moreover, the optimal steady state on government expenditure on health amounts are estimated assuming that the steady state condition spontaneously attains the golden rule consumption maximization result driven by the free market force. The results also revealed that the OECD economies have excessive health expenditure whereas, other economies show a decreasing pattern of reckless spending until their reach the optimal level. Dormont, Grignon and Huber (2006) reassessed the health expenditure growth relative to population growth France. They first assessed the decision to use health care services followed by the determinants of health expenditure in for the population group. The results revealed that population has little impact in determining health expenditure in France, furthermore, the results indicates that health expenditure is affected largely by the senior population group.

The determinants of both private and public expenditure on health were assessed by Bhat and Jain (2006) in India. The authors used fixed effect model, after applying Hausman test, to achieve the set objectives. Empirical results suggested that there is positive relationship among government spending on health, income and gross state domestic product. Their results further suggested that state government should allocate 0.43% of gross state domestic product to health expenditure, excluding funding from national government. The results, moreover postulates that for every 1% rise in state per capita income, government on healthcare expenditure has increased by around 0.68%. Lastly the results also suggested that large amounts of public health spending is spend on salaries rather than drugs and facilities.

In assessing causality among government spending on health and gross domestic product in Pakistan, Bukhari and Butt (2007) applied panel cointegration test. Their study applied panel cointegration test

postulated by Pesaran, Shin and Smith in 1999, which can test long run relationahip among health expenditure and economic growth disregarding the order of integration among the variables. The results revealed that economic growth is a major determinants of health expenditure in this economy, moreover, health expenditure grows at a faster rate than does of economic growth. Mosca (2007) examined decentralization as the determining factor of health spending for 20 OECD economies. The author used the Ordinary Least Squares and panel corrected standard errors (PCSE), to achieve the objectives. The results indicate that a decentralized health care setting tends to swell total health care spending. These findings lend support that supply related impact the overall health care costs and a decentralized health care setting inflate health expenditure in OECD. Thus, they suggest, If the aim of officials and health authorities is to compress the level of health spending, then decentralization does not seem to be the suitable resolution.

Public health care spending is determined largely by wage rises in excess of productivity growth (Hartwig, 2008). Moreover, the difference between productive growth and wage is found to add significantly to the explanation of public expenditure on health. This suggest that public expenditure on health can be increase by the labour price other than other factors. This results was discovered in the assessment of the drivers of public expenditure focus on unbalanced growth model of Baumol's using panel data of 19 OECD economies. The author applied three Robustness analysis namely: inclusion of other variables, parameter stability by splitting the estimation period by three, and parameter stability by dropping each economy one by one and re-estimate the model.

Colombier (2012) also assessed the drivers of public health expenditure, with special attention on Baumol's cost disease. The author used the Gourieroux-Holly-Monfort (GHM) test and the ANOVA F test, to test for time-specific and country effect. Further applied the assessed the consistency of the panel by fixed effect ad random effect carried out by Hausman specification test. The results depict the income is a key factor of public health expenditure, this suggested that Baumol's cost disease exert positive significant impact on health expenditure. In particular, the findings reveals that a 1% increase in the excess of wage increase over productivity growth in health care will increase the growth rate of public health expenditure by almost 0.2%. The author further suggested that Baumol's hypothesis is more applicable in public health sector. Bates and Santerre (2013) examined the determinants of public expenditure on health in 50 United States of America states. The main focus was to determinants whether the Baumol cost disease applies in in America. The authors used fixed effect model and two stage least squared estimation to achieve the objectives. The results provided that health care expenditure increase more rapidly when the states wage increases exceed productivity gains. In line with the above mention study, this study proposes that the United States health care sector supports the Baumol's cost disease.

In G7 economies, Verhoeven (2007*)* assessed the determinants of health and education expenditure. The study used data envelopment analysis (DEA) which allows one to recognize countries where the proportion of outcomes over spending is relatively high in link with other countries where it is comparatively low. The results showed that public expenditure on health and education differ between this economies. Both health and education was found to be significant related to economic growth in four of this economies. The authors further suggested that the effectiveness of education and health reform should aim at improving efficiency. This would take into consideration the stage at which the inefficiencies arise. Moreover, reforms should seek to balance decentralization and enhanced market competition with regulation to ensure accountability. Bokhari, Gai and Gottret (2007) examined government expenditure on health and its outcome in African countries. The authors used instrumental variables techniques (GMM-H2SL), by estimating the elasticity of health outcomes relative to government health expenditures and income while treating the variables as endogenous. The results revealed that while economic growth is certainly an important factor to health outcomes, government spending on health is just as important a factor in explaining economic growth in developing economies. They further suggested that allocating high budget on health is not a sufficient condition, if the corruption levels in this economies is very high.

In 44 African countries, Murthy and Okunade (2009) studied the major determining factors of public expenditure on health in Africa. The authors used a cross section data of 2001, OLS and LAE estimators, to examine government spending on health. Their results showed the health expenditure in majority of African countries is determined by real gross domestic product and real per capita foreign aid. Furthermore, their results revealed that health expenditure in the African context is a necessary good. They further suggested that the African government should increase government spending on health to improve the lives of the people of Africa. Potrafke (2010) assessed the determinants of growth in Public expenditure on health in OECD economies, with special focus on government ideology and electoral motives. The researcher used the least squares dummy variable estimator (fixed-effects) to estimate growth rate of public expenditure on health. The results revealed that government ideological motives have little impact in determining public health expenditure in this economies. Nonetheless, government in this economies devote more money on public health expenditure during the years of national government election.

Ordinary least squared was applied by, Barros (2010) in investigating the determinants of government expenditure on health, using the panel data for the OECD economies. The author used ordinary least squared to achieve the outcomes. The results showed that economies with higher health care expenditure per capita experience lower economic growth rate. He further suggested that this economies should reduce health care expenditure in order to achieve high level of economic growth. Moreover, the determining

factors of expenditure health growth should, thus, receive more attention from researchers and politicians, as it demonstrated to be difficult matter and do not constitute frank extensions of studies on the cross country deviation in the level of health care expenditures.

Prieto and Lago-Peñas (2012) studied the decomposition of the determinants of government expenditure on health in Spain for the period 1992 to 2005. They focus on the coexistence of models concerning the degree of decentralization of power and financing health care system in the region. The authors used the panel study techniques both fixed and random methods model to achieve the outcomes. The results showed that the estimated health expenditure does change when important variables are omitted and institutional arrangement. Furthermore, economic growth is affected positively by the increase in government expenditure on health. Chaabouni and Abednnadher (2014) analyzed the determinants of public expenditure on health in Tunisia for the period 1961 to 2008. The authors used Autoregressive Distributed Lag (ARDL) approach of Pesaran et al. (2001), because the model allows for different order of integration. The bounds test results showed that there is long run stable relationship between health expenditure and economic growth and population growth. While, granger causality results showed bidirectional relationship between health expenditure and income I both short and long run

Dynamic and standard fixed effects models were deployed by, Ke, Saksena and Holly (2011) in examining the determining factors of health spending in developing economies. The authors applied both dynamic and standard fixed effects models to discover the factors associated with the raise in total health expenditure and its main components particular, out of pocket payment and public health expenditure. They results revealed that public health expenditure does not increase faster relative to economic growth after taking other factors into consideration. Moreover, income elasticity is between 0.95 and 0.75 in the dynamic model while in the fixed effect model is larger. The Authors also found no variance in public health expenditure among insurance and tax-based health financing mechanisms. The study furthermore approves that the external aid for health cuts public health expenditure from domestic sources.

The economic determinants of health care expenditure in Zimbabwe was assessed by (Dhoro *et al.*, 2011). The authors applied Engle-Granger cointegration technique to explain the main factors that explain public health care spending in Zimbabwe and time series data was used for the period 1975 to 2005. The results revealed that the key determinants of health care spending in Zimbabwe are GDP per capita, population, inflation and foreign health aid. The authors recommended that if the government want to increase government expenditure on health should design policies that encourage economic growth, as growth is the main determinants of health expenditure. Sülkü and Caner (2011) conducted a study on health care

expenditure on gross domestic product in Turkey. They used the Johansen multivariate cointegration technique for the period 1984 to 2004. Their results revealed that the health care expenditure is not elastic to a change in income which indicate that health is a necessity in the economy of turkey. Moreover, the authors also found that the income elasticity of public health expenditure is less than one. Whereas, the income elasticity of private health care expenditure is greater than one, meaning private health care expenditure is the luxury good in the economy

Grigoli and Kapsoli (2013) examined the public expenditure on health with a special focus on its efficiency in emerging economies and developing economies. The authors used the Stochastic Frontier Model that control the socioeconomic determinants of public expenditure on health and provide economies specific estimates. The results revealed that both emerging and developing African countries have the lowest efficiency in health expenditure. Furthermore, the results indicated the at a current expenditure level, life expectancy can be push up by five years in the economies are efficient in public expenditure on health. Novignon, Olakojo and Nonvignon (2012) examined the effect of both public and private expenditure on health on health status in Sub-Saharan Africa. The objective was to determine the effect of health expenditure on the African population health status. Using panel data 1995 to 2010 for 44 Sub Saharan Africa economies. The authors used both fixed and random effect models to analysis the effect of health expenditure on health outcomes. The results revealed that health care expenditure has significantly and positive influence on health status by improving life expectancy at birth, reducing mortality and death rate. Public and private health care spending showed positive relationship with health status. However, public expenditure on health care spending had relatively higher impact than does of private expenditure.

The public expenditure on health, government effectiveness, education and the quality of life in Asia and Africa was studied by (Guisan and Exposito, 2010). The results revealed that the only way to improve health spending is to raise spending on education. Moreover, the effects of education on health have both defensive measures addressed to avoid malnutrition, water impurity and other negative circumstances. Hartwig and Sturm (2014) assessed the key determinants of public expenditure on health growth for 33 OECD economies. The authors used Extreme Bounds Analysis (EBA) which including all variables in the analysis that have been proposed as determinants in a certain field of research in order to find out which of them are robust. The results showed that economic growth and a variable representing Baumol's 'cost disease' theory appear as robust and statistically significant determinants of public health expenditure. Moreover, they recommended that the government of these economies should increase its spending on health for high growth purposes.

Eggoh, Houeninvo and Sossou (2015) examined government spending on health and education and their effect on economic growth in African countries. The authors used cross-section estimation to assess the long run relationship among the variables and generalized method of moment was applied to test the short run relation between the variables on dynamic panel. Their results revealed that government expenditure on education and health have a negative impact on economic growth. However, human capital indicators are positively affected by an increase in government expenditure on both health and education. Moreover, the results showed that government expenditure on education and health are complimentary, that is investment in education and health can be used jointly to improve human capital index.

Using the fixed effect model, Dorf and Freiholtz (2015) in assessing the connection among health and corruption in Sub-Saharan Africa. The authors applied a panel data for the period 2003 to 2011. The results revealed that healthier population have positive impact on economic growth and corruption has a negative impact on the population's health. The results also revealed that corruption has a negative impact on under five mortality rate and life expectancy in the economy. Therefore, suggest that fighting corruption could lead to better health of the people and increase in economic growth. Ramashamole and Thamae (2015) studies the growth of health expenditure in Lesotho for the period 1980 to 2011. The objective of the study was to determine the factors that causes growth in government expenditure on health, and whether both public and private health expenditure follow the same pattern. This objectives was achieved by Fully Modified Ordinary Least Squares (FMOLS) cointegration approach. The results, revealed the government expenditure on health is better explained by income in Lesotho, with public expenditure more responsive to income relative to private health.

Phi (2017) assessed the determinants of health expenditure in OECD economies with focus on economic growth, demographics, medical progress and health care systems. The author use both fixed effect and random effect models to examine the key drives of health expenditure in this economy. The results revealed the economic growth is the key determinants to health expenditure in this economies while positive correlation between health expenditure and income was found to be significant. This suggest that health expenditure is highly responsive to income in the region, with elasticity value of 0.78. Finally, the authors suggested that the government of this economies should provide more of health expenditure, since health care is responsive to income change.

In conclusion, it appears that the key determinants of government expenditure on health are: population growth, economic growth, life expectancy and income. Most studied applied OLS, 2SLS, and general least

square, with no attention given to panel and FMOLS and DOLS. In addition, there is no existing empirical literature studies based on SADC countries. Therefore, this gap warrants an investigation in SADC.

3.4 CONCLUSION

The objective of this was to review literature on the determinants of public health and education expenditure. It is inevitable that there are a number of factors determining public spending on health and education. However, the determining factors of education and health expenditure vary from country to country. Public expenditure theory, baumol's unbalance growth and the displacement effect were reviewed under theoretical framework. This theory are used as a foundation for determining the factors that explain the growth in public spending on health and education. All this theories are compatible with the present study.

Empirical framework revealed that public expenditure on health is mainly determined by per capita income, population above the age of 55 and economic growth. However, most work on health expenditure has been done in developed economies. Moreover, literature also show connection between health expenditure and education expenditure, where health expenditure is determined by the level of education attained by the individuals. Education was found to mainly determine by economic growth, per capita income and population. This study will be different from other study by incorporating corruption in the model. Assuming that the present of corruption in the economy inflate public expenditure on health and education. The next chapter will provide the methodology applied in this study to achieve the set objective

CHAPTER FOUR: RESEARCH METHODOLOGY

4.1 INTRODUCTION

This chapter outline the investigation approaches applied in this study to achieve and answer both the general and specific goals outlined in the preceding section. The first subsection provide a brief justification of the use of panel data methods, followed by the model to be estimated, the section also includes other test such as panel unit root and cointegration tests. Thirdly, estimation methods that contains dynamic OLS and fully modified OLS. Section four present granger causality test methods.

4.2 JUSTIFICATION OF PANEL DATA METHODS

A panel data set it holds repeated observations over the same cross section such as household, individuals and firms, collected over time. N in the panel data represent individuals in the panel or cross section whereas, t represent the time. In this study, macro panel data of 15 SADC economies for the period 1997 to 2016 is applied. Empirical work reveal a number of benefits brought forth by the use of panel data (Asteriou and Hall, 2015; Baltagi, 2008; Breitung and Pesaran, 2008; Im, Pesaran and Shin, 2003).The presence of repeated observations of the same unit allows investigators to specify and estimate more complicated and realistic model than a single cross section or time series. Panel study give more informative data, less collinearity between variables and more degree of freedom.

4.3 MODEL SPECIFICATION

This study estimate two models, one for education expenditure and the other for health expenditure in SADC. The most prominent author on the determinants of education expenditure is Busemeyer (2007), the author proposed a number of variables that can be the possible determinants of public education expenditure in OECD economies. In the panel data study by Busemeyer (2007), identified a number of variables that explains variation in public expenditure on education in OECD economies. In particular, tertiary enrolment, public social spending, economic growth per head, population growth rate, federal/unitary country as dummy variable, and fiscal decentralization. The estimated model took this form

$$REDUE_{it} = \beta_0 + \beta_1 TE_{it} + \beta_2 PCS_{it} + \beta_3 GDP_{it} + \beta_4 POP_{it} + \beta_5 FD_{it} + \beta_6 FC_{it}\, \varepsilon_{it} \ldots\ldots 4.1$$

Where REDUE is the real education spending as a percentage of GDP, TE is tertiary gross enrolment, and PCS is total social spending as percentage of GDP, GDP is economic growth rate, POP is population growth rate, and FD is federal country federalism dummy variable, FC is the fiscal decentralisation which is the degree of tax revenue decentralisation. To examine education expenditure the above stated model will be

modify by adding corruption and health expenditure removing, FC and FD, since FC and FD are dummy variables. So that the model used in this study will take this form:

$$EDU_{it} = \beta_0 - \beta_1 COR_{it} + \beta_2 GDP_{it} - \beta_3 POP_{it} - \beta_4 HE_{it} + \beta_5 TE_{it} + \varepsilon_{it} \ldots\ldots 4.2,$$

Where:

EDU = Education Expenditure

COR = Corruption.

POP = Population Growth rare.

HE = Health Expenditure as Percentage of GDP.

GDP = Gross domestic product.

TE= Tertiary Enrolment.

ε = Error term.

Where β_1, β_2, β_3, β_4 and β_5 are the parameters to be estimated in this study. Beta zero (β_0) is the constant. The error term in the model is included to factors or variables which not included or accounted for in the model such as; the randomness of human behaviour, the vagueness of the theory (Gujarati and Porter, 2010).

Education expenditure is expected to have both negative and positive connection with health expenditure in SADC. Negative relationship will be expected if governments of SADC countries prefers one over the other, which indicates that this variables are substitutes. Positive relationship will be expected if governments of SADC gives equal weight to the variables, which indicates that this variable are complements. Population is expected to have a negative impact on government expenditure on education. Population growth will put pressure on government expenditure on education, as government must finance the growing population, from primary to tertiary level.

Corruption is expected to have negative impact on education expenditure in SADC economies. This is because as corruption reduce the money which was budget on education at all levels, resulting in additional funds been required. Economic growth is expected to have positive impact on education expenditure. Growing economy will results in higher revenue for government, which will results in higher budget

allocation on education. Moreover, education expenditure is expected dot have a long run positive impact on economic growth, as the educated people will contribute positively through innovation and development.

For health model, this study will adapt and modify, Yildirim and Sezgin (2002) model which took the following form:

$$GRHE_t = \beta_0 + \beta_1 GRMX_t + \beta_2 GRTX_t + \beta_3 GREN_t + \beta_4 GRY_t + \beta_5 GROLD_t + \beta_6 MED_t + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 4.3$$

Where (GRHE) is the growth rate of health expenditure; GRMX is the growth rate of defence expenditure; GRTX is the Growth rate of taxes; GREN is the Secondary school enrolment growth rate; GRY is the GDP growth rate; GROLD is Growth rate of population; MED is the Number of people under medical care. This study modify the model by removing all the independent variables except of (GRY) growth rate and (GROLD) growth rate of population, due to the absence of the data in SADC. This study add education expenditure and corruption in the model, so that the model will takes this form:

$$HE_{it} = \beta_0 - \beta_1 COR_{it} - \beta_2 EDU_{it} + \beta_3 POP_{it} + \beta_4 GDP_t + \beta LIFE_{it} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots 4.4$$

This study take different notations from that of (Yildirim and Sezgin).

Where:

HE= Health Expenditure

COR = Corruption

EDU = Education Expenditure

POP = Population Growth rate

GDP = Gross Domestic Product

LIFE = Life Expectancy at birth.

Population growth is expected to have negative impact with health expenditure. Population has been the key driver of government expenditure on health, as government will need to increase expenditure on health as a result of increased population. People demand higher health service on their early stage (birth) and when they age (older). This exert upward pressure on health expenditure, as population growth is the

positive different between birth rate and death rate. Corruption is expected to have a positive connection with health expenditures, as more money will be required to finance corruption act by government officials. However, corruption affect health expenditure in a negative ways, since corruption will inflate health expenditure.

Life expectancy is expected to have positive relationship with health expenditure. One expect to see life expectancy increase as results of increase government expenditure on health, holding other things constant. Countries with high life expectancy have higher expenditure on health such as United States of America. Health expenditure is expected to have positive relationship with economic growth. The productivity of the people depends on their health status, as such increased health expenditure will results in growth from productive employees. The next section provide the sources and description.

4.4 DATA SOURCE

All the data is obtained from the African development indicators published by the World Bank. The data applied is the annul data covering the period from 1997 to 2016. The education expenditure collected from African development indicators and UNESCO data, it worth noting that it had missing values in all the sources, thus the education expenditure data was extrapolated to fill in the miss values. The unit of measure of all the variables are in percentages except of corruption which is an index.

Table 4.1: SADC Variables Description

Variable	Definition	source
HE	HE, is Health Expenditure as percentage of GDP for each country.	World Bank under African development indicators.
EDU	EDU, is education expenditure as percentage of GDP for each country.	World Bank under African development indicators and UNESCO data.
LIFE	LIFE, is life expectancy at birth for each country in years.	World Bank under African development indicators.
POP	POP, the population growth rate for individual country.	World Bank under African development indicators.
COR	COR, is Corruption values are measured as an indicator of prevalence of corruption on -2.5 to 2.5 rating method.	World Bank under African development indicators.
GDP	GDP, is Gross domestic product rate for each country.	World Bank under African development indicators.
TE	TE, is tertiary enrolment, for each country.	World Bank under African development indicators and UNESCO

4.5 PANEL UNIT ROOT

Unit root or stationarity is a process where the mean and variance of the series is not changing over time (Asteriou and Hall, 2015). Granger and Newbold (1974) claimed that, if two independent non-stationary series is regressed on one another, it's more likely that to receive spurious relationship between the two variables. Cointegration necessitate that the series be integrated of the same order. Therefore, to validate cointegration between government expenditure on health and education to their potential determinants, entails that the series be integrated for the same order.

In pure time series study Phillips Perron (PP) and Augmented Dickey Fuller (ADF) are frequently used to determine the absent or presences of unit root in the series. In the panel study however, the estimation

procedures is abstract than those applied in time series data. The complexity prevail because in panel data, estimation appears to be the degree heterogeneity. Taking the above presented problem, a variety of procedures have been developed with the aim to combine time series and cross section dimensions.

Panel unit root tests, broadly, are grouped into two. The first one assumes a common unit root process, in other words, it assumes homogenous autoregressive coefficient among the cross section. These includes the tests pioneered by Breitung (2001), Hadri (2000), and Levin, Lin and Chu (2002). The second group assumes individual unit root process, that is, first order autoregressive parameters differ among the cross section (Choi, 2001; Im *et al.*, 2003; Maddala and Wu, 1999). In this study the latest models from each group is used, in particular (Im *et al.*, 2003; Levin *et al.*, 2002). The null hypothesis for both test is that the series is non-stationary.

4.5.1 LEVIN, LIN AND CHU UNIT ROOT TEST

The first model to be develop to test for a panel unit root is the Levin and Lin model, which was developed in 1992. This work was presented in 1992 however, published in 2002 with an addition co-author Chu. This model is seen as an extension ADF test. The model assume homogenous behavior of stationarity all cross section in a manner that individual autoregressive coefficient is identical in all units. The null hypothesis is that there is a common unit root, against the alternative of no common unit root in the cross section (Levin *et al.*, 2002). Levin, Lin Chu can be presented in the fashion:

$$\Delta y_{i,t} = \theta_i y_{it-1} + \delta x_{it} + \varepsilon_{it} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 4.5$$

Where *i* represent the cross section data and *t* time series data time period, *x* indexes of explanatory variable and $\boldsymbol{\theta}$ represent individual autoregressive coefficient. The null hypothesis is that $\boldsymbol{\theta}$ is equal to zero whereas, the alternative says $\boldsymbol{\theta}$ is greater than zero. Contrary to the benefit that this test bring, the LLC has a number of limitation. One, the test assumes that there is independence across units, therefore once the assumption is violated the test cannot be applied. In other words, once there is correlation between cross section, LLC test become irrelevant. Two, under the assumption that autoregressive parameters are homogenous across all units, the alternative hypothesis stand strong in most cases, whereas the null hypothesis applies in specific cases (Im *et al.*, 2003).

The LLC test suggest s three steps procedures to apply the test:

Step one, is to perform separate Augmented Dickey-Fuller (ADF) test regressions for each cross section:

$$\Delta y_{it} = \rho_i y_{i,t-1} + \sum_{L=1}^{p_i} \theta_{iL} \Delta y_{it-L} + \alpha_{mi} d_{mt} + \varepsilon_{it} \dots\dots\dots\dots\dots\dots\dots\dots\dots 4.5.1$$

where ε_{it} indicates the residual process of AR equation, if the process are AR process and the AR order ρ_i are specified correctly, then $\varepsilon_{it}=\varepsilon_i$ holds. Moreover, the lag lengths in the autoregressive model have to be raised appropriately as a function of the time dimension of the panel, to ensure consistency if the processes ε_{it} are real ARMA processes.

The second step in the LLC test is to approximation the ratio of the long run to short run standard deviation. Where the null hypothesis is the presence of the unit root. The second step apply the following equation:

$$\sigma_{yi}^2 = \frac{1}{T-1}\sum_{t-1}^{T} \Delta y_{it}^2 + 2\sum_{L-1}^{\acute{K}} w_{\acute{K}L} \left[\frac{1}{T-1}\sum_{t=2+L}^{T} \Delta y_{it}\Delta y_{i,t-L}\right] \dots\dots\dots\dots\dots 4.5.2$$

Where $\acute{K}$ is a truncation lag that can be data dependent. Moreover, $\acute{K}$ must be obtain in the way that ensures consistency in σ_{yi}^2, where is σ_{yi}^2 denotes the long Run standard deviation.

Finally, the last step in the application of LLC test, is to calculate the panel test statistic. This is achieve by running a pooled OLS regression:

$$\check{e}_{it} = \rho\tilde{v}_{it-1} + \grave{\varepsilon}_{it} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 4.5.3$$

Based on N$\check{T}$ observation where, $\check{T}$ = T - $\dot{\rho}$ -1. $\check{T}$ is the mean number of observation per individual in the panel. $\dot{\rho}$ is the mean lag order of individual ADF regressions (Baltagi, 2008). The null hypothesis is $\rho = 0$.

4.5.2 IM, PESARAN AND SHIN TEST

Im *et al.* (2003) believed that Levin, Lin and Chu restriction of individual autoregressive of the coefficient being homogeneous was the essential limitation of the LLC test. These researchers extended the LLC test by allowing the individual autoregressive coefficient to be Heterogeneity. IPS test provide individual estimation for each N cross section (*i),* permitting varying specification of the parametric values, the residual variance and the lag lengths. This test is built on examining the null hypothesis of individual unit root against the heterogonous unit root (Im *et al.*, 2003). Therefore the two test will use the same model however, the difference will be on the unit root testing:

$$\Delta y_{i,t} = \theta_i y_{it-1} + \delta x_{it} + \varepsilon_{it} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 4.6$$

While the null hypothesis and the alternative hypothesis will take this form:

H_0: $\Theta_i = 0$ for all *i*

H_1: $\Theta_i < 0$ for at least one i

The null hypothesis for this test is that the series is has no unit root, and the opposite hypothesis is that the series has unit root. Conversely, under LLC test alternative hypothesis assumes that the series is stationary. This test is used in this study to correct the limitation brought forth by the LLC test.

4.6 PANEL COINTEGRATION TESTS.

Traditionally, time series data has tendency to trend which can results in a major problem in econometrics called spurious regression or meaningless regression. Macroeconomics variables are increasing or decreasing over time meaning that spurious regression is inevitable in time series. Gujarati and Porter (2010) definition panel data is the combination of both time series and cross sectional data (Asteriou and Hall, 2015), therefore panel data has inherited both the weakness and the strength of both time series and cross section data. Similar to time series data cointegration, panel data test for cointegration can only be possible when the series is integrated for the same order. Therefore stationarity is also prerequisite of cointegration in panel data. Indeed, one vital benefit of working with a cointegrated panel approach of this type is that it permits investigators to selectively pool the long run statistics enclosed in the panel while allowing the short run dynamics and fixed effects to be heterogeneous between different members of the panel.

This study uses panel data cointegration techniques in order to determine the long run relationship between of government expenditure on education and health to their respective possible determinants in SADC countries. When variables are cointegrated, it suggest that the variables move along over time so that short term disturbance are adjusted in the long run. Variables should be integrated for the same order to form a cointegration relation. There are a number of models designed to test for cointegration within the panel data studies (Kao, 1997; Kao, 1999; Levin *et al.*, 2002; Maddala and Wu, 1999; McCoskey and Kao, 1998; Pedroni, 1999). This study will apply both Pedroni and Kao tests for long run relationship tests between the variables. This two cointegration tests both based on residuals analysis for cointegration test and both assume one cointegrating vector.

4.6.1 PEDRONI PANEL COINTEGRATION TEST

Pedroni (1999) offered numerous tests for cointegation testing in panel data studies. Pedroni cointegration test is based on the assumption that there is heterogeneity of the cointegrating vector between individuals members of the panel. The researcher also add that for panels with homogeneous cointegrating vectors, special result holds in such a way that residual-based tests for no cointegration null have distributions that are asymptotically equivalent to panel unit root tests if the regressors are exogenous (Pedroni, 1999).

The difference between Pedroni cointegration test and McCoskey and Kao tests, is the fact that this model assumes that trends of the cross section with respect of the null hypothesis is there is cointegration. The test is classified into two categories: one, involve averaging test statistic for cointegration in both time series and cross section, two averaging is done in pieces so that limiting distribution are based on restrictions of piecewise numerator and denominator terms (Baltagi, 2008). Pedroni proposed the following model in test for cointegration between the variables which is residual based:

$$y_{it} = \gamma_{it} + k_{it} + \lambda_i x_{it} + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 4.7$$

$$\varepsilon_{it} = \phi_i \varepsilon_{it-1} + \omega_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 4.8$$

Where for i=1, 2 .., N for each unit in the panel, t=1, 2…, T. Where γ denote the fixed effect and $\boldsymbol{\lambda}$ represent the slope coefficient permitted to change cross individuals unit in equation 4.7. In model 4.8, ϕ is the autoregressive coefficient of the residual ε_{it} in equation 4.7. Pedroni divided the test into two categories namely, within and between dimension.The test statistics under the within-dimension are; panel PP-statistics panel rho-statistics, panel v-statistics and panel ADF-statistics. While under between-dimension is the group PP-statistics, group rho-statistics and group ADF statistics. The study uses of all 7 tests statistics to make a choice whether there is cointegration between variables by observing at the majority test statistics that checks the existence of cointegration.

4.6.2 KAO PANEL COINTEGRATION TEST

Kao presented ADF and DF test for long run connection between variables in the panel data study. Kao cointegration test is based on homogenous panel, which further assumes common cointegrating vector. This test is also the residual based cointegration test (Kao, 1997). The null hypothesis is that the residual are non-stationary or no cointegration, whereas the alternative hypothesis is that the residuals are stationary or cointegration between the variables. According to Kao (1999) the residuals based cointegration test can be used to model:

$\hat{u}_{it} = e u_{it-1} + \nu_{it}$ 4.9

Where ùit is the estimated residuals from model 4.9. The null hypothesis to be tested for this model is that there is no long run relationship and whereas, the alternative hypothesis is that there is long run relationship among the variables.

4.7 ESTIMATION METHODS

There are numerous techniques available for parameters estimation. First there are stationary estimation methods which includes fixed and random effect method. This estimation techniques requires the series to be integrated for the same order. Secondly, there are non-stationary estimation methods, which contains the canonical cointegrating regression, fully modified OLS, and the dynamic OLS method. This estimation techniques can be applied to the series which is not integrated for the same order. In this study, non-stationary estimation techniques, fully modified OLS and dynamic OLS since the series is not integrated for the same order.

4.7.1 FULLY MODIFIED ORDINARY LEAST SQUARES (FM-OLS)

In 1990, Phillips and Hansen modified OLS to produce FM-OLS, to provide optimal estimates of cointegrating regression. The reason behind modifying OLS was to account for serial correlation effects and for the endogeneity in the regressors that results from the existence of cointegrating relationship between variables. This test applies semi-parametric correction to eradicate the difficulties caused by the long run relationship between the cointegrating equation and stochastic regressor's innovations. The results from FM-OLS estimators are asymptotically unbiased and has fully effective mixture normal asymptotic permitting for standard Wald test, using asymptotic Chi-squares statistical inference. Moreover, it also produces nuisance parameters free standard normal distribution (Pedroni, 1999). The panel fully modified ordinary least Squares estimator for long run parameters can be defined geometrical as follows:

$$\beta_i fmols = N^{-1} \sum_{i-1}^{N} \left[\sum_{i-1}^{T} (x_{it} - \ddot{X}_{it})^2\right] \left[\sum_{t-1}^{T} (x_{it} - \ddot{X}_{it})\, \mu_{it}^{*} - T_{\Upsilon_i}\right] - 1 \quad \text{.....4.10}$$

Where: $\mu_{it}^{*} = \mu_{it} - \frac{\acute{L}_{2li}}{\acute{L}_{22i}} \Delta x_{it} \tilde{y}_{it} \equiv \acute{\Gamma}_{2li} + \Omega_{2li}^{0} - \frac{\acute{L}_{2li}}{\acute{L}_{2li}} \left(\acute{\Gamma}_{22i} + \Omega_{22i}^{0}\right)$ 4.10.1

The former equation describes the transformed variables of y_{it} to attain endogeneity correction. The latter equation also define the serial correlation term and L_i is a lower triangular decomposition of Ω_i which is the covariance metrics and can be defined as follows:

$$\Omega_i = \begin{bmatrix} \Omega_{11} & \Omega_{12} \\ \Omega_{21} & \Omega_{22} \end{bmatrix}$$.....4.10.2

Where Ω_{11}, is the long-run scalar variance of the residual μ_{it} and Ω_{22} is the $M \times M$ long-run covariance among. $\varepsilon_{it.}$ is $M \times 1$ vector that provides the long-run covariance among the residuals μ_{it} and each of the ε_{it} .

4.7.2 DYNAMIC ORDINARY LEAST SQUARES (DOLS)

The dynamic ordinary least squares was established by Saikkonen (1991) and Stock and Watson (1993) to estimate and test hypothesis about cointegrating vector to panel data. Panel dynamic ordinary least squares is wholly parametric and gives a calculation convenient. However, this method present two limit distribution. One distribution is found for a fixed number of cross sectional units N and letting T to be infinite, where the converges in distribution to a fraction of Wald test and Brownian motion for testing a set of s linear constraints has a limiting χ^2(s) distribution. Two, sequential limit distribution by first letting T infinite for fixed N, and then letting N be infinite. In this case, panel dynamic ordinary least squares has a limiting Gaussian distribution and as in the static N case, while Wald test has a limiting chi-square distribution. One of the weakness of using the DOLS estimators is that degrees of freedom are lowered by leads and lags. Panel DOLS has two prominent benefit, firstly, super consistency meaning that convergence towards the asymptotic distribution happens at rate T but it utters nothing about the sampling variability of the estimator for a fixed value of T. Lastly, DOLS normally performs better under the short-run dynamic designs that we consider and can achieve a striking improvement in estimation precision over that of single-equation DOLS with even a small number of cross-sectional units. The panel dynamic ordinary least Squares estimator for long run parameters can be defined geometrical as follows:

$$y_{it} = \alpha_i + \beta i x_{it} + \sum_{k=q}^{q} c_{ik} \Delta x_{it+k} + \mu_{it}$$.....4.10.3

Where α_i represent cross section specific effects and c_{ik} is the coefficient of a lead or lags of first differenced exogenous variables. While μ_{it} is the error term which is assumed to be integrated for order zero. The parameter estimates of DOLS can be defined as follows:

$$\beta i DOLS_{it} = N^{-1} \sum_{I-1}^{N} \left(\sum_{t-1}^{T} \mathrm{z}_{it} \hat{\mathrm{Z}}_{it} \right) \left(\sum_{t-1}^{T} \mathrm{z}_{it} y_{it}^{*} \right)^{-1}$$.....4.10.4

Where z_{it}=$(x_{it} - \ddot{\mathrm{X}}_{it} \Delta x_{it-k} \ldots\ldots \Delta x_{it+k})$

4.8 GRANGER CAUSALITY WALD TEST

Correlation between two more variables does not mean that one variable causes other variable. For example, one cannot say since there is positive correlation between teacher's salaries and alcohol consumption therefore, increase in teacher's salaries will causes an increase in alcohol intake. Causality in econometrics differs from everyday use of the word, since in econometrics refers to the ability of one variable to predict the value of another variables. The objective of this study is define the determinants of government expenditure. Therefore causality is the relevant instrument to achieve the objectives set in this study. There are a number of test for causality: Granger causality, Sim causality and VAR causality, nonetheless this study will apply Granger causality.

Granger (1969) developed technique to help one decides on causality among the variables. Granger causality test is the simplest test in test for causality which defines causality as follows: a variable say Y_{it} is said to Granger cause X_{it}, if the latter can be estimated with great accuracy by using the past value of the former variable. Granger causality uses the following vector in estimating the vector model:

$$Y_{it} = \beta_0 + \beta_1 X_{it} + \beta Y_{t-1} + \varepsilon_{it} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 4.10.5$$

$$X_{it} = \beta_0 + \beta_1 Y_{it} + \beta X_{t-1} \varepsilon_{it} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots 4.10.6$$

In this study, causality is exercised to determine the potential causality between education expenditure and health expenditure in SADC. This is informed by empirical worked outlined by a number of authors. The null hypothesis is that Y does not Granger causa X in the first equation, and X does not granger cause Y in the second model. Null hypothesis is rejected when the probability value is less than 10% level of significant or when the F-statistic absolute value is less than two

4.9 CONCLUSION

The purpose of this chapter was to present the data and econometric methods that are applied in this study. The study applied panel data analysis econometric method. This study applied both Levin, Lin and Chu, and Im, Pesaran and Shin tests, to test stationarity among the panel. In respect of panel cointegration analysis the study deployed two panel cointegration tests, which are Petroni, and Kao panel cointegration. This study further applies fully modified OLS and dynamic OLS as estimation techniques. Finally, Granger causality test, is applied to test for causality between government expenditure on health and education in

SADC countries. The principal role of this chapter was to deliver the information desired for interpreting the results from the econometric analysis.

CHAPTER FIVE: PRESENTATION AND ANAYSIS OF EMPIRICAL RESULTS

5.1 INTRODUCTION

This chapter present the empirical results of the study. Moreover, this section answers the question posed in the introduction of this study. What are the determinants of education and health expenditure in SADC region? This section is organized as follows: the first section present description statistics of the data used in this study, section two present unit root tests or stationarity results both formal and informal testing. The third section discussion and presentation of cointegration results. The forth section will provide estimation techniques, that is, the fully modified OLS and Dynamic OLS. Granger causality Wald test. Last section provide the conclusion.

5.2 DESCRIPTIVE STATISTICS

The descriptive statistics measures the central tendency, dispersion, nature and statistical distribution, and statistical significant. Where the mean and median measures the central tendency, standard deviation measures the dispersion, and nature and statistical distribution are measured by skewness and kurtosis. Jarque-bare and probability values are used to estimate the statistical significance of the results. Table 5.1 shows that government expenditure on education in SADC had an average value of 4.682% and the median of 4.133% for period under study. The median and mean are not far apart from each other. The minimum annual expenditure on education is 0.123% whereas, the maximum expenditure is 13.219%. The standard deviation is 2.717%, this indicates that the increase in education expenditure varied across the sample countries. Health expenditure on the other hand, had a mean value of 3.286% of the study period. The minimum annual expenditure on health is 0.044%, while the maximum expenditure is 9.087%. The standard deviation of health expenditure in SADC is 1.585%. This results are in line with those of Nyamongo (2008), but differ in the magnitude as Nyamongo studied was for 26 African countries

Population growth grow by 2.199% on average in SADC for the period 1997 to 2016. The minimum growth rate of population in SADC is negative 2.628%, while the maximum increase rate is 3.575%. The standard deviation is 0.988%. In SADC corruption is -0.278 on average which indicates that the corruption level in SADC is very high. The minimum (worse) corruption indicator value in SADC is negative 1.720, whereas the maximum (good) corruption indicators value is 1.160. The standard deviation is 0.702. On average SADC economies grow by 4.302% for the period under study. The minimum growth rate in SADC for the period under study is negative 17.660, with the maximum growth of 22.599%. The standard deviation of economic growth in SADC is 4.513%.

Furthermore, the table shows that the descriptive statistics. The mean values of education, health, gross national income, population and corruption are greater than their median values. This indicates that the distribution of these variables is positive skewed. This further indicates that the variables are normal distributed. Gross domestic product is the only variable, that the mean value is less than median value. This indicates the gross domestic product is negatively skewed, and its series is not normal distributed.

The values of standard deviation is depicted in the table below, which are much lower than off those mean and median except of gross domestic product and corruption which are higher. This clearly shows that there are insignificant variations in the values of the variables used in this study. The skewness values are also shown in the table, where education, health, population, corruption and gross domestic product have the value next to zero. This imply that the variables are not asymmetric rather symmetric.

The Kurtosis values, furthermore, of education, population are not far higher than the normal Kurtosis values of three. This demonstrate that the peak of the statistical distribution of the variables are normal distributed. However, the values of the other variables are higher than the normal Kurtosis value. This shows that the peak of the statistical distributions of these variables are high than the normal distribution. This kind of distribution is known as leptokurtic.

Table 5.2: Description statistics SADC economies

	EDU	HE	TE	LIFE	POP	COR	GDP
Mean	4.682	3.286	6.686	56.39	2.119	-0.278	4.302
Median	4.133	3.090	4.442	55.00	2.287	-0.335	4.478
Maximum	13.219	9.087	40.043	74	3.575	1.160	22.599
Minimum	0.123	0.044	0.0123	21	-2.628	-1.720	-17.668
Std. dev	2.717	1.585	7.479	8.521	0.988	0.702	4.513
Skewness	0.8654	0.9738	2.283	0.347	-0.7459	-0.0475	-0.6802
kurtosis	3.3010	4.4917	8.658	3.289	3.7571	2.1586	8.0643
Jarque-Bare	38.5851	75.240	66.015	7.098	34.9881	8.9612	343.7366
probability	0.0000	0.0000	0.000	0.028	0.000	0.0113	0.0000
sum	1404.785	985.8866	2006.024	16917	635.7490	-83.5100	1290.656
Sum Sq. Dev	2208.774	751.1650	16726.01	21711.37	292.0868	147.6391	6089.881
observations	300	300	300	300	300	300	300

The measures of the statistical significance of the distributions based on the Jacque-Bera statistic are shown on the table which have zero probability value. This indicates that the descriptive statistics are significant and that they are normally distributed. Therefore, the variables used in this study are normally distributed for number reasons, which are: (a) the mean and the median are significantly not different, (b) the values of skewness of the variables used in the study are closer to zero, (c) the Kurtosis of the variables are closer to 3.0, and (d) the Jacque-Bera Statistics are significant. Next subsection will test the series for unit root and cointegration.

5.3. PANEL UNIT ROOT RESULTS

Stationarity is a prerequisite of cointegration in time series analysis. Testing for stationarity can be done in two ways; one informal test, which is the graphical analysis of the series and two formal tests, which are statistical testing procedures. Graphical examination of the series is very important because it permits one to detect any form of capturing errors, existence of structural drift or breaks which may distorts the unit root test results. Appendix A and B, is the graphical examination of education and health expenditure and their potential determinants. The graph shows that before differencing the series education expenditure, gross domestic product, corruption and population growth rate shows signs of stationarity. However, gross national income and health expenditure susceptible of non-stationarity, but after differencing the variables give promise to stationarity.

The next step is to test the data for stationarity as a quest to cointegration using formal test, since informal tests have confirmed the possibility of stationarity. Levin, Lin and Chu, (2002) and Im Perasan and Shin (2003), panel unit root test are used to test for stationarity in the series, as outlined in chapter four. Table 5.3, shows Levin, Lin and Chu panel unit root for SADC economies. The first column shows the order of integration, followed the variable interest. The second column is the unit root test Levin, Lin and Chu, which can be tested under Constant, Constant and Trend, and None. Table 5.4 reveal Im, Pesaran, and shin panel unit root test, which can be test under Constant, Constant and Trend only.

Levin, Lin, and Chu test reveal that education expenditure (EDU) in SADC region is non-stationary at level, with the probability value above the significant level. Nonetheless, Im, Pesaran, and Shin test shows the absence of non-stationarity in education expenditure in SADC economies with the probability value of 0.0000 under both constant, and trend and constant. Therefore minority, two out of five, of the test confirms that education expenditure is non-stationary at level. Therefore, education expenditure need to be difference in order to achieve stationarity. Education expenditure after been difference is shows is stationary on all test at 1% level of significant. Health expenditure (HE) unit root result shows that health expenditure is not stationary at level under two test the Levin *et al.* (2002) and Im *et al.* (2003). However, at first difference health expenditure (DHE) unit root test shows that health is stationary at 1% level of significant under all tests.

Table 5.3: Levin, Lin and Chu panel unit root test, SADC economies

		Levin, Lin and Chu		
Order of integration	variable	constant	Trend & constant	none
Level	EDU	0.119	0.154	0.864
First difference	DEDU	0.000***	0.000***	0.000***
Level	HE	0.218	0.593	0.859
First difference	DHE	0.000***	0.000***	0.000***
Level	GDP	0.000***	0.0005***	0.002***
Level	POP	0.000***	0.0000***	0.053*
Level	LIFE	0.189	0.000***	1.000
First difference	DLIFE	0.014**	0.925	0.000**
Level	TE	0.994	0.313	1.000
First difference	DTE	0.018**	0.017**	0.000***
Level	COR	0.000***	0.062*	0.421

(*), (**), (***) represent 10%, 5% 1% level of significant respectively.

Table 5.4: Im, Pesaran and Shin panel unit root test in SADC.

		Im, Pesaran and Shin	
Order of integration	variable	constant	trend & constant
Level	EDU	0.000***	0.012**
First difference	DEDU	0.000***	0.000***
Level	HE	0.181	0.383
First difference	DHE	0.000***	0.000***
Level	LIFE	0.989	0.000***
First difference	DLIFE	0.073*	0.542
Level	GDP	0.000***	0.007***
Level	POP	0.000***	0.000***
Level	TE	1.000	0.467
First difference	DTE	0.000***	0.000***
Level	COR	0.011**	0.056*

(*), (**), (***) represent 10%, 5% 1% level of significant respectively.

Gross domestic product (GDP) is stationary at level, where Levin, Lin and Chu test show stationary at 1% level of significant under constant, constant and trend, and none. This results are also confirmed by Im, Pesaran, and Shin, under constant and constant and trend. Therefore, gross domestic product has no unit root at level. Population (POP) is also test unit root using the similar tests, which shows stationary at level on both test at 1% level of significant. Levin, Lin, and Chu test showed some signs of non-stationarity only at constant. Nonetheless, majority, four out of five, of the test proved that population is stationary at level.

Levin, Lin and Chu test, shows that life expectancy (LIFE) is non-stationary at level under constant and none but stationary at trend and intercept. However, Levin, Lin and Chu test shows that life expectancy is stationary first difference under constant and none at 5% level of significant, but not stationary trend and

intercept. Therefore, two test shows that life expectancy is stationary at first difference. Im, Pesaren and Shim shows that life expectancy is non-stationary at level under constant but stationary at trend and intercept. The test further shows that at first difference, life expectancy is stationary at constant but non-stationary at trend and intercept. Majority of the test shows that life expectancy is stationary at first difference.

Levin, Lin and Chu, and Im, Pesaren and Shim tests shows that tertiary enrolment (TE) is not stationary at level. Tertiary enrolment is only stationary at first difference, where Levin Lin, and Chu test shows that tertiary enrolment is stationary and significant at 5% level of significant. Im, Pesaren, and Shin, however shows difference results where tertiary enrolment is only stationary at 1% level of significant. However, since majority of the test, three out of five, state that tertiary enrolment is stationary at 1% level of significant. Therefore, we can concluded that tertiary enrolment is stationary at 1% level of significant.

Under Levin, Lin, and Chu corruption (COR) only show non-stationarity at none with the probability value of 0.4217. Nonetheless, corruption is stationary at level with the probability of 0.0001 and 0.0624 at constant, and trend and constant respectively. This were also confirmed by Im, peseran, and Shin test with the probability of 0.0111 and 0.0560 at constant, and trend and constant. Therefore majority, four out of five, of the test show that corruption is stationary at level.

In conclusion, the graphical examination are conforming to those of Levin, Lin and Chu, and Im, Peseran and Shim tests. Furthermore, the results shows that gross demotic product, corruption, population and education expenditure are stationary at level I (0), and gross domestic income and health expenditure are stationary first difference I(1). Since majority, four out of six, of the variable are integrated for order zero, then we can concluded that the variable are integrated for order zero. Therefore, this study will apply the non-stationary models in estimation techniques. The next step is to check for long run relationship between education expenditure, health expenditure, and their potential determinants.

5.4 PANEL COINTEGRATION TEST

The next subsection present panel cointegration test results, starting with Pedroni cointegration test followed by Kao cointegration test on health and education respectively.

5.4.1 PEDRONI COINTEGRATION TEST ON HEALTH

Table 5.5 report the Pedroni cointegration test on health, which is divided into two groups, within dimension and Between Dimension statistics. The value on the brackets shows the t-statistic. The null hypothesis of

Pedroni cointegration test is that there is no cointegration between the variables. Therefore, if the probability values of the within and between dimension are below 10% level of significant, we reject the null hypothesis and concluded that there is cointegration between the variables.

The within test shows that PP-statistic and ADF statistic are both 0% which is below 1% level of significant. Therefore, under this test we can reject the null hypothesis and conclude that there is cointegration between the variables. Panel rho statistics and panel V-statistics are both above 50% which is above 10% level of significant. This indicates that under panel rho and panel v-statistics we failed to reject the null hypothesis and conclude that there is no cointegration between the variables. Therefore, we cannot concluded about cointegration relationship without considering the between dimension results. Since there is a stalemate between the four tests, two claiming no cointegration and the other two claiming cointegration between the variables.

The between dimension statistics reveals 0.891 value of group rho statistics, which is above 10% level of significant. However, the table shows 0.000 and 0.000 values of PP-statistics and ADF statistics which are below 1% level of significant respectively. Therefore, two out of three between dimension group statistics rejects the null hypothesis that there is no cointegration. Majority of between dimension statistics reveals that the variables are cointegrated. The aggregate results of Pedroni cointegration test contend that there is cointegration between health expenditure and their potential determinants.

Table 5.5: Pedroni Panel cointegration test on health expenditure

Methods		**(t-statistic) Probability value**
Within dimension/ panel statistic	Panel v-statistics	(-2.632), 0.995
	Panel rho-statistics	(1.234), 0.891
	Panel PP-statistic	(-11.007) 0.000***
	Panel ADF-statistics	(-4.368) 0.000***
Between dimension / group mean statistic	Group rho-statistics	(2.910) 0.998
	Group PP-statistics	(-15.777) 0.000***
	Group ADF-statistics	(-3.839) 0.000***

(*), (**), (***) represent 10%, 5% 1% level of significant respectively.

Table 5.6 shows Kao cointegration test on health expenditure and its potential determinants. The Kao (1999) cointegration test reject the null hypothesis at 1% level of significant. The results come to an understanding with those of Pedroni (1999) test that there is cointegration among the variables.

Table 5.6: Kao cointegration test on health expenditure.

method		**(t-statistic)Probability value**
Kao test	ADF statistics	(-3.344) 0.000***
	Residual variance	0.658

(*), (**), (***) represent 10%, 5% 1% level of significant respectively.

5.4.2 PEDRONI COINTEGRATION TEST ON EDUCATION EXPENDITURE

Table 5.7 report the Pedroni cointegration test on education, which is divided into two groups, within dimension and Between Dimension statistics. The value on the brackets shows the t-statistic. The null hypothesis of Pedroni cointegration test is that there is no cointegration between the variables. Therefore,

if the probability values of the within and between dimension are below 10% level of significant, we reject the null hypothesis and concluded that there is cointegration between the variables.

The within test shows that PP-statistic and ADF statistic are equally 0% which is below 1% level of significant. Therefore, under this test we can reject the null hypothesis and conclude that there is cointegration between the variables. Panel V-statistics and Panel rho statistics are both above 40% which is above 10% level of significant. This indicates that under panel rho and panel v-statistics we failed to reject the null hypothesis and conclude that there is no cointegration between the variables. Therefore, we cannot decided about cointegration relationship without bearing in mind the between dimension results. Since there is a draw between the four tests, two claiming no cointegration and the other two claiming cointegration between the variables.

Table 5.7: Pedroni cointegration test on education expenditure

Methods		**(t-statistic) Probability value**
Within dimension/ panel statistic	Panel v-statistics	(-2.086), 0.981
	Panel rho-statistics	(-0.171), 0.432
	Panel PP-statistic	(-23.785) 0.000***
	Panel ADF-statistics	(-4.692) 0.000***
Between dimension / group mean statistic	Group rho-statistics	(0.905) 0.817
	Group PP-statistics	(-35.392) 0.000***
	Group ADF-statistics	(-4.675) 0.000***

(*), (**), (***) represent 10%, 5% 1% level of significant respectively.

The between dimension statistics reveals 0.986 value of group rho statistics, which is above 10% level of significant. However, the table shows 0.000 and 0.000 values of PP-statistics and ADF statistics which are below 1% level of significant respectively. Therefore, two out of three between dimension group statistics rejects the null hypothesis that there is no cointegration. Majority of between dimension statistics reveals that the variables are cointegrated. The aggregate results of Pedroni cointegration test contend that there is cointegration between education expenditure and its potential determinants.

Table 5.8 shows Kao cointegration test on education expenditure and its potential determinants. The Kao (1999) cointegration test reject the null hypothesis at 5% level of significant. The results are in agreement with those of Pedroni (1999) test that there is cointegration among the variables.

Table 5.8: Kao cointegration test on education expenditure

method		**(t-statistic)Probability value**
Kao test	ADF statistics	(-2.317) 0.010***
	Residual variance	0.730

(*), (**), (***) represent 10%, 5% 1% level of significant respectively.

Since gross domestic product, corruption, and population are integrated for order zero, health and education expenditure, life expectancy and tertiary enrolment are integrated for order one. The stationary methods of estimation cannot be applied in this study; that is your fixed effect and random effects methods. Therefore, this study will apply the non-stationary methods in particular fully modified ordinary least squares and the dynamic ordinary least squares.

5.5 ESTIMATION RESULTS

This part of the study is about two types of estimation techniques deployed in this study. Fully Modified OLS and Dynamic OLS for education expenditure will be presented first, followed by health expenditure.

5.5.1 FULLY MODIFIED AND DYNAMIC OLS

Table 5.9 present the fully modified OLS and Dynamic OLS results with education expenditure as the dependent variable. The first column depict the independent variables under study. Followed by FMOLS result, which is divided into two columns the coefficients and the probability values. The last column is the DOLS results, also divided into two coefficients and the probability values. FMOLS results are interpreted first followed by DOLS results. The prefix ‘D’ tertiary enrolment (DTE) and Health expenditure (DHE) indicates that the series is on first difference. The FMOLS results reveals that tertiary enrolment has a negative significant impact on education expenditure in SADC. Therefore, 1% increase in tertiary enrolment will lead to 0.646% decrease in education expenditure. Dynamics OLS coefficient shows that there is negative insignificant relationship between education expenditure and tertiary enrolment in SADC region. Thus, 1% increase in tertiary enrolment will lead to 0.018% drop in education expenditure however, this variable is not significant.

Table 5.9, under FMOLS test shows that health and education expenditure are positively and significantly related to each other. Moreover, 1% increase in health expenditure will lead to 0.599% increase in education expenditure. This results are contrary to those Canagarajah and Ye in 2001. Additionally, the dynamic OLS test also indicates that there is positive relationship between education and health expenditure in SADC, which is in line to those of the latter researcher. 1% increase in health expenditure will lead to 0.925% increase in education expenditure. This results also indicates that education expenditure and health expenditure are complement rather than rivals. DOLS and FMOLS reveals that gross national product has positive and significant relationship with education expenditure in SADC. This findings concur with those of Blankenau and Simpson (2014); Blankenau, Simpson and Tomljanivich (2017). So one can conclude that 1% increase in gross domestic product will results in 0.156% decrease in education expenditure in SADC. These indicates that as the gross domestic product increase, government officials of SADC reduce education expenditure. Table 5.9 also, show that population growth rate has a positive significant impact on education expenditure in SADC under FMOLS model. Hitiris (1997) found the similar results in European economies. Thus 1% in population growth will lead into 0.381% increase in education expenditure in the region. Dynamic OLS in table 5.9 also show that population growth has a positive impact on education expenditure, where 1% increase in population growth will lead to 0.056% increase in education expenditure in SADC.

Table 5.9: Education Expenditure in SADC FMOLS and DOLS

variable	**Fully modified OLS**		**Dynamic OLS**	
	Coefficient	Probability value	Coefficient	Probability value
DTE	-0.646	0.000***	-0.018	0.588
DHE	0.599	0.000***	0.925	0.000***
GDP	0.156	0.028**	-0.017	0.016**
POP	0.381	0.000***	0.056	0.000***
COR	0.337	0.000***	-0.106	0.001***
Adjusted R-squared	0.565963		0.96	

(*), (**), (***) represent 10%, 5% 1% level of significant respectively

Lastly, the table under FMOLS shows that corruption has a negative and significant relationship with education expenditure. Dorf and Freiholtz (2015) uncovered similar results in sub-Saharan Africa. Thus, 1% increase in corruption in SADC will lead to 0.226% decrease in education expenditure. The dynamic OLS model also reveal a negative significant relationship between education expenditure and corruption in SADC economies. One per cent increase in corruption will lead to 0.106 drop in education expenditure. This results are not consistence with those of FMOLS.

Table 5.10 shows the FMOLS and DOLS results with health expenditure as a dependent variable. The first column depict the independent variables under study. Followed by FMOLS result, which is divided into two columns the coefficients and the probability values. The last column is the DOLS results, also divided into two the coefficients and the probability values. The prefix 'D' on education expenditure (DEDU), and (DLIFE) life expectancy indicates that the series is on first difference or the series has been differenced once. FMOLS results will be discussed first followed by DOLS results for each variable. FMOLS indicates that there is positive insignificant relationship between health expenditure and life expectancy in SADC. This findings are similar to those of the latter researcher.1% increase in life expectancy will lead to 0.075 increase in health expenditure in SADC.

Table 5.10 shows that there is negative insignificant relationship between education expenditure and health expenditure in SADC, which are in line with those of Canagarajah and Ye in 2001. Therefore, 1% increase in education expenditure will lead to 0.0314 decrease in health expenditure. The dynamic model also indicates that there is positive insignificant relationship between health expenditure and life expectancy in SADC. Novignon, Olakolo, and Nonvigon (2012) found the similar results, but significant. One per cent increase in life expectancy will lead to 0.007% increase in health expenditure. Table 5.10, under FMOLS also shows that there is positive significant relationship between health expenditure and education expenditure in SADC. 1% increase in education expenditure will results in 0.264% increase in health expenditure in SADC. The dynamic OLS model also indicates positive and significant relationship between health expenditure and education expenditure, where 1% increase in education expenditure will result in 0.789% increase in health expenditure in SADC economies.

Table 5.10: Health Expenditure in SADC FMOLS and DOLS

variables	**Fully modified OLS**		**Dynamic OLS**	
	Coefficient	Probability value	Coefficient	Probability value
DLIFE	0.075	0.197	0.007	0.964
DEDU	0.264	0.000***	0.785	0.006***
GDP	-0.206	0.001***	0.015	0.586
POP	0.080	0.000***	0.012	0.192
COR	0.743	0.000***	-0.253	0.060*
Adjusted R-squared	0.63213		0.7958	

(*), (**), (***) represent 10%, 5% 1% level of significant respectively

FMOLS model shows that there is negative and significant relationship between health expenditure and economic growth in SADC, where 1% increase in economic growth will lead to 0.206% decrease in health expenditure. The dynamic OLS models shows that there is positive and insignificant relationship between health expenditure and economic growth in SADC. One per cent increase economic growth will lead to 0.015% increase in health expenditure. Eggoh, Houeninvo, and Sossou (2015) found negative relationship between the variables.

Population has a positive significant relationship with health expenditure in SADC. 1% increase in population will lead to 0.080% increase in health expenditure. The dynamic OLS model shows that there is positive and insignificant relationship between health expenditure and population, and 1% increase in population growth will lead to 0.012% increase in health expenditure. Corruption has a positive significant relationship with health expenditure according to FMOLS, and 1% increase in corruption will lead to 0.743% increase in health expenditure. Om the other hand, DOLS shows that there is negative and significant relationship between health expenditure and corruption, and 1% increase in corruption will lead to 0.253% drop in health expenditure.

5.6. PANEL GRANGER CAUSALAITY BLOCK EXOGENEITY WALD TEST

The Table 5.11 present panel Granger causality results for SADC economies. This the tables' shows that there is no causality for most of the variables understudy. The null hypothesis state that lag one and lag two for each independent variable cannot Granger cause the dependent variable. The null hypothesis can be rejected if the probability value of each independent variable is greater than 10% level of significant. The last column shows the aggregate causality score for each dependent variable. Table 5.11 reports Granger causality results for education expenditure as dependent variable in SADC. The results shows that lag one and two jointly of health expenditure, and tertiary enrolment cannot Granger cause education expenditure in SADC. However, lag one and lag two jointly of corruption, gross domestic product and population granger cause education expenditure in SADC. The aggregate model shows that all the independent variables Granger cause education expenditure in SADC.

Table 5.11: Granger Causality: Education Expenditure

	Chi .sq.	d.f	Probability value
DHE	2.696	2	0.440
COR	11.474	2	0.009***
DTE	0.645	2	0.886
GDP	7.430	2	0.059*
POP	11.138	2	0.011**
All	28.584	10	0.053

Table 5.12, reports Granger test of health expenditure as dependent variable in SADC. The results shows that lag one and two jointly of education expenditure Granger cause health expenditure. This further suggest that there is one way causality between education expenditure and health expenditure in SADC, running from education to health expenditure. This table also shows that other independent variables cannot granger cause health expenditure as well as the aggregate model.

Table 5.12: Granger causality, Health expenditure

	Chi .Sq.	D.F	Probability value
DEDU	12.131	2	0.006**
COR	5.886	2	0.117
GDP	2.896	2	0.407
POP	2.051	2	0.561
DLIFE	1.198	2	0.753
ALL	20.843	10	0.114

(*), (**), (***) represent 10%, 5% 1% level of significant respectively

Table 5.13, reports Granger test of corruption as dependent variable in SADC. The results shows that lag one and two jointly of all variables cannot Granger cause corruption in SADC. This further suggest that corruption has one causality with other variables in these models.

Table 5.13: Granger causality, Corruption

	Chi .Sq.	D.F	Probability value
DEDU	0.636	2	0.887
DHE	1.224	2	0.747
DTE	3.225	2	0.353
GDP	2.950	2	0.399
POP	3.075	2	0.380

DLIFE	1.640	2	0.650
ALL	13.172	12	0.781

(*), (**), (***) represent 10%, 5% 1% level of significant respectively

Table 5.14, reports Granger test of tertiary enrolment as dependent variable in SADC. The results indicates that lag one and two of population growth Granger cause tertiary enrolment in SADC. The also shows that lag one and two jointly of the other variables cannot Granger cause enrolment in SADC. This further suggest that Tertiary enrolment has one causality with other variables in these models.

Table 5.14: Granger causality, Tertiary Enrolment

	Chi .Sq.	D.F	Probability value
DEDU	6.120	2	0.105
DHE	1.428	2	0.699
COR	1.173	2	0.759
GDP	3.281	2	0.350
POP	6.270	2	0.099*
DLIFE	0.286	2	0.962
ALL	20.310	12	0.315

(*), (**), (***) represent 10%, 5% 1% level of significant respectively

Table 5.15, reports Granger test of gross domestic product as dependent variable in SADC. The results shows that lag one and two jointly of health expenditure Granger cause gross domestic product. This further suggest that there is one way causality between gross domestic product and health expenditure in SADC, running from health expenditure to gross domestic product. This table also shows that other independent variables cannot granger cause gross domestic product as well as the aggregate model.

Table 5.15: Granger causality, Gross Domestic Product.

	CHI.SQ	D.F	Probability value
DEDU	0.514	2	0.915
DHE	10.072	2	0.018**
COR	4.984	2	0.172
DTE	0.728	2	0.866
POP	4.192	2	0.241
DLIFE	0.712	2	0.820
ALL	23.293	12	0.179

(*), (**), (***) represent 10%, 5% 1% level of significant respectively

Table 5.16, reports Granger test of gross population growth as dependent variable in SADC. The results shows that lag one and two jointly of corruption and life expectancy Granger cause population growth. This further suggest that there is one way causality between population growth and corruption in SADC, running from corruption to population growth. This table also shows that other independent variables cannot granger cause population growth as well as the aggregate model.

Table 5.16: Granger causality, population growth

	CHI.SQ	D.F	Probability value
DEDU	2.121	2	0.547
DHE	4.074	2	0.253
COR	12.676	2	0.005***
DTE	2.008	2	0.570
GDP	3.190	2	0.363
DLIFE	6.312	2	0.097*

ALL	30.983	12	0.128

(*), (**), (***) represent 10%, 5% 1% level of significant respectively

Table 5. 17, reports Granger test of life expectancy growth as dependent variable in SADC. The results shows that lag one and two jointly of all variables cannot Granger cause life expectancy in SADC. This further suggest that life expectancy has one causality with other variables in these models.

Table 5. 17: Granger causality, Life Expectancy

	CHI.SQ	D.F	Probability value
DEDU	3.598	2	0.308
DHE	1.853	2	0.603
COR	1.349	2	0.717
DTE	1.055	2	0.787
GDP	1.032	2	0.713
POP	2.032	2	0.565
ALL	15.984	12	0.573

5.7 CONCLUSION

This chapter presented the analysis on the relationship between health and education expenditure and their potential determinants in SADC. Started by analysing the panel properties of the data employing both formal and informal test for stationarity. Pedroni panel cointergration test, and Kao panel cointegration test provided evidence that there is cointegration between health, education expenditure, and their potential determinants. The presence of cointegration between the variables allowed the estimation of fully modified OLS and dynamic OLS. Granger causality results revealed that there is no causality between most variable understudy. The Wald test proved that the overall models is significant or variables are significant in explaining their dependent variables.

CHAPTER SIX: CONCLUSION, AND POLICY RECOMMENDATION

6. INTRODUCTION

This chapter provide conclusion and to put forward recommendations for future policy making. This chapter is divided into two three subsection. The first section delivers a summary of each chapter of the study. The second section provide a discussion on policy implications and recommendations to the results. The last section provide the limitations of the study, and gaps for further research.

6.1 SUMMARY OF THE STUDY

The aim of this study is to investigate the determinants of education and health expenditure in SADC countries. Chapter two provided a general overview of the determinants of government expenditure on health and education in SADC. The chapter reveal the trends of government expenditure on education and health and their determinants. Health expenditure in SADC countries has been fluctuating in most countries, excluding Eswatini which government expenditure on health is increasing over time. However, the aggregate government expenditure on health in SADC is fixed. Education expenditure in SADC countries has been fluctuating for the period under study, whereas, the aggregate trend of education expenditure in SADC is increasing. Similarly economic growth in SADC countries has been fluctuating, with countries like Mozambique, Botswana and Democratic Republic Congo contribute significantly. SADC aggregate growth trend was declining for the period 2008 to 2015. Population in SADC economies has been growing at a slower pace, excluding Democratic republic Congo and Tanzania. Corruption in the region is very high, where ten countries have corruption indicator below zero and five economies with a positive corruption indicator. Thus the aggregate corruption indicator of SADC is negative.

The third chapter provided the theoretical and practical evidence of the study. Theoretical framework reviewed in this study includes, the pure theory of government expenditure by Samuelson of 1954. Samuelson argued the the decentralization of pricing system cause the growth of public expenditure especially in the service sector such as education and health. Wagner's law was presented second, the law stated that as per capita gross national product raise public expenditure will increase. That is, as income increases, the demand for goods and services provided by the state increases more than in proportion, mainly because of the technological requirements of industrialization and urbanization that supplement the income growth. Furthermore, Wagner deliberates public expenditure as the endogenous factor that is caused by economic growth rather than exogenous factor. The displacement effect of Peacock and Wiseman of 1979 followed, which claimed that growth in public expenditure will only increase when the economy is in the state of emergence such as outbreaks and wars related expenses. Lastly, the unbalanced productivity

growth by Baumol 1967. In his model, the theorist believed that public expenditure raise can also be caused by an increase in price of goods used by the government as inputs. Empirical works has been consistent with the theories reviewed. Aspects such as population growth, gross national income, economic growth, and taxation were found to be significant factors in determining government expenditure on health and education in SADC.

Chapter four offered the models specification and how the models were estimated. The variables used were gross domestic product, life expectancy, tertiary enrolment, population growth rate, corruption, and education and health expenditure. The model employed the Im, Pesaren and Shin, and Levin, Lin and Chu tests for panel unit root. The Pedroni (2001), and Kao (1999) panel cointegration techniques were also engaged. Fully modified OLS and Dynamic OLS methods were applied as estimation techniques. Wald test was done to test for the variables significance in explaining their dependent variable. Lastly, granger causality test was conducted to test causality among the variables.

Chapter five analysed the determinants of government expenditure on health and education in SADC countries. The chapter analysed the panel data properties by using the formal and informal tests. The data was exposed to stationarity tests using the Levin, Lin and Chu, and Im, Pesaren and Shin panel unit root tests. Most variables were non- stationary at levels, after being differenced once all variables achieved stationary. Therefore, variables either integrated for order zero or order one. Pedroni (1999) cointegration test and Kao (1999) cointegration test were applied to test for cointegration. The results suggested that there is cointegration between health and education expenditure and their potential determinants.

This study applied the two types of estimation methods which is fully modified ordinary least squares and dynamic ordinary least squares. The results showed that health expenditure has a significant impact on education expenditure in SADC. DOLS model showed that education expenditure is positive and significant related to health expenditure in SADC. This indicates that health and education expenditure are complements in SADC region. However, this results are not in agreement to those of Gustafsson and Shi (2004) discovered in rural china. Moreover FMOLS reveal that the relationship is positive and significant. FMOLS shows that education expenditure is negative and significant related to gross domestic product, which are in line with these of DOLS. These results revealed are in agreement with those of Mussagy and Babatunde (2015) found in Mozambique. DOLS also show that education expenditure is negatively and significantly related to corruption in SADC. FMOLS and DOLS shows that population growth is positive and significant related to education expenditure. FMOLS shows that education expenditure is positive and

significantly related to tertiary enrolment in SADC, however DOLS shows that education is negative and insignificantly related to tertiary education.

On health model, life expectancy has a positive and insignificant relationship with health expenditure in SADC in both FMOLS and DOLS. Both FMOLS and DOLS shows that health expenditure is positively and significantly related to education expenditure. FMOLS and DOLS shows that population is positively related with health expenditure. These results are in agreement with those of Hitiris (1997) in EU economies and Karatzas (2000) in the US. Gross domestic product is negatively and significantly related to health expenditure in FMOLS, whereas DOLS shows that gross domestic product is positively related with health expenditure. Dhoro *et al*. (2011) found similar results in Zimbabwe. Corruption is has a positive correlation with health expenditure but insignificant in both test. The Wald test revealed that all variables in the model are significant in explain the dependent variable, therefore, none of this variables need to be removed from the model. Granger causality test showed that gross domestic product Granger cause education expenditure in SADC. Corruption Granger cause health expenditure and health expenditure Granger cause gross domestic product.

6.2 POLICY IMPLICATION AND RECOMMENDATION.

The SADC region has endured high level of poverty, inequality and high rate of high unemployment. This can be the shortcoming undemocratic government, and civil wars which caused economic instability in SADC economies. Further, most SADC economies have failed to meet the millennium development goals in health and education. This indicates that there is little attention for government of SADC provide education and health in the region.

This research makes a contribution to the policy discussion by examining the major determinants of SADC government expenditure on health and education. The study highlights that corruption and education expenditure are the major determinants of health expenditure. This is indicated by both FMOLS and DOL which shows significant relationship between health expenditure and the latter variables. Thus there is a need for SADC governments to implement policies that increase education expenditure and corruption control policies to affect health expenditure. This can be achieved by allocating high budget on education expenditure, and implementing independent corruption agencies. Nonetheless, all the other variables are important in explaining health expenditure since Wald test confirmed this hypothesis. Granger causality results showed that education expenditure causes health expenditure in SADC, thus SADC government should implement policy which address the education expenditure in solving health expenditure problems.

6.3 LIMITATION OF THE STUDY AND AREA OF FURTHER RESEARCH.

Data availability has become a prominent problem for African studies, therefore there is no exception for this study. This studied was intend for 37 observation from 1980 to 2016, however this was not achieved since data was not available for the intended period. Panel data studies works better on larger sample (Baltagi, 2008). This has a huge impact on the estimation techniques which requires more observation to be unbiased and consistence such as FMOLS and DOLS. Moreover, data on education for SADC countries is unavailable for most of the countries which compiled the study to extrapolate which has the potential to distort the results. The second limitation of the study is that the empirical work on the determinants of health expenditure and the determinants of education expenditure in SADC individual countries is limited, which dilute the empirical work.

This study suggested three topic for further research: first, the study suggested that future research be conducted on a country by country basis, which will accurately capture the heterogeneity of the each country. Secondly, developing instruments that can be used by developing countries in enhancing and maintaining higher expenditure on health and education. Lastly, expenditure on education and health can be assessed at a micro level, since education and health are both provided by private and public in SADC economies.

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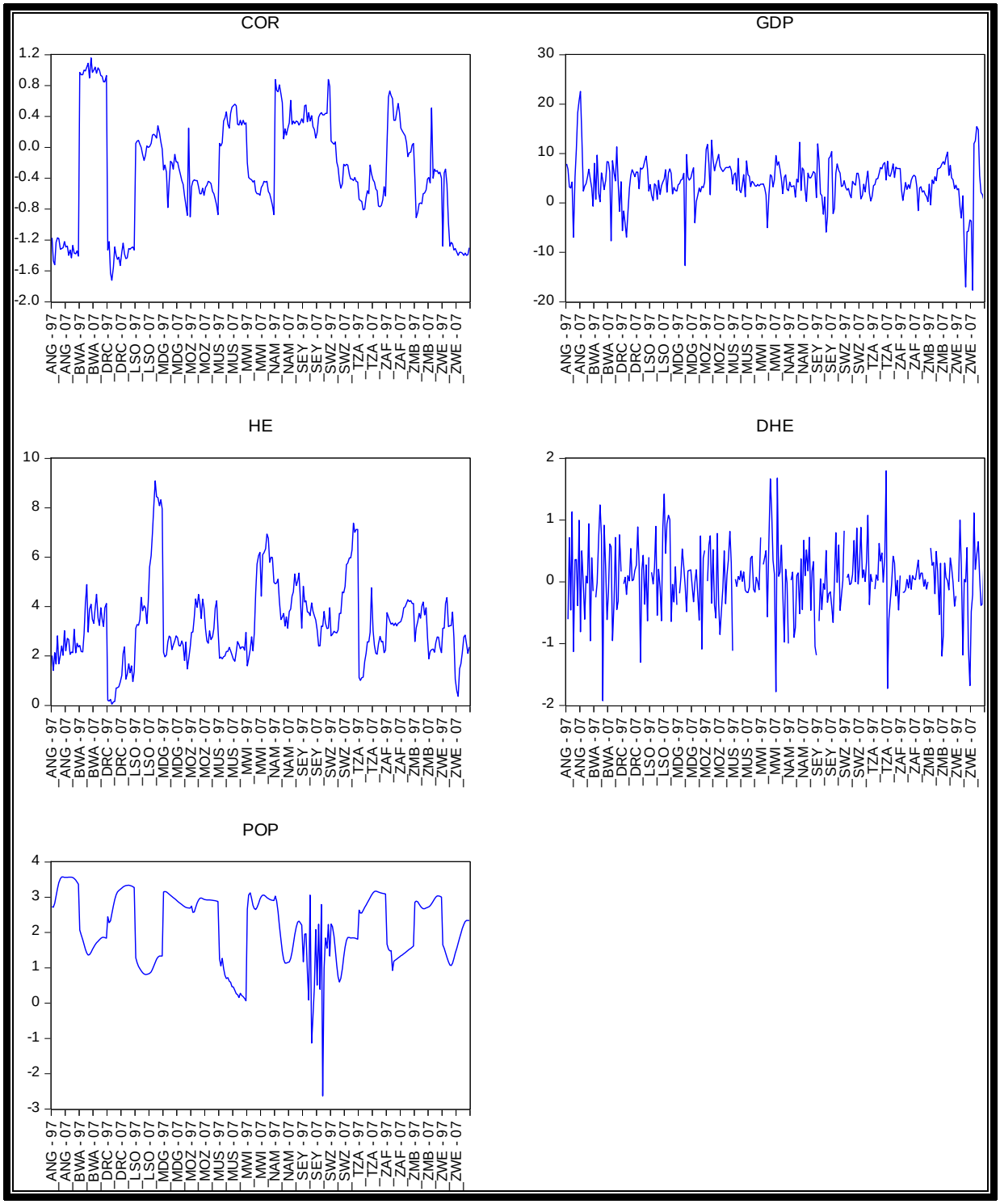
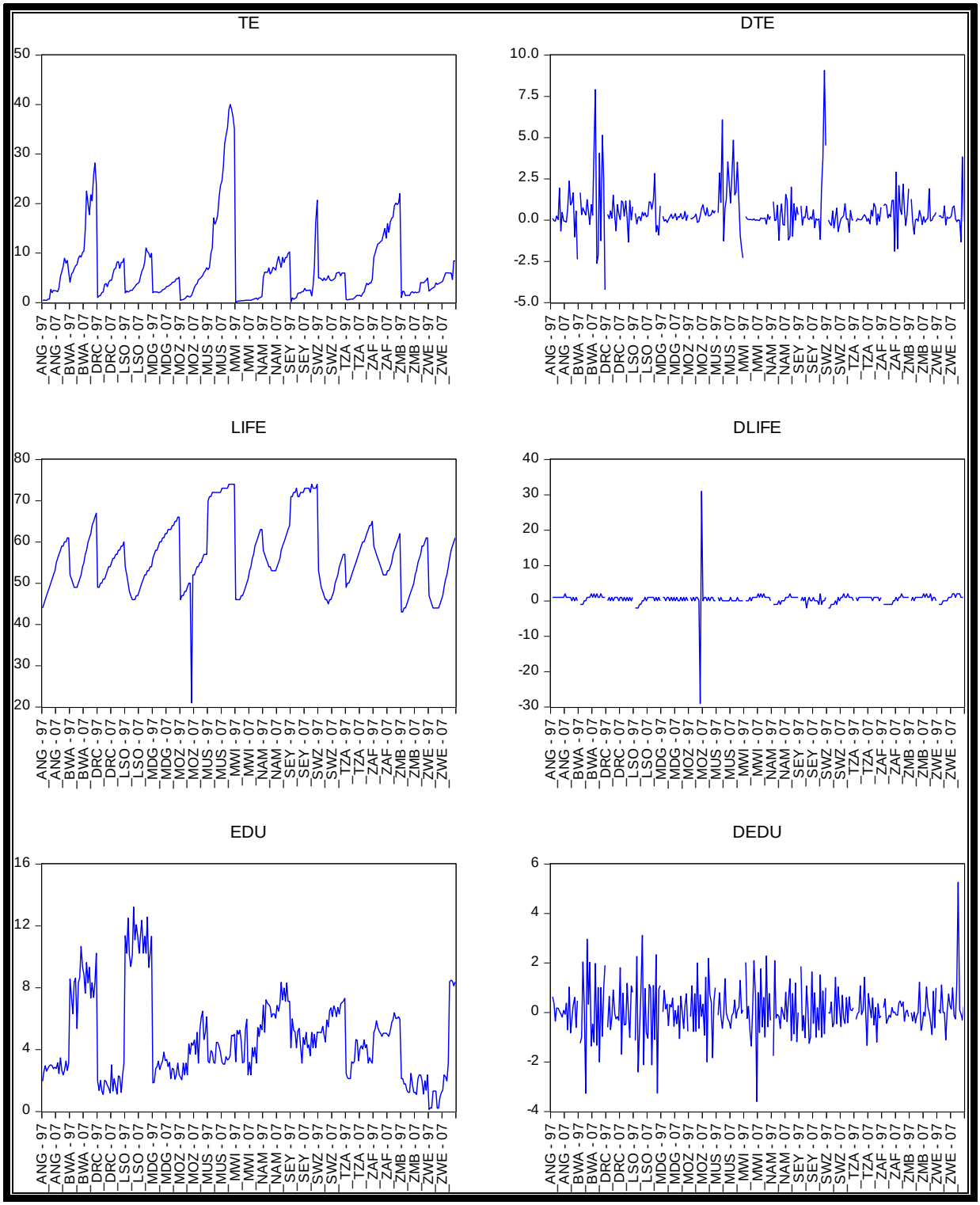
8 APPENDIX

Appendix A, Graphical examination of variables in SADC.



Appendix B, Graphical examination of variables in SADC.



Appendix C: Health Expenditure Pedroni residual cointegration test

Pedroni Residual Cointegration Test
Series: DHE DEDU COR DLIFE GDP POP
Date: 08/28/18 Time: 01:38
Sample: 1997 2016
Included observations: 300
Cross-sections included: 15
Null Hypothesis: No cointegration
Trend assumption: No deterministic trend
User-specified lag length: 1
Newey-West automatic bandwidth selection and Bartlett kernel

Alternative hypothesis: common AR coefs. (within-dimension)

	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistic	-2.632988	0.9958	-3.556822	0.9998
Panel rho-Statistic	1.234617	0.8915	1.479874	0.9305
Panel PP-Statistic	-11.00781	0.0000	-8.161220	0.0000
Panel ADF-Statistic	-4.368209	0.0000	-3.653707	0.0001

Alternative hypothesis: individual AR coefs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	2.910074	0.9982
Group PP-Statistic	-15.77720	0.0000
Group ADF-Statistic	-3.839679	0.0001

Cross section specific results

Phillips-Peron results (non-parametric)

Cross ID	AR(1)	Variance	HAC	Bandwidth	Obs
_ANG	-0.763	0.160239	0.108383	3.00	18
_BWA	-0.099	0.324876	0.046968	10.00	18
_DRC	-0.169	0.172705	0.114161	4.00	18
_LSO	-0.131	0.254563	0.185828	3.00	18
_MDG	-0.292	0.147492	0.064212	7.00	18
_MWI	-0.279	0.449573	0.034620	16.00	18
_MUS	-0.097	0.048623	0.036455	3.00	18
_MOZ	0.046	0.200364	0.115830	6.00	18
_NAM	0.027	0.266899	0.254494	1.00	18
_SEY	0.053	0.110845	0.040485	5.00	18

_ZAF	-0.079	0.008696	0.008696	0.00	18
_SWZ	-0.323	0.064674	0.007817	17.00	18
_TZA	0.021	0.314000	0.314000	0.00	18
_ZMB	0.087	0.183820	0.144863	3.00	18
_ZWE	0.140	0.390727	0.101626	6.00	18

Augmented Dickey-Fuller results (parametric)

Cross ID	AR(1)	Variance	Lag	Max lag	Obs
_ANG	-1.383	0.142692	1	--	17
_BWA	-0.846	0.184013	1	--	17
_DRC	-0.459	0.171890	1	--	17
_LSO	-0.344	0.260702	1	--	17
_MDG	-0.807	0.138737	1	--	17
_MWI	-0.890	0.365513	1	--	17
_MUS	-0.297	0.049009	1	--	17
_MOZ	-0.276	0.172166	1	--	17
_NAM	-0.326	0.264682	1	--	17
_SEY	-0.083	0.112892	1	--	17
_ZAF	-0.149	0.009025	1	--	17
_SWZ	-0.876	0.055987	1	--	17
_TZA	0.048	0.331136	1	--	17
_ZMB	-0.134	0.185256	1	--	17
_ZWE	-0.199	0.301558	1	--	17

Appendix a: 2, Health Expenditure: Kao Residual cointegration test

Kao Residual Cointegration Test
Series: DHE DEDU COR DLIFE GDP POP
Date: 08/28/18 Time: 01:44
Sample: 1997 2016
Included observations: 300
Null Hypothesis: No cointegration
Trend assumption: No deterministic trend
User-specified lag length: 1
Newey-West automatic bandwidth selection and Bartlett kernel

	t-Statistic	Prob.
ADF	-2.712243	0.0033
Residual variance	0.656087	
HAC variance	0.155471	

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RESID)
Method: Least Squares
Date: 08/28/18 Time: 01:44
Sample (adjusted): 2000 2016
Included observations: 255 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID(-1)	-1.217454	0.095619	-12.73237	0.0000
D(RESID(-1))	0.110954	0.064573	1.718271	0.0870

R-squared	0.541811	Mean dependent var	-0.015456
Adjusted R-squared	0.540000	S.D. dependent var	0.833515
S.E. of regression	0.565317	Akaike info criterion	1.704953
Sum squared resid	80.85467	Schwarz criterion	1.732728
Log likelihood	-215.3815	Hannan-Quinn criter.	1.716125
Durbin-Watson stat	2.026445		

Appendix D: education expenditure Pedroni residual cointegration test

Pedroni Residual Cointegration Test
Series: DEDU COR DTE GDP DHE POP
Date: 08/25/18 Time: 00:15
Sample: 1997 2016
Included observations: 300
Cross-sections included: 15
Null Hypothesis: No cointegration
Trend assumption: No deterministic trend
User-specified lag length: 1
Newey-West automatic bandwidth selection and Bartlett kernel

Alternative hypothesis: common AR coefs. (within-dimension)

	Statistic	Prob.	Weighted Statistic	Prob.
Panel v-Statistic	-2.086029	0.9815	-3.359054	0.9996

Panel rho-Statistic	-0.171361	0.4320	-0.088445	0.4648
Panel PP-Statistic	-23.78595	0.0000	-25.62174	0.0000
Panel ADF-Statistic	-4.692285	0.0000	-6.358784	0.0000

Alternative hypothesis: individual AR coefs. (between-dimension)

	Statistic	Prob.
Group rho-Statistic	0.905369	0.8174
Group PP-Statistic	-35.39201	0.0000
Group ADF-Statistic	-4.675085	0.0000

Cross section specific results

Phillips-Peron results (non-parametric)

Cross ID	AR(1)	Variance	HAC	Bandwidth	Obs
_ANG	-0.617	0.133026	0.018815	10.00	18
_BWA	-0.190	1.279531	0.468702	6.00	18
_DRC	-0.502	0.465869	0.067027	17.00	18
_LSO	-0.579	1.957112	0.265349	17.00	18
_MDG	-0.340	0.198424	0.216491	1.00	18
_MWI	-0.106	1.566403	0.963746	3.00	18
_MUS	-0.269	0.195408	0.030203	17.00	18
_MOZ	-0.587	0.562896	0.559533	2.00	18
_NAM	-0.549	0.321812	0.321812	0.00	18
_SEY	-0.484	0.481872	0.183552	8.00	18
_ZAF	-0.187	0.064673	0.062638	1.00	18
_SWZ	-0.403	0.150216	0.011562	16.00	18
_TZA	-0.410	0.249994	0.236621	1.00	18
_ZMB	-0.457	0.261187	0.154144	3.00	18
_ZWE	-0.108	1.363643	0.119653	17.00	18

Augmented Dickey-Fuller results (parametric)

Cross ID	AR(1)	Variance	Lag	Max lag	Obs
_ANG	-1.325	0.112723	1	--	17
_BWA	-0.568	1.208862	1	--	17
_DRC	-1.100	0.380811	1	--	17
_LSO	-1.030	1.803238	1	--	17
_MDG	-0.103	0.187805	1	--	17
_MWI	-0.235	1.636801	1	--	17
_MUS	-0.869	0.158657	1	--	17
_MOZ	-0.415	0.574786	1	--	17
_NAM	-0.357	0.284953	1	--	17
_SEY	-0.746	0.462535	1	--	17

_ZAF	-0.292	0.056143	1	--	17
_SWZ	-1.102	0.120936	1	--	17
_TZA	-0.505	0.249519	1	--	17
_ZMB	-0.445	0.276507	1	--	17
_ZWE	-0.586	1.180320	1	--	17

Appendix E, Education Expenditure: Kao Residual cointegration test

Kao Residual Cointegration Test
Series: DEDU COR DTE GDP DHE POP
Date: 08/28/18 Time: 01:34
Sample: 1997 2016
Included observations: 300
Null Hypothesis: No cointegration
Trend assumption: No deterministic trend
User-specified lag length: 1
Newey-West automatic bandwidth selection and Bartlett kernel

	t-Statistic	Prob.
ADF	-2.317384	0.0102
Residual variance	2.730450	
HAC variance	0.393375	

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RESID)
Method: Least Squares
Date: 08/28/18 Time: 01:34
Sample (adjusted): 2000 2016
Included observations: 255 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID(-1)	-1.627446	0.103357	-15.74582	0.0000
D(RESID(-1))	0.166956	0.060963	2.738619	0.0066

R-squared	0.710650	Mean dependent var	-0.002090
Adjusted R-squared	0.709507	S.D. dependent var	1.666284
S.E. of regression	0.898085	Akaike info criterion	2.630707

			2.65848
Sum squared resid	204.0586	Schwarz criterion	2
		Hannan-Quinn	2.64187
Log likelihood	-333.4152	criter.	9
Durbin-Watson stat	2.113534		

Appendix F, Education Expenditure in SADC FMOLS

Dependent Variable: DEDU
Method: Panel Fully Modified Least Squares (FMOLS)
Date: 08/29/18 Time: 00:26
Sample (adjusted): 1999 2016
Periods included: 18
Cross-sections included: 15
Total panel (balanced) observations: 270
Panel method: Weighted estimation
Cointegrating equation deterministics: C @TREND
First-stage residuals use heterogeneous long-run coefficients
Long-run covariance estimates (Bartlett kernel, Newey-West fixed
bandwidth)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DHE	0.599957	0.093094	6.444659	0.0000
DTE	-0.646812	0.090283	-7.164304	0.0000
GDP	0.156066	0.070843	2.202976	0.0286
POP	0.381127	0.035920	10.61038	0.0000
COR	0.337323	0.061978	5.442588	0.0000

		Mean dependent	0.096473
R-squared	0.565963	var	
Adjusted R-squared	0.659562	S.D. dependent var	1.009623
S.E. of regression	1.521506	Sum squared resid	544.0202
Durbin-Watson stat	2.389169	Long-run variance	0.660245

Appendix G, Education Expenditure in SADC DOLS

Dependent Variable: DEDU
Method: Panel Dynamic Least Squares (DOLS)
Date: 08/29/18 Time: 00:54

Sample (adjusted): 2000 2015
Periods included: 16
Cross-sections included: 1
Total panel (unbalanced) observations: 240
Panel method: Weighted estimation
Cointegrating equation deterministics: C @TREND
Fixed leads and lags specification (lead=1, lag=1)
Long-run variance weights (Bartlett kernel, Newey-West fixed bandwidth)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DHE	0.952619	23.06260	-14.300287	0.0000
DTE	-0.018473	0.630733	0.022947	0.5880
GDP	-0.017022	0.941789	11.047804	0.0160
POP	0.056176	5.669957	-6.104617	0.0000
COR	-0.103358	7.253220	4.016318	0.0001

R-squared	0.891000	Mean dependent var	0.089886
Adjusted R-squared	0.964000	S.D. dependent var	1.008419
S.E. of regression	6.29E-16	Sum squared resid	3.49E-29
Long-run variance	3.04E-30		

Appendix F, Health Expenditure in SADC FMOLS

Dependent Variable: DHE
Method: Panel Fully Modified Least Squares (FMOLS)
Date: 08/29/18 Time: 01:11
Sample (adjusted): 1999 2016
Periods included: 18
Cross-sections included: 15
Total panel (balanced) observations: 270
Panel method: Weighted estimation
Cointegrating equation deterministics: C @TREND
First-stage residuals use heterogeneous long-run coefficients
Long-run covariance estimates (Bartlett kernel, Newey-West fixed bandwidth)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DEDU	-0.264415	0.107444	-8.255157	0.0003
COR	0.743826	0.060139	3.239582	0.0609

DLIFE	0.075735	0.076165	0.937684	0.1970
GDP	-0.206403	0.073590	-0.812780	0.0019
POP	0.080558	0.039413	15.89731	0.0000

		Mean dependent var	0.057870
R-squared	0.619270		
Adjusted R-squared	0.632131	S.D. dependent var	0.573680
S.E. of regression	2.122646	Sum squared resid	1058.823
Durbin-Watson stat	2.936099	Long-run variance	0.177447

Appendix G, Health Expenditure in SADC DOLS

Dependent Variable: DHE
Method: Panel Dynamic Least Squares (DOLS)
Date: 08/29/18 Time: 01:22
Sample (adjusted): 2000 2015
Periods included: 16
Cross-sections included: 15
Total panel (balanced) observations: 240
Panel method: Pooled estimation
Fixed leads and lags specification (lead=1, lag=1)
Coefficient covariance computed using default method
Long-run variance (Bartlett kernel, Newey-West fixed bandwidth) used for coefficient covariances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DEDU	0.785163	0.282351	2.780803	0.0066
COR	-0.253762	0.133303	-1.903640	0.0602
DLIFE	0.007938	0.176547	0.044964	0.9642
GDP	0.015894	0.027740	0.572965	0.5681
POP	-0.120145	0.091513	-1.312876	0.1926

		Mean dependent var	0.051804
R-squared	0.936138		
Adjusted R-squared	0.798480	S.D. dependent var	0.562910
S.E. of regression	0.252696	Sum squared resid	5.746968
Long-run variance	0.024117		

Appendix H, Granger causality, Education Expenditure

Dependent variable: DEDU			
Excluded	Chi-sq	df	Prob.
COR	11.47430	2	0.0090
DHE	2.696894	2	0.4409
DTE	0.645504	2	0.8860
GDP	7.430833	2	0.0590
POP	11.138068	2	0.0115
All	28.58470	10	0.0532

Appendix I, Granger causality Health Expenditure

Dependent variable: DHE			
Excluded	Chi-sq	df	Prob.
DEDU	12.13131	2	0.0069
COR	5.88639	2	0.1176
DLIFE	1.198131	2	0.7535
GDP	2.896354	2	0.4073
POP	2.051765	2	0.5618
All	20.84363	10	0.1142

Appendix J, Granger causality GDP

Dependent variable: GDP			
Excluded	Chi-sq	df	Prob.
DEDU	0.51443	2	0.9154
DHE	10.07205	2	0.0182
COR	4.984008	2	0.1724
DLIFE	0.712841	2	0.8202
DTE	0.728230	2	0.8666
POP	4.192553	2	0.2417
All	23.29379	12	0.1795

Appendix K, Granger causality corruption

Dependent variable: COR			
Excluded	Chi-sq	df	Prob.
GDP	2.950693	2	0.3997
DEDU	0.636103	2	0.8876
DHE	1.224803	2	0.7473
DLIFE	1.640036	2	0.6506
DTE	3.225323	2	0.3535
POP	3.075413	2	0.3800
All	13.17221	12	0.7813

Appendix K, Granger causality Life Expectancy

Dependent variable: DLIFE			
Excluded	Chi-sq	df	Prob.
GDP	1.032207	2	0.7132
DEDU	3.598607	2	0.3080
DHE	1.853642	2	0.6034
COR	1.349684	2	0.7179
DTE	1.055395	2	0.7875
POP	2.032441	2	0.5658
All	15.98438	12	0.5735

Appendix L, Granger causality Tertiary Enrolment

Dependent variable: DTE			
Excluded	Chi-sq	df	Prob.
GDP	3.281689	2	0.3501
DEDU	6.120367	2	0.1055
DHE	1.428303	2	0.6998
COR	1.173173	2	0.7595
DLIFE	0.286882	2	0.9623
POP	6.270477	2	0.0993
All	20.31051	12	0.3153

Appendix M, Granger causality population

Dependent variable: POP

Excluded	Chi-sq	df	Prob.
GDP	3.190370	2	0.3637
DEDU	2.121612	2	0.5470
DHE	4.074457	2	0.2538
COR	12.67699	2	0.005
DLIFE	6.312264	2	0.0971
DTE	2.008118	2	0.5702
All	30.98315	12	0.1280