

RELATIONSHIP BETWEEN PUBLIC HEALTHCARE EXPENDITURE AND
SELECTED ECONOMIC AND SOCIO-DEMOGRAPHIC FACTORS IN KENYA

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DECLARATION

Declaration by the Student

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DEDICATION

To my parents; Mr. Bernard Rombo and Mrs. Jane Rombo for their support and love that has seen me accomplish my postgraduate studies.

ABSTRACT

Human health has improved drastically during the last century, yet grave inequalities in health persist. In Kenya, Public expenditure on health as a percentage of total government expenditure has been declining. Also Public expenditure on health as a percentage of Gross Domestic Product (GDP) has been declining. This means that access to health care has been and still is out of reach for majority of Kenyans. Increasing population and demand for healthcare outstrips the ability of the government to provide effective health services. Majority of Kenyans cannot easily access health care due to long distances they have to travel to get to health facilities, inadequate qualified health personnel, lack of medicines and more seriously the high cost since they have to make out-of-pocket payments to get health services. Per capita expenditure on public health is inadequate to meet even the most basic services such as diagnosis. This study investigated the relationship between per capita public healthcare expenditure (PHEXP) in Kenya as the dependent variable and independent variables; Real Per Capita GDP (RPGDP), Population (POP), secondary school enrolment (SSE) and life expectancy (LFE). The specific objectives were: to determine the relationship between Gross Domestic Product and public health care expenditure, to investigate the relationship between secondary school enrolment and public health care expenditure, to evaluate the relationship between population and public health care expenditure and to determine the relationship between life expectancy at birth and public health care expenditure. Data used in the study was annual time series secondary data which was sourced from International Monetary Fund (IMF) and The Kenya National Bureau of Statistics (KNBS). The data was analyzed using STATA 10 econometric software. The study covered a period of 31 years from 1980 to 2010. The results indicated that public healthcare expenditure (PHEXP) has a positive relationship with real per capita GDP (RPGDP) and population (POP) and a negative relationship with secondary school enrolment (SSE) and life expectancy (LFE). Only life expectancy (LFE) was statistically significant but real per capita GDP (RPGDP), population (POP) and secondary school enrolment (SSE) were statistically insignificant. The regression results indicated that the model is a good fit, meaning that all the predictors in the model account for the variation in the dependent variable. The variables were cointegrated implying there was a long-run relationship between them. The study recommended that: First, the government should increase its budgetary allocation to the health sector based on the economic growth of the country to ensure attainment of universal healthcare; Secondly, population should be taken into consideration when making allocations to the health sector. Increase in population means increased demand for health services hence more government spending is required to meet the increased demand. Thirdly, the government should also support secondary school enrolment and adult literacy programmes as these will make the population to be knowledgeable and health conscious.

TABLE OF CONTENTS

DECLARATION.....	ii
DEDICATION	iii
ABSTRACT	iv
TABLE OF CONTENTS	v
LIST OF TABLES	ix
ACRONYMS AND ABBREVIATIONS	xi
ACKNOWLEDGEMENTS	xiii
OPERATIONAL DEFINITION OF TERMS	xv
CHAPTER ONE: INTRODUCTION	1
1.0 Introduction	1
1.1 Background Information	1
1.2 Statement of the Problem	6
1.3 Objectives of the Study	9
The Specific Objectives were to:.....	9
1.4 Hypotheses	9
1.5 Justification and Significance of the Study	10
1.6 Scope of the Study.....	10
CHAPTER TWO: LITERATURE REVIEW	11
2.0 Introduction	11
2.1 Theories of Public Expenditure	11
2.1.1 Wagner’s Law of Increasing State Activities	11
2.1.2 Peacock and Wiseman’s Theory of Government Expenditure	14
2.1.3 Musgrave and Rostow's Development Model.....	16

2.2 The Healthcare System in Kenya	16
2.2.1 Health Indicators	20
2.2.2 Health personnel.....	22
2.2.3 Devolution of Healthcare in Kenya.....	24
2.3 Healthcare Financing in Kenya	27
2.3.1 Government Financing of Healthcare in Kenya.....	27
2.3.2 Health Insurance in Kenya	30
2.3.3 User Fees (Cost Sharing) in the Kenyan Healthcare System	33
2.4 Review of Related Studies	39
2.5 Conceptual Framework	44
2.6 Critique of Previous Studies and Knowledge Gap	46
CHAPTER THREE: RESEARCH METHODOLOGY	49
3.0 Introduction	49
3.1 Research Design	49
3.2 Theoretical Framework	49
3.3 Econometric Model	51
3.4 Study Area.....	53
3.5 Data Types and Sources	53
3.6 Data Analysis	54
3.7 Definition and Measurement of Variables	54
3.7.1 Dependent Variable	54
3.7.2 Independent Variables	54
3.8 Ordinary Least Square Assumptions for Time Series Analysis	56
3.8.1 Assumption 1 for Time series: Linear in Parameters.....	56

3.8.2 Assumption 2 for Time Series: Zero Conditional Mean	56
3.8.3 Assumption 3 for Time Series: No Perfect Collinearity	57
3.8.4 Assumption 4 for Time Series: Homoscedasticity.....	57
3.8.5 Assumption 5 for Time Series: No Serial Correlation.....	58
3.8.6 Assumption 6 for Time Series: Normality.....	58
3.9 Goodness of Fit	58
3.10 Data Analysis and Interpretation.....	61
3.10.1 Multicollinearity Test.....	61
3.10.2 Tests for Stationarity.....	61
3.11 Co-integration Tests	62
3.12 Error Correction Model (ECM).....	63
3.13 Dynamic Stability Tests	63
3.14 Assumptions of the Study.....	63
CHAPTER FOUR : EMPIRICAL RESULTS AND DISCUSSIONS.....	64
4.0 Introduction	64
4.1 Data and Estimation Results.....	64
4.1.1 Time Series Properties	64
4.2 Formal Unit Root Tests.....	75
4.3 Model Specification	77
4.4 Co-integration Rank Test	78
4.5 Vector Error Correction Model	79
4.6 Cointegration Results for Long Run Relationship	83
4.7 Dynamic Stability Test.....	87
4.7.1 Stability Test	87
4.7.2 Lagrange -Multiplier Test.....	87

4.8 The Estimated Multivariate Regression Model.....	89
CHAPTER FIVE: SUMMARY, CONCLUSIONS AND POLICY	
IMPLICATIONS.....	93
5.0 Introduction	93
5.1 Summary of Key Findings	93
5.3 Conclusions	94
5.4 Policy Implications.....	94
5.5 Limitations of the Study	96
5.6 Areas for Further Research.....	96
REFERENCES.....	97
APPENDICES.....	103

LIST OF TABLES

Table 1.1: Ministry of Health expenditure 2002/03 -2009/10 (Ksh Millions).....	7
Table 2.1: Health Personnel in Kenya from 2006 to 2010	20
Table 4.1: Unit Root Test -Augment Dickey Fuller (ADF) Results in Levels.....	90
Table 4.2: Augmented Dickey Fuller (ADF) Results after Differencing.....	91
Table 4.3: Model Specification Results.....	93
Table 4.4: Co-integration Test Results.....	93
Table 4.5: Vector Error Correction Model for Per Capita HealthCare Expenditure.....	94
Table 4.6: Vector Error Correction Model for Real Per Capita GDP (RPGDP).....	95
Table 4.7: Vector Error Correction Model for Population (POP).....	96
Table 4.8: Vector error correction model for Secondary School Enrolment (SSE).....	97
Table 4.9: Vector Error Correction Model for Life Expectancy (LFE).....	97
Table 4.10: Cointegration Relations 1.....	98
Table 4.11: Cointegration Relations 2.....	99
Table 4.12 Cointegration Relations 3.....	100
Table 4.13: Normality Test Results.....	103
Table 4.14: Cochrane-Orcutt AR (1) Regression.....	104

LIST OF FIGURES

Figure 2.1: Decentralization for Government and Health Ministries	15
Figure 2.2: Health System Functions, Actors and Payment Mechanisms.....	22
Figure 2.3: Conceptualized relationship between the Variables.....	56
Figure 4.1: Plot of Per Capita Public Healthcare Expenditure (InPHEXP) in Levels.....	80
Figure 4.2: Plot of Log Real Per Capita GDP (InRPGDP) in Levels.....	81
Figure 4.3: Plot of Log Population (InPOP) in Levels.....	82
Figure 4.4: Plot of Log Secondary School Enrolment (InSSE) in Levels.....	83
Figure 4.5: Plot of Log Life Expectancy (InLFE) in Levels	84
Figure 4.6: Plot of Per Capita Public Health Care Expenditure in First Difference.....	85
Figure 4.7: Plot of Log Real Per Capita GDP (InRPGDP) in Second Difference.....	86
Figure 4.8: Plot of Log Population (InPOP) in Second Difference.....	87
Figure 4.9: Plot of Log Secondary School Enrolment (InSSE) in First Difference.....	88
Figure 4.10: Plot of Log Life Expectancy (InLFE) in First Difference.....	89
Figure 4.11: Roots of companion matrix.....	102

ACRONYMS AND ABBREVIATIONS

ADF	Augmented Dickey Fuller
ADI	African Development Indicators
AMR	Adult Mortality Rate
BOO	Build Operate Own
CMR	Child Mortality Rate
DF	Dickey Fuller Test
ERS	Economic Recovery Strategy
ECM	Error Correction Model
GDP	Gross Domestic Product
GoK	Government of Kenya
HD	Human Development
HIV/AIDS	Human Immunodeficiency Virus/Acquired immunodeficiency Syndrome
IEA	Institute of Economic Affairs
IMF	International Monetary Fund
IMR	Infant Mortality Rate
Ksh	Kenya Shillings

KER	Kenya Economic Report
KNBS	Kenya National Bureau of Statistics
KIHBS	Kenya Integrated Household Budget Survey
KIPPRA	Kenya Institute for Public Policy Research and Analysis
MDG	Millennium Development Goals
MoH	Ministry of Health
NGO	Non-Governmental Organization
NHIF	National Hospital Insurance Fund
PHC	Primary Healthcare
TB	Tuberculosis
UN	United Nations
WHO	World Health Organization
WDI	World Development Indicators
WHS	World Health Statistics
WHR	World Health Report

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OPERATIONAL DEFINITION OF TERMS

Gross Domestic Product (GDP) is the total amount of income for the country of Kenya resulting from economic activities in the country. It represents the spending capability of the government. It is measured in Kenya Shillings. Per Capita GDP is the total GDP for the entire country divided by the population.

Public health expenditure is the total annual budgetary allocation by the government to the ministry of health to be used to provide health services to Kenyan citizens. It is measured in Kenya Shillings. It comprises of the sum of both recurrent and development expenditure.

Population is the number of people living in Kenya every year. It is measured in terms of persons. Population is usually measured at the end of every year.

Secondary School Enrolment is the number of people enrolled in secondary schools in the entire country of Kenya annually. It is measured in terms of persons. In this study it is used as a proxy for literacy rate.

Out-of – Pocket Payments is direct spending by household on healthcare from their own income and not through insurance or government subsidies.

Life expectancy at birth is the number of years an individual expects to live as at the time of birth. It is expressed in years.

CHAPTER ONE

INTRODUCTION

1.0 Introduction

This chapter presents the following: background information, statement of the problem, objectives, research hypotheses, significance of the study, scope of the study and organization of the thesis.

1.1 Background Information

Health is defined as the state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity. The maintenance and promotion of health is achieved through different combinations of physical, mental and social well-being, together referred to as “health triangle.” Broadly speaking, health is not just a state, but also a resource of everyday life, not the objective of living. Health is a positive concept emphasizing social and personal resources, as well as physical capabilities (WHO, 1978).

Good health is both a basic right and a prerequisite for rapid economic development. Health is a priority goal in its own right as well as a central input into economic development and poverty reduction. Good health constitutes one of the basic needs and contributes significantly towards enhancing and maintaining the productive potential of the people (Kosimbei, 2005). When Kenya gained independence in 1963, the government committed itself to providing “free” health services in order to reduce poverty and improve welfare and productivity of the nation so as to ensure development of the nation. Over the years there has been rapid expansion of the health sector but that expansion has

not matched the increase in population to ensure adequate coverage and accessibility of health care (Kimani *et al.*, 2004). Pressure on government resources has hindered it from continued financing of healthcare adequately as per the health demands of Kenyans. Kenya has seen a gradual decline in the quality of health services particularly those in the public sector. This has adversely affected the status of vulnerable groups including the poor, children and pregnant women (Ondimu, 2000a).

Kenya, with a population of 43.2 million people in 2012 up from 31.3 million in 2000 and a population growth rate of 2.6 percent, is a low income country in the Sub-Saharan of Africa with a per capita Gross National Income of US\$ 1,152 in 2012 (Worldbank, 2013). It is the largest economy in East Africa being the regional hub for trade and finance and recently identified as one of Africa's Information and Communication Technology hubs. Strong macroeconomic principles have resulted in resilient economic growth rates. Economic growth for year 2012 was 4.6 percent compared to 4.4 percent for 2011. Despite having a resilient economy, Kenya has made little progress towards reducing poverty, inequality and unemployment. Instead, Kenya's Gini-Coefficient stands at 0.47, the highest in the East African region. It is currently estimated that 20 per cent of Kenyans live in severe poverty while another 27.4 per cent are slightly above the poverty line but remain highly vulnerable to the influence of shocks such as drought, epidemics, flood and economic crisis.

Unemployment, underemployment and informal employment continue to be a major challenge in Kenya, with the youth and women being the most affected. Only 2.13

million Kenyans are employed in the formal sector, 30 per cent of which are women. On the other hand, 9.13 million Kenyans are employed in the informal sector, particularly women and youth aged 18-35 years. The informal sector is characterized by low social and economic security and those employed in this sector are considered “working poor” meaning they are unable to adequately sustain themselves and remain highly vulnerable to external shocks (UNDP-Kenya, 2013).

The overall poverty levels increased from 48.8 per cent in 2007 to 50.8 per cent in 2008 before declining marginally to 49.8 per cent in 2012. In terms of the number of poor people in the population, it was estimated at 18.2 million in 2007 and the number soared to 19.5 million and later 20.1 million in 2008 and 2010, respectively (KIPPRA, 2013). The increase in 2008 is largely explained by the slowdown in the economy, and high inflation following the postelection violence, drought, high international food and energy prices, and the global financial crisis. The level of income inequalities is relatively high, and Kenya’s urban population is growing at 4 per cent per annum. Kenya was ranked position 145 out of 186 countries with a Human Development index (HDI) of 0.519 in 2012 by the United Nations Development Programme’s Human Development Report 2013 titled, *The Rise of the South: Human Progress in a Diverse World*. Human Development Index (HDI) is a composite measure of indicators along three dimensions: life expectancy, educational attainment and command over the resources needed for a decent living. Public spending on health was 1.9 per cent of GDP in 2000 rising minimally to 2.1 per cent in 2010. Similarly public spending on education was 5.2

percent of GDP in 2000 rising to 6.7 per cent by 2010. Total debt service was 1.2 per cent of GDP in 2009 down from 4.7 percent in 2000 (UNDP, 2013).

Approximately 59 percent of the population had access to an improved water source in 2010 up from 44 percent in 1990 while 32 percent of the population had access to improved sanitation facilities in 2010 up from 25 percent in 1990. Life expectancy at birth was 56 years in 2010 down from 59 years in 1990. In 2010 public expenditure on health was 44.3 percent of total health expenditure (World Bank, 2012a).

The Government of Kenya has made a commitment to prioritize health in the Economic Recovery strategy and Vision 2030. As a signatory to the Abuja declaration, Kenya made a commitment to increase health allocations to 15 percent of total government budget (Republic of Kenya, 2011). In that light, the government has been increasing expenditure allocation to health sector as part of the Economic Recovery Strategy to provide equitable and affordable health care services at the highest possible standards for her citizens in order to enhance equity and affordable health care for its citizens (IEA, 2012).

The major economic activity is agriculture which employs over 70 percent of the total labour force and contributes about 25 percent to the GDP (KNBS, 2006). One prominent feature is that those who engage in agriculture are the poor. The main asset of the poor is clearly their labour and both education and health services improve the productivity and earnings of workers. The burden of diseases such as HIV/AIDS can slow the economic growth of developing countries. Thus, public spending aimed at improving the education

and health of people leads to a better quality of life as well as positively influencing economic development of a country. Education and health are important tools to empower poor people and overcome exclusion based on gender, location, and other correlates of poverty (Amaghionyeodiwe, 2009; Odior, 2011). Healthy people increase their value in labour markets. An increase in productivity frees up resources to create new technologies, new businesses and new wealth, eventually resulting in increased economic growth and human welfare. Healthcare in Kenya is financed from various sources with the government being the biggest single funder of public health care. Expenditure on health is estimated at about 2 percent of GDP (KIPPRA, 2009).

Health financing systems are vital in helping countries attain and maintain universal health coverage. Universal health coverage was the main objective of the health-related Millennium Development Goals (MDGs). The health-related MDGs are: Goal 4-Reducing child mortality; Goal 5-Improving maternal health; and Goal 6-Combating HIV/AIDS, malaria, tuberculosis (TB), and cholera. Universal health coverage has been defined as ensuring that all people have access to needed health services-prevention, promotion, treatment and rehabilitation- without facing financial ruin because they need to pay for them (WHO, 2012). Goal 3 -promotes gender equality and empowerment of women- is a fundamental principle for achieving good reproductive health and that Goal 2 -achieve universal primary education- is necessary to direct more health education messages to more people in the reproductive age population and that women with higher educational levels have smaller families (Jamison, 2006).

1.2 Statement of the Problem

Quality health care has a positive impact on economic growth. Improvement in health and nutrition improves the productivity and income of people. At the Abuja declaration in 2001 countries, Kenya among them, committed themselves to increasing public spending on health to 15 percent of the government budget so as to eradicate poverty and ensure universal access to health care for the world's poorest by 2015 (Chidoko *et al.*, 2011). In Kenya, Public expenditure on health as a percentage of total government expenditure has been declining. Also public expenditure on health as a percentage of GDP has been declining and is below 2 percent. Per capita public expenditure on health on the other hand has been increasing every fiscal year but it is still not enough to meet the most basic health needs since the increase is not matched by the health needs of Kenyans.

Table 1.1 reveals that MoH expenditure as a percentage of total government expenditure has been declining from 8.33 percent in fiscal year 2002/2003 to 6.99 percent in 2003/04 to 6.1 percent in 2004/05 to 5.73 percent in 2005/06, increasing to 7.6 percent in 2006/07, declining to 6.4 percent in 2007/08, increasing minimally to 6.7 in 2008/09 and increasing to 7 percent in 2009/10. Also MoH expenditure as a percentage of GDP was 1.49 percent in fiscal year 2002/03, increasing by small margin to 1.51 percent in 2003/04, increasing minimally to 1.55 percent in 2004/05, declining to 1.50 percent in 2005/06, remaining at 1.5 percent in 2006/07, increasing to 1.7 in 2007/08 and declining to 1.4 percent in 2008/09 (KIPPRA, 2009; KIPPRA, 2010).

Table 1.1: Ministry of Health Expenditure 2002/03 -2009/10 (Ksh Millions)

	2002/03 ^a	2003/4 ^a	2004/5 ^a	2005/6 ^a	2006/7 ^b	2007/8 ^b	2008/9 ^b	2009/10 ^b
Recurrent	14,405	15,438	17,417	19,765	21,542	23,518	25,552	28,184
Development	946	1,003	1,741	3,242	5,988	9,609	9,293	18,826
Total	15,351	16,441	19,158	23,007	27,530	33,127	34,845	47,010
Recurrent (%)	94	94	91	86	78	87	73	59
Development (%)	6	6	9	14	22	13	27	41
Total (%)	100	100	100	100	100	100	100	100
MoH Expenditure per capita								
	Ksh 469.40	487.90	552.90	646.30	750.6	983.0	850.0	-
	US\$ 6.10	6.52	7.40	9.10	10.9	13.8	11.6	-
Ministry of Health expenditure (Gross) as % of total government expenditure								
Recurrent	8.69	7.76	7.66	6.29	7.5	6.7	6.6	6.7
Development	5.12	2.77	2.01	3.73	7.7	5.8	4.7	7.3
Total	8.33	6.99	6.10	5.73	7.6	6.4	6.7	7.0
Ministry of Health expenditure (Gross) as % of GDP								
Recurrent	1.40	1.41	1.41	1.29	1.2	1.1	1.2	-
Development	0.09	0.09	0.14	0.21	0.3	0.6	0.2	-
Total	1.49	1.51	1.55	1.50	1.5	1.7	1.4	-

Source: Kenya Institute for Public Policy, Research and Analysis (KIPPRA) - ^a Kenya Economic Report, 2009; ^b Kenya Economic Report, 2010

Much of government budgetary allocation goes to recurrent expenditure such as paying salaries, paying utilities and day to day running of the Ministry of Health and health facilities as opposed to development such as construction of new health facilities. The high level task force on innovative international financing for health systems found that on average a country would require a minimum of US\$ 44 per capita expenditure on health in 2009 to ensure that every one could have access to a set of essential health services focusing largely on HIV, tuberculosis, malaria and maternal and child health with some preventive activities (WHO, 2012).

Kenya's total per capita expenditure on health in 2009 was US\$ 36 (KIPPRA, 2009) below the minimum US\$44 needed, meaning it will not be possible to ensure universal access to even a set of limited essential services. Achieving the health related MDGs will depend heavily upon the extent, to which health programmes can be integrated, shortfalls in funding met and underlying health systems strengthened-particularly in terms of health personnel, financing and the organization of service delivery.

The pattern of spending on public healthcare by the government on average is depicting a declining trend and this means that access to health care has been and still is out of reach for majority of Kenyans. Many Kenyans travel long distances to get to health facilities which have inadequate qualified health personnel, shortage of medicines, poorly maintained infrastructure and more seriously the high cost of health services since they have to make out-of pocket payments to get health services. To ensure universal access to healthcare requires knowledge on the relationship between public health care expenditure

and selected economic, social and demographic factors so as to enable the government allocate adequate funds to healthcare in Kenya.

1.3 Objectives of the Study

The broad objective of this study was to analyze the relationship between public healthcare expenditure in Kenya as the dependent variable and independent variables which are: real per capita GDP, Population, Secondary school enrolment and life expectancy.

The Specific Objectives were to:

- I. Determine the relationship between Gross Domestic Product and public healthcare expenditure.
- II. Evaluate the relationship between population and public healthcare expenditure.
- III. Investigate the relationship between secondary school enrolment (proxy for literacy rate) and public health care expenditure.
- IV. Determine the relationship between life expectancy at birth and public health care expenditure.

1.4 Hypotheses

H₀₁: There is no relationship between Gross Domestic Product and expenditure on public healthcare ($H_{01}=0$).

H₀₂: There is no relationship between population and public health expenditure ($H_{02}=0$).

H₀₃: Secondary school enrolment (proxy for literacy rate) has no relationship with spending on public healthcare ($H_{03}=0$).

H₀₄: Life expectancy has no relationship with public healthcare expenditure ($H_{04}=0$).

1.5 Justification and Significance of the Study

The study will contribute immensely towards understanding the relationship between public healthcare expenditure, economic growth (measured by GDP), social and demographic factors. Good health contributes immensely to good economic growth since healthy people are productive. Good health can only be achieved through adequate funding of the health sector.

The findings of this study are expected to benefit both the National government and County governments in Kenya when formulating policies as concerns financing the health system in Kenya to ensure universal access to healthcare. It will also be beneficial to researchers and academicians since it will be used for reference and will help stimulate further studies in the area of healthcare financing using different approaches.

1.6 Scope of the Study

The study investigated selected economic and socio-demographic factors that affect public healthcare expenditure in Kenya from 1980 to 2010. The period of 31 years is a reasonable length of time to reveal the nature of long run relationship between health expenditure on one hand as the dependent variable and GDP, literacy levels, life expectancy and population on the other hand as the independent variables.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter contains theories of public spending, overview of healthcare system in Kenya, healthcare financing, review of related studies, conceptual frame work and knowledge gap.

2.1 Theories of Public Expenditure

The size and growth of public expenditure are complex societal processes that cannot be explained exclusively by the discipline of economics as there are many causal factors behind the size and growth of public expenditure (Peters, 2007). Several theories have been put forth to try and explain patterns of public expenditure the world over. This study used three theories which are: Wagner's law of increasing state activities; Peacock and Wiseman's theory of government expenditure and Musgrave and Rostow's development model.

2.1.1 Wagner's Law of Increasing State Activities

Wagner's law of increasing state activities based on historical facts, primarily of Germany, was presented by German economist, Adolph Wagner. According to Wagner there are inherent tendencies between the growth of economy and Government activities with the result that the governmental sector grows faster than the economy (Peacock and Wiseman, 1961; Doessel and Valadkhani, 2003). There was a functional relationship between the growth of an economy and the growth of the government activities so that the governmental sector grows faster than the economy. In the original version, it is not clear to which he was referring to among the following; absolute level of public

expenditure, the ratio of government expenditure to GNP, or proportion of public sector in the total economy (Lamartine and Zaghini, 2008; Usenobong, 2011). All kinds of governments, irrespective of their levels, intentions and size had exhibited the same trend of increasing public expenditure (Peters, 2007; Bakare and Olubokum, 2011; Rauf *et al.*, 2012).

Wagner had three reasons to support his hypothesis. Firstly, as the traditional functions of the state were expanding, defence was becoming more expensive than ever before. Administrative set up was also increasing both in coverage and intensity. Administration, justice and maintenance of law and order were becoming more extensive and cumbersome as the society progressed. An additional force pushing up public expenditure here is the fact that various complexities of social and economic nature develop which made an efficient administration also more complex and expensive (Peters, 2007; Bakare and Olubokun, 2011; Kuckuck, 2012). Thus, as nations become more advanced the number and/or magnitude of market failures would force the state to become more regulatory in nature, thereby expanding its role and this would require higher public expenditures (Lamartine and Zaghini, 2008).

Secondly, the state activities were increasing in their coverage. Traditionally, the state was limited to only defence, justice, law and order maintenance of the state and social overheads. But with the growing awareness of its responsibilities to the society, the government was expanding its activities in the fields of various welfare measures. These include the measures to enrich the cultural life of the society and also those designed to

provide social security to the people. State activities were also increasing on account of its effort in redistributing income and wealth (Bakare and Olubokun, 2011). The expansion of 'cultural and welfare' expenditures based on the presumption that as income rises, society would demand more education, health, entertainment, a more equitable distribution of wealth and income, and generally more public services. Public Services were seen as normal goods, that is, their income elasticities of demand exceeded unity. Wagner cited education and culture as areas in which collective producers were more efficient than private producers (Peters, 2007).

Thirdly, the need to provide and expand the sphere of public goods was being increasingly recognized. The state was trying to shift the composition of national product in favour of public goods and this necessitated the expansion of the investment activities of the government. Wagner's law was based on historical facts. It did not show the inner compulsions under which a government has to increase its activities and public expenditures as time passes. His law was applicable to modern progressive governments only; in which the state was interested in expanding the public sector of the economy and undertakes other activities for the general benefit. This general tendency of expanding state activities has a definite long term trend, though in the short run, financial difficulties could come in the way, but in the long run, the desire for development of a progressive people will always overcome these financial difficulties (Bakare and Olubokun, 2011; Kuckuck, 2012).

Wagner's hypothesis was formulated in the context of industrializing economies with rising per capita incomes. As much as that is true, public expenditures have been observed to rise over time in many developing countries. It is argued by some economists that it is not the level of income that determines a nation's expenditure, but rather the perceived role of the government. They note that developed countries currently spend relatively more on their public services than they had done a hundred years ago, not because they became richer and more prosperous but rather as a result of an evolving conception of the duties of the state. The state is required to provide a whole range of services ranging from education, infrastructure, security, social amenities, and health care. They argued that these changes in ideas were not confined to the richer countries; poorer countries went through similar experiences and they also experienced increases in relative public expenditures. Public spending is influenced by a number of socio-economic variables not all of which are quantifiable. There is no agreement as to what variables should be used to measure both economic development and state activity. GDP per capita is used to measure increases in income, as it is a more accurate index of income advances because it accounts for population growth (Peters, 2007).

2.1.2 Peacock and Wiseman's Theory of Government Expenditure

Peacock and Wiseman unlike Wagner, who was concerned with explaining the relationship between public expenditure and economic growth, were concerned with explaining the variations in government expenditure over time by focusing on the experience of United Kingdom from 1890 to 1955. According to them, studying expenditure patterns from year to year would be more relevant for policy formulation than analyzing long term trends (Taiwo and Abayomi, 2011). Their analyses was based

upon a political theory of public determination namely that governments like to spend more money and citizens do not like to pay taxes, and that governments need to take into account the views and wishes of their citizens. Government expenditure depends majorly on tax revenues raised by taxation and there is a constraint on revenues that can be raised from taxation based on taxable capacity of a country (Peacock and Wiseman, 1961).

Peacock and Wiseman noticed that revenue and expenditure had no uniform growth in the United Kingdom but was characterized by sudden increases and drops caused by social unrest such as wars. A trend was seen where government expenditure rose to very high levels during war and did not drop to their previous level even after the war (Usenobong, 2011). This was attributed to the tolerable burden of taxation whereby during war the government increased taxes to enable it have more funds to perform functions it could not otherwise do. The increase in government expenditure with respect to national output is what is referred to as “Displacement Effect” (Doessel and Valadkhani, 2003). Public expenditure increases and for the period of the crisis exceeds private spending. Even after the crisis public expenditure does not however fall to its original level (Peacock and Wiseman, 1961). Every nation has a limit to which they can raise revenue from taxes. The government therefore expands its scope of services to improve these social conditions and because people perception to tolerable levels of taxation does not return to its former level, the government is able to finance these higher levels of expenditures originating in the expanded scope of government and debt charges (Taiwo and Abayomi, 2011).

2.1.3 Musgrave and Rostow's Development Model

Rostow and Musgrave examined the growth of public expenditure and concluded that the growth of public expenditure might be related to the pattern of economic growth and development in societies. According to them, in the early stages of economic development, the rate of growth of public expenditure will be very high, because government provides the basic infrastructural facilities-social overhead- which are capital intensive and as such the spending of the government will increase steadily (Aladejare, 2013). Private saving is inadequate to finance this necessary expenditure. Government expenditure must thus be a high proportion of total output. Investments in education, health, roads, electricity, and water supply are necessities that can launch the economy from the traditional stage to the take off stage of economic development making government to spend an increasing amount with time in order to develop an egalitarian society. In the middle stage of development, public expenditure would be restricted to the provisions of economic and social infrastructure. Ultimately, the private sector is expected to drive development at the higher state of societal development, with the role of the government restricted to the maintenance of law and order (Usenobong, 2011).

2.2 The Healthcare System in Kenya

One of the overall goals of the Government of Kenya is to promote and improve the health status of all Kenyans by making health services more effective, accessible and affordable. Therefore, health policy in the country revolves around two critical issues, namely: how to deliver a basic package of quality health services, and how to finance and manage those services in a way that guarantees their availability, accessibility and affordability to the poor (Kimani *et al.*, 2004).

Kenya is faced with a high dependency burden, with over 50% of the population below 15 years of age (Republic of Kenya, 2005). This has resulted in high dependence ratios placing high demands on social services such as primary education and health care. Kenya's economic blue print, the vision 2030 gives special attention to healthcare on the recognition of the importance of health in economic growth and development. It aims to provide efficient and high quality health care systems with the best standards to improve the overall livelihood of Kenyans. This will be achieved through two prolonged approaches: First, devolution of funds and management to the communities and district medical officers, leaving the Ministry to deal with policy and research issues; and secondly, shifting the bias of national health bill from curative to preventive care. Special attention will be paid to lowering incidences of HIV/AIDS, Malaria and TB, and lowering infant and maternal mortality ratios. All these will reduce inequalities in access to health care and improve key areas where Kenya is lagging behind, especially in lowering infant and maternal mortality. Specific strategies will involve: provision of robust health infrastructure; and improving the quality of health service delivery to the highest standards and promotion of partnership with the private sector. In addition, the government will provide access to those excluded from health care due to financial reasons (Republic of Kenya, 2007).

The key players in the health sector are the government, private for-profit organizations, faith-based, non-governmental organizations (NGOs) and development partners involved in service delivery (Muthaka *et al.*, 2004). This, in a centralized system, already poses many challenges that will significantly be heightened under a devolved structure of

government. Out of the 8,250 health facilities in the health sector, the Ministry of Health operates 47 per cent of the facilities (KIPPRA, 2013). The private sector and faith-based organizations (FBOs) complement the provision of health care by operating 49 per cent of health facilities. Private and mission health facilities and public hospitals are important sources of health services for the non-poor, while health centres in rural areas and urban slums are the primary health care providers for majority of the patients from poor households. Therefore, improvement in rural and basic urban health facilities would be more beneficial to the poor.

The public healthcare sector is organized into national, provincial, district, and community level, therefore forming a pyramid-like pattern. Health posts, mobile clinics, and dispensaries are at the very bottom of the pyramid with health centers, sub-district, district, and provincial hospitals at the middle of the pyramid. Kenyatta National Hospital in Nairobi and Moi Teaching and Referral Hospital in Eldoret are at the apex of the public healthcare system. The Kenyan health system has expanded rapidly in the post-independence period. This has been driven by the government's commitment to making healthcare services accessible and affordable to the majority of Kenyans. To achieve this, the government during the early years of independence, increased budgetary allocations to the health sector, and later adopted a non-restrictive policy environment towards private provision of healthcare services. The physical growth of infrastructure for healthcare services in Kenya is evidenced by the increase in the number of hospitals and other health centers. The number of hospitals grew from 148 in 1963 to about 514 in

2002, while health centers increased from 160 to 634 in the same period (Muthaka *et al.*, 2004).

Kenya has struggled to build a health system that can effectively deliver quality health services to its population. However, access to health and medical care is unequal throughout the country and is determined on numerous factors, in particular, differences exist between rural and urban communities, and between the few rich and the poorer masses. Utilization of health services is a key factor in improving health outcomes for Kenyans, in both the short- and long-term. At present, the level of and access to care varies by region, with the most facilities per person located in Central Province, and the least located in the border provinces of Western Valley and Nyanza. North eastern is the most underdeveloped. The health care utilization rate in Kenya is approximately 77 percent for those who are sick, meaning that a large percentage of the population does not seek care despite being ill (Turin, 2010). Poor people in rural areas who are ill and choose to seek care, usually only have the option of treatment at primary care facilities. These facilities are often under-staffed, under-equipped and have limited medicines. Among those Kenyans who are ill and do not choose to seek care, 44 per cent are hindered by cost. Another 18 percent are hindered by the long distance to the nearest health facility (Allianz worldwide Care, 2013).

Approximately 78 percent of Kenyans live in rural areas, yet a disproportionate share of healthcare facilities are located in urban areas. Those in rural areas often have to travel long distances, often on foot, to seek care. The World Bank index of access to health

services (measuring the share of newborns delivered at a health facility) in Kenya revealed massive disparity. For instance, over eight in ten children born in Kirinyaga County, which is located in the central part of the country, are delivered in a health facility. In Wajir, which is located in one of the most remote and marginalized regions of the country, one child in twenty is born in a health facility (KPMG-Africa, 2011).

2.2.1 Health Indicators

Health indicators in Kenya reveal that even though some progress has been made but a lot needs to be done if the country is to ensure universal health coverage. Life expectancy at birth was 54.9 years in 2009 rising to 57.7 years in 2012. Under five mortality was 115 per 1,000 live births in 2003 reducing to 74 per 1,000 live births in 2008 and increasing to 85 in 2010. Infant mortality fell from 77 per 1,000 live births in 2003 to 52 in 2008 and rising in 2010 to 55 per 1,000 live births (KIPPRA, 2013; UNDP, 2013). Mother mortality was 499 per 100,000 live births in 2009 falling to 360 per 100,000 live births in 2010 and 43.8 percent of births were attended by skilled health staff in 2009. Also, 74 percent of children between 13-23 months received measles immunization in 2009 rising to 86 percent in 2010 while 46 percent of children under 5 years used mosquito treated nets in 2009 (World Bank, 2011; UNDP, 2013). HIV prevalence in 2009 was 4.1 per cent for females and 1.8 per cent for males aged between 15 -24 years of age. Adult mortality in 2009 was 282 for females and 358 for males. The incidence of these and other diseases has not improved during the last decade, despite significant increases in the budgetary resources allocated to health.

Most other targets in the health sector have not been met. Non-communicable diseases such as diabetes and cancer are increasingly contributing to morbidity and mortality. The government should double efforts on the commitment to improve health sector infrastructure, attaining acceptable standards and norms without adversely affecting staffing, equipment, infrastructure and operating costs across all counties (KIPPRA, 2013). Moreover, accessibility to health facilities varies across counties, with the worst affected areas being in the Northern part of Kenya. Health sector financing is also below the WHO recommendation. The growth in population has outstripped the production of qualified health personnel and this has posed serious challenges in ensuring that health needs of Kenyans are met.

Health services are provided through a network of over 4,700 health facilities countrywide, with the public sector system accounting for about 51 percent of these facilities. The best quality of care is found at national referral hospitals, which represent the apex of the healthcare system and provide diagnostic, therapeutic and rehabilitative services. The two public national referral hospitals are Kenyatta National Hospital in Nairobi and Moi Referral and Teaching Hospital in Eldoret. The equivalent private referral hospitals are the Nairobi Hospital and the Aga Khan Hospital, also in Nairobi (Allainz Worldwide Care, 2013).

WHO has estimated that a poor physical environment is responsible for about one fourth of all preventable diseases. Environmental conditions are especially critical for some diseases; for example, such conditions account for an estimated 90 percent of health

problems caused by malaria. Environmental threats to human health can be divided into “traditional hazards” associated with a low level of economic development, and “modern hazards” associated with industrialization (Republic of Kenya, 2005).

2.2.2 Health personnel

According to The Kenya National bureau of statistics (KNBS, 2011), there has been a rise in all categories of health personnel, but the increase is not matched by needs of the entire Kenyan population. Table 2.1 depicts the number of health personnel with various skills in Kenya between 2006 and 2010. Nurses are the highest of all categories. In 2006 there were 18,773 registered nurses, 5,775 doctors, 751, dentists, 2,697 pharmacists and 6,095 clinical officers. The numbers increased to 29,678 registered nurses, 7129 doctors, 898 dentists, 3097 pharmacists and 8598 clinical officers in 2010. As at 2010 there were 18 doctors per 100,000 of the population, 2 dentists, 8 pharmacists, 75 registered nurses and 22 clinical officers per 100, 000 of the population below the WHO recommended minimum of 36 and 356 doctors and nurses, respectively, per 100,000 population (KIPPRA, 2013).The growth in population has outstripped the production of qualified health personnel and this has posed serious challenges in ensuring that health needs of Kenyans are met.

In addition to the lack of health care workers, their uneven distribution poses a challenge to the provision of quality care to all the population. In 2006, only 15 per cent of the health workforce worked in health centers while 70 per cent worked in hospitals. In fact, two national hospitals-Kenyatta National Hospitals and Moi Teaching and Referral

Hospital- employ 42 percent of all the doctors in Kenya and 13 per cent of the nurses (World Bank, 2012_b). This uneven distribution of health workers disproportionately affects the rural poor who do not have access to urban hospitals due to financial or geographical barriers.

Table 2.1: Health Personnel in Kenya from 2006 to 2010

Type of personnel	2006	2007	2008	2009	2010	No. per 100,000 of the population in 2010
	Number	Number	Number	Number	Number	
Doctors	5,775	6,065	6,369	6,800	7,129	18
Dentists	751	785	817	859	898	2
Pharmacists	2,697	2,775	2,860	2,921	3,097	8
Pham technologists	1680	1,680	1,815	1,950	2,233	6
Bsc Nursing	549	666	745	863	988	2
Registered Nurses	18,773	20,845	23,310	26,678	29,678	75
Enrolled Nurses	33,077	33,473	33,690	34,282	34,282	86
Clinical officers	6,095	6,618	7,245	8,598	8,598	22
Public Health officers	6,503	6,728	6,960	7,429	7,429	19
Public health technicians	5,938	5,969	5,969	5,969	5,969	15
Total	81,838	85,604	89,780	95,219	100,301	252

Source: Adopted from Kenya National Bureau of Statistics (KNBS)-Statistical Abstract 2011

It is evident from table 2.1 that Kenya has acute shortage of specialized medical personnel and this means that various health needs of Kenyans cannot be meet. Most public hospitals do not have modern equipment such as dialysis machines, radiology

equipment, laundry machines and theatre equipment. Overall, Kenya has 16 doctors per 100,000 population and 153 nurses per 100,000 population compared to WHO recommended minimum staffing levels of 100 doctors and 356 nurses per 100,000 population. Only a third of these are in the public service. Effectively therefore a third of the doctors cater for 57 percent of outpatient visits and 64 percent of all admissions in the country. In addition the Kenya health system exhibits its mal-distribution of health workers. Although the minimum staffing norms are clearly described, they are rarely used (Wafula, 2013_b)

2.2.3 Devolution of Healthcare in Kenya

The promulgation of the constitution of Kenya on 27th August, 2010 was a major milestone towards the improvement of health standards. Citizen's high expectations were grounded on the fact that the new Constitution came with devolution of resources and services to the grassroots. It states that every citizen has right to life, right to the highest attainable standard of health including reproductive health and emergency treatment, right to be free from hunger and to have food of acceptable quality, right to clean, safe and adequate water and reasonable standards of sanitation and the right to a clean healthy environment (KHSSP, 2012). To improve the overall livelihoods of Kenyans, the country aims to provide an efficient integrated and high quality affordable health care system. Priority will be given to prevented care at community and household level, through a decentralized national health-care system. With devolution of funds and decision-making to county level, the Ministry of Health (MoH) will then concentrate on policy and research issues. With the support of the private sector, Kenya also intends to become the regional provider of choice for highly-specialized health care, thus opening Kenya to

“health tourism”. Improved access to health care for all will come through: provision of a robust health infrastructure network countrywide; improving the quality of health service delivery to the highest standards; promotion of partnerships with the private sector; providing access to those excluded from health care for financial or other reasons.

Healthcare in a devolved system is organised in a four-tiered system: Community health services: This level is comprised of all community-based demand creation activities, that is, the identification of cases that need to be managed at higher levels of care, as defined by the health sector; Primary care services: This level is comprised of all dispensaries, health centres and maternity homes for both public and private providers; County referral services: These are hospitals operating in, and managed by a given county and are comprised of the former level four and district hospitals in the county and include public and private facilities; National referral services: This level is comprised of facilities that provide highly specialised services and includes all tertiary referral facilities. The counties are responsible for three levels of care: community health services, primary care services and county referral services. The national government has responsibility for national referral services (KPMG-Africa, 2011).

Figure 2.1 depicts forms of decentralization of health systems. Decentralization can be from central government to local government and from the Ministry of health to the local government, regional hospitals, district hospitals, private hospitals and NGO health facilities.

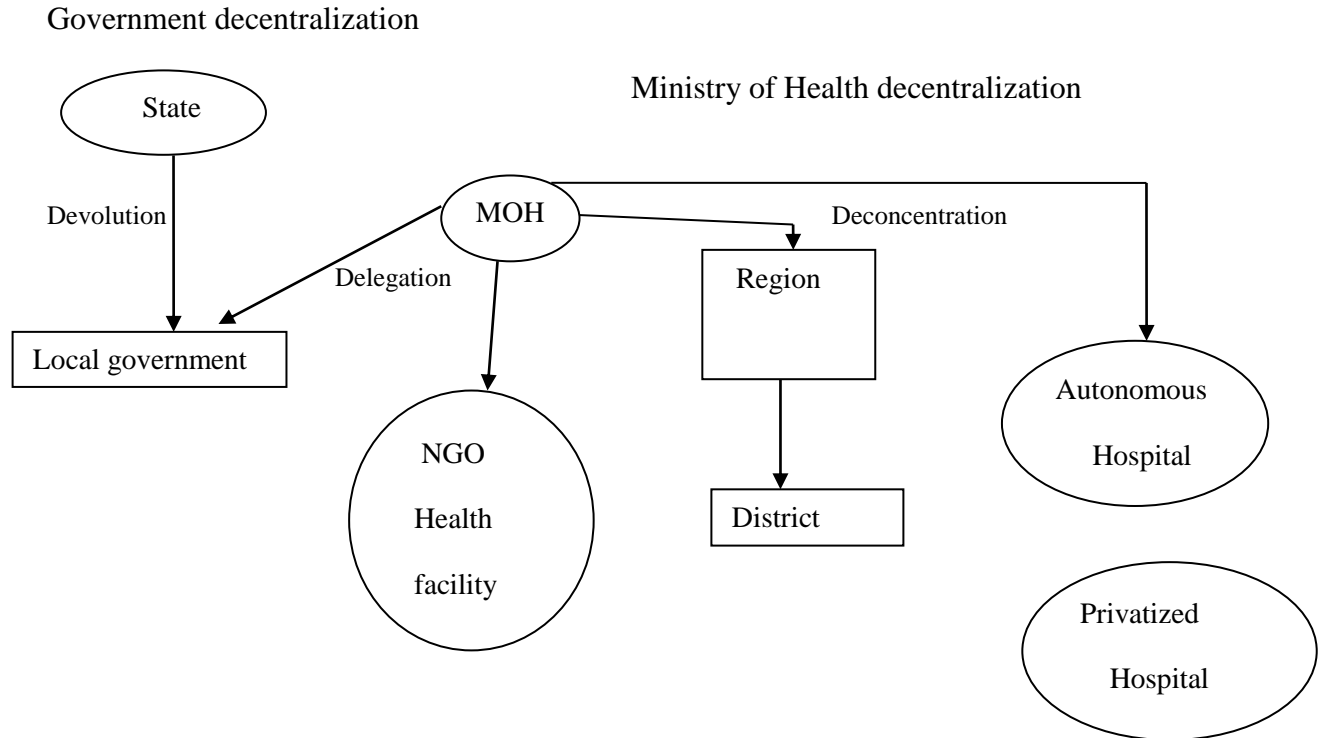


Figure 2.1: Decentralization for Government and Health Ministries

Source: Campbell-White *et al.*, 2006

Decentralization of health services can occur from the central government to local authorities and /or from the ministry of health to regional hospitals, district hospitals, NGO health facilities and other private health facilities. The main aim of decentralization is to give local managers autonomy and independence as concerns certain decisions and utilization of resources. Deconcentration may give local managers more control over input management, such as purchase of medicines, maintenance of facilities and equipment, hiring and deployment of staff, and contracting with vendors (Campbell-White *et al.*, 2006).

2.3 Healthcare Financing in Kenya

There are four traditional sources of health care financing in Kenya: taxation, social insurance, private insurance and direct or household out-of-pocket payments. Other sources include donor grants and loans. In 2007, the Ministry of Health (MoH) provided a summary of the sources of health financing in Kenya and in its households remained the main source of funds for health care, accounting for 51 percent of the funds. Government and parastatals account for 30 percent of the funds, donors account for 16 percent while Non-Governmental Organizations and private companies contributed approximately 3 percent of health care finance (IEA, 2012).

2.3.1 Government Financing of Healthcare in Kenya

The Kenya government health expenditure as a percentage of total government expenditure has significantly declined from 8.6 percent in 2001-2002 to 4.6 percent in 2010-2011 (EuroNGOs, 2012). The trend differs from other East African countries, such as Ethiopia, Tanzania and Uganda who comparatively spend more on health as a percentage of government expenditure. Declining investments in the health system has severely affected all aspects of the health system. Public expenditure on health has attained a plateau and is unlikely that more would be expected from the exchequer. Kenya Government is signatory to the Abuja and Maputo Declaration that commit African Governments to allocate at least 15 percent of the annual national budget to health (KPMG Africa, 2011; TI Kenya, 2011). Kenya's spending is both low and unevenly distributed with almost 70 percent going to secondary and tertiary facilities rarely used by the poor. During 2012 financial year had the government allocated 15 percent of its budget to health, this would have amounted to approximately Kshs 150 billion for health alone (Republic of Kenya, 2012). Conservative estimates indicate that the

healthcare sector is under-funded by approximately 60 to 70 percent. This chronic under-funding of the health sector is not likely to ease in the foreseeable future, making it difficult for the country to bridge the gap in the national Millennium Development Goals by 2015.

Between the years 2006 to 2012, allocations to the health sector have on average about 6 percent of the total government budget. This has made the sector predominantly financed by private sector sources including households' out-of-pocket spending. The health sector is running on less than a third of its recommended budget even though the real figures have been growing year on year. The increment is neither matched by the total budget nor growth of economy. The health sector has faced stiffest cuts with spending decreasing from 7.2 percent in 2010 of the sh998.8 billion budget, to 6.1 per cent in 2011 and falling further to 5.9 per cent in the Ksh 1.5 trillion budget of 2012. The country has fallen much below the 15 percent Abuja target. In the sh1.6 trillion 2013 budget the government has allocated Ksh 34.7 billion to health (Wafula, 2013a). This is about 2 percent of the total budget. Most public health facilities have old and dilapidated equipment. Evidence shows that up to 30 percent of medicines in Kenya are counterfeit. This has contributed to increased morbidity and mortality and increased health costs that have ultimately reduce the performance of the health system.

The allocation of spending across services within the health sector is not favorable to the poor. Governments allocate large portions of their budgets to hospital-based services which the poor do not use. In Ghana, for example two-thirds of health budget was spent

on hospital services, in South Africa 89 percent and in Kenya more than half went to hospitals. Targeting health spending on the poor would require less spending of the health budget on hospitals and more on primary facilities (Dayton *et al.*, 2000).

In Sub-Saharan Africa, government expenditures on health are also extremely low and therefore donor funding is an important source of revenue for health in these countries. Private spending exceeds public spending on health with household out-of-pocket spending accounting for 80 percent of private spending and almost 50 percent of total health spending. Africa faces difficult health financing decisions due to low per capita income, challenging growth prospects, limited domestic revenue mobilization potential, severe shortages of health manpower, and the highest disease burden in the world. The continent accounts for 25 percent of the global disease burden and 60 percent of the people living with HIV/AIDS but it accounts for less than 1 percent of global health spending and contains only 2 percent of the global health workforce. Increasing the level of health expenditures and improving their efficiency is important towards attainment of universal healthcare (Gottret and Schieber, 2006).

High income countries spend an average of 7 percent of GDP on health compared to low income countries spend an average of only 4.2 percent on the sector. Insufficient health budgets due to deteriorating economic conditions, combined with burgeoning health problems such as the global HIV/AIDS pandemic, have led to an acute shortage of health workers, shortage of drug and medical supplies, unaffordable out-of-pocket costs for health services' consumers, poorly remunerated health personnel or non-payment of

health workers, poor quality of care, and inequitable healthcare services in many low income and transition countries. With corruption as both a cause and effect, the result has been the deterioration of general health among individuals and degradation of the health system in developing countries (TI-Kenya, 2011).

2.3.2 Health Insurance in Kenya

The most significant event since 1989 has been the government's interest in social health insurance (SHI). The purpose of the latter is to ensure access to outpatient and inpatient health care for all Kenyans and to significantly reduce the out-of-pocket health care expenditure of households, especially the poorest (Carrin *et al.*, 2007).

Kenya has both public -National Hospital Insurance Fund and private health insurance schemes. Private third party insurance is a growing industry, but still quite small and limited to urban areas and covering primarily those employed in the formal sector. The National Hospital Insurance Fund (NHIF) was established in 1968 to provide care for the contributors and their families for inpatients in registered hospitals. The Fund is characterized by problems of weak administrative system, poor investment portfolio and low claim settlement. Most of the registered health facilities with NHIF are rarely used by the poor (Kimalu, *et al.*, 2004). The poor use local clinics and dispensaries, which are not registered by the Fund, and therefore do not get reimbursed for the medical expenses they incur even though they are members of the Fund. The pattern of healthcare financing implies that the poor are subsidizing the rich as the poor rarely claim for reimbursement

from the Fund. As of 2007, the NHIF insured approximately 7.1 per cent of the population (World Bank, 2012b).

Private insurance is still in its infancy stage, covering only 1.6 per cent of the population in 2007 and paying for 5.8 per cent of total health expenditures in 2006. The majority of the costs related to providing health care at public facilities are subsidized by government and donor funds. However, user fees, which were introduced in 1989, also pay for a portion of health services at public facilities. Exemptions for children under the age of five and people with special ailments were put in place. The NHIF suffers from a variety of problems, which impair its role as a successful risk-sharing scheme. Among these problems are reimbursement policies which have encouraged growing lengths of stay at the hospitals (especially private hospitals), increased value of claims, and expansion of the private-for-profit sector (Kimani *et al.*, 2004). The challenges that NHIF faces has necessitated the government to look into ways of transforming it into a National Social Health Insurance Scheme (NSHIS) which is supposed to address issues of equity, access, affordability and quality in the provision of health services in Kenya that NHIF has failed to achieve.

In 2004 the then minister for health, Charity Ngilu, proposed the National Social Health Insurance Bill which was meant to transform National Health Insurance Fund into a universal health insurance scheme to cover all Kenyans so as to ensure access by eliminating the burden of out-of-pocket payments for the poor. The bill was however not signed into law by the then government on the basis that the Ksh 40 billion needed to

fund the scheme was too expensive to be sustained by the economy. Thus access to healthcare, particularly for the poor, has remained an unattainable goal unless the Government introduces new strategies that reassure Kenyans with regard to cost containment vis-à-vis the tax wage bill. It is for these concerns that it is being proposed that financing of healthcare in the country gradually shift from predominantly out-of-pocket and tax funding to more sustainable pre-payment schemes in which Government will increasing focus attention to paying for the poor. Although mandatory coverage under the NHIF Act is only applicable to wage earning workforce, the Act in no way prohibits Government to use this mechanism as a preferred mode for financing healthcare services in the country. Today, approximately 25 percent of the population in the country is contributing to the Fund, enabling about 8.4 million Kenyans to benefit from health insurance (Republic of Kenya, 2012). This translates to approximately 10 percent contribution from the Fund to the overall public expenditure in health.

In Uganda, Quaye (2007) explored the feasibility of introducing a social health insurance and found that Ugandans support the introduction of social health insurance. Some are willing to contribute financially and most believe that the Ugandan government should make this benefit available to all Ugandans by playing an active role in the scheme's design and implementation and that some employers should be forced to cover their employees by reforming the current value added tax system to allow companies to use tax income to finance SHI provision for their employees. However others many were against cost sharing since they saw it as burdensome on people with lower incomes and has negative impact on the delivery and utilization of health services among the poor.

Jacobs and Goddard (2002) examined the key features of social health insurance systems by drawing experience Germany, Switzerland, France and The Netherlands. All the four countries finance their health care primarily through social contributions and have implemented a variety of reforms, including some competition in order to achieve some of the objectives of their health system. The details of the organization of funds and provision of care often arisen as a result of slow evolution and adaptation of institutions to meet new challenges. In the case of health insurance the evolution of the system in Germany, for instance, owed much to the pattern of industrialization, the growing influence of organized labour and the development of Germany as a united but decentralized country. In some countries the resulting social health insurance and arrangements are unplanned but have shown to remain robust and able to prosper in many countries, even when the social health insurance reforms have been relatively recently implemented such as Switzerland. Countries which want to implement or reform social health insurance systems need to be aware of the trade-off that exists between competition and objectives of equity and low management costs. As health reforms continue to be many countries there are numerous issues they have to face such reducing costs of service and administration, while retaining features valued by users. It is evident that there are no quick fix solutions to the challenges faced by healthcare systems.

2.3.3 User Fees (Cost Sharing) in the Kenyan Healthcare System

User fees were introduced with the main aim of financing government health services in developing countries and also to help improve quality of healthcare. Governments were reducing their spending on health and other services and user fees were seen as an

alternative to tax-based financing of government health services. There is controversy about user fees as it is argued the poor cannot pay hence will not be able access healthcare from government facilities that initially were free. The poor people's demand for health care is very sensitive to price changes (high elasticity of demand) than the rich and introduction or increasing user charges will reduce access to healthcare among the poor people. Moreover, it was argued that by increasing the resources available to health facilities, cost recovery would improve the quality and range of services provided, with beneficial outcomes for public health. Therefore, new or increased user fees in public health facilities, when accompanied by improvement in services, would increase usage. This increase was expected to be positive for both the poor and the non-poor. Furthermore, a system of user fees would promote allocative efficiency by discouraging frivolous use of scarce healthcare services (Bedi *et al.*, 2004).

Since independence in 1963, Kenya has had a predominantly tax-funded health system, but gradually introduced a series of health financing policy changes. In 1989, user fees, or 'cost-sharing' were introduced. User fees were abolished for outpatient care in 1990, inspired by concerns about social justice, but re-introduced in 1992 because of budgetary constraints. Until recently, these fees have remained, with their impact on access to health care the subject of several empirical studies (Carrin *et al.*, 2007). The user fee system was significantly altered in June 2004, when the Ministry of Health stipulated that health care at dispensary and health centre level be free for all citizens, except for a minimal registration fee in government health facilities.

In Kirinyaga district, Kenya, Mwabu and Wang'ombe (1997) found out that following the introduction of user charges, the utilization of health services dropped by about 40 per cent, but after the abolition of registration fees the use of services increased by some 30 per cent. This increase was, however, insufficient to reverse the overall downward trend in demand. The reintroduction of cost sharing, in the form of a treatment fee in April 1992, further reduced the number of out-patient visits, but the drop was not as large as the one which occurred during the first phase of the cost sharing. By July 1993, out-patient attendance had begun to show an upward trend. It was revealed that since user charges raise health care costs, they stimulate the growth of medical insurance schemes as people explore ways of hedging against risks of excessive costs of medical care. Patients are more sensitive to the costs of diagnostic services than to registration fees, implying that proportional price mark-ups for diagnostic services should be lower than for the out-patient services if the authorities want to keep proportional changes in the two services the same. If medical care is viewed as a merit good, it can be argued that a fall in demand during the period of cost sharing reduced the social welfare if persons in need of medical attention were unable to get treatment.

According Ngugi (1999), when user fees are introduced, the demand for public health facilities drop while that for mission health facilities grows. Public health facilities are the first point of seeking health care when illness strikes and that consumers supplement services from public health facilities with those from other sources. Consumers prefer services that are comparable to the utility derived from the fee charged. They expect an improvement in quality of services offered by public health facilities as user fees are

introduced. Most consumers indicated that they preferred the facility with a regular supply of drugs and high quality services and they observed that public health facilities had not improved with the introduction of user fees as they still had irregular supply of drugs and low quality service. Irregularity in supply of services meant that costs faced by public facilities were higher than proposed fees; however, these costs were relatively low compared with those of the non-public facilities. A trade-off was noted between the price charged and the lost production time. Consumers were ready to pay higher charges but wait less for services, or pay high and wait long if the quality of service was high. This indicates the need to accompany user fees with improved services in order to move closer to a competitive situation.

In 2004, the Ministry of Health reduced user fees at health centers to Ksh 10 at dispensaries and Ksh 20 at health centers. In total, user fees raised an estimated 1.8 billion Kenyan shillings in 2009. Health facilities are allowed to retain 100 per cent of the revenue collected via user fees (World Bank, 2012b). In general, the money is used to buy medical supplies and hire non-clinical staff. Clinical staff are hired through the central Ministry of Health and are not paid with user fee revenue.

The National Health Accounts have shown that the Government contribution to healthcare amounts to only about 30 percent of the total health expenditure in Kenya and households bear the greater burden of about 40 percent of the healthcare costs. The rest is borne by partners. Thus the population will this year alone seek and pay for services in both public and private health facilities to the tune of Kshs 45-50 billion. This

expenditure is through using out-of pocket cash payments that on average annually drive at least 1 million economically marginal Kenyans below the poverty line, whenever sickness in the family occurs (Republic of Kenya, 2012).

Bedi *et al.* (2004) studied the effects of user charges and quality of medical treatment on health service utilization patterns in Kenya, controlling for education, wealth, gender and the environment in which households live. The study uses a standard multinomial discrete choice model. The findings reveal that government health facilities provide healthcare of poorer quality than do private and missionary facilities, but they are also much cheaper and more readily available. The magnitude and signs of the price and quality elasticities of demand computed in this study suggest that the negative demand effect of user charges is offset by the positive effect of improved service quality. A price increase in government health facilities has the effect of diverting demand to non-government clinics, but it increases demand for self-treatment by a negligible amount.

In Lira district Uganda, Okurut *et al.* (2006) found that the demand for government health care services was negatively and significantly influenced by the user-fees and drug unavailability. A simulation analysis showed that an increase in medical charges (user-fees) leads to a fall in demand for government health facilities but increases the demand for both private health facilities and self- medication. Controlling for drug availability, the demand for government health facilities falls when drugs are not available while demand for private health facilities rises. Poor people do not have enough money to meet

their medical bills. Poor households are generally larger than non-poor households, with larger household size implying larger number of people who may fall sick.

Figure 2.2 maps health system functions and identifies actors. Consumers pay for health services through taxes, insurance premiums, and out-of-pocket payments. Healthy behaviors are a key determinant of health outcomes. Consumer payments in taxes and insurance premiums are channeled through health financing institutions.

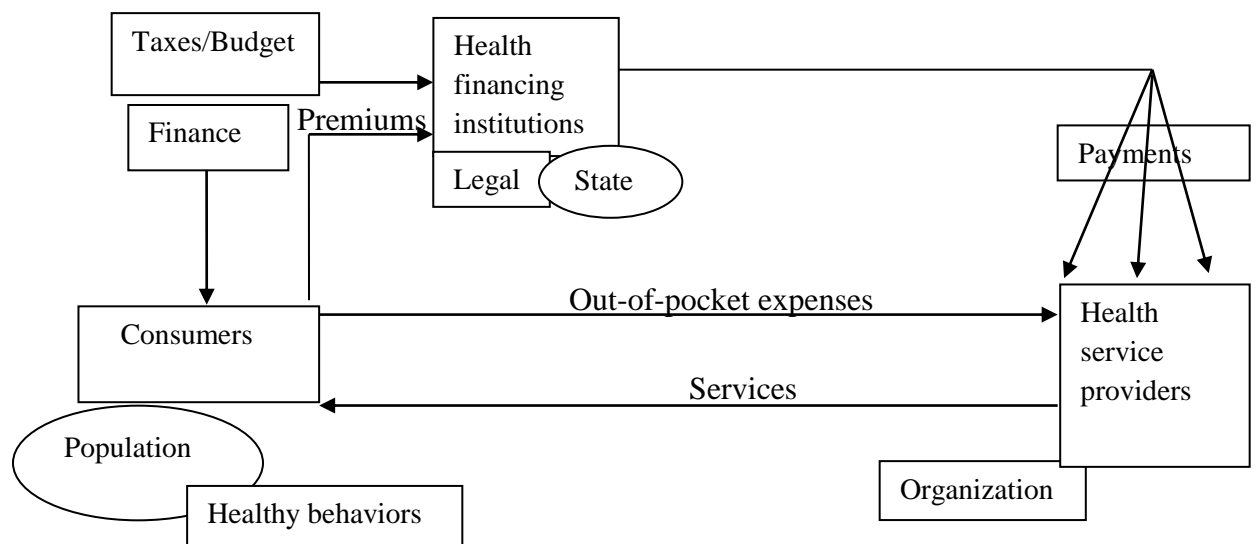


Figure 2.2: Health System Functions, Actors and Payment Mechanisms

Source: Campbell-White *et al.*, 2006

These institutions include public and private insurance organizations as well as national and sub national government ministries and agencies that pay for health care. In some countries, private enterprises collect and disburse payments for health care on behalf of

their employees. Payment for health care can take several forms: government budget, fees for services, and contracts between providers and insurance organizations (for example, capitation agreements through which a provider agrees to make a specific package of services available to a specific population for a specific period for an agreed price). The form of payment is important, because it affects provider motivation and performance. It also affects consumer behavior. Shifts in the way payments are made can change incentives such that service performance and health outcomes improve (Campbell-White *et al.*, 2006).

2.4 Review of Related Studies

Health care systems of developing countries are failing to meet the basic health needs of their people since they were largely modelled on Western health care. The achievement of primary health care calls for the involvement of individuals in their own health care. Improvements in health can come about only through information and education to the public to enable them to make healthy choices. The primary health care strategy in Kenya, for example, focuses on health promotion through provision of timely information at the community level. The aim of community based health care is that the community must be informed, motivated and involved. Through community-based health schemes the standard top-down approach of conventional health care delivery would be replaced by that in which the organization and activities for health care within the community are determined by local needs and conditions. Health concerns been incorporated in village activities (Kaane, 1997).

Ondimu (2000b) examined the quality of obstetric care offered by both public and private sectors facilities in the Nyanza province, Kenya. The findings revealed that public sector health facilities are under staffed, lack essential drugs and equipment and are unable to offer even basic therapeutic and diagnostic services. Local people have lost confidence in the facilities and only use them when in absolute danger. Sometimes this may be late, leading to severe complications. It was recommended that more personnel be trained and posted to rural areas, a reliable supply of drugs and the purchase of necessary equipment for public health facilities. Also, the private sector should be encouraged to charge less for essential services like maternity care.

HIV/AIDS prevalence rates in Kenyan urban areas are higher than in rural areas, and that HIV/AIDS is imposing heavy costs on the economy, primarily through increased medical care expenditure and labour losses. There are no strong indications that the epidemic is declining, casting doubts on the success of past anti-AIDS efforts. The true impact of awareness-creation campaigns in reducing new infections is still uncertain despite that most funds for intervention are channeled to these efforts. Medical treatment of AIDS patients, which can prolong life and prevent loss of productive labour, has received little attention or funding (Nyaga *et al.*, 2004).

Mwabu (2004) examined the relationship between health status and economic growth in Africa over the period 1960-2000. Between 1960 and 1970s, health status in many African countries expanded rapidly, slowed down in the 1980s, and declined in the mid-1990s. The slow-moving HIV/AIDS infection rate, which reached alarming proportions

in the mid-1990s, is the main factor responsible for the sharp decline in the health status of most African countries. The accumulation of health human capital in Africa has been good for growth in the continent and the vice-versa. There is some evidence that in countries where growth occurred, it facilitated production and financing of better health, which in turn promoted growth. The paper further suggests that health human capital, which is intertwined with education human capital, is a key factor in explaining economic performance in Africa vis-à-vis other world regions, and in designing policies for attacking poverty in the continent.

Kimalu *et al.* (2004) in a review of the health sector in Kenya found that although there has been a massive expansion of health infrastructure since independence, increasing population and demand for healthcare outstrips the ability of the government to provide effective health services. Since the early 1990s, there has been a declining trend in the health status of the population. Many people in Kenya lack access to basic health and adequate nutrition. A quarter of Kenyan households are located more than 8 kilometers from any form of health facility. There are also inadequate medical supplies, which is occasioned by poor administration and distribution procedures and general inefficiency in the central procurement system. The inadequacy of medical supplies in public health facilities is partly due to changes in macroeconomic situations, procurement decisions, poor institutional set-ups, decline in donor support, and corruption. For example, drug expenditure allocation favours big hospitals.

High economic growth may not result into better HD indicators. This is in conflict with the trickle-down approach of economic growth which advocates the economically disadvantaged segments of the society ultimately reap the long-term benefits of economic growth. HD is as an end in itself and a means to achieve higher productivity. Population has emerged as the most critical factor in a country's development planning. Knowing the size of a country's population and its development over time is on one hand fundamental to estimate the quantity of goods and services that will be required to meet future needs of human centered development, and on the other hand is also necessary to assess the productive capacity of her economy and its impact on the demographic transition. It is therefore, imperative to have better estimate of country's population as a basis for its development planning. The processes that generate the momentum of population development intertwine various quantifiable and unquantifiable factors through a complex network of nonlinear feedbacks that govern these processes involving delays. Education is one of the various components of HD which not only creates enabling environment but also has positive impact on economic growth. Education has strong effects on labor productivity, faster technology adoption and technological change (Qureshi, 2008).

Health spending significantly affects health status. The probability that an individual's health status will be good or bad is linked directly and positively to health spending. The effect is positive in that increased health spending leads to a more positive self-assessment of health status, a lower probability that the individual will suffer from a chronic illness or a chronic limiting illness, of having an illness that limits the individual's

main activity and the number of days confined to bed. It is of course true that indiscriminate, undefined increases in health resources do not necessarily imply improved health levels in the widest of senses, but it is certainly true that there is a direct, significant link between health resources and the individual's self-perception of his health status (Rivera, 2004).

Public subsidies for social services rest on two basic policy objectives -efficiency and equity. Efficiency gains can be achieved when the subsidies produce external benefit or correct for market failure. Equity is also an important objective of public spending. Health care is a basic service that is essential in any fight against poverty (Dayton *et al.*, 2000). Improving targeting to the poor involves not only rearranging the public subsidies, but also addressing the constraints that prevent the poor from accessing these services. Governments allocate large portions of their budgets to hospital-based services which the poor do not use. In Ghana, for example two-thirds of health budget was spent on hospital services, in South Africa 89 percent and in Kenya more than half went to hospitals. Targeting health spending on the poor would require less spending of the health budget on hospitals and more on primary facilities.

Makochekanwa (2012) investigated the impacts or effects of economic performance on health service delivery in Zimbabwe for the period 1980 to 2009. The findings revealed that there was a general decline in health financing during especially between 2000 and 2008, as real government or per capita allocations towards health expenditure has declined from 5.3 percent of national budget in 1980 to around 4.2 percent in 1998.

Trends in government per capita health expenditure allocations declined from \$55.7 in 1980 to \$0.19 in 2007. The decline in economic growth also led to the reduction in health preventive provision by the government and a case in point is fall in immunization which in turn contributed to the increase in mortality caused by preventable diseases. Also the health staff migrated to other countries and drug stocks declined resulting into less than optimal service delivery to the public.

To improve health, emphasis must not only be placed on improving health infrastructure and health systems, but also on broader issues such as improvement of income inequality. The health benefits of improving income inequality are greater in developing countries. In many developing countries, social services such as health and education tend to suffer cuts during periods of economic rationalization or structural adjustment. At low-income levels people are more likely to fall sick owing to malnutrition and therefore will be less able to work. Persistence of ill health within the population will then widen the income distribution owing to the decline in individual income. Improvement in health is a necessary condition for economic development. Under the human capital view of health, improved health is seen as a factor for enhancing the production possibilities of the economy, which in turn enhances the income-earning potential of the population (Asafu-Adjaye, 2004).

2.5 Conceptual Framework

The relationship between the independent variables and the dependent variable is as shown in figure 2.3.

*Independent Variables/explanatory variables
variable*

*Dependent variable/explained
variable*

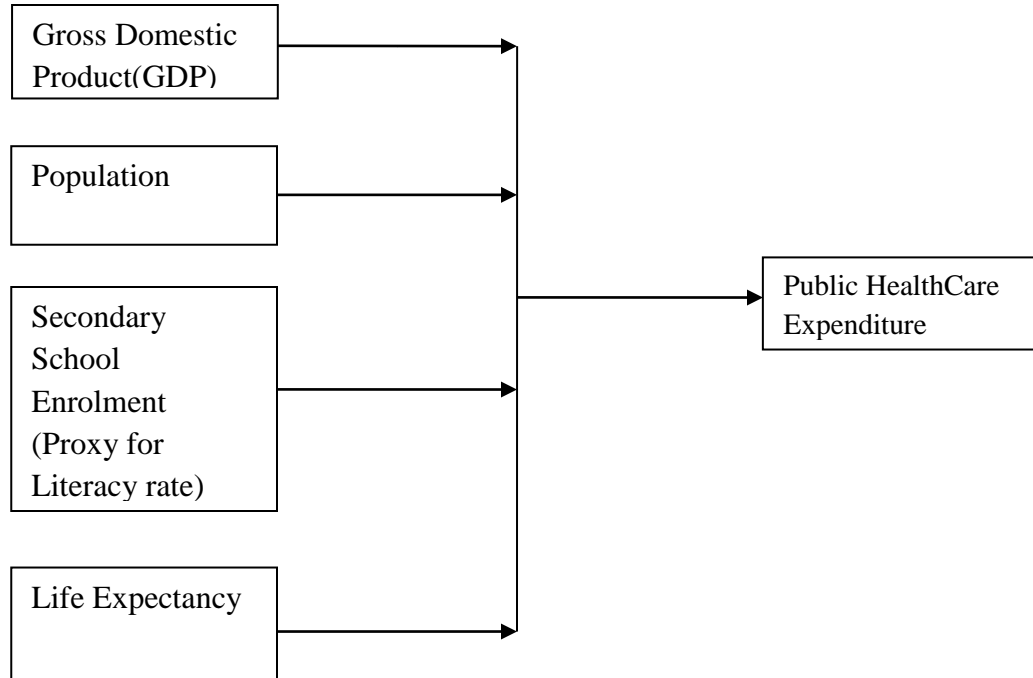


Figure 2.3: Conceptualized relationship between the variables

Source: Author's conceptualization, 2013

Variations in the independent variables will prompt the changes in the dependent variable. Health care expenditure is the dependent variable while the independent variables are: real per capita GDP, population, Literacy rate and Life expectancy. A change in any or all of the explanatory variables will cause the explained variable to change as shown by figure 2.3.

Health care expenditure is influenced by the level of GDP. High levels of GDP means there is increased incomes that the government can use to expand its spending on health care. Changes in population will determine government spending on health care. High population means more people will demand health services and to meet this demand the government will have to spend more as population increases. Literacy rate will determine health care expenditure in the sense that if people are literate they are knowledgeable and informed about their health needs and will demand certain health services and facilities from government. It is expected that life expectancy affects government spending on healthcare. High life expectancy leads to low government spending since the health status of the population will be perceived to be higher Life expectancy in most instances is usually determined by the type of maternal care babies and mothers receive before, during and even after birth. Quality maternal care guarantees high life expectancy.

2.6 Critique of Previous Studies and Knowledge Gap

This study critiqued related literature and identified the knowledge gap as follows: First, most researches on healthcare systems are in developed countries. Campbell-White *et al.* (2006) investigated reproductive health and millennium development goals (MDG) in a Changing World. Jacobs and Goddard (2002) examined the key features of social health insurance systems by drawing on the experience Germany, Switzerland, France and The Netherlands. Jamison (2006) looked at Priorities in health with a focus on healthcare systems of countries in Europe and other developed countries. Lamartine and Zaghini (2008) examined increasing public expenditure and Wagner's law in OECD countries. Peacock and Wiseman (1961) investigated the determinants of government expenditure

in the United Kingdom. All these studies focus on the developed countries. Therefore, there is need to carry out research on healthcare systems in developing countries, particularly Kenya. This study was designed to fill that knowledge gap by focusing on the Kenyan healthcare system.

Secondly, researches done on healthcare are qualitative in nature. There is need to for a time-series analysis. For instance, Allainz Worldwide Care (2013) reviewed the healthcare in Kenya. Kimalu et al. (2004) reviewed the health sector in Kenya. Kimani et al., (2004) in a study of healthcare financing through health insurance in Kenya found that National Hospital Insurance Fund (NHIF) is inefficient and that private healthcare insurance is not that well developed in the country. Mwabu (2004) examined the relationship between health status and economic growth in Africa over the period 1960-2000. Muthaka et al. (2004) reviewed the regulatory framework for private healthcare services in Kenya. The studies are all descriptive in nature. This study therefore filled the knowledge gap by employing a time-series analysis of factors that affect government healthcare spending in Kenya.

Thirdly, most studies on health focus on indicators of a health system like infant mortality, maternal mortality and HIV/AIDS prevalence while only mentioning funding of healthcare in passing. Ondimu (2000b) examined the quality of obstetric care offered by both public and private sectors facilities in the Nyanza province, Kenya. Kaane (1997) focused on the transfer of health information to the rural community in the developing world. Kosimbei (2005) examined child healthcare seeking behaviour in Kenya. These

studies left out funding of healthcare which is important in ensuring universal access. This study filled that knowledge gap by looking at funding of healthcare in Kenya on the basis that adequate funds are important towards achieving universal health care.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter contains the study area, data types and sources, sampling design, data analysis econometric model, and the techniques of interpreting results.

3.1 Research Design

The study constituted a document analysis of journals, government papers, theses, online materials and periodicals. Data used were macroeconomic data for the entire country of Kenya on the selected variables.

3.2 Theoretical Framework

The study reviewed three theories of government expenditure namely: Wagner's law of increasing state activities; Peacock and Wiseman's theory of government expenditure and Musgrave and Rostow's development model. This was to help in the understanding of relationship between government spending patterns and the economy. Wagner's law of increasing activities was the main theory that informed this study. The theory was developed by Adolph Wagner mainly based on historical facts of the German economy in the 18th century. Wagner observed there was a functional relationship between the growth of an economy and the growth of the government activities so that the governmental sector grows faster than the economy (Doessel and Valadkhani, 2003).

Kenya gained its independence in 1963 and since then the size and distribution of government expenditure has changed remarkably. In the early 1960s, the country was able to maintain a high level of investment, much of it financed from domestic savings. The government was the major investor in the economy financing infrastructure, administration, law and order, infrastructure, social welfare, education and health. Government expenditure components and economic growth are interrelated. As a nation develops the society becomes more complex, its needs increase and thus the state has to spend to cater for the society in terms of administration, law and order, infrastructure, social welfare, education and health (Peters, 2007; Kuckuck, 2012). By borrowing to finance public expenditure the government competes with private investors for capital thereby crowding out private investment and instigating enormous foreign debt burden. Mercantilist ideology supports government involvement in the economy due to market failures, public goods and externalities. Government expenditure is indeterminate of economic growth. Kenya has had mixed economic performance since independence.

The savings investment gap has, however, expanded over time — from about 3.2 percent of GNP in 1965-69 to 6 percent in the 1980s — thus the country has come to rely increasingly on external resources to finance its capital formation. A major cause of the widening savings—investment gap has been the large budget deficits incurred by the public sector. The overall budget deficit increased from 4.9 percent of GDP in 1969-73 to 9.4 percent in 1979-83 and was about 5 percent in 1989-1990 (Muthui *et al.*, 2013). Wagner's law is relevant for this study since Kenya is still a developing country and requires massive investments in infrastructure and other services that only the

government can finance. Government spending therefore is expected grow faster than the economy.

3.3 Econometric Model

This section looks at the econometric model used by the study to investigate the relationship between public healthcare spending in Kenya and selected economic and socio-demographic factors. There is a perceived non-linear relationship between the dependent variable which is per capita public health care expenditure and the independent variables which are; real per capita GDP, population, secondary school enrolment and life expectancy.

The hypothesized structural relationship for public healthcare expenditure per capita in Kenya is:

$$PHEXP = f(RPGDP*POP*N*SSE*LE).....3.1$$

Where; *PHEXP* is per capita public health care expenditure; *RPGDP* is per capita real gross domestic product (GDP); *POP* is population; *SSE* is the secondary school enrolment and *LE* is life expectancy

The Model used was an exponential model which is specified as follows

$$Y_t = \beta_0 X_{1t}^{\beta_1} X_{2t}^{\beta_2} X_{3t}^{\beta_3} X_{4t}^{\beta_4} e^{U_t}3.2$$

Where: Y_t = Per capita public healthcare expenditure in period t

X_{1t} = Real per capita GDP in period t

X_{2t} = Population of the country in period t

X_{3t} = Secondary school enrolment in period t

X_{4t} = Life expectancy in period t

U_t = Error term

The study used an exponential model because the variables under investigation follow an exponential growth pattern. To linearize the function natural logs were introduced (Cohen *et al.*, 2003). Use of natural logs helps to reduce variability of the data and enables the direct estimation of elasticities. Estimation of the variables was done in levels. This form of regression equation, with regression coefficients as exponents is not the familiar form of ordinary least square regression. It signals a nonlinear relationship of the predictors of Y. To linearize we take natural logarithms on both sides of the equation so as to make the model be analyzed using Ordinary Least Square (OLS) regression.

The linearised function was the specified as follows

$$\ln Y_t = \ln \beta_0 + \beta_1 \ln X_{1t} + \beta_2 \ln X_{2t} + \beta_3 \ln X_{3t} + \beta_4 \ln X_{4t} + U_t \dots \dots \dots 3.3$$

Where: $\ln Y_t$ = Log of Per capita Public healthcare expenditure in period t

$\ln X_{1t}$ = Log of Real per capita GDP in period t

$\ln X_{2t}$ = Log of Population of the country in period t

$\ln X_{3t}$ = Log of Secondary school enrolment in period t

$\ln X_{4t}$ = Log of Life expectancy in period t

The expected signs from the regression equation to be estimated are as follows:

$\beta_i > 0$, where $i = 1, 2, 3, 4$

A priori, the coefficients were expected to be positive from economic theory since there was a perceived positive relationship between spending on public health on one hand as dependent variable and GDP (Income), population, secondary school enrolment rate and life expectancy on the other hand as independent variables.

3.4 Study Area

The study focused on the Kenyan health system. Kenya is situated in the Eastern part of the African continent. The country lies between latitudes 5 degrees north and 5 degrees south and between longitude 24 and 31 degrees east. It is almost bisected by the equator. Ethiopia and Sudan border it to the North; Uganda to the West; Tanzania to the South; Somalia to the northeast; and Indian Ocean to the southeast. The coastline is about 536 kilometers. The total land area is about 582,650 km² of which 569,250 km² constitutes dry land while water takes the rest of about 13,400 km². Approximately 80% of the land area is arid or semi-arid, and only 20% is arable (Republic of Kenya, 2005). See Appendix II for the map of Kenya.

3.5 Data Types and Sources

The study used quantitative secondary data which was sourced from journals, government papers, theses, online materials and periodicals published by the International Monetary Fund (IMF) and Kenya National Bureau of Statistics (KNBS). The study used secondary data because of the macroeconomic nature of the study and also since secondary data has already been organized. Secondary data is readily available

and analysis and interpretation of secondary data can be done easily. The study constituted a document analysis of journals, government papers, theses, online materials and periodicals. Data analyzed were macroeconomic in nature for the entire Kenyan economy.

3.6 Data Analysis

The study examined time series data. The data was entered into Ms-Excel and the time series data analyzed using Statistical Analysis 10 (STATA 10) Econometric Software.

3.7 Definition and Measurement of Variables

3.7.1 Dependent Variable

Per Capita Public healthcare expenditure (*PHEXP*): Is the dependent variable which refers to the expenditure incurred by the government to provide health services. Per capita health care expenditure is calculated by dividing the total government expenditure on health care by the total population.

3.7.2 Independent Variables

Real per capita GDP (RPGDP): GDP is defined as the market value of all goods and services produced within an economy over an accounting period usually yearly. Real per capita GDP is calculated by dividing the real GDP by the total population.

Population (POPN): Refers to the number of people living in Kenya at the end of every year. Spending by the government on health also takes into account population as much as income. The number of recipients will influence how much resources go to health.

Secondary School Enrollment (SSE): This is the total number of students enrolled in secondary schools as at January of each year and covers both public and private secondary schools. In this study Secondary School Enrolment has been used as a proxy for Literacy rate. Literacy rate represents the population of Kenya aged 15 years and above who are able to read and write. In this study secondary school enrolment refers to enrolment

Life expectancy (LE): Health status can be measured using three major indicators: infant mortality rate, under-5 mortality rate and life expectancy at birth. This study has chosen to use life expectancy at birth to represent the health status of the Kenyan populace. Life expectancy at birth is the time in years that an individual is expected to live at birth.

Error term: It is not a variable but is included in the model to take into account the impact of some explanatory variables that are not included in the model but influence health care expenditure. For instance; cultures and traditions, social factors and political factors have not been incorporated in the model but they influence the demand patterns and utilization of healthcare services which in the end influence spending on health. The error term also captures the randomness of data.

3.8 Ordinary Least Square Assumptions for Time Series Analysis

3.8.1 Assumption 1 for Time series: Linear in Parameters

The regression model is correctly specified. The regression model is linear in the parameters. The relationship between Y and X, is linear. It is presumed that Y is related to the X's and that X's are controlled by the researcher (Rubinfeld and Pindyck, 1991; Wooldridge, 2000 Madala, 2001). No specification bias. The stochastic process $\{(x_{t1}, x_{t2} \dots x_{tk}, y_t): t= 1, 2 \dots n\}$ follows the linear model

$$y_t = \beta_0 + \beta_1 x_{t1} + \dots + \beta_k x_{tk} + u_t \dots\dots\dots 3.4$$

Where $\{u_t: t=1, 2 \dots n\}$ is the sequence of errors or disturbances. Here, n is the number of observation (time periods).

3.8.2 Assumption 2 for Time Series: Zero Conditional Mean

For each t , the expected value of the error u_t , given the explanatory variables for *all* time periods, is zero. Mathematically,

$$E(u_t | X) = 0, t = 1, 2 \dots n \dots\dots\dots 3.5$$

Assumption 2 implies that the error, u_t at time t is uncorrelated with each explanatory variable in every time period (Wooldridge, 2000; Rencher, 2002). The fact that this is stated in terms of the conditional expectation means that we must also correctly specify the functional relationship between y_t and the explanatory variables. If u_t is independent of X and $E(u_t) = 0$, then Assumption 2 automatically holds.

3.8.3 Assumption 3 for Time Series: No Perfect Collinearity

In the sample (and therefore in the underlying time series process), no independent variable is constant or a perfect linear combination of the others (Rubinfeld and Pindyck, 1991; Wooldridge, 2000; Madala, 2001). There is no exact linear relationship (i.e., multicollinearity) in the regressors (Rencher, 2002). No exact collinearity between the X variables, or no exact linear relationship between X_i and X_j .

$$\text{COV}(X_i, X_j) = 0 \dots\dots\dots 3.6$$

Unbiasedness of Ordinary Least Square: Under assumption 1, 2 and 3, the OLS estimators are unbiased conditional on X , and therefore unconditional as well: $E(\beta_j) = \beta_j$, $j = 0, 1 \dots k$.

3.8.4 Assumption 4 for Time Series: Homoscedasticity

The random error term (u_t) has a constant variance. The variation in the error term for each value of X_i is constant. This is the assumption of “Homoscedasticity” meaning constant variance. For given X 's, the variance of u_t is constant for all t that is, homoscedastic.

$$\text{Homoscedasticity, } \text{Var}(u_t | X) = \text{var}(u_t) = \sigma^2 \dots\dots\dots 3.7$$

This assumption means that $\text{Var}(u_t | X)$ cannot depend on X . It is sufficient that u_t and X are independent *and* that $\text{Var}(u_t)$ must be constant over time (Wooldridge, 2000; Rencher, 2002). Violation of assumption 4 means that the errors are heteroscedastic and the variance is not constant over time.

3.8.5 Assumption 5 for Time Series: No Serial Correlation

Any two successive error terms, for instance u_t and u_s should be independent for $s \neq t$. For given X 's, there is no autocorrelation in the disturbances (Rubinfeld and Pindyck, 1991; Wooldridge, 2000; Madala, 2001; Rencher, 2002).

No serial correlation, or

$$\text{Cov}(u_s, u_t) = 0 \dots\dots\dots 3.8$$

If two successive error terms are dependent/related the problem of autocorrelation arises

For instance if $\text{cov}(u_s, u_t) \neq 0$, meaning u_s and u_t are dependent

$$u_t = f(u_s) \dots\dots\dots 3.9$$

where $t=2$ and $s=1$

$$u_2 = \rho u_1 + V_t \dots\dots\dots 3.10$$

This is the problem of autocorrelation.

$$u_s = \rho u_{t-1} + V_t \dots\dots\dots 3.11$$

3.8.6 Assumption 6 for Time Series: Normality

The errors u_t are independent of X and independently and identically distributed as Normal.

The stochastic (disturbance) term u_i is normally distributed with a mean of zero and a constant variance, that is $u_t \sim \text{iid}(0, \sigma^2) \dots\dots\dots 3.12$

3.9 Goodness of Fit

To evaluate the model we first consider the test of goodness of fit, which is the coefficient of determination (R^2). The regression residuals can provide a useful measure of the fit between the estimated regression line and the data. A good regression equation

is one which helps to explain a large proportion of the variance in explained variable (Y). Large residuals imply a poor fit while small residuals imply a good fit.

To show the derivation of R^2 we begin by defining the variance of Y about its mean as

$$\text{Variation}(Y) = \sum (Y_i - \bar{Y})^2 \dots\dots\dots 3.13$$

Variation in Y can be divided into two parts, the first is the one accounted for by the regression equation and the second is the unexplained portion associated with the error term of the model. We assume that the slope of the linear regression model is known to be zero and we fit a regression estimating only an intercept (Rubinfeld and Pindyck, 1991; Madala, 2001). The best prediction of Y_i , associated with any X_i , is given by the sample mean of Y:

$$\hat{Y}_i = \hat{\alpha} + X_i = \hat{\alpha} = \bar{Y} \dots\dots\dots 3.14$$

When the slope is nonzero we can improve our predictions by accounting for Y_i , being dependent on X_i : that is,

$$\hat{Y}_i = \hat{\alpha} + \hat{\beta}X_i \dots\dots\dots 3.15$$

Consider the following identity which holds for all observations:

$$Y_i - \bar{Y} = (Y_i - \hat{Y}_i) + (\hat{Y}_i - \bar{Y}) \dots\dots\dots 3.16$$

The term in the left of the equal sign shows the difference between the sample value of Y and the mean of Y, the first-right hand term is the residual $\hat{\epsilon}_i$ and the second right- hand term the difference between the predicted value of Y and the mean of Y.

To measure the variation, we square both sides of (3.16) and then sum over all the observations $i=1, 2, \dots, N$

$$\sum(Y_i - \bar{Y})^2 = \sum(Y_i - \hat{Y}_i)^2 + \sum(\hat{Y}_i - \bar{Y})^2 + 2\sum(Y_i - \hat{Y}_i)(\hat{Y}_i - \bar{Y}) \dots\dots\dots 3.17$$

Since $2\sum (Y_i - \hat{Y}_i) (\hat{Y}_i - \bar{Y}) = 0$

Equation 3.17 is reduced to

$$\sum (Y_i - \bar{Y})^2 = \sum (Y_i - \hat{Y}_i)^2 + \sum (\hat{Y}_i - \bar{Y})^2 \dots\dots\dots 3.18$$

$$\text{TSS} = \text{ESS} + \text{RSS} \dots\dots\dots 3.19$$

Where, TSS is the total variation of Y (total sum of squares), ESS is the residual variation of Y (Error sum of squares) and RSS is the explained variation of Y (regression sum of squares) (Rubinfeld and Pindyck, 1991; Wooldridge, 2000)

Dividing entire equation 3.19 by TSS we get

$$1 = \frac{\text{ESS}}{\text{TSS}} + \frac{\text{RSS}}{\text{TSS}} \dots\dots\dots 3.20$$

R^2 is therefore defined as:

$$R^2 = 1 - \frac{\text{ESS}}{\text{TSS}} \dots\dots\dots 3.21$$

R^2 , thus defined, of necessity lies between 0 and 1. The closer it is to 1, the better is the fit. But there are problems with R^2 . First, it measures in-sample goodness of fit in the sense of how close an estimated Y value is to its actual value in the given sample. There is no guarantee that it will forecast well out-of-sample observations (Rubinfeld and Pindyck, 1991; Wooldridge, 2000; Madala, 2001). Second, in comparing two or more R^2 's, the dependent variable, or regressand, must be the same. Third, and more importantly, an R^2 cannot fall when more variables are added to the model. Therefore, there is every temptation to play the game of “maximizing the R^2 ” by simply adding more variables to the model. Of course, adding more variables to the model may increase R^2 but it may also increase the variance of forecast error.

3.10 Data Analysis and Interpretation

3.10.1 Multicollinearity Test

The correlation test was conducted using the correlation matrix. A correlation statistic of more than 0.8 showed there was strong correlation between variables.

3.10.2 Tests for Stationarity

When using time series data one underlying assumption is the underlying time series is stationary. In real life most time series data is always non stationary and as such to use time series data for planning it has to be made stationary using differencing method. If a time series is stationary, its mean, variance, auto covariance (at various lags) remain the same no matter what point the data was measured; that is, they are time invariant (Gujarati, 2004). Therefore to use the time series data for forecasting, the data was made stationary by differencing method.

3.10.2.1 Graphical Method

The first test was to draw a graph and observe the trend in the variables. From graphs, it was possible to know whether the data was stationary over time or is changing (non-stationary).

3.10.2.2 Unit Root Testing

Unit root testing was conducted using the Augmented Dickey-Fuller Test (ADF) to check spurious correlation between variables in the regression equation. ADF test is an improvement from Dickey-Fuller (DF) test. Whereas the DF test is used in situations in which the error terms (μ_t) are uncorrelated, the ADF is used where μ_t are correlated and this is done by augmenting the equations by adding lagged variables. The ADF was used to estimate the following regression equation:

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \sum \alpha \Delta Y_{t-1} + \varepsilon_t \dots\dots\dots 3.22$$

Where ε_t is a pure white noise (error term) and where $\Delta Y_{t-1} = (Y_{t-1} - Y_{t-2})$, $\Delta Y_{t-2} = (Y_{t-2} - Y_{t-3})$. The number of lagged difference terms to include is often determined empirically, the idea being to include enough terms so that the error terms in equation 3.8 are serially uncorrelated. In ADF we still test whether $\delta = 0$ and the ADF test follows the same asymptotic distribution as the DF statistic, so the same critical values can be used (Gujarati, 2004). Differencing was done to check for unit root.

3.11 Co-integration Tests

Co-integration about two series revealed a particular kind of model known as Error Correction Model (ECM), for short-term dynamics. This study used the Engle-Granger two steps test to test for co-integration. The issue of co-integration applies when two series are I(1) but a combination of them is I(0); in this case the regression of one on the other is not spurious, but instead revealed something about the long-run relationship between them.

Consider the following equation:

$$Y_t = \beta_1 + \beta_2 X_t + \mu_t \dots\dots\dots 3.23$$

This can be rewritten as

$$\mu_t = Y_t - \beta_1 - \beta_2 X_t \dots\dots\dots 3.24$$

Error term (u_t) was then be subjected to unit root analysis and if it was found stationary; then it was I(0). Although Y_t and X_t are individually I(1), that is, they have stochastic trends, their linear combination is I(0). The linear combination cancels out the stochastic

trends in the two series. Two variables are co-integrated if they have a long-term, or equilibrium, relationship between them (Gujarati, 2004).

3.12 Error Correction Model (ECM)

Engle-Granger test was used as Error Correction Model mainly for reconciling short-run behavior of a variable with its long-run behavior. Granger theorem states that if Y and X are co integrated the relationship between them can be expressed as ECM.

The ECM was estimated using the following equation:

$$\Delta Y_t = \alpha_0 + \alpha_1 \Delta X_t + \alpha_2 \mu_{t-1} + \varepsilon_t \dots \dots \dots 3.25$$

Where Δ denotes the difference operator, ε_t is the random error term and

$\mu_{t-1} = \Delta Y_{t-1} - \beta_1 - \beta_2 X_{t-1}$ is the one –period lagged value of the error term from the co - integration regression (Gujarati, 2004).

3.13 Dynamic Stability Tests

The model was tested for stability using (stability test), autocorrelation using (Lagrange - Multiplier Test) and Normality using (Jarque-Berra test) and specification error using (Ramsey reset test).

3.14 Assumptions of the Study

In this study it was assumed that the government does not rely on foreign aid to finance public healthcare. Tax revenues are used to finance healthcare through annual budgetary allocations to the Ministry of Health.

CHAPTER FOUR

EMPIRICAL RESULTS AND DISCUSSIONS

4.0 Introduction

This chapter presents the estimates of the built model based on the secondary data gathered from various sources. The model was used to determine the relationship between public health care expenditure as the explained variable and GDP, population, Secondary school enrolment rate and life expectancy as explanatory variables.

4.1 Data and Estimation Results

4.1.1 Time Series Properties

First, the series were tested for stationarity. Plots of the model variables at their levels indicated that the variables were non-stationary that is, they had non-constant means and variances. In such a case econometric inference under stochastic assumption was not be valid. It was therefore necessary to transform the data by an appropriate form. This study used differencing technique as a method of transforming non stationary time series data to its stationary form.

For small changes, the first difference of the log of a variable is approximately the same as the percentage change in the variable. Thus if the logs of a variable are specified to follow a unit root process, the assumption is that the rate of growth of the series is a stationary stochastic process (Hamilton, 1994). Therefore the results were interpreted as elasticities or percentage change.

4.1.2 Movement of the variables in levels

For figures 4.1 through to 4.5, each variable was plotted against time at levels to determine whether it was stationary or not.

The plot for log per capita public healthcare expenditure (lnPHEXP) in Levels is as shown by figure 4.1. It is non-stationary as it is fluctuating from year to year. Sharp fluctuations were seen from around year 2000 to year 2010.

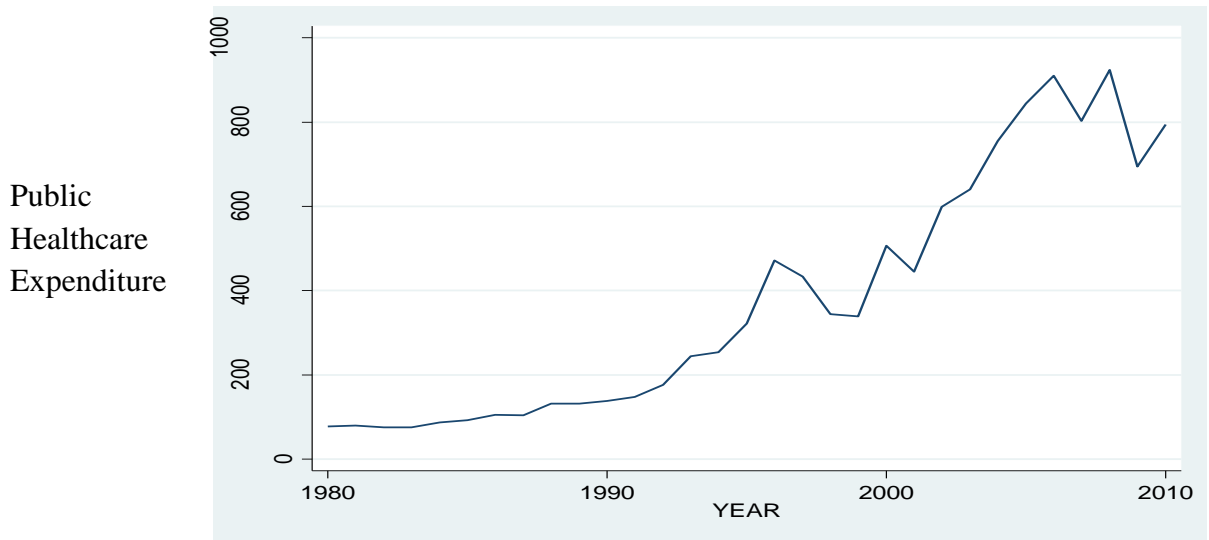


Figure 4.1: Plot of Log Per Capita Public Healthcare Expenditure (lnPHEXP) in Levels

Source: Author, 2013

The plot for Public Health Care Expenditure shows that it is a random walk with drift and trend. Fluctuations occurred with upward trend. It has an intercept meaning that there must always be some public health care expenditure to begin with.

The plot for log real per capita GDP (lnRPGDP) in Levels is shown by figure 4.2. It is fluctuating sharply upwards and that means it is non-stationary.

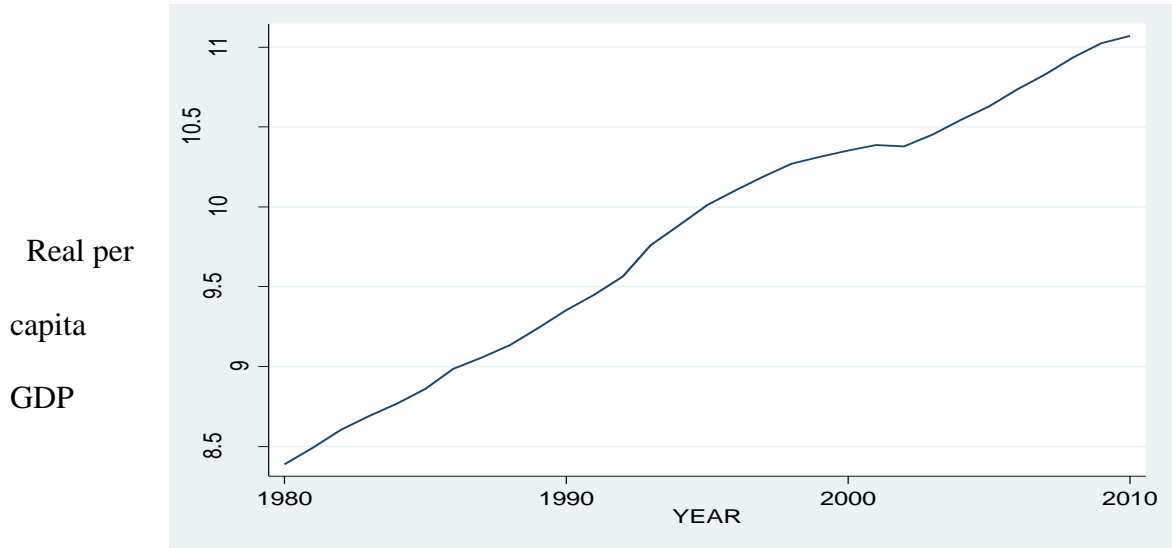


Figure 4.2: Plot of Log Real Per Capita GDP (lnRPGDP) in Levels

Source: Author, 2013

The plot for Real Per Capita GDP shows that it is a random walk with trend and is strongly trended. It means that the rise in GDP is based on a constant value by which it increases every year hence a strong trend.

The plot for Log Population (InPOP_N) in Levels is shown by figure 4.3. Population starts at year 1980 and grows explosively to year 1980.

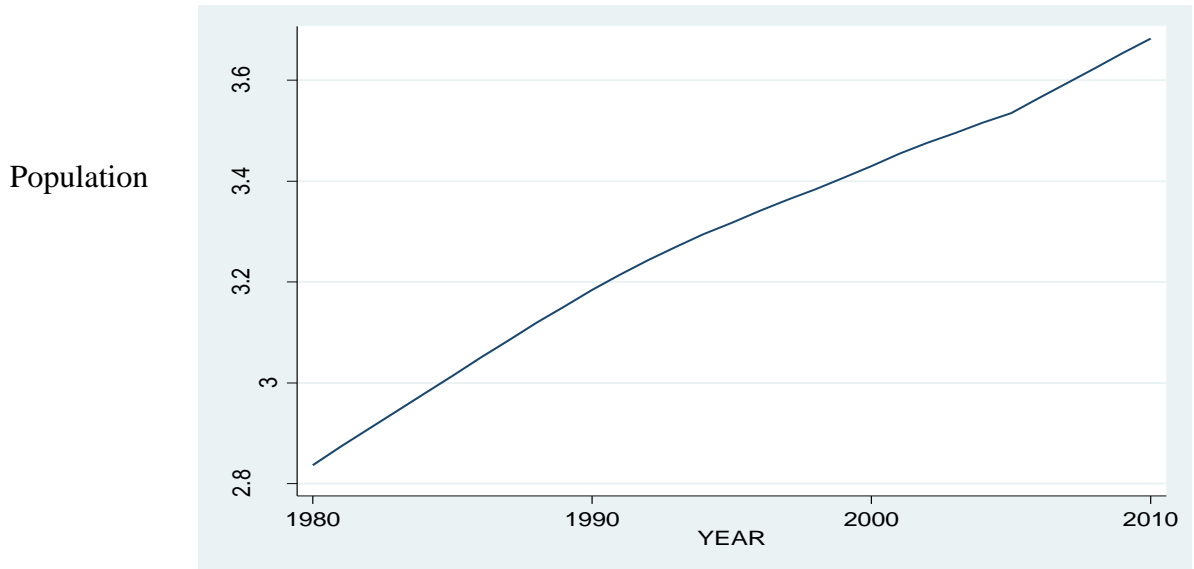


Figure 4.3: Plot of Log Population(InPOP_N) in Levels

Source: Author, 2013

The plot for Population shows that it is strongly trended. This implies that population growth is a constant fraction of the size of the current population. Its mean is constant over time. Proportional growth in population would arise if the number of children born were a constant fraction of the current population (Hamilton, 1994)

The plot for log secondary school enrolment (InSSE) in levels is shown by figure 4.4.

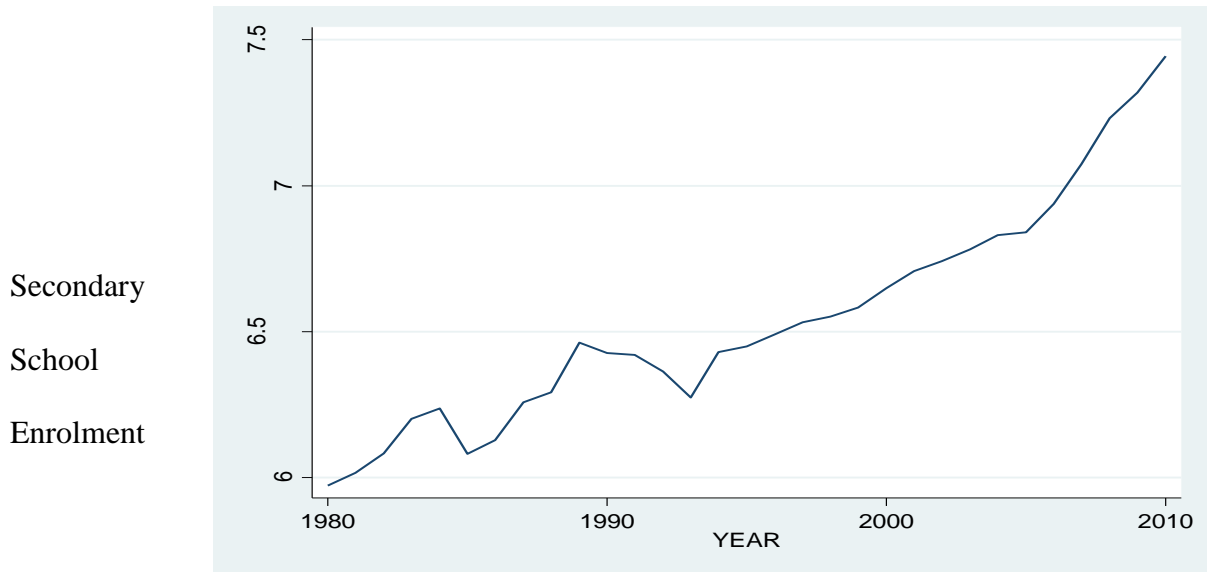


Figure 4.4: Plot of Log Secondary School Enrolment (InSSE) in Levels

Source: Author, 2013

The plot for secondary school enrolment shows that it is weakly trended as can be seen by sharp fluctuations in its pattern.

The plot for log life expectancy (InLFE) in levels is shown by figure 4.5. The intercept term implies that there must always be some life expectancy.

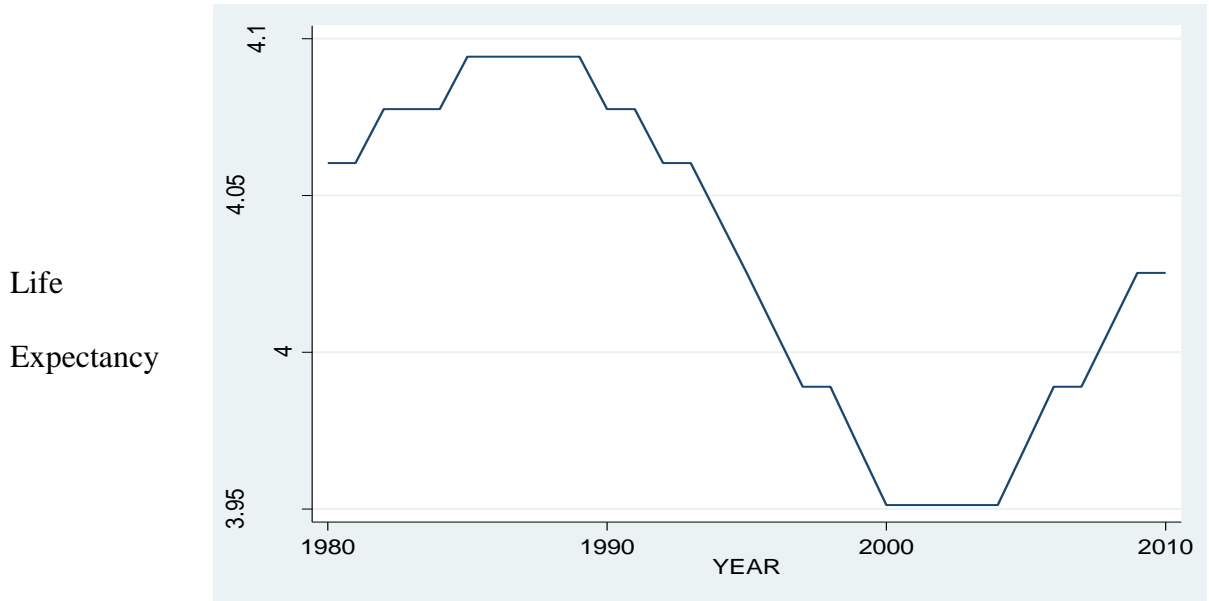


Figure 4.5: Plot of Log Life Expectancy (InLFE) in Levels

Source: Author, 2013

The plot for life expectancy shows that it is a random walk with a drift. It suggests possible breaks. It is not smooth. A Random walk with drift has a constant term. In a random walk with a drift the mean as well as the variance increases over time, again violating the conditions of (weak) stationarity.

Figures 4.1 through to 4.5 show that all the variables are non-stationary at levels. This implied that their means and variances are non-constant and vary with time. Their variance increase over time and have no tendency to return to a constant value.

4.1.3 Movement in Variables after Differencing

The plot for log per capita public healthcare expenditure (lnPHEXP) after first differencing is shown by figure 4.6.

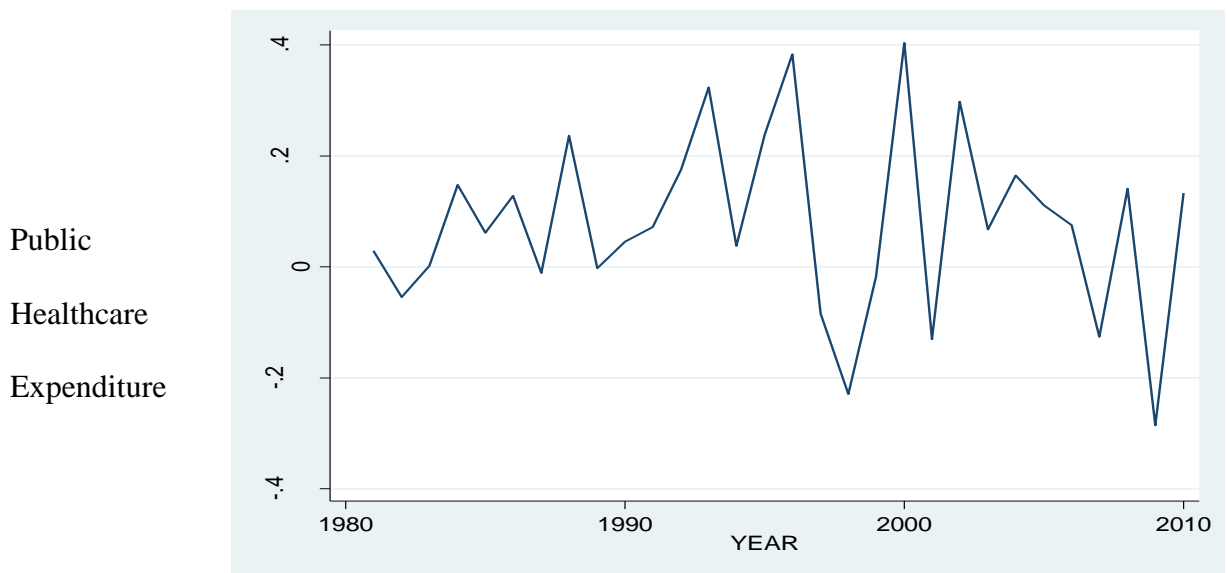


Figure 4.6: Plot of Log Per Capita Public Healthcare Expenditure (lnPHEXP) in First Difference

Source: Author, 2013

The first differenced variable is stationary around a trend or mean. The changes are within a certain range such that the fluctuations cancel one another. The variable per

capita public healthcare expenditure is integrated of order 1 since it became stationary after being differenced once.

The plot for log real per capita GDP (InRPGDP) after second difference is shown by figure 4.7.

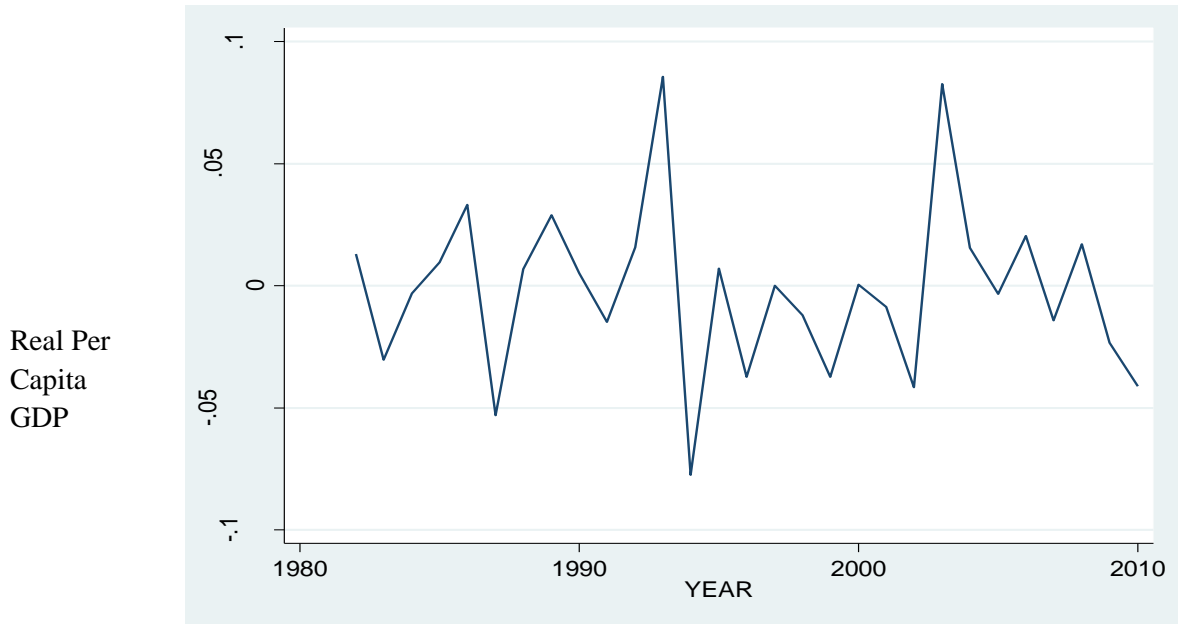


Figure 4.7: Plot of Log Real Per Capita GDP (InRPGDP) in Second Difference

Source: Author, 2013

The second differenced variable was stationary around a trend or mean. The changes are within a certain range such that the fluctuations cancel one another. The variable real per capita GDP was integrated of order 2 since it became stationary after being differenced twice.

The plot for Log Population (InPOP_N) in Levels is shown by figure 4.8.

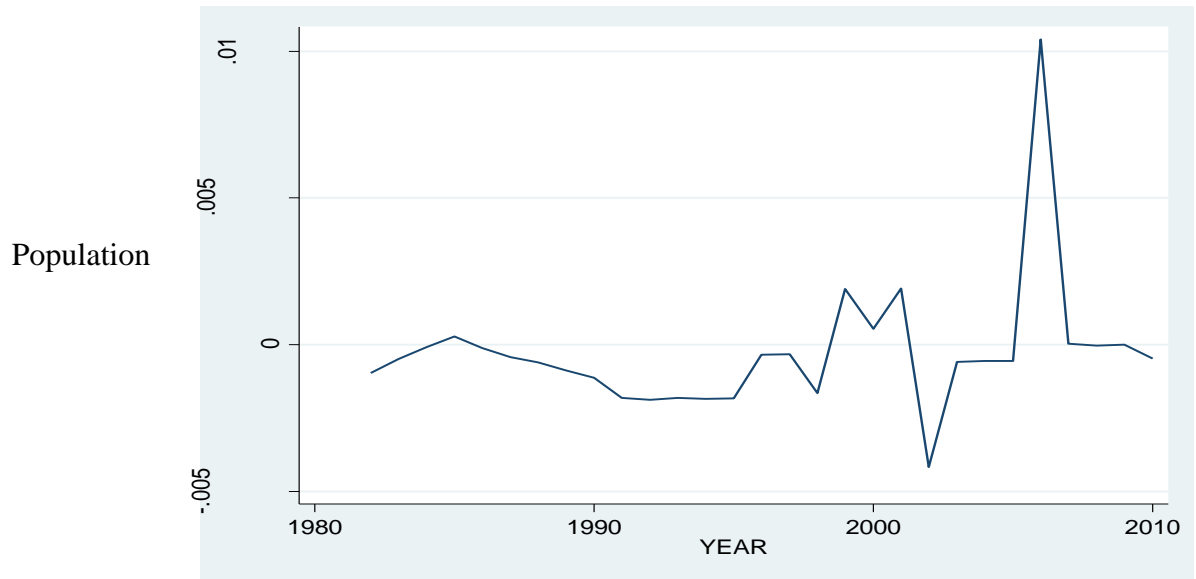


Figure 4.8: Plot of Log Population (InPOP_N) in Second Difference

Source: Author, 2013

The second differenced variable was stationary around a trend or mean. The changes are within a certain range such that the fluctuations cancel each other. The variable population was integrated of order 2 since it became stationary after being differenced twice.

The plot for log secondary school enrolment (InSSE) after first difference is shown by figure 4.9.

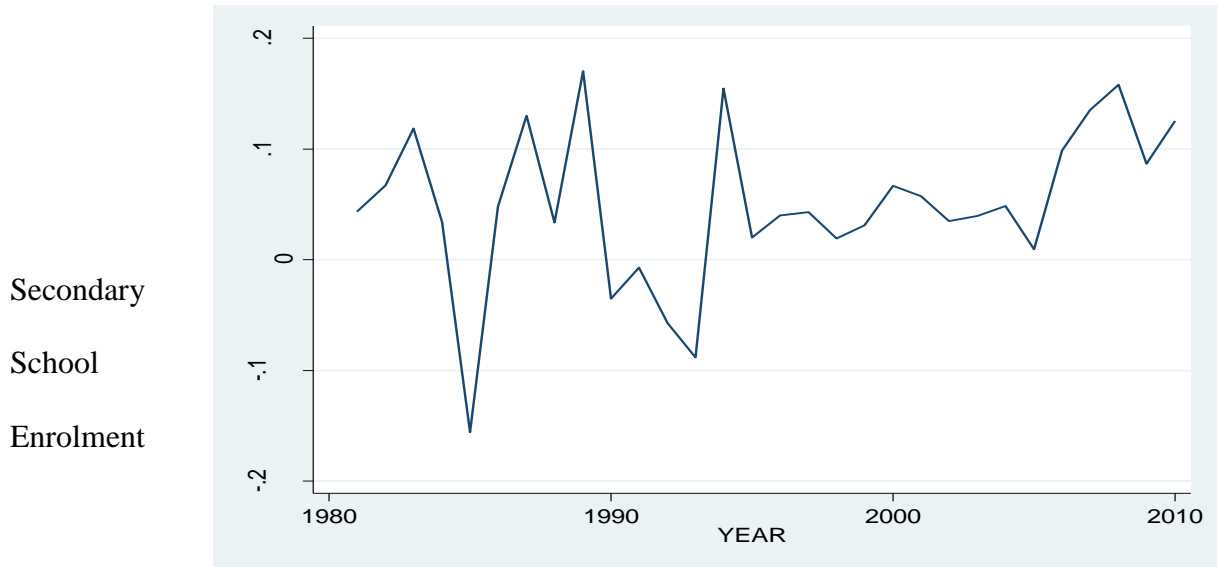


Figure 4.9: Plot of Log Secondary School Enrolment (InSSE) in First Difference

Source: Author, 2013

The first differenced variable is stationary around a trend or mean. The changes are within a certain range such that the fluctuations cancel one another. The variable secondary school enrolment is integrated of order 1 since it became stationary after being differenced once.

The plot for log life expectancy (InLFE) after first difference is shown by figure 4.10

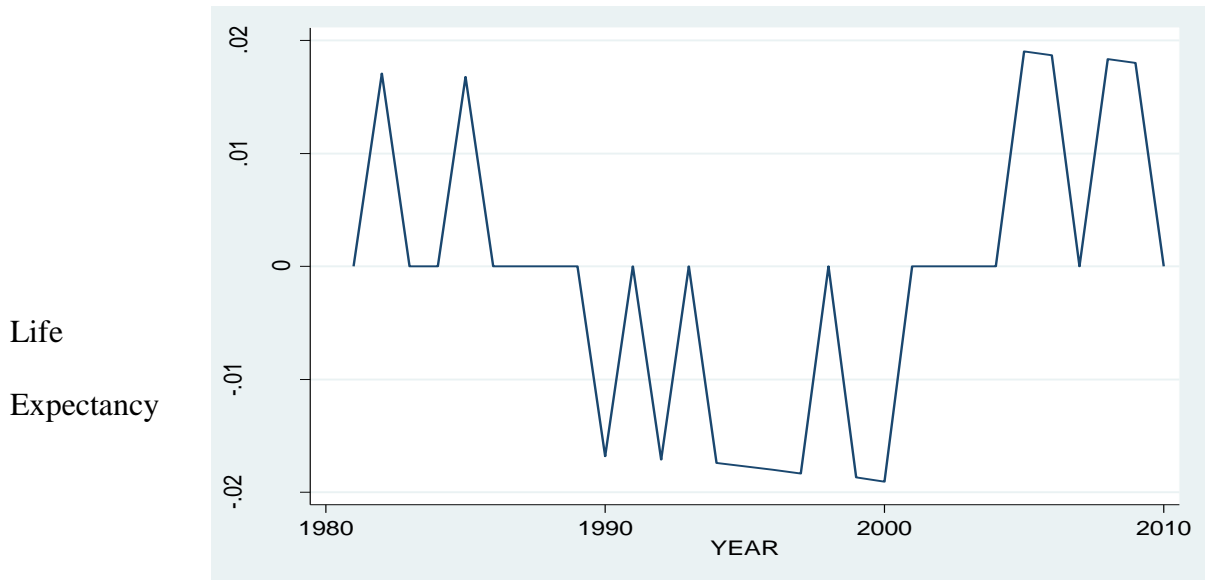


Figure 4.10: Plot of Log Life Expectancy (InLFE) in First Difference

Source: Author, 2013

The first differenced variable was stationary around a trend or mean. The changes are within a certain range such that the fluctuations cancel one another. The variable life expectancy is integrated of order 1 since it became stationary after being differenced once.

Figures 4.6 through to 4.10 show that all the variables become stationary after differencing. Their means and variances become constant over time and any fluctuations are canceled out. Per capita public healthcare expenditure, secondary school enrolment

and life expectancy become stationary after first differencing, meaning they are integrated of order 1. Real per capita GDP and population however became stationary after second difference, meaning they are integrated of order 2.

4.2 Formal Unit Root Tests

The Augmented Dickey-Fuller (ADF) test was used to test for unit root in the variables. The unit root tests were conducted to check for spurious correlation between variables in the regression equation. The ADF tests the null hypothesis of stationarity against an alternative hypothesis of non-stationarity. If there is unit root regressing one time series variable on another will only cause spurious regression. The results of unit root test are shown in table 4.1.

Table 4.1: Unit Root Test -Augment Dickey Fuller (ADF) Results at Levels

Variable	ADF t-statistic	1% level	5% level	10% level	Conclusion
InPHEXP	-2.316	-4.334	-3.580*	-3.228	Non-Stationary
InRPGDP	-1.804	-3.716	-2.986*	-2.624	Non-Stationary
InPOP	-3.360	-4.334	-3.580*	-3.280	Non-Stationary
InSSE	1.229	-3.716	-2.986*	-2.624	Non-Stationary
InLFE	-0.770	-3.716	-2.986*	-2.624	Non-Stationary

NOTE: InPHEXP is log of per capita public healthcare expenditure, InRPGDP is real per capita GDP, InPOP is log of population, InSSE is log of secondary school enrolment and InLFE is log of life expectancy.

*Indicates that all the variables are non-stationary at 5% critical level

Source: Author's computations, 2013

ADF statistics showed DF_{τ} of -2.316 for Per capita public healthcare expenditure, -1.804 for real per capita GDP, -3.360 for population, 1.229 for secondary school enrolment and -0.770 for life expectancy which are $> DF_{\tau}$ of -3.58 for Per capita public healthcare expenditure at 5%, -2.986 for real per capita GDP at 5%, -3.58 for population at 5%, -2.986 for secondary school enrolment at 5% and -2.896 for life expectancy. The unit root test indicated that all variables are non-stationary in levels at 1% and 5% level of significance. The study used 5% level of significance. The null hypothesis, that there is stationarity is rejected and it is concluded that there is a unit root in all the time series variables under study. To accommodate this non stationary the variables were differenced to achieve stationarity and the results of difference shown in table 4.2.

Table 4.2: Augmented Dickey Fuller (ADF) Results after Differencing

Variable	ADF t-statistic	1% level	5% level	10% level	Conclusion
InPHEXP	-6.179	-3.723	-2.989*	-2.625	I(0) Stationary
InRPGDP	-6.743	-3.730	-2.992*	-2.624	I(0) Stationary
InPOPEN	-4.915	-3.730	-2.992*	-2.626	I(0) Stationary
InSSE	-4.528	-3.723	-2.989*	-2.625	I(0) Stationary
InLFE	-3.249	-3.723	-2.989*	-2.625	I(0) Stationary

NOTE: InPHEXP is log of per capita public healthcare expenditure, InRPGDP is real per capita GDP, InPOPEN is log of population, InSSE is log of secondary school enrolment and InLFE is log of life expectancy.

*Indicates that all the variables are non-stationary at 5% critical level

Source: Author's computations, 2013

After differencing the ADF statistics showed DF_{τ} of -6.179 for Per capita public healthcare expenditure, -6.743 for real per capita GDP, -4.915 for population, -4.528 for

secondary school enrolment and -3.249 for life expectancy which are $< DF_{\tau}$ of -2.989 for Per capita public healthcare expenditure at 5%, -2.992 for real per capita GDP at 5%, -2.992 for population at 5%, -2.989 for secondary school enrolment at 5% and -2.989 for life expectancy at 5%. The unit root test indicated that all variables are stationary at 5% level of significance after differencing. The null hypothesis, that there is stationarity is accepted and it is concluded that there is no unit root.

4.3 Model Specification

Optimum lag length of 4 was selected. However the study used lag length of 1 as per Schwarz Bayesian Information Criterion (SIBC) since our data was annual (Greene, 2000). This is shown in table 4.3.

Table 4.3: Model Specification Results

Selection-order criteria								
Sample 1984-2010						No of observations= 27		
Lag	LL	LR	DF	P	EPE	AIC	HQIC	SBIC
0	134.787	-	-	-	4.6e-11	-9.61388	-9.54253	-9.37391
1	341.647	413.72	25	0.000	6.7e-17	-23.0849	-22.6568	-21.6451*
2	358.294	33.295	25	0.124	1.5e-16	-22.4662	-21.6813	-19.8266
3	391.799	67.01	25	0.000	1.6e-16	-23.0962	-21.9545	-19.2567
4	454.091	124.58*	25	0.000	5.6e-17*	-2.8586*	-24.3601*	-20.8192

Model specification optimum lag length = One (1) SBIC

Source: Author's computations, 2013

According to the Schwarz Bayesian information criterion the lag length with the lowest value is selected. In our case we select a lag length of 1 with SBIC= -21.6451 which the lowest among other values.

4.4 Co-integration Rank Test

Co-integration rank test was conducted using the Johansen Co-integrating test to determine the order of co-integration so as to ascertain the number of co-integration equations to run. The results are shown in table 4.4.

Table 4.4: Co-integration Test Results

Johansen Test for Cointegration					
Sample period 1980-2010			No of observations= 30		
Lags= 1					
Max rank	Parms	LL	Eigen value	Trace statistic	5% critical value
0	5	314.2191	-	128.3951	68.52
1	14	345.97282	0.87960	64.8877	47.21
2	21	361.10577	0.63537	34.6218	29.68
3	26	374.2989	0.58503	8.2355*	15.41
4	29	378.05574	0.22155	0.7218	3.76
5	30	378.41666	0.02377	-	-

*Shows that we have 3 cointegration relations

Source: Author's computations, 2013

The cointegration rank test shows that we have two cointegration relations ($r=3$). The variables are cointegrated and that three linear combinations of time series data set have

long term relationship which they deviate from in the short run but they return to in the long run.

4.5 Vector Error Correction Model

Two variables, X_t and Y_t will be cointegrated if they have a long-term, or equilibrium, relationship between them. An important theorem, known as the Granger representation theorem, states that if two variables Y_t and X_t are cointegrated, then the relationship between the two can be expressed as Error Correction Model (Madala, 2001). Cointegration means that despite being individually nonstationary, a linear combination of two or more time series can be stationary. Cointegration of two (or more) time series suggests that there is a long-run, or equilibrium, relationship between them. The error correction mechanism (ECM) developed by Engle and Granger is a means of reconciling the short-run behavior of an economic variable with its long-run behavior (Greene, 2000; Gujarati, 2004). This was used to describe both short-run and the long run relationship.

The short run relationship shows the deviation of the variable from its long run trend. The variable deviates but returns to a normal mean. This is shown by table 4.5

Table 4.5: Vector Error Correction Model for Per Capita Public Health Care Expenditure (PHEXP)

Cointegration relations	coefficient	Standard Error	Z	P-value
Ce1 L1	-0.5740795*	0.1752309	-3.28	0.001
Ce2 L1	0.4684763*	0.146678	3.19	0.001
Ce3 L1	0.4822945*	0.1935588	2.49	0.013
Constant	0.0061683	0.1424047	0.04	0.965

Source: Author's computations, 2013

These deviations in per capita healthcare expenditure in the short run are all significant as shown by the coefficients of cointegration relations 1, 2 and 3 in table 4.5. The deviation of the constant from its mean is not statistically significant. The economic interpretation of the constant term being insignificant means that per capita public healthcare expenditure does not depend principally on the previous value.

The variable real per capita GDP in the short run deviates from its long run trend and later returns to a normal mean. This is shown by table 4.6.

Table 4.6: Vector Error Correction Model for Real Per Capita GDP (RPGDP)

Cointegration relations	coefficient	Standard Error	Z	P-value
Ce1 L1	-0.0990878*	0.0361944	2.74	0.006
Ce2 L1	-0.0213021	0.0302967	-0.70	0.482
Ce3 L1	-0.0947384*	0.0399801	-2.37	0.018
Constant	0.0035506	0.0294141	0.12	0.904

*Statistically significant at 5% level of significance.

Source: Author's computations, 2013

In short run there are fluctuations which cancel each in the long run. They adjust towards the mean. These deviations in real per capita GDP in the short run are statistically significant for cointegration relations 1 and 3 while they are insignificant cointegration relation 2 and the constant term as shown by their coefficients in table 4.6. The deviation of the constant from its mean is not statistically significant. The constant term being statistically insignificant implies that real per capita GDP does not depend on its value in the previous period.

The variable population in the short run deviates from its long run trend and later returns to a normal mean. This is shown by table 4.7.

Table 4.7: Vector Error Correction Model for Population (POPN)

Cointegration relations	coefficient	Standard Error	Z	P-value
Ce1 L1	0.0055689	0.0032235	1.73	0.084
Ce2 L1	-0.0072429	0.0026983	-2.68	0.007*
Ce3 L1	-0.0314153	0.0035607	-8.82	0.000*
Constant	0.0274999	0.0026197	10.50	0.000*

*Statistically significant at 5% level of significance.

Source: Author's computations, 2013

These deviations in population in the short run are statistically significant for cointegration relations 2 and 3 and the constant term while they are statistically insignificant for cointegration relation 1 as shown by their coefficients in table 4.7. The deviation of the constant from its mean being statistically significant implies that the variable population depends on its value in the previous period.

In short run there are fluctuations which cancel each in the long run. They adjust towards the mean. These deviations in secondary school enrolment in the short run are all insignificant as shown by the coefficients of cointegration relations 1, 2 and 3 in table 4.8.

Table 4.8: Vector error correction model for Secondary School Enrolment (SSE)

Cointegration relations	coefficient	Standard error	Z	P-value
Ce1 L1	0.1553495	0.0873221	1.78	0.075
Ce2 L1	-0.0775174	0.0730934	-1.06	0.289
Ce3 L1	-0.0185836	0.0964553	-0.19	0.847
Constant	0.0132922	0.0709639	0.19	0.851

*Statistically significant at 5% level of significance.

Source: Author's computations, 2013

The deviation of the constant from its mean is not statistically significant. The economic interpretation of the constant term being insignificant means that secondary school enrolment does not depend principally on the previous value.

The short run relationship shows the deviation of the variable life expectancy from its long run trend. The variable deviates but returns to a normal mean as shown by table 4.9.

Table 4.9: Vector Error Correction Model for Life Expectancy (LFE)

Cointegration relations	coefficient	Standard Error	Z	P-value
Ce1 L1	0.0280313	0.0110605	2.53	0.011
Ce2 L1	-0.0457337	0.0092582	-4.94	0.000*
Ce3 L1	-0.0440917	0.0122173	-3.61	0.000*
Constant	0.0346463	0.0089885	3.85	0.000*

*Statistically significant at 5% level of significance.

Source: Author's computations, 2013

These deviations in life expectancy in the short run are all statistically significant for cointegration relations 2 and 3 while they are statistically insignificant for cointegration relations 1 as shown in table 4.9. The deviation of the constant from its mean is not statistically significant. The economic interpretation of the constant term being insignificant means that life expectancy does not depend principally on the previous value.

4.6 Cointegration Results for Long Run Relationship

Cointegration relation 1 shown by table 4.10 revealed that there is no long run relationship between population and per capita public healthcare expenditure since population has been dropped from the model.

Table 4.10: Cointegration Relations 1

Variable	Coefficient	Standard error	Z	P-value
InPHEXP	1	-	-	-
InRPGDP	-5.5e-17	-	-	-
InPOPEN	(Dropped)	-	-	-
InSSE	-1.472868	0.1440634	-10.22	0.000*
InLFE	8.412403	0.9438453	8.91	0.000*
Constant	-28.84847	-	-	-

NOTE: InPHEXP is log of per capita public healthcare expenditure, InRPGDP is real per capita GDP, InPOPEN is log of population, InSSE is log of secondary school enrolment and InLFE is log of life expectancy.

*Significant at 5% level of significance

Note: coefficient of InPHEXP of -5.5e-17 was simplified using a scientific calculator to get - 0.9999

Source: Author's computations, 2013

The dropping of variable population was done automatically by the STATA 10 software as matter of procedure. Per capita public healthcare expenditure has a positive relation with life expectancy and negative relations with real per capita GDP and secondary school enrolment. The coefficient of real per capita GDP of -0.99 means that if real per capita GDP increases by 1 percent, per capita public healthcare expenditure falls by 0.99 percent when all other variables are constant. Coefficient of secondary school enrolment is -1.473 and that means that per capita public healthcare expenditure falls by 1.473 percent when secondary school enrolment increases by 1 percent. Per capita public healthcare expenditure rises by 8.412 percent when life expectancy increases by 1percent. The coefficients of secondary school enrolment and life expectancy are statistically significant meaning they are important variable in explaining the longrun behaviour of per capita public healthcare expenditure.

Cointegration relation 2 shown by table 4.11 revealed that there is no long run relationship between real per capita GDP and population since population has been dropped from the model.

Table 4.11: Cointegration Relations 2

Variable	Coefficient	Standard error	Z	P-value
InPHEXP	2.2e-16	-	-	-
InRPGDP	1	-	-	-
InPOPEN	(Dropped)	-	-	-
InSSE	-1.807978	0.1912197	-9.45	0.000*
InLFE	8.994642	1.252794	7.18	0.000*
Constant	-32.63596	-	-	-

NOTE: InPHEXP is log of per capita public healthcare expenditure, InRPGDP is real per capita GDP, InPOPEN is log of population, InSSE is log of secondary school enrolment and InLFE is log of life expectancy

*Significant at 5% level of significance

Note: coefficient of InPHEXP of -2.22e-16 was simplified using a scientific calculator to get – 1

Source: Author's computations, 2013

The dropping of variable population was done automatically by the STATA 10 software as matter of procedure. Real per capita GDP has a positive relation with life expectancy and negative relations with per capita public healthcare expenditure and secondary school enrolment. The coefficient of per capita public healthcare expenditure of -1 means that if per capita public healthcare expenditure increases by 1 percent, real per capita GDP falls by 1 percent when all other variables are constant. Coefficient of secondary school enrolment is -1.808 and that means that real per capita GDP falls by 1.808 percent when secondary school enrolment increases by 1 percent. Real per capita GDP rises by 8.995 percent when life expectancy increases by 1 percent. The coefficients of secondary school enrolment and life expectancy are statistically significant meaning they are important variables in explaining the longrun behaviour of real per capita GDP.

Cointegration relation 3 shown by table 4.12 reveals that there is no long run relationship between real per capita GDP and population since real per capita GDP has been dropped from the model.

Table 4.12 Cointegration Relations 3

Variable	Coefficient	Standard error	Z	P-value
InPHEXP	-2.43e-17	-	-	-
InRPGDP	(Dropped)	-	-	-
InPOP	1	-	-	-
InSSE	-0.4898635	0.0595822	-8.22	0.000*
InLFE	-2.263814	0.3903588	-5.80	0.000*
Constant	8.818624	-	-	-

NOTE: InPHEXP is log of per capita public healthcare expenditure, InRPGDP is real per capita GDP, InPOP is log of population, InSSE is log of secondary school enrolment and InLFE is log of life expectancy

*Significant at 5% level of significance

Note: coefficient of InPHEXP of -2.43e-17 was simplified using a scientific calculator to get 0.9999

Source: Author's computations, 2013

The dropping of variable real per capita GDP was done automatically by the STATA 10 software as matter of procedure. Population has a positive relation with per capita public healthcare expenditure and negative relations with secondary school enrolment and life expectancy. The coefficient of per capita public healthcare expenditure of 0.999 means that if per capita public healthcare expenditure increases by 1 percent, population also increases by 0.99 percent when all other variables are constant. Coefficient of secondary school enrolment is -0.4899 and that means that population falls by 0.4899 percent when secondary school enrolment increases by 1 percent. Population falls by 2.26 percent when life expectancy increases by 1 percent. The coefficients of secondary school enrolment

and life expectancy are statistically significant meaning they are important variables in explaining the long-run behaviour of population.

4.7 Dynamic Stability Test

4.7.1 Stability Test

The stability test was conducted and it revealed that the model was stable. All the variables lie inside the unit cycle. This is shown in figure 4.11 below.

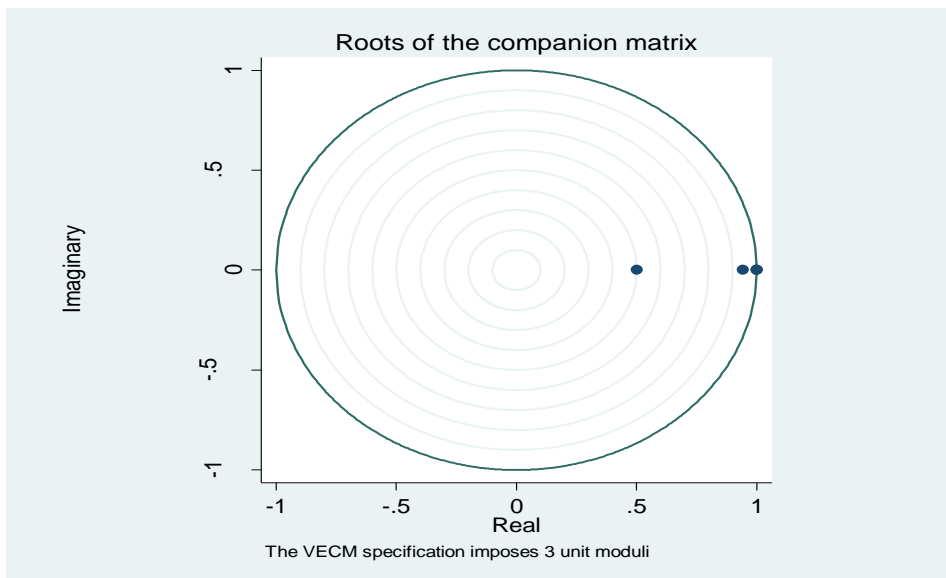


Figure 4.11: Roots of companion matrix

Source: Author's computations, 2013

4.7.2 Lagrange -Multiplier Test

The lagrange-multiplier test was performed and it revealed that there was no autocorrelation at the specified lag length. Prob (0.52159) < χ^2 (23.9616). Therefore the

null hypothesis was accepted and it was concluded that there is no residual autocorrelation at lag order.

4.7.3 Jarque-Bera Normality test

Jarque-Bera test was conducted to check for normality and the results are shown in table 4.13 below.

Table 4.13: Normality Test Results

Jarque-Bera Normality Test			
Equation	Chi ²	Degrees of freedom	Prob > Chi ²
D_ InPHEXP	0.325	2	0.85014
D_ InRPGDP	7.025	2	0.02982
D_ InPOPEN	23.028	2	0.00001
D_ InSSE	3.694	2	0.15774
D_ InLFE	3.796	2	0.14987
ALL	37.867	10	0.00004

NOTE: InPHEXP is log of per capita public healthcare expenditure, InRPGDP is real per capita GDP, InPOPEN is log of population, InSSE is log of secondary school enrolment and InLFE is log of life expectancy.

Source: Author's computations, 2013

The test revealed that per capita health expenditure is not normally distributed (prob of 0.8514 > chi² of 0.325), real per capita GDP is normally distributed (prob of 0.02982 < chi² of 7.025), population is normally distributed (prob of 0.00001 < chi² of 23.028), secondary school enrolment is normally distributed (prob of 0.15774 < chi² of 73.694)

and life expectancy is normally distributed (prob of $0.14987 < \chi^2$ of 3.796). Overall, the residuals from the estimated multivariate model follow a normal distribution (prob of $0.00004 < \chi^2$ of 37.867) thus enabling us to interpret the model.

4.8 The Estimated Multivariate Regression Model

The final regression results after correcting non stationarity, checking cointegration and conducting dynamic stability tests are given in table 4.14.

Table 4.14: Cochrane-Orcutt AR (1) Regression

Cochrane-Orcutt AR (1) Regression					
					Number of Observations = 31
					F(4,26) = 2638.33
					Prob >F = 0.0000
					R-squared = 0.9974
					Adjusted R-squared = 0.9971
					Root MSE = 0.14775
Dependent Variable is InPHEXP					
Variable	Coefficient	Standard Error	t-value	Probability	
InRPGDP	0.9826715	0.6413933	1.53	0.137	
InPOPEN	0.362522	2.273804	0.16	0.875	
InSSE	-0.2248951	0.3304043	-0.68	0.502	
InLFE	-0.9375578	0.2341643	-4.00	0.000*	
Rho= 0.5350247					
Durbin -Watson statistic (original) = 0.979839					
Durbin -Watson statistics (Transformed) = 1.960587					
5% level of significance					
NOTE: InPHEXP is log of per capita public healthcare expenditure, InRPGDP is real per capita GDP, InPOPEN is log of population, InSSE is log of secondary school enrolment and InLFE is log of life expectancy.					

Source: Author's Computations, 2013

The model was correctly specified without error as can be seen from the values of the Durbin-Watson static (adjusted) of 1.960587 which is greater than the values of $R^2=0.9974$ and Adjusted $R=0.9971$. This implies that the problem of correlation has been handled. Per capita healthcare expenditure has a positive relationship with real per capita GDP and population while it has a negative relationship with secondary school enrolment and Life Expectancy.

Real per capita GDP was found to be positively related to public health expenditure. The coefficient of real per capita GDP of 0.9827 implies that for a 1 percent increase in real per capita GDP, per capita healthcare expenditure increases by 0.9827 percent when all other variables are held constant. This is consistent with economic theory which postulates that expenditure will increase as income increases but by a less proportion as the increase in income (Boyes, 1986). This means that public healthcare expenditure in Kenya will rise as the economy develops and becomes wealthier. Increased income leads to increased public expenditures. This is in agreement with Bakare and Olubokun (2011), Odior (2011) and Taiwo and Aboyami (2011) who also found the existence of a positive relationship between Healthcare expenditure and economic growth in Nigeria. The coefficient of real per capita GDP per capita shows that elasticity of public health care expenditure of 0.9826 is less than unity suggesting that health is not a luxury good in Kenya.

Population was found to be positively related to public expenditure on health care. A 1 percent increase in population leads to a 0.3625 percent increase in per capita healthcare expenditure. This is in line with economic theory since as population increases; the government also has to increase its expenditure on healthcare to cater for the increased demand for health services by the expanding population as was found by Kimalu *et al.* (2004) in Kenya and Qureshi (2008) in Pakistan. Knowing about the size of population and its growth over time enables the government to spend adequately on various aspects of human development such as education and healthcare. However, the coefficient of population is insignificant implying that the amount that the government spends on health care it does not depend on population.

Secondary school enrolment was found to be negatively related to public healthcare expenditure and statistically insignificant. Per capita healthcare expenditure falls by 0.2249 percent for when secondary school enrolment increases by 1 percent. The negative relationship between spending on public health and secondary school enrolment is as expected since when enrolment increases it means more resources are devoted to education and as such spending on public health will fall as they compete for government resources.

Life expectancy was found to be negatively related to public health care expenditures and statistically significant in explaining public health care, meaning that life expectancy in Kenya influences the amount of health care spending by the public sector. A 1 percent

increase in life expectancy leads to fall in per capita healthcare expenditure by 0.9376 percent. The relationship between spending on healthcare and life expectancy is not clear cut. It can be positive or negative depending on whether one is examining a developed or a developing economy. For this study there was a negative relationship between spending on public health and life expectancy implying that when life expectancy rises spending on public health falls.

The stability test was conducted and it revealed that the model was stable as all the variables lie inside the unit cycle. The lagrange-multiplier test was performed and it revealed that there was no autocorrelation at the specified lag length. Jarque-Bera test was conducted to check for normality and the results showed that the residuals from the estimated multivariate model follow a normal distribution thus enabling the interpretation the model.

The coefficient of determination (R^2) of 0.9974 of the model implies that all the predictors used in the model captured the variation in public healthcare expenditure. It means that 99.74 percent of the variation in the dependent variable, Per Capita Public Healthcare Expenditure is explained by the independent variables; Real per capita GDP, Population, Secondary School Enrolment and Life Expectancy. Only 0.26 percent of the variation in Per Capita Public Healthcare Expenditure is due to error, chance or other factor that were not included in the study.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND POLICY IMPLICATIONS

5.0 Introduction

This chapter presents summary, conclusions and policy implications of the study. The chapter focuses on the findings and how they relate to the objectives of the study.

5.1 Summary of Key Findings

The study empirically investigated the relationship between public health care expenditure and selected economic and socio-demographic factors in Kenya. The Specific Objectives were to: determine the relationship between Gross Domestic Product and public healthcare expenditure; evaluate the relationship between population and public healthcare expenditure; investigate the relationship between secondary school enrolment (proxy for literacy rate) and public health care expenditure and to determine the relationship between life expectancy at birth and public health care expenditure. To achieve these objectives, first, the time series data used in the study was cleaned to ensure it was fit for analysis. Stationary tests were conducted to ensure the variables did not have unit root. The data were also converted to logarithms to reduce variability. Finally, a regression was then run to reveal the relationship between the dependent variable and the independent variables.

The regression results revealed the coefficient of real per capita GDP to be positive and statistically insignificant. Coefficient of population was found to be positive and statistically insignificant. Coefficient of secondary school enrolment was found to be negative and statistically insignificant. Coefficients of life expectancy was found to be

negative and statistically significant in explaining public health care, meaning that life expectancy in Kenya influences the amount of health care spending by the public sector. The coefficient of determination (R^2) was 99.74, meaning that all the predictors together explain 99.74 percent of the dependent variable.

5.3 Conclusions

The results revealed that there is a relationship between government spending on healthcare and life expectancy since the coefficient of life expectancy was the only one significant. The other independent variables, namely: GDP; population and secondary school enrolment had coefficient that were not significant hence they do not influence government spending on healthcare in Kenya.

5.4 Policy Implications

Life expectancy was found to influence government spending on health. Therefore the government should invest more in maternal and reproductive health as these have great bearing on the lifespan of an individual. Funding immunization against malaria, polio and ensuring births are attended by skilled health personnel will have a great boost on life expectancy. These can only happen with adequate funding.

GDP was found to have no influence of public healthcare spending. This may be due to the fact that Kenya is still a developing country with limited government resources and diverse demands by the population such as needs for infrastructure like roads and electricity. Healthcare may not be a priority for Kenya now, thus the disconnect between economic growth and government spending on health as found by the study. Health is a critical sector for economic growth and as such the government should increase its

allocation to the sector from the current 6 percent to 15 percent as per the Abuja and Maputo declarations (TI-Kenya, 2011). Good health is critical for economic growth of a country. Healthy individuals are productive as they produce more output which increases incomes and facilitates further increases in output.

Population was found to have no influence on government healthcare spending in Kenya. This could be due to the fact that the population growth is faster than the government can provide for. Kenya being a developing country is still at a stage of rapid population growth than the output generated by the economy. When the population increases it means there will be more people demanding healthcare services and as such the government should take into consideration changes in population to meet increased demand for healthcare services arising from growth in population. The higher the population the higher will be the spending.

Secondary school enrolment was found to have no influence on public healthcare spending. This is due to the fact that the education sector and the health sector compete for resources such that if the government increases budget allocation to the health sector, secondary school enrolment will fall as it will receive reduced funds. The government therefore should strike a balance on optimum allocation of resources between the two sectors as they compete with each other. A healthy person will be more productive and generate more income while a literate person will be health conscious. Both health and education contribute towards human development as was found also by Qureshi (2008) in Pakistan.

5.5 Limitations of the Study

Limited research has been done on healthcare financing in Kenya using time series data and that made literature review difficult. Most research on health system in Kenya is descriptive in nature. The study therefore reviewed the available literature on Kenya's healthcare system and those of other African countries.

The study also examined the relationship between selected factors and public health care expenditure in Kenya from the year 1980 to the year 2010. It left out periods prior to 1980, that is from 1963 to 1979 which are equally important in our understanding of trends in public healthcare financing in Kenya since the data on some variables was available from 1980 onwards.

5.6 Areas for Further Research

The findings of the study identified a number of areas for further research which are:-

The study examined public health expenditure by the government and not private health expenditure or a total healthcare expenditures. There is need to conduct studies on private health expenditures and/or total health expenditures.

The study did not take into account the impact of foreign aid on public health care expenditure in Kenya. There is need for future studies to incorporate the impact of foreign aid on health care in Kenya.

There is need for future studies to examine the impact of health insurance on healthcare access in Kenya. There is public health insurance provided by The National Hospital Insurance Fund (NHIF) and private insurance.

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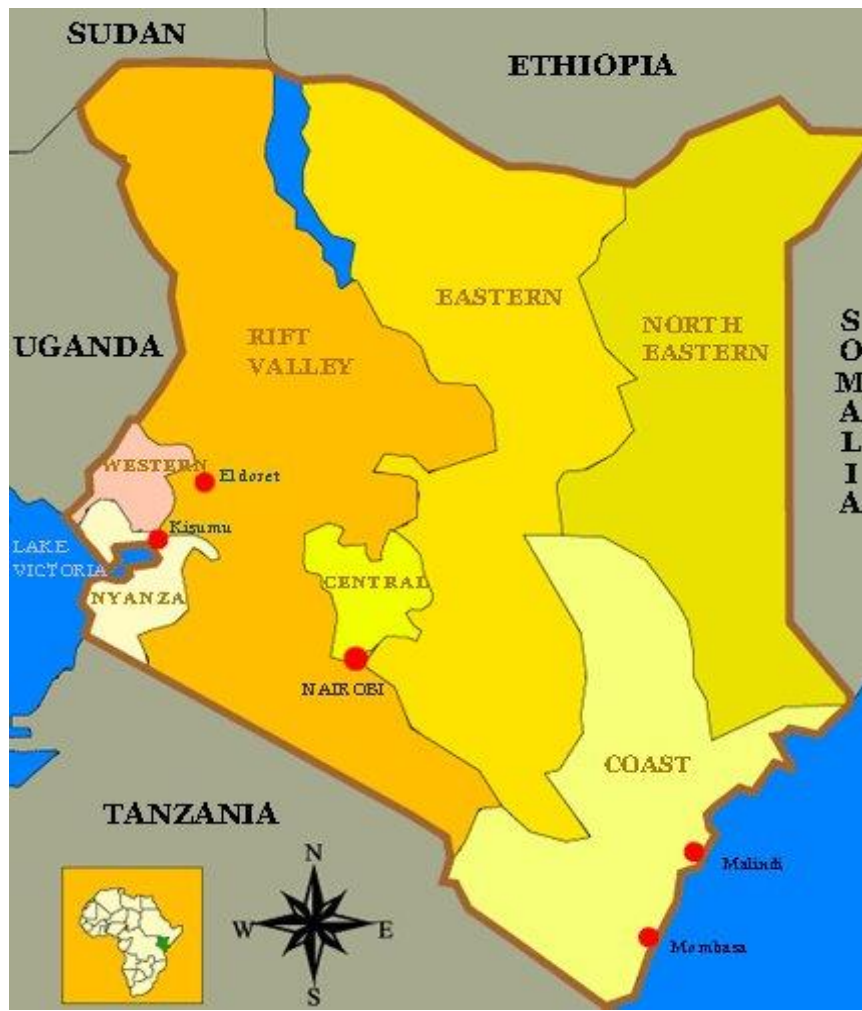
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APPENDICES

APPENDIX I: STUDY AREA-KENYA

Source: <http://www.kenya-advisor.com/images/kenya-map-provinces.jpg>