

**IMPACT OF SELECTED MACROECONOMIC VARIABLES ON  
PUBLIC HEALTHCARE FINANCING IN KENYA**

**Lumbasi Misiko David**

**A Research Thesis Submitted to the School of Business and Economics in Partial  
Fulfilment of the Award of Master of Science Degree in Economics of Masinde  
Muliro University of Science and Technology.**

**OCTOBER, 2025**

## DECLARATION

This thesis is my original work and has not been submitted for a degree in any other university or for any other award

Signature.....

Date.....

**David Misiko Lumbasi**

ECO/G/01-70169/2022

## CERTIFICATION

The undersigned certify that they have read and hereby recommend for acceptance of Masinde Muliro University of Science and Technology, a thesis entitled '**Impact of selected Macroeconomic variables on Public Healthcare Financing in Kenya (2013-2022)**'

Signature.....

Date.....

**Dr. Consolata Ngala**

Department of Economics

Masinde Muliro University of Science and Technology

Signature.....

Date.....

**Dr. Edwin Simiyu**

Department of Economics

Masinde Muliro University of Science and Technology

## **COPYRIGHT**

This thesis contains copyright-protected work that is covered by the 1999 Copyright Act, the Berne Convention, and other national and international intellectual property laws. It may not be duplicated in whole or in part by any means, with the exception of brief excerpts used in a fair and reasonable manner for research, private study, critical scholarly review, or discussion with attribution, and with written consent from the dean of graduate studies on behalf of Masinde Muliro University of Science and Technology and the author.

## **DEDICATION**

I dedicate this research to my family; my wife Linda my son Sharpton and my daughter Arielle for their moral support and keeping up with me during preparation of this thesis. Their love, sacrifice, and encouragement have been the foundation of my academic journey. To my parents; Alfred Makawu and Margaret Makawu who instilled in me the value of education and perseverance, their unwavering support gave me the strength to persevere through every challenge.

I owe my deepest gratitude to my supervisors, Dr. Edwin Simiyu, Dr. Consolata Ngala and Dr. Reuben Ruto for their invaluable guidance, mentorship and supervision throughout the course of this study. Their commitment and encouragement have been a great source of inspiration.

This study is also dedicated to all the healthcare professionals and policymakers in Kenya whose efforts to improve public healthcare financing inspired my research. Finally, this work is dedicated to Masinde Muliro University of Science and Technology fraternity, for providing me with the opportunity and conducive environment to pursue my studies and contribute to knowledge on healthcare financing in Kenya.

## **ACKNOWLEDGEMENT**

I give thanks to God for his favour and grace in allowing me to do this study. May all the honour go to him. Thank you to Drs. Edwin Simiyu and Consolata Ngala, my supervisors, for their advice on writing this thesis. An excellent source of motivation is Masinde Muliro University of Science and Technology, which offers an inspiring work atmosphere. We especially thank the other professors and students at the School of Business and Economics for their invaluable advice, encouragement, and support. Sincere gratitude to my colleagues for their insightful comments and helpful critiques. Blessings to all of you.

## ABSTRACT

Healthcare financing is a critical aspect of ensuring access to quality healthcare services for individuals and populations worldwide. However, macroeconomic factors have posed challenges like eroding the real value of medical finances through inflation, low tax revenues collection and high public debt that attract high interest repayments that crowd out funds meant for social sectors like healthcare and thereby affecting sustainable financing of healthcare systems. This has resulted to inadequate and inconsistent healthcare funding, as well as wasteful use of existing resources leading to disastrous out-of-pocket medical expenses that drive the country's populace into poverty. Despite efforts to achieve sustainable Development Goal number 3 (SDG 3) which aims to achieve universal health coverage across the world, Kenya still allocates inadequate resources on healthcare falling below the Abuja Declaration of 2001. In this regard, the study examined the impact of selected macroeconomic variables on public healthcare financing in Kenya. Specific objectives of the study were to: determine the impact of inflation on public healthcare financing in Kenya, examine the impact of public debt on public healthcare financing in Kenya, determine the impact of Gross Domestic Product (GDP) growth on public healthcare financing in Kenya and establish the impact of tax revenue on public healthcare financing in Kenya. The study was anchored on Grossman theory of Health demand which states that quality healthcare system guarantees a healthy populace that is more productive and spur economic growth, other theories are the Wagner's theory, Resource allocation theory and the Human capital theory. There are limited studies conducted on this topic and mainly focused on specific counties with qualitative analysis which did not represent Kenya at large and did not provide robust quantitative inferences. Quarterly time series data was collected, cleaned, coded through standardization and log transformation then arranged in table form before subjecting it to pre-diagnostic tests for normality, unit root, multicollinearity, bounds cointegration and Optimum lag length to ensure its reliability and consistency. The data was analysed using Vector Error Correction Model (VECM) method. From the results, all the tests met the required threshold for reliability. Post diagnostic tests for normality, autocorrelation, heteroskedasticity and CUSUM model stability were carried out and all of them met the required respective threshold for analysis. The study adopted descriptive and correlational research design. VECM results confirmed a long-run equilibrium between macroeconomic variables and healthcare financing. Inflation exerted a negative long-run effect ( $\beta = -0.1069$ ,  $p < 0.05$ ) but showed short-run positive adjustments ( $\Delta\beta = 0.0477$ ,  $p = 0.03$ ). GDP growth ( $\beta = 0.2748$ ,  $p < 0.001$ ) and tax revenue ( $\beta = 0.6634$ ,  $p < 0.001$ ) significantly enhanced health allocations, while public debt displayed a weaker long-run effect ( $\beta = 0.1262$ ,  $p = 0.059$ ) with delayed short-run benefits ( $\Delta\beta = 0.0892$ ,  $p = 0.069$ ). The study concluded that Inflation weakens real health budgets, public debt offers delayed benefits, GDP growth expands fiscal space, and tax revenue provides the most sustainable foundation for healthcare financing. The study recommended that Kenya should stabilize inflation, adopt strategic debt management, and link GDP growth to health allocations. Expanding domestic tax capacity through digitization, formalization, and earmarked health taxes will enhance sustainable financing. Strengthening procurement efficiency and local pharmaceutical production can mitigate inflationary pressures, ensuring predictable, equitable, and long-term funding for universal healthcare.

## TABLE OF CONTENTS

<b>DECLARATION</b> .....	<b>ii</b>
<b>COPYRIGHT</b> .....	<b>iii</b>
<b>DEDICATION</b> .....	<b>iv</b>
<b>ACKNOWLEDGEMENT</b> .....	<b>v</b>
<b>ABSTRACT</b> .....	<b>vi</b>
<b>LIST OF TABLES</b> .....	<b>xi</b>
<b>LIST OF FIGURES</b> .....	<b>xii</b>
<b>LIST OF ABBREVIATIONS AND ACRONYMS</b> .....	<b>xiii</b>
<b>OPERATIONAL DEFINITION OF KEY TERMS</b> .....	<b>xiv</b>
<b>CHAPTER ONE</b> .....	<b>1</b>
<b>INTRODUCTION</b> .....	<b>1</b>
1.1 Background of the study .....	1
1.2 Statement of Problem .....	6
1.3 Objectives of the study .....	7
1.3.1 General Objective .....	7
1.3.2 Specific Objectives .....	7
1.4 Research Hypothesis .....	8
1.5 Significance of the study .....	8
1.6 Scope of the Study.....	9
1.7 Limitations of the study.....	10
<b>CHAPTER TWO;</b> .....	<b>12</b>
<b>LITERATURE REVIEW</b> .....	<b>12</b>
2.1 Introduction .....	12
2.2 Theoretical review .....	12
2.2.1 Grossman theory of Health Demand .....	12
2.2.2 Resource Allocation Theory.....	15
2.2.3 Human Capital Theory .....	17
2.2.4 Wagner’s law (1883).....	18
2.3 Conceptual Review .....	20
2.3.1 Inflation.....	21

2.3.2 Public Debt .....	23
2.3.3 GDP Growth .....	25
2.3.4 Tax revenue .....	27
2.3.5 Public Healthcare Financing .....	29
2.3.5.1 Kenya healthcare financing strategy (2020-2030).....	32
2.4 Empirical literature .....	33
2.4 Public Healthcare Financing .....	33
2.4.1 Inflation and Public Healthcare financing .....	36
2.4.2 Public debt and Public Healthcare Financing .....	39
2.4.3 GDP Growth and Public Healthcare Financing .....	43
2.4.4 Tax Revenue and Public Healthcare Financing.....	46
2.5 Research Gaps .....	49
2.6 Conceptual Framework .....	52
<b>CHAPTER THREE .....</b>	<b>54</b>
<b>RESEARCH METHODOLOGY .....</b>	<b>54</b>
3.1 Introduction .....	54
3.2 Research Design .....	54
3.3 Study Area.....	55
3.4 Data and Data Collection .....	56
3.5 Data Analysis and Presentation.....	57
3.5.1 Model Specification.....	58
3.5.2 Description and Measurement of variables .....	59
3.5.3 Pre-Estimated Diagnostic Tests .....	60
3.5.3.2 Unit root test .....	60
3.5.4 Post –estimated Diagnostic tests.....	62
3.6 Model Stability by use of CUSUM Test .....	65
3.7 Ethical Considerations.....	65
<b>CHAPTER FOUR.....</b>	<b>65</b>
<b>DATA ANALYSIS AND DISCUSSIONS.....</b>	<b>65</b>
4.1 Introduction .....	65
4.2 Descriptive Statistics .....	66

4.2.1 GDP Growth.....	67
4.2.2 Public Debt .....	68
4.2.3 Tax Revenue .....	70
4.2.4 Inflation.....	72
4.2.5 Public Healthcare Financing.....	73
4.3 Pre-estimation.....	75
4.3.1 Normality Test .....	75
4.3.2 Test for Unit Root.....	76
4.3.3 Multicollinearity .....	78
4.3.4 Determination of Optimum Lag Length.....	79
4.3.5 Cointegration Test- Bounds Test.....	81
4.3. Correlational Analysis.....	84
4.5 Vector Error Correction Matrix.....	87
4.5.1 Model Summary .....	87
4.5.2 Speed of Adjustment .....	88
4.5.3 Long Run Effect .....	89
4.5.4 Short Run Effect .....	90
4.6 Post Estimation Tests .....	94
4.6.1 Normality.....	94
4.6.2 Autocorrelation/Serial correlation Test .....	95
4.6.3 Heteroscedasticity.....	96
4.6.4 Model Stability by use of CUSUM Test.....	97
4.7 Discussion of the Results .....	99
4.7.1 Impact of Inflation on Public health financing in Kenya .....	99
4.7.2 Impact of Tax Revenue on Public Health Financing in Kenya .....	107
4.7.3 Impact of Public Debt on Public Health Financing in Kenya .....	101
4.7.4 Impact of GDP Growth on Public Health Financing in Kenya .....	104
<b>CHAPTER FIVE .....</b>	<b>110</b>
<b>SUMMARY, CONCLUSIONS AND RECOMMENDATIONS .....</b>	<b>110</b>
5.1 Introduction.....	110
5.2 Summary of the Findings .....	110

5.3 Conclusion.....	114
5.4 Recommendations of the Study.....	116
5.5 Areas for Further Studies .....	118
<b>REFERENCES.....</b>	<b>119</b>
<b>APPENDICES .....</b>	<b>127</b>
<b>APPENDIX I: Data Collection Tool.....</b>	<b>127</b>
<b>APPENDIX II: Map of Kenya .....</b>	<b>128</b>
<b>APPENDIX III: University Letter of Proposal Approval.....</b>	<b>129</b>
<b>APPENDIX IV: Research License.....</b>	<b>130</b>

## LIST OF TABLES

Table 2. 1: Knowledge Gap .....	49
Table 3. 1: Data collected for 10 years .....	56
Table 3. 2: Description and measurement of variables .....	59
Table 4. 1: Descriptive Statistics .....	67
Table 4. 2: Normality Test .....	75
Table 4. 3: Unit Root Tests .....	77
Table 4. 4: Test for Multicollinearity using Variance Inflation Factor.....	78
Table 4. 5: Lag Length Determination summary .....	79
Table 4. 6: Optimal Lag Length for ARDL Model.....	81
Table 4. 7: Bound Test for Cointegration .....	83
Table 4. 8: Correlational Analysis Results .....	85
Table 4. 9: Model Summary .....	87
Table 4. 10: Error Correction Term .....	88
Table 4. 11: Long Run Effect.....	89
Table 4. 14: Residual Normality .....	94
Table 4. 15: Breusch-Godfrey Serial Correlation LM Test .....	95
Table 4. 16: Heteroskedasticity.....	96
Table 4. 17: CUSUM Test stability Output .....	98

## LIST OF FIGURES

Figure 2. 1 Kenya’s public debt trends .....	24
Figure 2. 2 Diagrammatic relationship among the variables. ....	53
Figure 4. 1: Quarterly GDP Growth.....	68
Figure 4. 2: Quarter public debt .....	69
Figure 4. 3: Quarterly Tax Revenue .....	71
Figure 4. 4: Quarterly Consumer Price Index .....	72
Figure 4. 5: Quarterly Public Health Financing.....	73
Figure 4. 6: Residual Normality Plot .....	95
Figure 4. 7: CUSUM Test stability Output.....	98

## LIST OF ABBREVIATIONS AND ACRONYMS

BETA	Bottom-up Economic Transformation Agenda
FY	Financial Year
GDP	Gross Domestic Product
IEA	Institute of Economic Affairs
IMF	International Monetary Fund
KNBS	Kenya National Bureau of Statistics
LMICs	Low- and Middle-Income Countries
MoH	Ministry of Health
MTEF	Medium Term Expenditure Framework
NHIF	National Health Insurance Fund
OOP	Out Of Pocket
RMNCH	Reproductive, Maternal, Neonatal and Child Health
SSA	Sub-Saharan Africa
SDG	Sustainable Development Goals
UHC	Universal Health Coverage
VAR	Vector AutoRegression
VECM	Vector Error Correction Matrix
WHO	World Health Organization

## OPERATIONAL DEFINITION OF KEY TERMS

<b>Debt management:</b>	Getting a debt under control through financial planning and budgeting.
<b>GDP growth:</b>	The rise in the value of domestically produced products and services after accounting for inflation.
<b>Health Spending:</b>	All costs associated with providing health services, family planning, nutrition, and health-related emergency assistance.
<b>Inflation:</b>	The general increase in the prices of goods and services leading to a decrease in the purchasing power of money
<b>Macroeconomic variables:</b>	Broad economic indicators that reflect the overall health of the economy
<b>Public healthcare financing</b>	Methods and mechanisms by which governments fund and manage healthcare services for its citizens
<b>Public Debt</b>	Money borrowed by the government both from domestic and foreign sources for its use
<b>Tax Revenue</b>	Funds that a government agency receives from its citizens for use in public projects.
<b>Universal Health coverage:</b>	Financial hardship-free access to the entire spectrum of high-quality healthcare services when and where they are required.

## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background of the study

Macroeconomic variables are broad economic indicators that reflect the overall health and performance of an economy (Tsai, 2019), while public healthcare financing refers to the funding mechanisms and resources allocated by the government to support healthcare services for its citizens (Cashin, 2016). Sustainable development goal number 3 (SDG 3) aims to achieve universal health coverage, including financial risk protection and access to quality and affordable health care for all (WHO, 2022). Overall, macro-economic variables such as GDP growth, public debt, inflation and tax revenue play a critical role in determining how a government allocates funds to healthcare (Dash, 2019).

Robust researches and comparative analyses have been conducted on healthcare financing systems in different countries in the world to identify strengths, weaknesses, dynamics and variations. These studies have explored the sustainability measures and how different financing models contribute to or mitigate health disparities and inequities and impact access to quality healthcare. In some countries like Germany and Netherlands, individuals contribute to a health insurance fund, often through payroll deductions or premiums (Allison, 2017). The contributions are typically income-based, and the government may subsidize the premiums for certain populations.

Yagmur (2022) indicated that in some countries like Singapore, individuals contribute to personal savings accounts designated for healthcare expenses. These accounts may be tax-advantaged, and individuals can use the funds for medical expenses. Other nations like

Canada have a national health insurance which involves a single public insurance system that covers the entire population. The government acts as the sole payer, and funds may come from general taxation or health insurance contributions.

Stenberg et al., (2021) states that out of all the African countries, only eight, on average, met the recommended threshold of spending a minimum of US\$ 249 per capita on health during the period from 2012 to 2020, the other countries spent less than \$249 per capita, with health expenditures ranging from \$16.4 to \$236.6, indicating notable regional inequalities. The Abuja Declaration's goal of spending at least 15% of government expenditures on health from 2014 to 2020 was only met and maintained by South Africa.

Domestic general government spending on health as a percentage of overall government expenditures in Africa varied from 2.1% to 12% in 2020, underscoring the wide regional differences and the limited ability of many African nations to increase public health resources. Between 2012 and 2020, OOP accounted for an average of 35.8% of health expenditures. This stresses that OOP continue to be a major funding source for health expenditure, posing a high risk of financial hardship, particularly for vulnerable populations (WHO, 2024).

A recent International Monetary Fund (IMF) report (2021), stated that Sub-Sahara Africa is experiencing one of the most difficult economic environments in years, characterized by sluggish recovery from a COVID-19 pandemic which resulted to economic downturns and mild inflation as pressure mounted on food and other necessities including healthcare. The greatest challenge for the region right now is to address historically high inflation levels, eroding incomes and purchasing power of healthcare services (IMF, 2021).

Apegyei et al (2024) states that Health spending in sub-Saharan Africa is significantly lower than any other region in the world. North Africa and the Middle East, spent \$379 on health per person in 2021, compared to \$92 for sub Saharan Africa, whose health spending is also expected to expand at a flattening annualised growth rate of 0.7% (0.5–0.9), with per capita health spending expected to be \$86.3 (60.1–111.9) in 2050. While health spending in sub-Saharan Africa is still low, there are numerous obstacles to leading a healthy life.

WHO (2024) report states that by 2020, all East African countries spend far less per person on health than middle- or high-income regions. Even the relatively higher spenders (Kenya, Rwanda) are under US\$100 per capita in recent years. This constrains service capacity and quality. Rwanda's recent rise in per-capita health spending contrasts with lower levels in Uganda and Tanzania; Kenya sits in the middle. This reflects differing fiscal capacity, policy choices, and donor mixes. World Bank data show that OOP in East African countries still represents a sizable share of health spending raising financial-protection concerns. Health expenditures as % of GDP in the region typically falls in the low single digits often 3–6% and do not meet the Abuja target (15%) of government allocation on healthcare. This underlines a gap between stated commitments and fiscal reality.

In an environment of rapidly rising global medical inflation, the real value of money too is gradually eroded thereby exerting incredible pressure on purchasing power in healthcare services as a whole. The COVID-19 health crisis in late 2020 and throughout the entirety of 2021 led to a steep rise in healthcare supply input costs, which has been slow to recover (Ndanjiwo, 2023). Since 2013, Inflation in Kenya is on the rise putting pressure on the

national budget to meet desired goals at an adjusted inflation; this has resulted to insufficient healthcare funding in relation to inflation which results to understaffed healthcare facilities, inadequate infrastructure, outdated medical equipment, increasing costs, straining budgets thereby affecting healthcare service delivery leading to poor health outcomes (Osaze, 2021). Inflation indexing and monitoring should be adopted to ensure a balance between the price of accessing healthcare and inflation.

Cooray and Schneider (2017) noted that balancing the need to manage public debt with the requirement to provide adequate and sustainable healthcare services is a complex task for the Kenyan government. It necessitates careful fiscal planning, debt sustainability analysis and a commitment to ensuring that quality healthcare remains affordable and accessible to the citizens, even in the face of macro-fiscal challenges. The only nation capable of effectively managing its debt and allocating borrowed funds to targeted development initiatives is one with well-established, disciplined institutions.

A study by Osoro (2015) sought to examine the trajectory of health spending and macroeconomic factors associated with growth in total health expenditure thereby influencing policy actions on financing UHC. A time series data from 1980 to 2012 was tested for co-integration in order to estimate the determinants of aggregate healthcare spending in Kenya. The empirical results suggest that impactful and stable GDP play a significant role in modifying an effective health financing system thus, gradually boosting economic growth thorough harnessing human capital formation, increasing productivity and reducing out-of-pocket healthcare expenditure. Therefore, nations must maintain the equilibrium of GDP and reform health systems to achieve greater positive health.

Basu (2015) states that the primary source of government funding for developing and extending health systems around the world is tax revenue. The ability of a nation to collect taxes is crucial to its ability to fund social services like health and education, infrastructure, and other requirements. Across the world, the challenge of implementing health care finance systems that provide financial risk protection to the entire population continues to be a significant problem. Compared to advanced economies, which collect 40% of GDP in taxes, developing economies only collect 15%.

Allison (2017) indicated that tax revenue is important for government to raise money and fund development of poverty relief projects or public services such as healthcare effectively. Developing countries need to get better at collecting taxes if they want to grow in a sustainable way, rely less on external sources of financing and have citizens spending not as much money on healthcare costs. It encourages a nation to develop its capacity for economic independence by ensuring sufficient income is available from the financial revenue pool to support proper investment in sectors that stimulate growth.

Achieving a stable healthcare system is a costly endeavor and developing countries like Kenya have limited fiscal space with low tax base capacity as most of the taxable bracket is in the informal sector (Munyua, 2020). There is need for Kenya to increase fiscal space by improving tax collection capacity to ensure more funds are directed to healthcare. Hanson (2022) indicated that establishing the right financing arrangements for healthcare by understanding how inflation, public debt, GDP and tax revenue affect healthcare financing is an important way to support the development of people-centered healthcare (Hanson, 2022).

## **1.2 Statement of Problem**

The ability of health systems to function is dependent on health financing. Inadequate and inconsistent funding, as well as wasteful use of existing resources, cripple Kenya's healthcare system, resulting in disastrous out-of-pocket medical expenses which accounted for over 26% of the total healthcare spending in Kenya by 2020, this drives the country's populace into poverty a setback towards achieving Universal Health Coverage (WHO, 2024). Upon achieving lower-middle income status in 2015 (CBK, 2022), Kenya is now perceived by international donors as able to finance its healthcare system. As a result, there is an urgent need to transition from donors dependency to self-sufficiency for healthcare funding by allocating adequate funds to the health sector.

Kenya faces mounting macro-fiscal pressures on high public debt, limited tax revenue, slow GDP growth and inflationary pressures that constrain public health financing at the same time access to and demand for affordable, quality healthcare is rising with rapid population growth. Medical inflation is on the rise which erodes the real value of money leading to reduced purchasing power of healthcare services, inflation averaged 6.8% (Munyua, 2020) which resulted to understaffing, inadequate healthcare infrastructure and industrial actions thereby affecting health service delivery. A nation's ability to finance its sectors, such as healthcare, depends heavily on its ability to collect taxes. Kenya is faced with budget deficits hence need to examine how tax revenue impacts public health financing.

One vital instrument in bridging the gap in a country's financial resources is public debt. Yet, excessive borrowing and careless use of borrowed money can have a negative impact on healthcare outcomes, much like a double-edged sword (Said & Sani, 2020). Kenya's debt servicing consumed over 50% of domestic revenue by 2021, crowding out allocations to social sectors including healthcare which is one of the driving force and catalyst of economic growth through higher human capital productivity (National Treasury, 2022).

Kenya has seen an increase in the amount of money allocated to healthcare; nonetheless, Kenya's public healthcare expenditure averaged 6–7% of total government expenditure between 2013 and 2022, far below the 15% Abuja Declaration target which would have accelerated up Kenya's progress towards achieving Universal Health Coverage (MoH, 2022). Per capita public health expenditure in Kenya stood at USD 54 in 2020, below the recommended USD 86 minimum for essential healthcare (WHO,2024) reflecting underfunding. Additionally, there are limited studies conducted in Kenya on this topic with research gaps ranging from the methodology, time scope and focus on selected counties.

### **1.3 Objectives of the study**

#### **1.3.1 General Objective**

The general objective of the study was to examine the impact of selected Macroeconomic variables on Public Healthcare Financing in Kenya.

#### **1.3.2 Specific Objectives**

The study addresses the following specific objectives

- i. To determine the impact of inflation on public healthcare financing in Kenya

- ii. To examine the impact of public debt on public healthcare financing in Kenya
- iii. To investigate the impact of GDP growth on public healthcare financing in Kenya.
- iv. To establish the impact of tax revenue on public healthcare financing in Kenya.

#### **1.4 Research Hypothesis**

The study tested the following null hypothesis;

- i. **H01:** there is no statistically significant impact of inflation on public healthcare financing in Kenya.
- ii. **H02:** there is no statistically significant impact of public debt on public healthcare financing in Kenya.
- iii. **H03:** there is no statistically significant impact of GDP growth on public healthcare financing in Kenya.
- iv. **H04:** there is no statistically significant impact of tax revenue on public health care financing in Kenya.

#### **1.5 Significance of the study**

The study's strength is its capacity to provide valuable insights into the intricate connection between a nation's economic conditions and its ability to fund and sustain a functional healthcare system for economic development. The findings will inform decision-making processes related to budget allocations, fiscal policies and healthcare reforms. It will also help to optimize resource allocation and boost the effectiveness and impact of public healthcare financing strategies.

Researchers in healthcare find value in this study's empirical findings and methodological approaches. International organizations, development agencies and donor entities

supporting healthcare initiatives in Kenya may utilize this knowledge to inform funding priorities, program design and policy dialogue aimed at strengthening healthcare systems and promoting sustainable development outcomes.

Policy makers and stakeholders working on healthcare reform and public finance may use the research findings to advocate for policy changes, accountability measures and resource mobilization efforts aimed at improving public healthcare financing and ensuring equitable access to quality healthcare services for all segments of the population.

### **1.6 Scope of the Study**

This study examined the impact of selected macroeconomic variables on public healthcare financing in Kenya. Kenya is located in East Africa and covers 581.31K km<sup>2</sup> with a population of more than 47.6 million people (KNBS, 2019). Kenya is one of the few Sub-Saharan African countries actively rolling out Universal Health Coverage (UHC) as a national agenda under Vision 2030 and the “BETA” development plan. In 2013, Kenya ushered in devolved units where robust strategies were laid towards achieving UHC.

The study covered a 10-year period, from 2013 to 2022. The year 2013 marked the start of Kenya’s devolved system of government under the 2010 Constitution. Health service delivery and financing responsibilities were transferred to county governments, fundamentally reshaping healthcare financing as per the MOH report (2023). Between 2013 and 2022, Kenya experienced notable shifts in inflation, public debt accumulation, and GDP growth. For instance, public debt rose from KES 1.9 trillion in 2013 to over KSh 8.6 trillion in 2022, while GDP growth varied sharply from 5.9% in 2016, contracting to -0.4% in 2020, then rebounding to 7.6% in 2021. This period thus provides sufficient

variation in macroeconomic conditions to study their effect on healthcare financing. Besides the year 2022 is a natural cutoff since it marks the end of the Jubilee administration (2013–2022), which prioritized health sector reforms.

The macroeconomic variables were chosen according to their suitability for the study. Between 2013 and 2022, Kenya's annual inflation rate fluctuated between 4.7% and 9.2% (KNBS, 2023). Empirical evidence shows that inflation significantly drives up the cost of medical supplies and service delivery. World Bank (2021) indicates that in 2017–2018, when inflation spiked above 8%, the real value of government per capita health expenditure fell by nearly 12%, despite nominal increases in health budget allocations.

Kenya's public debt rose sharply from KSh 1.9 trillion in 2013 to over KSh 8.6 trillion by 2022 (National Treasury, 2022). Debt servicing consumed more than 55% of ordinary revenue in FY 2021/22, leaving limited fiscal space for social sectors. This strong negative fiscal linkage makes public debt a suitable macroeconomic variable to examine

The proportion of health spending to GDP from 2013 to 2022 stagnated at about 2.2–2.5%, despite rising health needs (KNBS, 2023). This statistical co-movement between GDP growth and health expenditure demonstrates why GDP growth is an essential variable. Tax revenue remains Kenya's main fiscal revenue resource, averaging with over 70% of revenues that fund sectors of the economy like healthcare (KRA, 2022), being the largest source funder of public healthcare, it is important to investigate its impact on public healthcare financing.

### **1.7 Limitations of the study**

Establishing causality between the selected macroeconomic variables and healthcare financing is challenging due to the presence of intervening factors such as political priorities, governance quality, corruption, donor support and external shocks. Data reliability was assured to guarantee better results despite absence of a moderating variable. Furthermore, the findings may be specific to Kenya's economic and political context and may not be directly applicable to other African countries with different fiscal structures and healthcare financing models, hence limited to Kenya and not other countries.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter reviews the literature written by various authors on the subject of macroeconomic variables and how they relate to the funding of healthcare. The chapter also identifies the gaps that need to be filled in light of the study's dimension. The review begins with a methodical procedure of finding, organising and analysing the prior research that has information pertinent to this study. The chapter summarises the theoretical, conceptual, and empirical framework supporting and relating to the impact of macroeconomic variables on Kenya's healthcare financing.

#### **2.2 Theoretical review**

Theories are used in order to explain behavior of units or entities in relation to different conditions and environments. Theories are important when backed up by evidence through research. The current study sought to explain how inflation, public debt, GDP growth and tax revenue affect Public Healthcare Financing in Kenya.

##### **2.2.1 Grossman theory of Health Demand**

In 1972, Michael Grossman developed the Grossman Model of Health Demand, an approach in health economics that views health as both an investment and a consumption item. It provides a theoretical foundation for understanding how individuals make decisions about their health behaviors and healthcare utilization. The Grossman Model emerged during a period of growing interest in applying economic principles to healthcare and understanding the determinants of health behaviors and outcomes. This theory laid the groundwork for the modern field of health economics.

Volkova (2024) points that individuals derive utility from being healthy, viewing health as a consumption good. Good health contributes to overall well-being and quality of life. Besides health is also considered an investment good because it enhances an individual's productivity and earning potential. Investing in health can lead to increased human capital and better economic returns. When the government invests in healthcare, the aim is not just based on the wellbeing of the populace but enhancing a healthy population that can spur production, offer services and drive the economy towards its potential growth levels. Provision of health can be influenced by macroeconomic factors that may determine how funds are allocated towards healthcare.

Inflation erodes the purchasing power of money, reducing individuals' real income. This may lead to a decrease in the demand for healthcare services if individuals perceive healthcare as a luxury good. Sousa (2024) states that in such situations, higher healthcare prices may lead to increased healthcare expenditure as individuals allocate more resources to maintain their health if the government does not come in to fill the inflationary gap. Ideally, Inflationary pressures may strain government budgets, potentially leading to increased public healthcare financing to ensure access to essential healthcare services.

While focusing on the price of healthcare services, Onuoha (2020) indicated that inflation increases the general price level, including the cost of healthcare services. As healthcare prices rise, individuals may allocate a larger portion of their budget to healthcare spending.

Tax revenue constitutes a significant portion of government funding for public services, including healthcare. Higher tax revenue increases the government's ability to finance public healthcare programs and infrastructure. Gaaliya (2017) mentions that this may lead

to higher public healthcare expenditure, including investments in healthcare infrastructure, personnel and medical supplies. Higher tax revenue can contribute to improved healthcare quality and accessibility, positively impacting individuals' health-seeking behaviors and health outcomes. The theory emphasizes on efficient resource allocation and prioritization of healthcare spending to ensure optimal health outcomes within a constrained tax revenue generation environment.

Raghupathi (2020) states that higher GDP growth is associated with increased wealth and resources available to individuals and the government. Higher GDP growth generally leads to increased affordability of healthcare services as individuals' incomes rise. This may result in higher demand for healthcare services and investments in health. Strong GDP growth provides the government with additional revenue through taxes, enabling increased spending on public healthcare financing. Higher GDP growth rates may therefore correlate with higher levels of public healthcare expenditure.

Appiah *et al.* (2020) indicates that high levels of public debt can lead to debt servicing obligations, diverting resources from other government expenditures. Increased debt servicing obligations may lead to reduced public healthcare financing, limiting the government's ability to invest in healthcare infrastructure and services. This may negatively impact individuals' access to quality healthcare hence citizens will not access healthcare both as consumption and as investment. In conclusion, understanding the interplay between macroeconomic variables and public healthcare financing in Kenya through the lens of the Grossman Model of Health Demand provides policymakers with valuable insights for designing effective healthcare policies. By addressing economic barriers to healthcare access and promoting investments in health promotion and disease

prevention. However, the model assumes individuals are perfectly rational and forward-looking, making optimal lifetime decisions about health, education, and investment. In reality, people often display bounded rationality, lack information or act myopically which can be limiting to the theory.

### **2.2.2 Resource Allocation Theory**

Maritan & Lee (2017) states that the distribution of scarce resources among different demands and economic sectors is the main subject of resource allocation theory. It provides a framework for understanding how different macroeconomic variables influence the prioritization and funding of public services, including healthcare to achieve optimal outcomes. It involves making decisions on how to allocate scarce resources such as time, money, labor and materials in a way that maximizes efficiency and utility.

The theory is anchored on the principles and Concepts of scarcity, opportunity cost, efficiency and pareto optimality. Resources are limited while wants and needs are infinite. Scarcity necessitates the need for allocation across different sectors of the economy. The government evaluates the relative worth of different choices and which critical sectors to give priority while allocating resources (Yaylali & Lasry, 2016). Resources are allocated in a manner that maximizes utility while maximizing the welfare of its citizens. Governments allocate resources to different sectors such as healthcare, education and defense based on priorities and policy objectives. Allocation of healthcare resources involves decisions on funding, staffing and infrastructure to maximize health outcomes.

Murunga (2019) posits that economic growth expands the overall resource pool available for allocation. Higher GDP growth means more resources that can potentially be directed

towards public services. With more resources available, governments might allocate more to healthcare, recognizing its importance for societal well-being and economic productivity. Overall, Higher GDP growth leads to increased public healthcare financing, but the extent depends on government priorities and competing needs. (Waruingi, 2020)

Allison (2017) alludes that tax revenue is a primary source of government funding. Higher tax revenues provide the government with more resources to allocate across different sectors, including healthcare. The distribution of tax revenue to public healthcare depends on the government's prioritization of health relative to other sectors (Pablo, 2022). Increases in tax revenue can lead to more substantial healthcare funding if health is a priority. Increases in tax revenue positively affect public health financing, contingent to governmental prioritization of healthcare.

Wendel (2024) states that inflation decreases the real value of healthcare financing, thereby necessitating adjustments in budget allocations, requiring more nominal funds to maintain the same level of service delivery. Governments might need to reallocate resources to address rising costs, potentially reducing funds available for healthcare if inflation pressures are not managed. In periods of high inflation, maintaining the real value of healthcare financing requires proactive budget adjustments and potentially increased nominal allocations. Higher inflation negatively affects the real value of public healthcare financing. This comes amid increased prices of medical equipment, high prices of establishing & maintaining medical infrastructure and expected increase in remuneration of health practitioners to maintain their real value of earnings.

Resource Allocation Theory suggests that high public debt levels can constrain the availability of resources for various sectors due to the need to service debt. This can impact how much is allocated to healthcare. High levels of public debt result in substantial interest payments, which can reduce the funds available for public healthcare, as more resources are allocated to debt servicing, fewer resources remain for other public services, including healthcare (Kibigo & Muthinja, 2021).

By examining how resources are distributed among competing needs, policymakers can better understand the dynamics influencing healthcare funding. The theory points to the need for transparency and accountability in resource allocation and in healthcare financing to mitigate the risk of inefficiencies and wastage in the public sector (Ranucci, 2016). However, the theory has some limitations, for instance it assumes that individuals, organizations or governments make rational choices to optimize outcomes, but in reality, decisions are influenced by politics, biases, emotions, and imperfect information.

### **2.2.3 Human Capital Theory**

The 17th century is when the idea of human capital first emerged. Humans are an investment that yields a return, this is according to the early authors of the literature on human capital economics, including Adam Smith (1776), Jean Baptiste (1821), and John Stuart Mill (1909) who argued that there is a connection between a person's production and their health. People who are in good health are more likely to be employed, productive, and supportive of the development of human capital. Health financing plays a crucial role in improving access to healthcare, ensuring adequate healthcare infrastructure and promoting preventive measures. In the context of healthcare financing in Kenya, investing in healthcare can lead to a healthier and more productive populace and

contribute to sustainable economic growth. According to Maina et al (2018), human capital theory emphasises the value of funding healthcare workers' education and training because by doing so it can improve health outcomes, healthcare services and the economy.

The theory appreciates that human capital will dispense a person's creativity, knowledge, wisdom and abilities for the betterment of the society. The attributes aforementioned can only be put to action if one is in good health, therefore advocating for a healthy society through proper health outcomes. Notwithstanding, there is divergence among economists regarding the direct relationship between human capital and productivity. Freeman (1976) contended that human capital merely served as an indicator of skills and ability, with actual productivity emerging through capital equipment, motivation, and training. Accordingly, he concluded that human capital was not a factor of production.

#### **2.2.4 Wagner's law (1883)**

Wagner's law, commonly referred to as the law of increasing state activity, is the idea that government spending tends to expand in tandem with increases in national revenue. It is named after the German economist Adolph Wagner (1835–1917), who first noticed this impact in his own country and later observed it in other countries as well.

According to Wagner's, there is a long run relationship between increased state spending and economic growth (Wagner, 1883). He states that governments are likely to spend a lot on social programs such as healthcare that greatly influence economic growth of a nation through various multiplier effects. The government may allocate more resources to

healthcare which lead to an expansion of public healthcare financing, including increased funding for hospitals and public health programs.

Wagner provided three arguments in favour of higher government spending. The first was that modernisation and industrialisation will replace the public sector with the private one. Government spending on private sector regulation rises as a result of the public sector's declining proportion. Second, there would be a greater need for healthcare as real income increased. These services are delivered by the government more effectively than by the private sector. Third, the government must step up and invest in critical sectors, thereby boosting public expenditure, in order to eliminate monopolistic tendencies in a nation and improve economic efficiency in the sector (Jalles, 2019).

Jalles (2019) studied on Wagner's law and governments' functions. In order to validate Wagner's law, In a sample of 61 developed and emerging market economies, Jalles assessed how various forms of government spending reacted to changes in economic activity from 1995 to 2015. According to evidence from panel data analysis, Wagner's law seems to be common in advanced economies and in fast developing nations than the less developed ones. This is due to the limited funding and resources available to LMICs from their governments.

Though Wagner's law and other positive affirmation studies on the theory have been instrumental in understanding the relationship between government spending and economic development, some economists have criticized Wagner's law due to the ambiguity of measuring government expenditure (Musgrave, 1969). Critics argue that the empirical evidence supporting Wagner's law is mixed. While some countries exhibit a

positive correlation between income growth and public expenditure, others do not follow this pattern. Factors such as political ideology, institutional differences and historical context can lead to exceptions.

In conclusion, Wagner's Law suggests that, as for Kenya's case, as the economy develops and incomes increase, there is a natural tendency for the government to expand its role in healthcare financing and provision to meet the escalating demand for healthcare services, this will always have an implication on the growth of the country's economy. However, the theory assumes government expenditure rises automatically with economic growth, but ignores political ideologies, governance quality, corruption, and lobbying which strongly shape public spending.

## **2.3 Conceptual Review**

The process entails the observation and analysis of existing data on inflation, public debt, GDP growth, tax revenue, and public healthcare financing in Kenya. It involves integrating past research and related efforts to elucidate the current phenomena related to the variables being examined. The study systematically outlines the necessary steps to be taken based on the acquired knowledge.

### **2.3.1 Inflation**

According to IMF (2022), Inflation refers to the overall upward trend in prices of goods and services over time that results in a decline in the purchasing power of money. The real worth of the funding allotted to the public sectors, particularly the health sector, can be diminished by inflation.

Konczal (2023) states that between 2013 and 2022, inflation in Sub-Saharan Africa showed a pattern of relative stability in the mid-2010s, followed by fluctuations and a sharp surge toward the end of the period. From 2013 to 2015, regional inflation declined gradually from about 4.9% to 3.5%, reflecting moderate price pressures and relatively stable global commodity markets. In 2016 and 2017, inflation edged upward again, averaging around 5%, largely influenced by rising food and fuel prices in several countries. By 2018–2020, the region experienced a period of relatively low inflation, with rates falling to about 2.8–3.5%, as weaker demand and lower global oil prices kept consumer prices in check, even during the COVID-19 pandemic. However, from 2021, inflationary pressures began to intensify, climbing above 4%, before surging to nearly 9.5% in 2022

Sub-Sahara Africa is currently experiencing one of the most difficult economic conditions in recent times, with high levels of national debt, slow recovery from the COVID-19 pandemic, and rising prices for food and other necessities. The need to address the region's decade-high levels of inflation, which are degrading incomes and reducing the purchasing power of healthcare services, is one of the most pressing challenges (IMF, 2021).

Inflation in Kenya ranged 5 - 6% between 2013 and 2016, showing relative stability. In 2017, it rose sharply to about 8%, mainly due to drought conditions that pushed up food prices and higher energy costs. This was followed by a significant decline to 4.7% in 2018, reflecting improved food supply and relative macroeconomic stability. From 2019 to 2020, inflation remained stable at around 5 - 5.5%. However, from 2021, inflation began to climb again, rising to 6.1% and further accelerating to 7.7% in 2022, with end-year levels surpassing 9% (Saungweme, 2023).

Nyoni (2018) states that if healthcare budgets are not adjusted to account for inflation, it can lead to a decrease in the actual resources available for healthcare. When healthcare costs rise faster than the rate at which the government can increase its healthcare budget, it can put pressure on public healthcare financing. Therefore, it is important to understand how changes in inflation affect how government allocates funds towards health sector. Since 2018, Inflation in Kenya is on the rise putting pressure on the national budget to meet desired goals at an adjusted inflation, this has resulted to insufficient healthcare funding in relation to inflation which results to understaffed healthcare facilities, inadequate infrastructure and outdated medical equipment leading to poor health outcomes.

Kiptum (2020) estimated the threshold level of inflation for Kenya from 1971 to 2019 and how it impacts economic growth. The inflation level was determined through the use of a regression model. V. inflation can lead to increased healthcare costs leading to rising prices for healthcare workers in terms of salary increment to meet inflationary pressures, imported medical supplies and equipment due to a weaker shilling and global supply chain issues. Additionally, inflation exacerbates disparities in healthcare access, with marginalized communities bearing the brunt of reduced service availability.

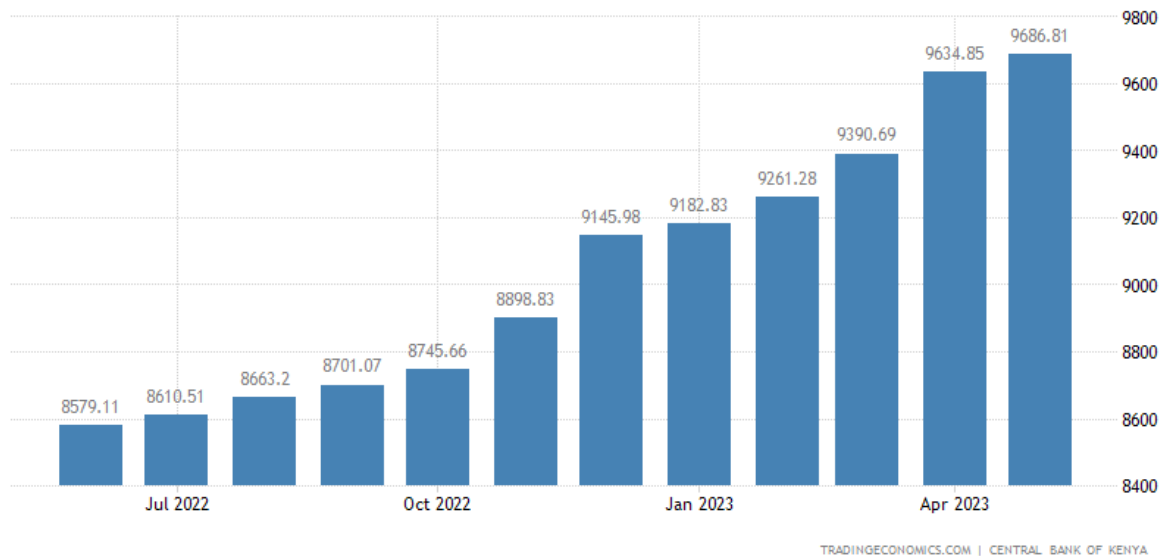
Inflation in Kenya since 2013 has had a significant impact on public healthcare financing, increasing costs, straining budgets and affecting service delivery. Ensuring economic stability and mitigating the adverse impacts of inflation remains a critical challenge for policymakers in Kenya. Addressing these challenges requires comprehensive policy responses, improved efficiency and increased funding to ensure that healthcare services remain accessible and equitable for all Kenyans. The government and relevant authorities

should continuously monitor and adjust healthcare financing policies as well as indexing healthcare budgets to inflation rates to ensure that funding keeps pace with rising costs.

### **2.3.2 Public Debt**

Public debt refers to money borrowed by the government both from domestic and foreign sources for purposes of financing its development budget deficits (Sani, 2022). The management of public debt can significantly impact the government's ability to provide adequate and sustainable healthcare services. Countries with high and growing debt have to set aside a bigger portion of their income for interest payments. Less money will thus be available for expenditure. As public debt increases, low-income nations are more susceptible to cuts in government funding for healthcare (Federspiel, 2022). Constrained public debt may cause capital flight driven by debt, depleting foreign exchange reserves and ultimately lowering overall budgetary allocation to healthcare.

From the study by (Kipyego, 2022) shows that in 2013, Kenya's public debt stood at about KES 1.9 trillion, equivalent to 43% of GDP, but it grew steadily due to increased borrowing to finance infrastructure projects, such as roads, energy, and the Standard Gauge Railway. From 2014 to 2017, the debt burden expanded rapidly, crossing the 50% of GDP mark as the government relied heavily on external concessional and commercial loans. By 2018 - 2019, total debt had surpassed KES 5 trillion, with a growing share owed to external commercial creditors, raising concerns about sustainability. The situation worsened during the COVID-19 pandemic (2020 - 2021). By 2022, Kenya's public debt had reached over KES 8.6 trillion, 67% of GDP, above the IMF's recommended threshold of 50.0% for emerging economies and increasing debt-servicing pressures. Figure 2.1 below, summarises Kenya's public debt stock as of April 2023 (CBK, 2023).



*Source: Central bank of Kenya (2023)*

**Figure 2. 1 Kenya’s public debt trends**

Makau (2018) alludes that such high levels of public debt as for the case of Kenya can contribute to economic instability, which can affect healthcare financing. Economic downturns lead to reduced government revenue, making it even more challenging to allocate adequate funds to healthcare. Kenya needs to implement effective debt management strategies to reduce the burden of interest payments and ensure that debt remains sustainable. This can free up resources for healthcare and other essential services. There is also need to optimize the allocation of healthcare resources to ensure that available funds are used efficiently and effectively. Countries can seek support from international donors and organizations to bolster healthcare financing, especially for critical health programs and initiatives as well as explore PPPs to finance healthcare infrastructure and services, allowing for additional resources without significantly increasing government debt.

Cooray and Schneider (2017) notes that balancing the need to manage public debt with the requirement to provide adequate and sustainable healthcare services is a complex task for the Kenyan government. It necessitates careful fiscal planning, debt sustainability analysis and a commitment to ensuring that quality healthcare remains affordable and accessible to the citizens, even in the face of macro-fiscal challenges. A nation's ability to manage and use its debt effectively and direct borrowed funds to desired development purposes is largely dependent on the strength of its institutions. Only a country with disciplined strong institutions is able to manage and use her debt efficiently.

### **2.3.3 GDP Growth**

Gross domestic product growth is the value of goods and services generated in a nation after accounting for inflation. It is frequently used to gauge the expansion and development of the economy (Eneji, 2013). The economic performance of a country significantly impacts its ability to allocate resources towards healthcare, a higher GDP growth may lead to increased government revenues and a larger budget for healthcare. Murunga (2019) indicates that the relationship between GDP growth and public healthcare financing is not always linear hence further examination was required to explore its trends over specified periods. Africa's GDP growth has been relatively strong in recent years, with many countries experiencing growth rates of 5% or higher which propelled many African countries to make significant investments in healthcare.

Kenya's GDP growth has shown resilience and positive projections despite facing significant challenges over the years. From 2013 to 2023, Kenya's economy experienced fluctuations influenced by drought, political instability, global economic trends and the COVID-19 pandemic. From 2013-2019, Kenya's GDP growth averaged around 5-6%,

driven by sectors such as agriculture, service industry and construction. The government invested heavily in infrastructure, including the Standard Gauge Railway and expanded access to electricity and education which spurred economic activities.

The COVID-19 pandemic in 2020 resulted in a notable economic downturn, with GDP growth plummeting to -0.4% as global and domestic activities slowed down. From the recovery period of 2021 to 2023, the economy rebounded with growth rates around 5%, fueled by recovery in key sectors and government stimulus measures. In 2023, real GDP grew by 5.9%, driven by a resurgence in agriculture and increased investment. Projections for 2024/2025 for Kenya's GDP growth is optimistic, projected between 5.2% and 6.0% buoyed by increased private sector investment as the government reduces its borrowing from the domestic credit market (WHO, 2023).

Mudida (2018) asserts that Kenya made a significant transition in 2013 from a nationally unified governance structure to a regionalized one grounded in counties, which are devolved units. Eradicating poverty and accelerating economic progress were the main goals of devolution. However, local economic growth has slowed and the number of impoverished individuals has increased, along with widening regional income imbalances in devolved units due to growing political authority and devolved budget. The reason why some counties grow faster than others continue to be up for contention (Mudida, 2018).

#### **2.3.4 Tax revenue**

The effectiveness and efficiency of healthcare at the county level have been weakened by instances of corruption and financial mismanagement. Income, property value, or sales of products and services may all be used as bases for taxes (Lakin, 2020). Lakin alludes that

the structure of the tax system can impact the progressivity of healthcare financing. A more equitable healthcare funding can be achieved through progressive taxation, in which individuals with higher incomes pay a larger proportion of their income in taxes. The amount of funds available for financing healthcare can be directly impacted by changes to tax regulations, especially tax rates and structures. It is crucial to investigate how health-specific taxes affect the amount of money set aside for healthcare initiatives and programs.

Between 2013 and 2022, Kenya's tax revenue showed a general upward trend in absolute terms, but its growth relative to GDP was uneven, reflecting both economic performance and tax administration challenges. In 2013 - 2015, tax revenues rose steadily in line with GDP growth, with collections averaging 18% of GDP, supported by VAT, income tax, and excise duties. However, from 2016 to 2019, the tax-to-GDP ratio began to stagnate and even declined, falling below 16%, as revenue growth lagged behind rapid debt-driven expenditure growth. In 2020, the COVID-19 pandemic caused a significant shortfall in tax revenue due to reduced business activity, tax relief measures, and weakened trade, pushing the ratio further down. A strong rebound occurred in 2021 and 2022, when revenue collections improved sharply with economic recovery, enhanced compliance measures and tax policy reforms. By 2022, Kenya's tax-to-GDP ratio had risen to 16.8%, up from 15.4% in 2021, though still below the government's target of 20% (KRA, 2023).

Allison (2017) states that to be able to provide governments with the funds needed to invest in development, alleviate poverty, and provide public services like healthcare and education, tax revenue is an indispensable component of domestic revenue mobilization. If developing nations wish to prosper, achieve fiscal sustainability, and lessen their excessive reliance on foreign aid, they must examine their tax performance. This is so that

a nation may progress towards financial autonomy and strengthen its ownership of public policy. It is expensive to establish a solid healthcare system, and many African nations have small tax bases and limited fiscal capacity as most of the taxable bracket is in the informal sector (Munyua, 2020).

Kola (2023) alludes that KRA has undergone significant transformation, resulting in more tax revenue collection. Among the strategies used are customer assistance initiatives that seek to improve revenue collection and enhance voluntary compliance by establishing a customer-centric tax environment. In addition, initiatives to expand the tax base with the goal of onboarding taxpayers who had not previously paid taxes, digitizing revenue administration to make tax compliance and trade easier, and debt collection and dispute resolution programs utilizing mutually agreed-upon debt instalment plans are in progress. In Kenya, the existence of hard-to-tax industries including agriculture, small businesses, and the sizable unorganized sector is considered to be one of the major obstacles to increase tax revenues (Khalifa, 2017).

There is hope that tax reforms can significantly increase tax revenue, this is by looking at successful reforms in low-income and developing market economies that had some of the highest revenue gains following tax reform. The experiences of Georgia, Cambodia, Guyana, Liberia, and Ukraine demonstrate that, despite their limitations, nations can increase their ability to raise taxes by implementing reform plans with distinctive features befitting each country's economic environment (Tsai, 2019). The public finances of the majority of LMICs are in disarray due to widespread corruption involving tax evasion, unlawful tax credits, and theft of government tax income. In order to make progress in tax revenue collection, KRA should manage and track the impact of the tax reforms.

### **2.3.5 Public Healthcare Financing**

According to Cashin (2016), Public healthcare financing refers to the funding mechanisms and resources allocated by the government to support healthcare services for its citizens. Globally, universal health coverage (UHC) has been recognized as a common foundation for the development of sound health systems. It is described as the desire of a nation's people to have access to necessary medical care on the basis of need and free from the risk of financial strain (WHO, 2022). The methods by which public health facilities are financed are a major factor in determining how well they work. The finances of public healthcare facilities have an impact on the goals and outcomes of the health system. Healthcare facilities that have scarce funds are more likely to provide poor healthcare services (Kairu, 2021).

Songa (2015) states that before and shortly after Kenya's independence in 1963, healthcare financing was largely driven by colonial policies and missionary efforts. Healthcare services were primarily funded by the government and external donors, with a focus on curative rather than preventive care. The government of Kenya takes a central role in financing healthcare through budget allocations. However, due to limited resources and competing priorities, the healthcare budget often falls short of meeting the growing health demands of the population (Osoro 2015).

In 2013, government health expenditure accounted for 6.5% of total government spending, which was below the Abuja Declaration target of 15%. With the rollout of devolution in 2013, county governments assumed major responsibility for health services, leading to increased allocations at the subnational level. The strain of rising public debt and competing priorities, especially for infrastructure and debt servicing limited in healthcare

budgetary allocation (Oraro, 2020). During 2020/2021, the COVID-19 pandemic prompted a temporary boost in health financing, with emergency funds directed toward testing, vaccines, and health worker support. However, these increases were short-term, and by 2022, health spending had plateaued, averaging about 2.5% of GDP and less than 10% of total government expenditure (Sharma, 2023)

Waruingi (2020) outlines that the National Government retained control over national referral hospitals, policy formulation, regulation and overall strategic direction of the health sector. Besides it continues to fund national referral hospitals and other specialized services through the Ministry of Health's budget. County Governments are responsible for managing primary and secondary healthcare services, including the operation of health centers, dispensaries and county hospitals. Each county is allocated funds from the national government through the equitable share formula and conditional grants.

Counties also generate their own revenue, which can be used to finance health services. Devolution has led to increased financial resources at the county level, allowing for more tailored and responsive healthcare services. Counties have been able to prioritize health issues specific to their populations, leading to improvements in service delivery and infrastructure development. Devolution has facilitated greater community involvement in healthcare planning and decision-making, leading to more relevant and accepted health interventions (Agatha, 2023).

Barmaasai (2021) highlights that some of the challenges faced by Counties in meeting healthcare goals which include Resource variations in revenue-generating capacity among counties leading to disparities in healthcare funding and service quality, Poor coordination

between county and national governments, particularly regarding policy implementation and adherence to national standards. Many counties face limitations in administrative and technical capacity affecting their ability to manage healthcare services and finances. Incidences of corruption and mismanagement of funds have undermined the efficiency and effectiveness of healthcare financing at the county level.

One of the major focus of County and national governments is to strengthening Governance and Accountability, implementing robust financial management systems and regular audits to ensure transparency and accountability in the use of healthcare funds. Enhancing the capacity of county health departments through training and technical support and establishing clear communication channels and frameworks for collaboration to ensure consistent policy implementation and adherence to national health standards.

A major barrier to attaining Universal Health Coverage (UHC) in Low- and Medium-Income Countries (LMICs) is health financing. This is primarily due to the fact that LMICs allocate relatively little financial resources to the growth of the health sector, which results in higher catastrophic Out-of-Pocket (OOP) health spending and poor health (Sharma, 2023). Every year, the catastrophic health expenditures in developing nations push about 100 million people into extreme poverty (WHO 2022). Almost half of the world's population lives in developing nations, but their combined public healthcare spending is only USD 1.3 trillion, or less than half of what the US government spends on healthcare (Zhou, Opuni & Salman 2020).

### **2.3.5.1 Kenya healthcare financing strategy (2020-2030)**

Kenya developed the 2020-2030 Healthcare Financing Strategy. The insufficiency of Kenya's existing healthcare financial situation is acknowledged by the Kenya Health financial Strategy (KHFS). Even with the notable advancements in health outcomes and the benefits of health system reforms, development is still inconsistent and inadequate. The strategy's primary goals are to increase healthcare resource mobilization, raise the amount of money allocated by the government to healthcare, and optimize efficiency and value for money in the management and application of the country's health resources, all of which are necessary to help Kenya meet its UHC and SDG targets (GoK, 2020).

The strategy also calls for the creation of a county health fund in each county, as well as the ring-fencing of government and external funds to counties for healthcare services. The major targets of the Kenya healthcare financing strategy (2020-2030) include; Increase government healthcare budgetary allocation, reduce out of pocket healthcare spending, increase the annual Per capita health spending and reduce the population incurring catastrophic health spending.

## **2.4 Empirical literature**

This study has focused on the different studies conducted in developed, developing and less developed economies. Governments must play a bigger role in allocating and directing public resources towards healthcare. Since public healthcare is linked to productivity, this would lead to greater human capital output and contribute to the growth of the economy (Svedoff & Wagstaff, 2020).

## **2.4 Public Healthcare Financing**

Chapin, Dieleman and Angela (2015) on the ‘Trends and drivers of government health spending in sub-Saharan Africa,’ found out that in sub-Saharan Africa, the government only contributes approximately a third of all healthcare expenditures, the remainder is covered by donors or privately. An analysis of the variables connected to government health spending was conducted using a multiple regression model. The findings indicated a positive correlation between government health financing and good governance. The study also found that policy measures made by a nation are significant and have a direct impact on the amount of funding allocated to the health sector. The study focused on qualitative aspects like corruption, policy and accountability. There is need to use quantitative methods which give more accurate and robust results that are data based for ease of making reliable fact-based decisions on improving healthcare financing.

One of the most essential ways to assist the development of people-centered healthcare is to establish sustainable financing frameworks. Enhancing healthcare funding has the potential to propel advancements in healthcare delivery and strengthen the ability of the system to address the changing health wants of the populace. It is important to pay attention to the plans for both financing and service delivery (Hanson, 2022). By designing a sustainable national healthcare financing system, mobilizing extra pooled public funding, and allocating and safeguarding adequate funds for healthcare, countries need to invest more and better in healthcare.

A study by Asante (2020) shows that Sub-Saharan Africa (SSA) bears the highest percentage of the world's disease burden but devotes the least resources to healthcare, a strong health finance system is therefore necessary in SSA. More than 60% of all healthcare financing in Malawi and Mozambique came from donors in 2018. The

research also states that OOP health spending in 2017 accounted for more than 70% of all health spending in Sudan, Equatorial Guinea, Nigeria, and Cameroon.

Moore, Prichard & Fjeldstad (2018) carried out a study in Kenya, Malawi, Burundi, Nigeria and South Sudan on how they are making towards the attainment of Universal Health Coverage and the implementation of the Abuja Declaration 2001. None of the five nations have matched the 72.4-year global life expectancy, nor have they complied with the Abuja Declaration's demand that the health sector get at least 15% of the overall budget. Furthermore, none of these nations have achieved the SDG 3 goals of bringing neonatal mortality down to 12 deaths per 1000 live births and the mortality rate for children under five down to 25 deaths per 1000 live births. From this study it is evident how most African countries are far from achieving universal health coverage hence a compelling need for intervention on how funds can be mobilized to meet healthcare needs.

Ssewanyana (2020) articulates that the SSA has high burden of catastrophic health costs and the need for increased focus on raising adequate public income to pay for healthcare. Through monitoring and managing the macroeconomic factors like tax revenue, public debt, inflation and GDP growth, governments should focus on creating favourable economic environment to raise revenues. Atim (2020) focused on the macro-fiscal space in Sub-Saharan Africa (SSA) as well as the possible benefits of more domestic finance for reproductive, maternal, neonatal, and child health (RMNCH). The findings showed that RMNCH benefited greatly from public health financing when the macro-fiscal space was conducive.

Tsofa (2016) asserts that there is a persistent mismatch between budgeting, planning, and policy in emerging nations. To address this misalignment, The MTEF for the health sector is improved by the Annual Operational Plan procedure, which was implemented by the Kenyan Ministry of Health. The study assessed how well Kenya's health sector Annual Operational Plan process has aligned national planning and budgeting through document evaluations, participant observation, and key informant interviews. According to the study, planning and budgeting alignment was still far from being realized in Kenya's healthcare system. Weak stewardship, a macroeconomic climate that is changing swiftly, and low participation from important stakeholders were the main causes.

Kenya has shown through a series of healthcare reforms that it intends to expand public healthcare financing in order to provide poor and disadvantaged people with more financial risk protection and service coverage. These include free maternity care, the elimination of user fees from public health facilities, and a scheme that provides health insurance subsidies to the underprivileged. But because public healthcare financing is limited, the evidence indicates the possibility that the impoverished will continue to be left behind in terms of service coverage and financial risk protection (Kabia, 2019).

#### **2.4.1 Inflation and Public Healthcare financing**

IMF (2022) states that the benefits of holding cash diminish and the economy becomes less productive if inflation remains high, leading to slower growth thus rendering economies poorer. According to a study conducted by (Morgan, 2023) on 'Health care financing in times of high inflation,' he alludes that spending on healthcare jumped by almost 1% of GDP across middle income and developed countries, on average, during the high inflationary period of 2019-2022 as governments stepped in to cover unexpected

health costs while maintaining proper health standards. There is need for adequate investments in healthcare to strengthen health system resilience in the face of shocks like inflations.

Konczal (2023) posits that Sub Sahara Africa is experiencing one of the most difficult economic conditions in recent time; by August 2023, the region's median inflation rate has risen to about 9%. Inflation was almost twice as high as pre-pandemic levels, despite the fact that the growth has been less sharp than in other regions of the world and that the drivers are different. This puts the proper distribution of public resources in healthcare at risk in order to satisfy the continuously increasing health needs (Konczal, 2023). While wealthier nations invest trillions of dollars into their economies to assist social sectors like healthcare, the majority of developing countries have not had enough resources to support and drive growth. In order to guarantee long-term health coverage and results, authorities in sub-Saharan Africa have to control and keep a tight eye on inflation.

Across 20 nations in the sub-Saharan area, food inflation increased during 2019 as a result of disrupted production and imports of seeds and fertilizers, which led to shortages during planting seasons (Garcia, 2019). According to the study, most African nations are among the world's most wretched due to a high unemployment rate and ongoing inflation. Due to income being redirected to pay for food, high and rising food prices pose an immediate threat to a household's food security and access to healthcare services, thereby jeopardizing public healthcare.

Osaze (2021) determined the dynamic relationship between healthcare spending in SSA nations and macroeconomic variables. Panel data from 41 nations between 2010 and 2018

were used in the study. The generalized methods of moments were used to estimate a dynamic data panel model. The findings revealed that health spending is highly influenced by the inflation rate and per capita income. The study advocated for effective policy efforts towards reducing the high inflation rate, strengthening government institutions, tackling corruption and improving per capita income. Inflation monitoring and forecasts help inform allocation of adequate funds to healthcare with a view to cater for any future inflationary pressures and trends. The cost of healthcare in Africa has increased due to the depreciation of local currencies and rising inflation, which has a detrimental effect on patients and industry actors. Additionally, prices of medicines have gone up by 10-20 percent globally (Tao, 2022).

Oyerinola (2022) examined the effects of food price inflation on the improvement of public health as measured in terms of life expectancy, infant mortality rate, access to safe sanitation, GDP per capita, and government healthcare spending in six African countries with high misery indexes between 2000 and 2020. Nigeria, South Africa, Angola, Mauritius, and Mali were the countries under study. In addition to the Westerlund Cointegration tests, the Augmented Mean Group and Common Correlated Estimation Mean Group were employed. The findings showed that government health financing still has an immense impact on health outcomes and the economy in the majority of African nations. With \$9.12 billion in government health spending, South Africa and Mauritius (\$6.25 billion) had the highest health results compared to Nigeria (\$5.05 billion), which had the lowest public health spending.

WHO (2022) mentions that in the eve of inflation many people prefer over-the-counter medication as opposed to going to hospital where they will be charged more. Healthcare

supply input costs spiked in late 2020 and 2021 during the COVID-19 crisis and the recovery has been slow. Medical inflation is on the rise hence eroding the real value of money leading to reduced purchasing power of healthcare services. This is as a result of rising cases of lifestyle diseases and high cost of imported medical equipment. A decrease in general affordability brought on by inflation affects people's well-being by lowering consumption, decreasing investments and producing unfavorable health results.

Wendel (2024) alludes that inflation has the same effect as a tax increase, decreasing household purchasing power and driving up the cost of necessities like food and healthcare. It also sets off a chain of health-related problems. Nevertheless, economies frequently enter recessions when measures to combat inflation are taken, such as tightening monetary policy. A recessionary economy not only raises unemployment, which is known to be a risk factor for a number of health problems, but it also puts pressure on public budgets and may lead to a reduction in funding for public health programs, medical research, and infrastructure related to health. The quality and availability of health services may be hampered as a result of this fiscal cutback, which has an indirect negative impact on productivity and population health (Bethel, 2024).

Onuoha (2020) examined the relationship between the rate of inflation and government spending on infrastructure, defense, education and health in selected African countries. The study analysed eleven (11) countries across Africa. One major macroeconomic factor affecting these countries is high rate of inflation which in most cases is in double digit. The study estimated the cointegrating relationship using OLS. The findings revealed that a 1 percent change in healthcare led to 0.56 percent incremental change in inflation rate.

Governments need to allocate adequate funds to healthcare to spur growth and have measures to control inflation which can erode the real value of money (Okorie, 2020).

Sousa (2024) carried a study on the intricate relationships between economic variables, such as inflation and government spending, and how they affect public healthcare. The research emphasized the necessity of strategic healthcare planning in the face of economic volatility by highlighting the effect of inflation on healthcare costs to ensure healthcare stability and sustainability.

#### **2.4.2 Public debt and Public Healthcare Financing**

Makau (2018) indicated that one significant means of closing the financial resource gap is through governmental debt. Around the world, a large number of nations are forced to borrow money in order to support their economies due to fiscal deficits. But the decision to use such deficit financing, and to what degree, must be made at levels that are thought to be sustainable and closely aligned with the government's fiscal objectives, public debt management rules, and budgetary requirements. High budget deficits have made it more difficult for governments to finance critical sectors like healthcare. Since low-income levels and ineffective tax structures plague the majority of developing economies, borrowing has become the most practical means of funding public budget deficits (Appiah, Malec, Phiri, Maitah & Smutka 2022).

Many governments now have massive outstanding debts and weak economies as a result of years of excessive borrowing, which raises significant policy issues about the effects of public debt use on national productivity. Some empirical analysis conducted by León, Murillo and Hernández (2019), revealed that a ratio of 75% between Public Debt and GDP

led to a decline in economic growth in Latin America while that of 35% increased volatility in economic growth. The standard view held is that public debt has the impact of stimulating the level of short-run aggregate demand and economic output, but in the long run decreases output and crowds out investible capital (Coulibaly, Brahim & Gandhi, 2019).

An empirical study carried out by Lotto and Mmari (2018), sought to ascertain the influence that domestic debt financing had on the growth of the economy in Tanzania. The study's analytical results, which were derived from the Ordinary Least Square (OLS) regression approach between 1990 and 2015, showed a negative correlation between domestic debt financing and Tanzania's estimated economic growth levels. Haffner *et al.* (2017) carried out a related study, examining the impact of domestic debt financing on the expansion of Sierra Leone's economy between 1970 and 2015. The model's analytical findings found a negative short-run correlation between variables, with domestic debt having a detrimental effect on economic growth that was also evident in the long run. According to the empirical study, private sector investment and credit are squeezed out with over 20 percent domestic debt to GDP ratio.

According to Said and Sani (2020) while studying the relationship between public debt and healthcare spending, the research revealed that the relationship between public debt burden and healthcare spending in SSA is negative. Further, the research pointed that debt burdens are growing steadily in LMICs threatening to crowd out essential health spending. Further, the study states that 54 LMICs spent more money in 2019 paying off their foreign debt than they did on spending for their healthcare. Even if the loans might have a good

effect, the restrictions that follow for debt servicing could have a negative effect on healthcare by reducing the amount of funds available for government health spending.

In 2019, Benin, Cameroon, Angola and the Republic of the Congo spent at least five times more on external debt servicing than they spent on healthcare (Federspiel, Borghi, & Martinez-Alvarez, 2022). The study explained that Sub-Saharan African (SSA) nations spend little on public healthcare, and this may be partially explained by the growing debt burden in this region. In view of this, a sizeable amount of their domestic resources are diverted from health and other sectors of the economy to debt servicing.

Using ordinary least squares (OLS) and generalized method of moment (GMM), (Lartey, 2018) in the study 'Public debt and economic growth: Evidence from Africa,' noted that the country's capacity to pay its debts promptly will be affected if this borrowing is not used in the income-generating and productive sectors of the economy. This would lead to debt buildup, which is a major obstacle to allocating enough funds for healthcare. A considerable amount of the annual income of many African countries is diverted towards paying off debt interest, leaving little domestic resources for other sectors of the economy like healthcare.

Appiah *et al.* (2022) indicates that public debt is a necessary component of each nation's development path. But like a double-edged sword, excessive borrowing and careless use of borrowed money can result in debt overhang, which is unfavorable for economic expansion. Africa's national debt has been increasing, leaving the continent deeply indebted and unable to provide sufficient funding to its economic sectors like healthcare and education. The public debt level in 2019 has surpassed the 50 percent mark, indicating

a concerning possibility that the continent's rapid public debt growth will overtake the world's highest public debt-to-GDP ratio and spark a new debt crisis (Said & Sani, 2020).

Yiega (2022) conducted a study in Kenya, Nigeria and Zambia to understand whether there is a connection between the amount of funds allocated to healthcare and the amounts spent servicing foreign debt. The findings demonstrated the significant influence that corruption and poor financial management play in restricting access to the resources required to pay for public services like healthcare. If the government makes sufficient investments in the healthcare sector and guarantees that there are enough medical professionals to care for patients, the right to health can gradually be realized (Yiega, 2022). This study offered two potential remedies to the growing problem of public debt: first by restructuring the debt and secondly making sure that all available resources, including borrowed monies, are managed responsibly.

Onyango (2019) on establishing a connection between public debt and expenditure in Kenya from 1980 to 2018 centered on understanding the type and direction of the causal relationship that existed between public debt and public spending. Vector Error Correction Model was used as the foundation for the empirical study. The results indicated that while inflation and development government spending have a favorable effect on public debt, recurrent government spending has a negative effect on public debt.

Kibigo and Muthinja (2021) employed a correlational research design approach to evaluate the relationship between governmental debt and economic growth in Kenya. Study factors were empirically analyzed using secondary time series data from 1999 to 2019. To evaluate the impact of public debt on economic growth, the Johansen's

multivariate cointegration test and the Vector Autoregression (VAR) estimation approach for a linear time series regression model were used. From the analysis, Kenya's public debt has a favorable impact on the nation's economic expansion. However, only increased and proper use of public debt would lead to increased economic and production activity in the country (Kibigo, 2021).

### **2.4.3 GDP Growth and Public Healthcare Financing**

It is believed that a country or state can only experience economic growth and development if it ensures that the resources it has are distributed fairly across different sectors of the economy (Murunga, 2019). Since citizens are a country's most important resource and its main source of human capital, investing in their healthcare is a priority that any nation ought to undertake. Good health is the foundation of a prosperous economy. A sick population is not optimally productive. The Kenyan government's funds allocation towards healthcare falls short the minimum of the international obligations like the 2001 Abuja Declaration, which stipulates that at least 15 percent of the overall budget should be allocated to healthcare (Agatha *et al.*, 2023).

A study by (Osoro, 2015) estimated the determinants of aggregate healthcare spending function for Kenya by applying a cointegration test on a time series data from 1980-2012. It was clear that Kenya's rising healthcare costs could be explained by the country's GDP per capita. The study notes that for the last 50 years, Kenya has shown improvements in the health infrastructure, though public financing remained unsatisfactory. The analysis also noted that for every one percent increase in GDP, 0.48 of that go to public healthcare spending. This explains why Kenya should strive to grow its GDP and increase revenue to expand allocation to sectors like healthcare.

Raghupathi (2020) on 'Healthcare financing and Economic Performance' explores the relationship between public health spending and economic performance in terms of GDP growth across the United States. Proper healthcare financing and optimal utilization of healthcare resources can lead to improved health chances being provided, which can boost productivity and human capital, both of which can enhance economic performance. The study analyzed economic and health statistics for the United States from 2003 to 2014 from the Bureau of Economic Analysis and the Bureau of Labor Statistics using visual analytics. The overall results strongly showed a positive correlation between GDP growth and healthcare financing.

According to WHO (2022), countries across the world have different health spending patterns according on their GDP. High-income nations spend an average of more than US dollars (USD) 3000 per person on health care, compared to only USD 30 per person in resource-poor nations. While less developed nations spend less than 3% of their GDP on healthcare, wealthy nations spend over 12% of their GDP on this sector (Murango, 2017). Globally, the share of GDP devoted to healthcare has been rising. Kenya spends averagely 4% of its GDP on healthcare, which is still low if the country desires to achieve Universal Health Coverage (Murunga, 2019).

Murango (2017) assessed how healthcare spending affects Kenya's economic growth. In this study, a descriptive research design was adopted to analyse time series data from 1985 to 2016. According to the study's findings, there is a significant positive correlation between economic development and public health investment ( $\beta = 0.1149$ ;  $p < 0.05$ ) and private health sector investment ( $\beta = 0.2407$ ;  $p < 0.05$ ). The report suggested that the government allocate the health sector additional funds to realise desired growth.

Waruingi (2020) investigated how Kenya's devolved county governments' economic growth was impacted by the allocation of health budget. Kenya's 47 counties were surveyed for the study. The study's data was collected from 2015 to 2018. Panel regression analysis and a descriptive study design were employed. The regression analysis's findings showed a strong and positive correlation between the county's economic growth and allocation towards healthcare. Additionally, there was a strong correlation between the creation of own source revenue and the economic expansion of Kenyan counties.

Descriptive research was employed by Barmaasai (2021) in eight counties in Kenya's North Rift Economic Block to estimate the financial impact of health budget allocation on counties' economic performance from 2016 to 2020. A panel regression analysis using SPSS was carried out. The study demonstrated that there was a statistically significant positive correlation between internal appropriations and healthcare budgetary allocation and the county's gross product. As was the case with counties' own source income, budgetary allocation for healthcare had a positive and significant relationship with county economic growth. The study suggested that in order to accelerate the counties' economic growth, Kenyan county government administrations should devote more financial resources on healthcare (Barmaasai, 2021).

The studies acknowledge that a nation experiences economic growth and development when it ensures that its resources are allocated across productive and crucial sectors. Since people are the driving force of a nation's economic growth and human capital, investing in their health is essential.

#### **2.4.4 Tax Revenue and Public Healthcare Financing**

Basu (2015) states that the primary source of government funding and expanding health systems around the world is tax revenue. A nation's ability to finance its public goods, key infrastructure including roads, electricity, healthcare, and other economic sectors rely heavily on its ability to collect taxes. Across the world, implementing healthcare finance systems that safeguard everyone from financial risk is still a major challenge. Compared to advanced economies, which collect 40% of GDP in taxes, developing economies only collect 15%. This low level of tax collection negatively impacts the economic development of developing economies, given their huge financial demands.

Health financing is a major challenge in low-and middle-income countries (LMICs) for achieving Universal Health Coverage (UHC). The amount of money allotted to finance health care may be affected by macroeconomic initiatives, such as tax revenue. Tax receipts make for about 65% of the overall amount of government revenue in LMICs. Over the years, the Kenyan government has implemented tax reforms aimed at enhancing its flexibility (Wawire, 2016). Studies have revealed that the tax structure is still inelastic and prone to slow adjustment despite continuous efforts. This has called for robust studies on why such reforms do not meet the intended objectives of increasing the tax revenue.

There is growing recognition that in order to achieve real and long-term progress towards achieving and sustaining UHC, LMICs need to locate additional domestic funding sources. There is increasing efforts and research to examine potential strategies for expanding government revenue, such as enhancing the effectiveness of tax administration and collection, raising the rates of current taxes, enacting new taxes, or exploiting other sources of funds (Doherty, 2018).

Moore (2018) notes that tax compliance remains a major challenge in Africa. Taxation must be the most sustainable source of funding healthcare in order for African governments to increase their tax revenues. Since a sizable portion of the population is not properly covered by the tax system, there is a strong need to establish a link between fiscal policy and health policy and to work towards raising awareness and simplifying tax payment. The study indicates that a major way to achieve tax revenue targets is through sound macroeconomic fiscal policies, such as progressive and equitable taxes, and by combating unfair tax practices such as tax evasion. Additionally, public health spending should be efficient, transparent and accountable to realize better health outcomes (Moore, Prichard, & Fjeldstad, 2018)

Cashin (2022) pointed that the primary source of funding for healthcare should come from public resources. Reducing out-of-pocket expenses is necessary so that they no longer prevent people from receiving healthcare, make households more impoverished or plunge households into hardship. The majority of LMICs are unable to finance healthcare without increasing tax income allotment to healthcare, which necessitates raising the taxing powers of the nation. It is vital to design and implement clear financial arrangements that stipulate how to mobilize, allocate, and use resources to support and sustain the delivery of healthcare services in an effective, efficient, and equitable manner.

Pablo (2022), 'Health Financing Revisited in Low- and Middle-Income Countries,' World Bank research focused on health finance policies from the standpoints of the two primary financing tasks, namely resource pooling and revenue collection. The analysis found that there is a significant disparity between the amount of money that nations currently spend on healthcare and what they actually need to finance it. Although emerging

economies comprise 90% of the world's illness burden and 84% of its population, developing nations only account for 12% of global health spending. The study mainly focused on tax revenue collection as a determinant of healthcare financing hence not addressing other macroeconomic factors that may affect healthcare financing.

According to (Thuku, Manyasa, Wawire, & Omondi, 2014) on the 'Impacts of Tax Reforms on Buoyancy and Elasticity of the Tax System in Kenya,' Kenya has implemented a number of tax reforms, but the country's budget deficits continue to grow. The Kenyan government ought to borrow or increase tax collection in order to cover the deficit. While external debt, especially non-concessional loans, is tied to strict terms, domestic borrowing discourages investment. Non-concessional loans are an option available to the government, however they have high interest rates and short repayment terms. Thus, the optimal course of action is to raise taxes while minimizing the burden.

Because of limited tax resources, Kenya's health system is underfunded and depends heavily on out-of-pocket expenses, which has a detrimental effect on household living standards. Creating fiscal flexibility without pushing out other high priority sectors of the economy or adding to the national debt is one possible strategy to boost domestic funding. One method of freeing up budgetary space is by increasing income through enhancing the administration of taxes. It is generally believed that Kenya cannot significantly raise tax revenue due to the country's limited administrative capabilities, high rates of tax evasion, and its workforce composition, which primarily consists of unstructured and unregulated workforce (Gaalya, 2017).

## 2.5 Research Gaps

The previous researches on this topic have added insight to this study, however, the studies have gaps in terms of methods of analysis used, Geographical limitations, Time period of the study and Objectivity of the studies. Most of the studies conducted on this topic focused on LMICs in general while those that focused to Kenya were limited to specific select counties and adopted qualitative approach with more emphasis on how allocated funds were utilized and not what determines the amount allocated to healthcare.

**Table 2. 1 Knowledge Gap**

<b>Author</b>	<b>Study</b>	<b>Methodology</b>	<b>Results</b>	<b>Gap</b>	<b>How the Gap is filled</b>
Deepak, and Umakant, (2019)	Impact of macro-fiscal determinants on health financing:	Multiple regression model. Descriptive research design	GDP and tax revenue had positive whereas public debt was negatively correlated with health spending.	The impact was varying in LMICs, hence compelling a study in specific for explicit results	Focuses on Kenya to examine results for Kenya in specific
Kabia, E. <i>et al.</i> (2019)	Experiences of the poor with health financing reforms Kenya	A qualitative cross-sectional study.	Reforms to health financing reduced financial burden and enhanced access to healthcare	Applied qualitative approach, compelling need to apply quantitative analysis for accurate results.	Applies quantitative approach which is robust and better results can be drawn from the inferences
Waruingi (2020)	Impact of Healthcare budget allocation on County's economic growth in Kenya	Descriptive research design. Panel regression analysis	Internal appropriation and health budgetary allocations were positively correlated with GDP	Focused on how health financing affects Gross County Product in Kenya which may not be representative of the country	Focuses on Kenya wholesomely and the factors that affect public healthcare financing

---

Tsofa <i>et al.</i> (2016)	Health sector operational planning and budgeting in Kenya	Interviews, Document reviews and observation	Planning and budgetary alignment was still far from being achieved in Kenya's health system.	The study analysed data up to 2014, hence need to conduct study using recent data to inform accurate decision making.	Study is recent incorporating cyclic in public health financing since 2014
Asante (2020)	Health financing in sub-Saharan Africa	Multiple regression. Descriptive research design.	Donor funding accounted for more than 60% of total healthcare financing in SSA	The study focused on social aspects and not macroeconomic factors affecting healthcare financing	Macroeconomic variables are adopted for measurable results and reliable conclusions
Morgan (2023)	Health care financing in times of high inflation.	Multiple regression analysis using Correlation research design.	Healthcare Spending jumped by almost 1% of GDP in developing and developed nations	The study focused on inflation only; it did not account for other macroeconomic factors affecting health financing.	Incorporates other macroeconomic variables besides inflation for better results
Said and Sani (2020)	Relationship between Public Debt Burden and Health Expenditure in SSA	Generalized Method of Moment. Multiple regression using descriptive research design	The relationship between public debt burden and healthcare spending in SSA is negative.	Focused on total healthcare expenditures and public debt only overlooking other macroeconomic variables.	Focuses on public funds allocation to healthcare because it is the biggest financier of health sector to realize UHC

---

Appiah and Phiri (2022)	Key drivers of public debt levels: empirical evidence from Africa:	Generalized Method of Moment. Correlational research design	Overborrowing and imprudent use of borrowed money result in debt stress; unfavourable for economic growth	Focused on why governments borrow and not how borrowed funds affect public health financing.	Focuses on the end goal of borrowing in terms of how borrowing can affect resources allocation to healthcare sector
Pablo (2022)	Healthcare Financing in Low and Middle Income Countries	Qualitative analysis approach. Document reviews and interviews.	There exists a mismatch between health financing needs and health spending.	The study applied qualitative approach	Applied quantitative analysis for a more robust analysis to get reliable and better results
Murango (2017)	Impact of investment in healthcare on economic development in Kenya.	Multiple regression model. Using descriptive research design.	Both public investment in health and private investment in health sector have significant positive impact on economic development.	The study focused on the impact of health financing on economic growth and not what impacts public healthcare financing	Focuses on specific variables that affect public health financing
Ssewanyana (2020)	Estimating Catastrophic Health Expenditures in SSA.	Generalized methods of moments	In SSA, the cost of catastrophic medical expenses is still very high.	The study majorly focused on private health expenditures in SSA with little consideration to public healthcare financing.	To reduce OOP health expenses and achieve UHC, the study focused on public health financing

## 2.6 Conceptual Framework

This was an analytical method used to identify and coordinate ideas that enabled easy conceptualization and understanding of concepts. It highlights the independent and dependent variables and how each of them will be measured.

**Independent variables:** These are inflation, public debt, GDP growth and tax revenue from FY 2012/2013 to FY 2021/2022 that have a positive or negative influence on the public health care financing which is the dependent variable. The variance of public health care financing is accounted for by these variables, with a causal relationship.

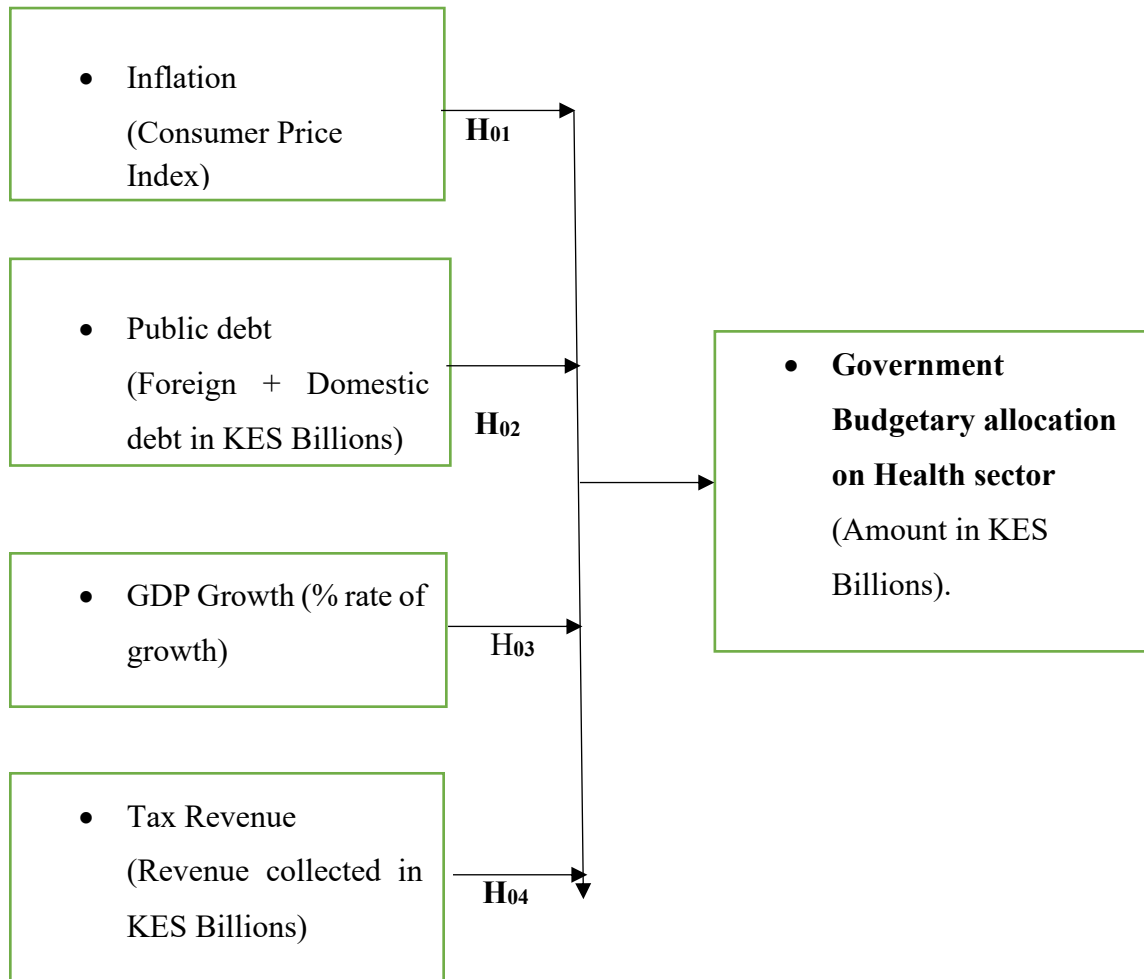
**Dependent variable:** This variable is of primary interest in the study and through critical evaluation of this variable, the solution to the problem under study can be identified. The dependent variable in this study is public healthcare financing with focus on the Government budgetary allocation on Healthcare in Kenya.

**Independent variables**

**Dependent variable**

Selected Macroeconomic Variables

Public Healthcare Financing



**Figure 2. 2 Diagrammatic relationship among the variables.**

Source: Adopted from Deepak & Umakant, (2019)

## CHAPTER THREE

### RESEARCH METHODOLOGY

#### 3.1 Introduction

This chapter provides the method that the study adopted. It includes the research design, the population of the study, sample and the sampling procedure, the sources of data as well as the data collection methods that were applied, the pre-diagnostic and post diagnostic estimation tests. It also describes the analysis and interpretation that were done on the data collected in order to give the research relevance and meaning.

#### 3.2 Research Design

Politano (2018) states that a research design is a strategic plan focusing to answer research questions with least deviations. It is the strategy used to collect, measure, scrutinize and analyze data. Good research has to be undertaken using a research design that is applicable to its purpose and needs. Additionally, Kumar (2019) points that a research design is the guideline, framework, or method utilized to generate solutions to research problem. An overriding factor that should influence the selection of a good research design is whether the design provides the best practical techniques of providing trustworthy responses to the research questions (Kumar, 2019).

A descriptive research design was used to carry out this research. Descriptive research design helped to explain general trends of the study using mean, standard deviation, min. and max. values, skewness and kurtosis. It is cost-effective and can be done within a short time frame. It goes beyond data collection and involves measures, classification, analysis and interpretation. Adopting a descriptive study design assisted in establishing the relation

between the selected macroeconomic variables and public health care financing in Kenya. Descriptive research design is more reliable as the researcher has no control on the variables hence cannot manipulate them, but only observe and measure them (Casin and Perron, 2018). The study also adopted causal research design which helped to undertake the multiple regression and also to determine the strength and direction of the relationship between macroeconomic factors (inflation, public debt, GDP growth and tax revenue) and public healthcare financing in Kenya.

### **3.3 Study Area**

A study area is the focus topic area or place where the research was conducted. The study focused on Inflation, public debt, GDP growth and tax revenue as selected macroeconomic variables and how they affected public healthcare financing in Kenya from 2013 to 2022. The study was conducted in Kenya, a country in East Africa with a population of more than 47.6 million people lying on latitude 1° 0' 0" N and longitude 38° 0' 0"E (KNBS, 2019). In 2013, Kenya ushered in devolved units where robust strategies and health reforms were laid by counties and national government towards reducing out of pocket healthcare financial burden achieving UHC through increased budgetary allocations towards healthcare financing. (MoH, 2017). Kenya is one of the few Sub-Saharan African countries actively rolling out UHC as a national agenda under Vision 2030.

### **3.4 Data and Data Collection**

Data was collected for a period of 10 years from FY 2012/2013 to 2021/2022. A definition by Kumar (2019) refers to time series data as a sequence of numerical data pointing in successive order. Data was collected from authentic national and internationally recognized body sources of data for credibility and reliability. Data captured included

inflation measured by the Consumer price index (CPI), public debt measured by the Kenya’s amount of foreign and domestic public debt in KES billions, GDP growth measured by the percentage rate of growth and tax revenue measured by the amount collected by the Kenya Revenue Authority (KRA) in KES billions. The public healthcare financing was measured by the amount in KES billions allocated to healthcare by the government of Kenya. The research used document analysis method to collect data. Quarterly data was collected and arranged in table form. Data was cleaned, sorted then standardized using logs and analyzed using the Vector Error Correction Model (VECM).

**Table 3. 1 Data collected for 10 years**

<b>Data type</b>	<b>Data source</b>
Inflation	Ministry of National Treasury and Economic Planning Kenya National Bureau of Statistics - KNBS Central Bank of Kenya
Public Debt	Ministry of National Treasury and Economic Planning Central Bank of Kenya Kenya National Bureau of Statistics World Bank International Monetary Fund – IMF
GDP Growth	Ministry of National Treasury and Economic Planning Kenya National Bureau of Statistics Institute of Economic Affairs (EIA) The central bank of Kenya World Bank
Tax Revenue	Ministry of National Treasury and Economic Planning Central Bank of Kenya Kenya National Bureau of Statistics Kenya Revenue Authority (KRA)

---

Public Healthcare	Central Bank of Kenya
Financing	Ministry of Health – Kenya (MOH)
	Commission of revenue allocation
	Office of the Controller of Budget
	Ministry of National Treasury and Economic Planning
	World Health Organization – WHO

---

**3.5 Data Analysis, Presentation and Discussion**

Pre-diagnostic tests were conducted to check for outliers and ensure reliability, validity of the results and measurement consistency in the data. After then, Vector Error Correction Model (VECM) was used to analyze and interpret the data. To determine the link between the variables under investigation, regression analysis was used. Additionally, post-diagnostic testing was done to ensure credibility in the interpretation of results.

**3.5.1 Model Specification**

The relationship between public healthcare financing and selected macroeconomic variables; Inflation ( $X_1$ ), Tax Revenue ( $X_2$ ), Public debt ( $X_3$ ) and GDP growth ( $X_4$ ), was expressed as below. The study adopted the Vector Error Correction Model (VECM)

$$Y_t = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t} + \beta_4 X_{4t} + \varepsilon \dots\dots\dots (i)$$

Where;  $\beta_0$  - Constant showing Public Healthcare financing in absence of the selected macroeconomic variables.

- Y - Public Health Financing
- $X_1$  - Inflation
- $X_2$  - Tax Revenue
- $X_3$  - Public Debt
- $X_4$  - GDP Growth

t -Time period (FY 2012/2013 – 2021/2022)

$\varepsilon$  - Error term  $\beta_1$ ,  $\beta_2$ ,  $\beta_3$  and  $\beta_4$  are coefficients of inflation, tax revenue, public debt and GDP growth respectively.

Between 2013 and 2022, Kenya's inflation rate fluctuated between 4.7% and 9.2%. Inflation drives up the cost of medical supplies and service delivery. In 2017 to 2018, when inflation spiked above 8%, the real value of government per capita health expenditure fell by 12% (KNBS, 2023) making inflation a critical variable to study. Kenya's public debt rose sharply from KES 1.9 trillion in 2013 to KES 8.6 trillion in 2022. Debt servicing consumed more than 55% of ordinary revenue in FY 2021/22, leaving limited fiscal space for social sectors. Statistical data show that during this period, the proportion of health spending to GDP stagnated at 2.4%, despite rising health needs (National Treasury, 2022), making public debt a suitable to examine.

Kenya recorded an average annual GDP growth rate of 5.0% between 2013 and 2022, with sharp declines in 2020 due to COVID-19 (contracting to -0.4%) and recovery to 7.6% in 2021 (KNBS, 2022). This statistical cyclic movement demonstrates why GDP growth is an essential explanatory variable. Tax revenue remains Kenya's main fiscal resource, averaging 16-18% of GDP in the study period (KRA, 2022). revenue mobilization is one of the most statistically relevant determinants of public healthcare financing.

### **3.5.2 Description and Measurement of variables**

The table below gives a brief description of study variables and how they were measured

**Table 3. 2: Description and measurement of variables**

<b>Variable</b>	<b>Description</b>	<b>Measurement</b>	<b>Sign</b>
Public Healthcare Financing.	The financial resources allocated to healthcare sector by a government from the budget.	Amount allocated to health sector by government (KES Billions)	
Inflation	Rising prices of goods and services in the economy	Consumer Price Index (CPI)	-
Public Debt.	Money borrowed by the government both from domestic and foreign sources.	Amount of money Borrowed (foreign and domestic)- (KES Billions)	+
GDP Growth	The value of products and services generated in a nation adjusted for inflation	GDP growth rate- Percentage (%)	+
Tax Revenue	Money collected by a government body from its constituents for public spending.	Amount of money collected (KES Billions)	+

### **3.5.3 Pre-Estimated Diagnostic Tests**

This section focused on descriptive statistics involving the mean, standard deviation, minimum and maximum values, skewness and kurtosis. The section discussed tests for normality, stationarity, multicollinearity, determination of optimum lag length and bounds co-integration.

#### **3.5.3.1 Normality test**

Blanca (2013) states that normality refers to the extent to which a set of observations follows a normal distribution over a specific period. The likelihood that a random variable in the data was normally distributed was calculated using the normality test. The Jarque-Bera test was used in this investigation to determine normalcy. This test assisted in

determining whether the distribution of a random variable complies with the predicted features of a normal distribution. The study tested both skewness, whose normality threshold was values below 2 and kurtosis whose threshold was values under 6.

### **3.5.3.2 Unit root test**

Unit root test tests for stationarity in a time series (Flick, 2020). Time series data display unit root(s) trends over a period of time. To establish whether stationarity exists in time series data, it is important to ascertain the integration order of the data. If a shift in time does not result in a change in the distribution's form, the time series is said to be stationary; non-stationarity might have several reasons, one being the unit root (Politano, 2018).

To determine if time series variables exhibit non-stationarity and unit root, the research used the unit root test. To check for stationarity, the Augmented Dickey-Fuller (ADF) test was employed. This is due to ADF's ability to manage intricate models. The series would be stationary if the computed ADF statistics was less than the ADF critical value, and there would be a unit root if the computed ADF statistics exceeded the ADF critical value at a given level of significance. Until all unit roots were removed, the differencing procedure was repeated.

The research also adopted Philips Perron (PP) test which is used to correct autocorrelation and heteroscedasticity without adding lagged difference terms (Escobari, Garcia & Mellado, 2017). The null hypothesis of the PP test was that the series had a unit root, indicating non-stationarity. The alternative hypothesis was that the series was stationary. If the test statistic was statistically significant at 5% level of significance, then the null hypothesis of a unit root would be rejected, implying stationarity.

### **3.5.3.3 Determination of optimum lag length**

The research identified the optimum lag length of Unrestricted Vector Autoregressive (VAR) and Vector Error Correlation (VEC) order before estimating the model. This step helped to avoid too many lags, which would have resulted in the loss of degrees of freedom and triggered serial correlation in the error term or cause multicollinearity.

### **3.5.3.4 Bounds cointegration test**

Cointegration exists when two or more non-stationary variables have a long run linear relationship. The Autoregressive Distributed Lag (ARDL) bounds test was adopted as variables exhibited mixed stationary results rendering the Johansen test unsuitable. The hypothesis was adopted as;

Null hypothesis  $H_0$ : there was no cointegration and Alternative hypothesis  $H_1$ :  $H_0$  was not true. Decision criteria was made at 10%, 5%, 2.5%, and 1% significance level by comparing the F- statistic and critical value. The null hypothesis would be rejected if the calculated F statistic was greater than the critical value for the upper bound, this would imply the presence of cointegration. However, if the calculated F statistics would be lower than the critical value of the lower bound, the research would fail to reject the null hypothesis and conclude that cointegration did not exist (Adom, 2012).

### **3.5.4 Post estimated Diagnostic tests**

The study conducted Ordinary Least Square (OLS) regression for estimation. STATA version 15 was used to run the regression analysis. To confirm the correctness and consistency of data, relevant post diagnostic tests were carried out, this included Autocorrelation, Normality, Heteroscedasticity, multicollinearity and model stability test.

#### **3.5.4.1 Test for Autocorrelation**

Autocorrelation is the degree of similarity or correlation between values of the same variable or data series at different dates. The OLS makes an assumption that errors in succeeding observations ought not to be connected (Flick, 2020). To determine whether errors in successive observations were connected, the autocorrelation test was employed. The null hypothesis was that there is no correlation;  $H_0: P > 0.05$ , while the alternative hypothesis was that autocorrelation was present;  $H_1: P < 0.05$ . The study used Breusch-Godfrey serial correlation LM test to test for correlation.

#### **3.5.4.2 Normality test**

Koizumi (2009) states that A normality test determines if the distribution of a given collection of data is in line with a normal distribution. It is a goodness-of-fit test, which validates the null hypothesis that the data was collected from a normal population. The null hypothesis was; the residual was normally distributed;  $H_0 > 0.05$  while the alternative hypothesis was; Residuals was normally distributed;  $H_1 < 0.05$ .

The study used Jarque-Bera statistic to test for Skewness and Kurtosis in the model residuals. Kurtosis assesses how heavy the distribution's tails are, whereas skewness defines how asymmetrical a dataset's value distribution is, indicating whether the data are more or less outlier-prone compared to a normal distribution (Blanca, 2013). A skewness of zero would indicate a symmetrical distribution, while positive skewness would mean a right-skewed distribution (long tail on the right), and negative skewness would indicate a left-skewed distribution (long tail on the left).

A kurtosis of zero would indicate a normal distribution, while positive kurtosis (leptokurtic) would signify heavier tails and a more peaked distribution, and negative kurtosis (platykurtic) would signify lighter tails and a flatter distribution. For the model residuals to be normally, the P-value for the Jarque-Bera test was expected to be  $P > 0.05$  at a 5% level of significance. Distributed (Politano, 2018).

#### **3.5.4.3 Test for Multicollinearity**

In a multivariate regression model, multicollinearity is the presence of strong intercorrelations between two or more independent variables (Laurens, 2018). Multicollinearity may produce skewed or deceptive results when a researcher tries to ascertain how well each independent variable can be applied to predict or understand the dependent variable in a statistical model. The idea that independent variables shouldn't be linearly connected is one of the fundamental principles of OLS. It would be determined using the multicollinearity test whether or not independent variables are linked.

Variance inflation factor (VIF) was utilized in the study to check for multicollinearity. VIF shows the strength of the correlation as well as the correlation between the predictor variables. A VIF of less than ten would indicate that the independent variables are not correlated. A correlation between independent variables with poorly estimated coefficients and questionable P values would be implied by a VIF of 10 or above.

#### **3.5.4.4 Test for Heteroscedasticity**

This is a particular kind of pattern found in model residuals, when the degree of variability is consistently higher for some subsets of the residuals than for others. Another name for it is non-constant variance. OLS makes the assumption that the error terms have the same

variance and that the disturbance terms that appear in the population regression function are heterogeneous (Politano, 2018).

To find out if the assumption has been compromised, a heteroscedasticity test was conducted. Heteroscedasticity suggested that OLS estimators are efficient but not unbiased. Heteroscedasticity was tested using the Breusch-Pagan test, also known as the Chi-square test. The assumption of heteroscedasticity would be made and the null hypothesis of homoscedasticity would be rejected if the statistic produced a P value below the predetermined threshold at K degree of freedom ( $P < 0.05$ ).

### **3.6 Model Stability by use of CUSUM Test**

A cumulative sum test (CUSUM) was used to assess the regression model's stability. It was anticipated that a stable model would stay within the 0.05 significance level's upper and lower boundaries.

### **3.7 Ethical Considerations**

The research ensure that data used from sources such as KNBS, Central bank, World Bank, KRA, MoH and National Treasury is credible, authentic, and free from manipulation. There was proper citation of all data sources and acknowledging data producers which prevented plagiarism and respected intellectual property rights. The methodology for sourcing, cleaning, and analyzing the data was transparent. This allows other scholars and policymakers to replicate or verify the findings, enhancing accountability and credibility. Data was conducted in a responsible and ethical manner, ultimately contributing to the integrity and trustworthiness of the research findings.

## **CHAPTER FOUR**

### **DATA ANALYSIS AND DISCUSSIONS**

#### **4.1 Introduction**

This chapter presents the findings of statistical analyses, focusing on descriptive statistics, inferential statistics and their interpretations. The study evaluated the impact of selected macroeconomic variables on public healthcare financing in Kenya from 2013 to 2022. The results are organized into various sections, beginning with initial data findings from descriptive statistics and correlational analysis, then progressing to an in-depth examination of time series data, including unit root tests, determination of optimal lag length, Auto Regressive Distributed Lag (ARDL) Bounds test for cointegration, Vector Error Correction Model (VECM), and regression analysis. Additionally, post-estimation tests were conducted to validate the outcomes of the study.

#### **4.2 Descriptive Statistics**

To determine the fundamental features of the data set, descriptive statistics were used. For the variables under consideration, this study employed quarterly data from a number of sources, including the Central Bank of Kenya (CBK), the Kenya National Bureau of Statistics (KNBS), the Office of the Controller of Budget, the Office of the Commission of Revenue Allocation, and World Bank data. The variables under investigation's descriptive features are displayed in table 4.1.

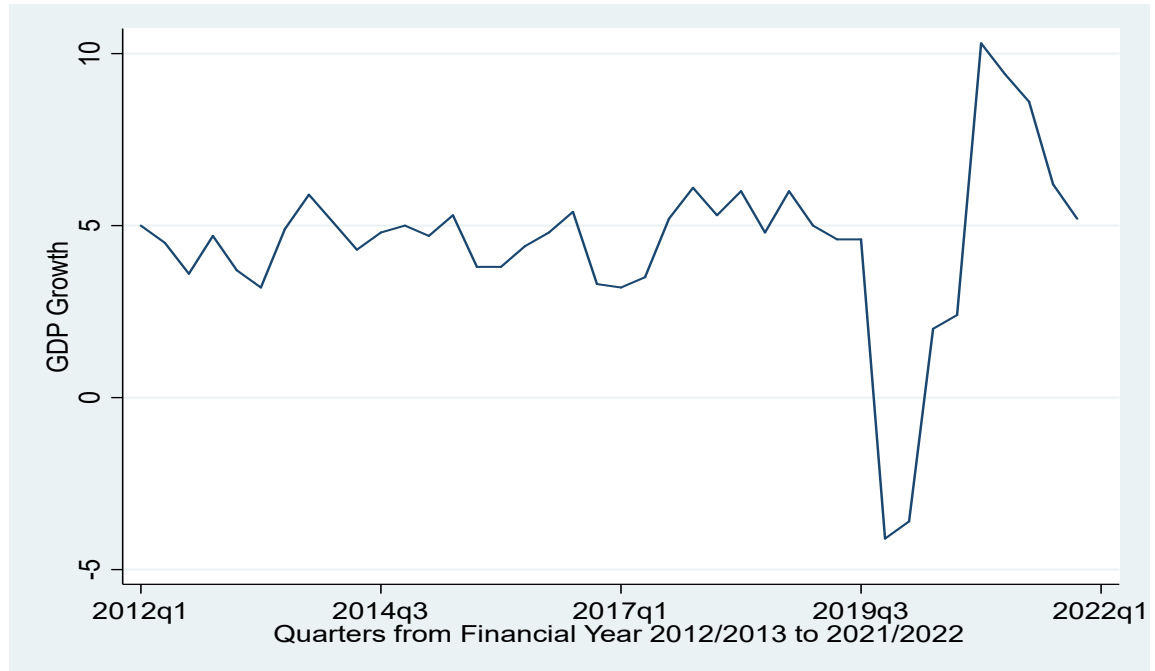
**Table 4. 1: Descriptive Statistics**

<b>Stats</b>	<b>GDP Growth (%)</b>	<b>Public Debt (Kes Billions)</b>	<b>Tax Revenue (Kes Billions)</b>	<b>Consumer Price Index</b>	<b>Health Financing (Kes Billions)</b>
N	40	40	40	40	40
Min	-4.10	1724.65	151.06	67.31	12.00
Max	10.30	8579.11	1837.22	123.17	67.00
Mean	4.52	4589.56	751.09	92.94	41.70
Std Dev.	2.53	2149.82	418.39	16.06	15.46
se(mean)	0.40	339.92	66.15	2.54	2.44

**Source: Author, 2024****4.2.1 GDP Growth**

With 40 observations, the data set represents quarterly GDP growth rates over a 10-year span, offering a comprehensive overview of economic trends between FY 2012/2013 and 2021/2022. The minimum GDP growth rate during this period was -4.10%, indicating a contraction in the economy, this was attributed by the COVID19 pandemic as alluded by Yiega (2022) while the maximum was 10.30%, suggesting significant growth in mid-2021. This wide range reflects the variability in economic performance, likely influenced by various internal and external factors.

The average GDP growth rate over the period was 4.52%. This indicated that, on average, Kenya's economy experienced positive growth, with a rate that aligns with typical growth rates for developing economies as per the IMF report (2021). However, this mean value can mask significant fluctuations within the period. The standard deviation of 2.53% indicates considerable variability in GDP growth. This deviation suggests that growth rates fluctuated significantly, pointing to periods of both robust expansion and contraction across the 10-year period.



**Figure 4. 1: Quarterly GDP Growth**

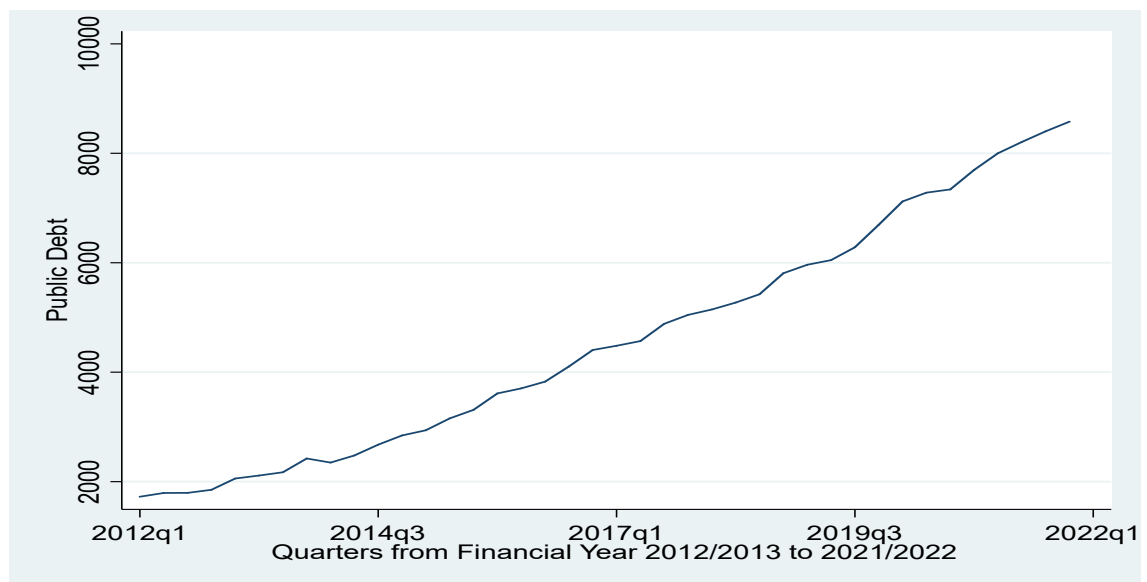
**Source: Author, 2024**

Between 2012q1 and 2019q2, the GDP growth was oscillating between growth rate of 3.20 percent and 6.10 percent. The growth rate was high in 2021q1, 2021q2 and 2021q3, a period where robust recovery initiatives from COVID19 had been put in place and stability of the economy was the key focus. However, despite the growth being highest in 2021q1, the trend of growth since then has been declining with 2022q4 as the last period covered in the study having GDP growth rate of 5.20 percent.

#### **4.2.2 Public Debt**

The minimum public debt recorded during this period was 1,724.65 billion Kenyan shillings, while the maximum was 8,579.12 billion shillings. This substantial range indicates significant growth in public debt over the decade, pointing to an increase in borrowing. The average public debt was 4,589.56 billion shillings. This mean suggests

that public debt levels were considerably high during this period, with a trend of increasing borrowing to finance public projects and services. The standard deviation of 2,149.83 billion shillings reflects considerable variability in public debt levels, indicating that the debt amount fluctuated greatly from quarter to quarter. This high variability could be due to changes in government policies, fiscal needs, change of government priority agenda like ‘the big 4’ which ought to have been heavily financed as alluded by (Appiah *et al*, 2022).



**Figure 4. 2: Quarter public debt**

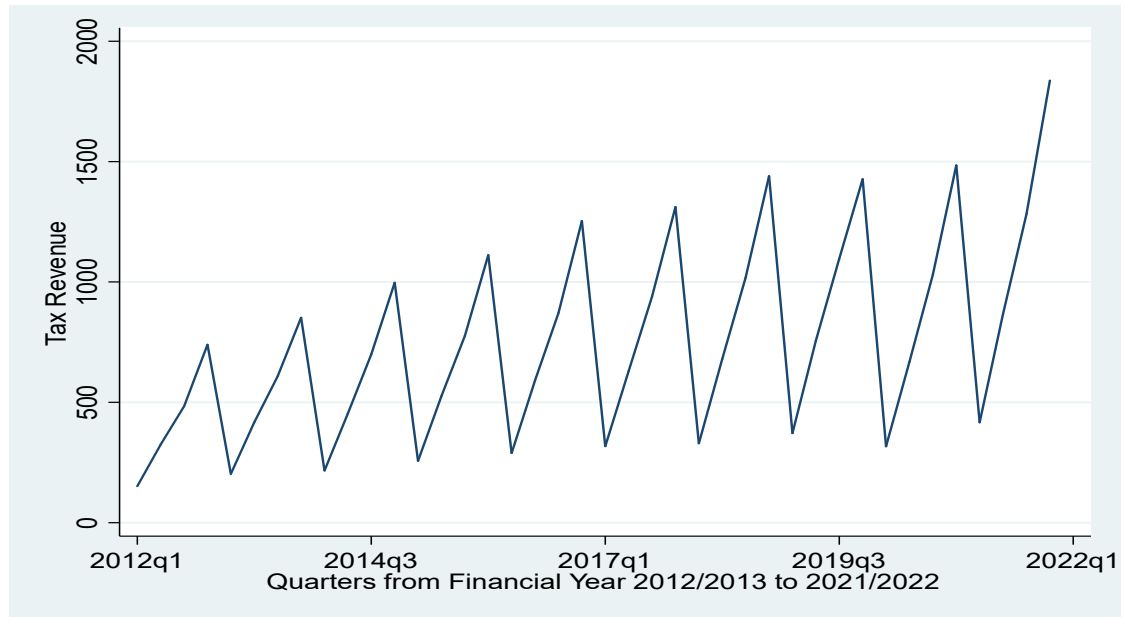
**Source: Author, 2024**

Generally, the growth of public debt has been steadily increasing over the years from 1.72 trillion Kenya shillings in 2012q1 to 8.58 trillion Kenya shillings in 2022q4. This is attributed to ever increasing Kenyan budget deficits arising from increased budget allocation to sector of the economy and to counties, this compelling the government to source for additional funds to fill the budget deficits. Asante (2020) posts that whenever

the government is faced with budget deficits, it is faced with the option of increasing taxes or resorting to borrowing, and that most countries resort to borrowing as the easiest means to finance budget deficits that also come with high interests which explains the increasing trend in public debt.

#### **4.2.3 Tax Revenue**

The minimum tax revenue recorded during this period was 151.06 billion Kenyan shillings, while the maximum was 1,837.22 billion shillings. This substantial range suggests that tax revenue varied significantly, indicating fluctuations in the government's revenue collection ability over the decade. The average tax revenue was 751.09 billion shillings, representing the general level of tax revenue collected by the government. The standard deviation and skewness values indicate variability in tax revenue collection, while the mean and standard error reflect the overall level of tax revenue during this period. The standard deviation of 418.39 billion shillings indicates a considerable spread around the mean, suggesting that tax revenue levels experienced significant variability from quarter to quarter (Refer to figure 4.3).



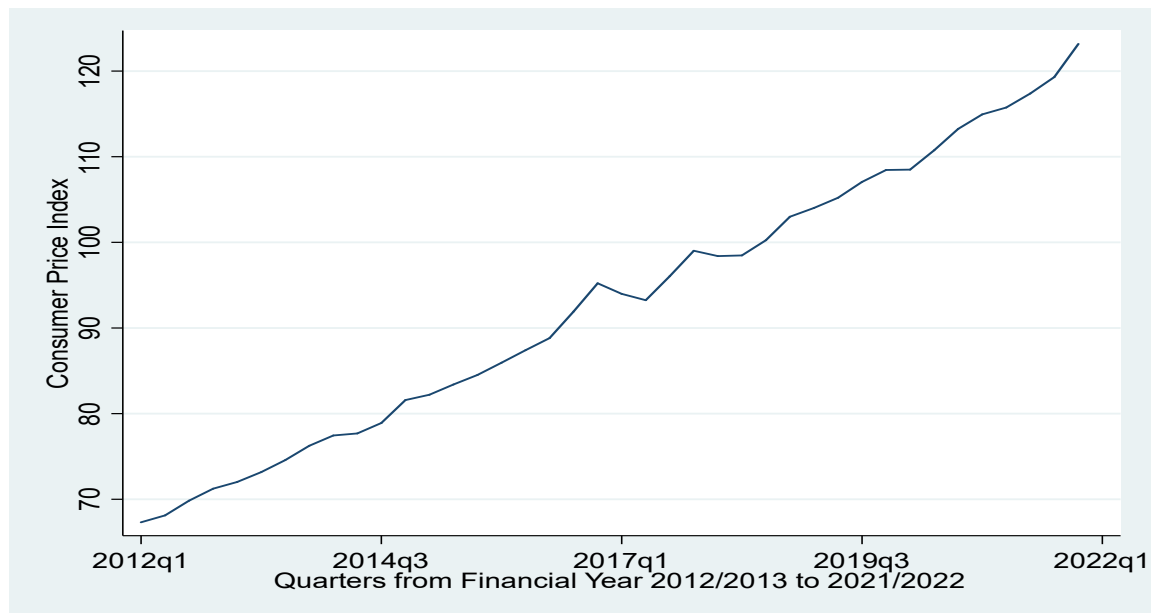
**Figure 4. 3: Quarterly Tax Revenue**

**Source: Author, 2024**

The tax revenue data was presented quarterly; tax collection often increases through the quarters because the amount is cumulative as the year proceeds. During the first quarters of each year the collection is lowest compared to other quarters. The collection is highest at q4 of each year as this is the cumulative of the collections in the whole year. This explains the trends in the graph in which q1 of each year is the lowest while q4 having the highest collections. Additionally, there was an increase in the amount collected as tax revenue from 739.89 billion Kenya shillings in 2013q4 to 1.84 trillion Kenya shillings in 2022q4. Kola (2023) indicates that this is a result of robust transformation undertaken by KRA. This includes customer support programs, tax Base Expansion and digitalizing revenue administration.

#### 4.2.4 Inflation

The minimum CPI value recorded during this period was 67.31, while the maximum was 123.17. This range indicates the variation in price levels, suggesting periods of lower and higher inflation. The average CPI value was 92.94, providing a general indication of the overall price levels during this period. This mean value represents the typical level of prices across the dataset, suggesting a moderate level of inflation over time. The standard deviation of 16.06 indicates a moderate spread around the mean, suggesting variability in price levels. This spread might be influenced by fluctuating economic conditions, policy changes, or other factors impacting inflation (Refer to figure 4.4)



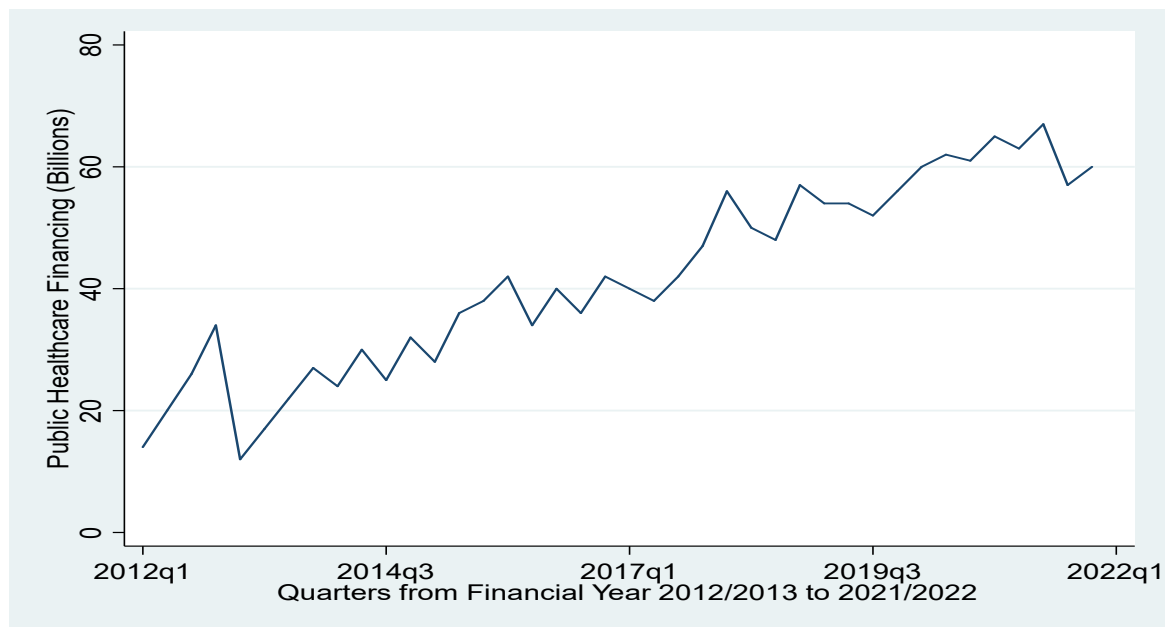
**Figure 4. 4: Quarterly Consumer Price Index**

**Source: Author, 2024.**

CPI had an increasing trend from 67.30 in 2012q1 to 123.17 in 2022q4. There were no shocks in inflation as the changes were moderately increasing.

#### 4.2.5 Public Healthcare Financing

The minimum public health financing value during this period was 12 billion Kenyan shillings, while the maximum was 67.00 billion shillings. This wide range indicates significant fluctuations in health financing over the decade, reflecting variability in budget allocation, policy changes, or external factors impacting public healthcare funding. The average health financing value was 41.70 billion shillings, suggesting that this was the typical funding level during the period. The mean provides a central point, indicating the general trend in healthcare financing. The standard deviation of 15.46 billion shillings indicates considerable variability in health financing, suggesting fluctuations in the level of funding from quarter to quarter. This could be due to changing budget priorities, economic conditions or other factors influencing health funding.



**Figure 4. 5: Quarterly Public Health Financing**

**Source: Author, 2024**

There were fluctuations in the amount allocated to healthcare by the Kenyan government. The trend revealed that in a financial year, the least allocations were in q1 of each year while the highest allocations were q4 of each year. It is worth noting tax revenue exhibit defined trend with public healthcare financing. As tax revenue increased from quarter to quarter in each FY, public healthcare financing also increased in almost similar trend, therefore the increase in tax revenue provided additional funds which led to increased allocation to healthcare.

GDP growth had mixed trend with government allocation to healthcare but the dominant trend is that when GDP growth rates increased, the allocation to healthcare also increased. For instance, when the GDP growth rate was lowest in 2020q4 at -4.00 percent, the allocation was 56.00 billion Kenya shillings while when GDP growth rate was highest at 10.30 percent in 2021q4, the allocation was high at 65.00 billion Kenya shillings.

Consumer price index and public debt had an increasing trajectory from 2012q1 to 2022q4 while public healthcare financing had an increasing trend in each FY and not consistently across the period of study, it was observed that q4 of every FY had higher allocation of funds to healthcare than q1 of the proceeding FY. Upon comparing the q4 of each FY, it is worth noting that the common trend is public healthcare financing increases in q4 in the most of the proceeding FY, this can be explained by increased borrowing across the years to which part of the borrowed funds were allocated on healthcare.

### 4.3 Pre-estimation

#### 4.3.1 Normality Test

Normality refers to the extent to which a set of observations follows a normal distribution over a specific period (Politano, 2018). The normality test estimates the probability that a random variable from the underlying data is normally distributed. This study employed the Jarque-Bera (JB) test to assess normality. This test helps determine if a random variable's distribution conforms to expected characteristics of a normal distribution (Koizumi, 2009). Skewness scores below 2 and kurtosis figures below 6 are displayed in the summary table (4.3), which strongly implies that the data in all examined variables closely follow a normal distribution. These figures indicate a regular pattern in the data by showing that the observed distribution has reasonably flat kurtosis and limited skewness.

**Table 4. 2: Normality Test**

	<b>Skewness</b>	<b>Kurtosis</b>	<b>Jarque Bera</b>	<b>P-Value</b>
GDP Growth	-1.307	2.881	0.453	0.798
Public Debt	0.332	1.867	0.909	0.634
Tax Revenue	0.587	2.584	0.649	0.857
Consumer Price Index	0.096	1.863	0.688	0.709
Public Health Financing	-0.134	1.918	0.664	0.717

**Source: Author, 2024**

As presented in Table 4.3, all variables recorded skewness values below 2 and kurtosis values below 6. These results indicate that the data approximated a normal distribution. The relatively low skewness implies that the data were symmetrically distributed, while the moderate kurtosis suggests no significant outliers. Furthermore, the Jarque-Bera test produced p-values greater than 0.05, confirming that the null hypothesis of normality

could not be rejected. Therefore, the dataset met the assumption of normality, validating its suitability for further statistical analysis.

#### **4.3.2 Test for Unit Root**

Because time series data is non-stationary, it frequently displays the unit roots problem. Casin and Perron (2018) states that this occurs when the statistical properties of a variable, such as mean and variance, change over time, leading to unreliable inferences and potentially resulting in spurious regression outcomes. A variable is not integrated of order 0 ( $I(0)$ ) when it has a unit root, meaning that its statistical behaviour is inconsistent across time. This makes statistical conclusions and forecasts erroneous or untrustworthy. To ensure that the time series data is suitable for analysis, it must be stationary, meaning that its statistical properties remain constant over time (Flick, 2020). For dependable modelling and forecasting, stationarity must be attained so that the model may make accurate predictions about the future. If non-stationary data is not properly processed, it might produce false regression findings, where the reported associations between variables may be distortions of non-stationarity rather than real relationships.

The study used the Phillips-Perron (PP) test and the Augmented Dickey-Fuller (ADF) test to look at the unit root in individual variables in order to solve this problem and increase the reliability of the findings. These tests serve as a foundation for additional study by assisting in determining whether a variable is stationary or contains a unit root. The Augmented Dickey-Fuller test checks for unit roots by examining the presence of autocorrelation in the time series data and adjusting for it, while the Phillips-Perron test uses a different approach to correct for autocorrelation and heteroscedasticity without

adding lagged difference terms (Kumar, 2019). By using these tests, the study can confirm whether the data requires differencing or other transformations to achieve stationarity, thereby reducing the risk of spurious regression and allowing accurate statistical inferences and forecasts (Kumar, 2019).

**Table 4. 3: Unit Root Tests**

<b>Variable</b>	<b>Augmented Dickey-Fuller (ADF)(Prob.)</b>	<b>Phillips-Perron (PP)(Prob.)</b>	<b>Integration Level</b>
GDP Growth	-3.499 <b>(0.0080)</b>	-3.379 <b>(0.0117)</b>	I(0)
Public Debt	-2.416(0.1374)	-2.228(0.1962)	I(1)
ΔPublic Debt	-6.290 <b>(0.0000)</b>	-6.759 <b>(0.0000)</b>	I(0)
Tax Revenue	-6.009 <b>(0.0000)</b>	-6.034 <b>(0.0000)</b>	I(0)
Consumer Price Index	-5.738 <b>(0.0000)</b>	-5.748 <b>(0.0000)</b>	I(0)
Public Health Financing	-2.455(0.1269)	-2.376(0.1486)	I(1)
ΔPublic Health Financing	-8.731 <b>(0.0000)</b>	-11.568 <b>(0.0000)</b>	I(0)

**Notation:** \* sig at 5% level, \*\* sig at 1% level, Values in parenthesis are probability values  
**Source: Author, 2024**

Results presented in Table 4.3 indicate that the ADF and PP test statistics for GDP Growth, Tax Revenue, and Consumer Price Index (CPI) were all statistically significant at the 1% level, confirming that these variables were stationary at level, denoted as I(0). This implies that their statistical properties such as mean and variance remain constant over time. Conversely, Public Debt and Public Health Financing were not stationary at level since their test statistics were insignificant at conventional levels ( $p > 0.05$ ), suggesting the presence of a unit root. However, after first differencing, both variables became stationary, as evidenced by highly significant test statistics at the 1% level. This implies that these variables are integrated of order one, denoted as I(1). Overall, the findings show a mixture of I(0) and I(1) variables, confirming the absence of higher-order integration (I(2) or

beyond). This satisfies the preconditions for applying regression techniques such as Autoregressive Distributed Lag (ARDL) or other models compatible with mixed integration orders, thereby validating the suitability of the dataset for further econometric analysis.

### 4.3.3 Multicollinearity

Variance Inflation Factor (VIF) test was conducted to evaluate the presence and degree of multicollinearity in the model. Multicollinearity occurs when two or more independent variables in a regression model are highly correlated, which can lead to unreliable and unstable coefficient estimates (Politano, 2018).

According to Laurens (2018) a VIF value greater than 10 indicates a significant level of multicollinearity. When VIF values are greater than 10, it would suggest that the independent variables are closely linked, which can inflate the variances of the estimated coefficients and lead to misleading statistical inferences (Laurens, 2018).

**Table 4. 4: Test for Multicollinearity using Variance Inflation Factor**

<b>Variable</b>	<b>VIF</b>	<b>1/VIF</b>
GDP Growth	1.58	0.631
Public Debt	1.42	0.707
Inflation	1.23	0.813
Tax revenue	1.12	0.890
Mean VIF	1.34	

**Source: Author, 2024**

The results of the VIF test are displayed in Table 4.4 above, the calculated VIF values for each independent variable. All VIF values were below 10, the model was considered free from significant multicollinearity.

#### **4.3.4 Determination of Optimum Lag Length**

It is crucial to determine the optimal lag length for the Unrestricted Vector Autoregressive (VAR) model and the Vector Error Correction (VEC) model before estimating them (Politano, 2028). The specified lag length is essential for assessing the number of cointegration ranks or fitting cointegrating equations in the VECM model. According to Engle and Granger (1987), there are several methods to select the appropriate lag length for a VAR model with stationary variables. Table 4.7 indicates that one lag was selected as the lag duration for this multivariate model. The choice was based on the Akaike Information Criterion (AIC), which showed that the ideal lag order, represented by an asterisk (\*), existed at four delays. The AIC was chosen because it was the most appropriate option for this model's lag duration and had the lowest value.

In time series analysis, choosing the appropriate lag length is essential since it influences the precision of the VAR and VEC models. Together with additional information criteria like the Hannan-Quinn Information Criterion (HQIC) and the Schwarz Information Criterion (SIC), the AIC aids in determining the ideal model complexity while preventing overfitting. Flick (2020) states that a shorter lag length may lead to omitted variable bias, whereas a longer lag length can result in overfitting, leading to less reliable results. By choosing the optimal lag length based on the AIC, the analysis can achieve a balance between complexity and simplicity, ensuring that the model provides robust and reliable estimates (Casin and Perron, 2018). The best configuration for examining the underlying correlations and cointegration between the variables in question in this situation is the VAR and VEC models with one lag.

**Table 4. 5: Lag Length Determination summary**

lag	LL	LR	Df	P	FPE	AIC	HQIC	SBIC
0	-182.034				0.022403	10.3908	10.4675	10.6107*
1	-137.895	88.278	25	0.000	0.007858	9.32749	9.78807	10.6471
2	-97.4506	80.889	25	0.000	0.003628	8.46948	9.31386	10.8887
3	-63.3274	68.246	25	0.000	0.002757	7.96263	9.19084	11.4816
4	-23.2814	80.092*	25	0.000	.001987*	7.12674*	8.73876*	11.7453

**LL:** Log-Likelihood, **LR:** Likelihood Ratio; **FPE:** Final Prediction Error; **AIC:** Akaike Information Criterion; **SBIC:** Schwarz Bayesian Information Criterion; **HQIC:** Hannan-Quinn Information Criterion.

**Source: Author,2024**

Lag 4 is the ideal lag length for this model, as evidenced by its maximum log-likelihood, lowest FPE, AIC, and HQIC values. Furthermore, the likelihood ratio (LR) at lag 4 is significant ( $p < 0.05$ ), indicating that the model fits better when more lags are added. The asterisks (\*) highlight where these criteria select the optimal lag length. The least appropriate model is suggested by the fact that Lag 0 has the highest values for FPE, AIC, HQIC, and SBIC and the worst log-likelihood.

The fit improves with increasing lag until lag 4, where it achieves the best balance between complexity and fit. As Table 4.7 illustrates, SBIC chose lag 0 while most selection criteria (LR, FPE, AIC, and HQIC) reached their minimum values at lag 4. This is in accordance with econometric convention, which states that the lag length that minimises the majority of the information criteria is preferred. Therefore, lag 4 was chosen as the optimal lag length for subsequent model estimation.

**Table 4. 6: Optimal Lag Length for ARDL Model**

<b>Variable</b>	<b>Selected Lag Order</b>
Public Health Financing	2
GDP Growth	2
Public Debt	3
Tax Revenue	3
Inflation	4

The lag order for each variable was selected automatically based on the Akaike Information Criterion (AIC), ensuring optimal model fit while minimizing information loss. As shown in Table 4.8, the ARDL model was specified as ARDL (2, 2, 3, 3, 4), indicating that the dependent variable (Public Health Financing) was lagged twice, GDP Growth twice, Public Debt three times, Tax Revenue three times, and Consumer Price Index four times. The varying lag lengths reflect the different speeds at which each explanatory variable adjusts to changes in the dependent variable. Longer lags, such as in the inflation (4), suggest a delayed impact of inflationary changes on public health financing, while shorter lags (GDP Growth at lag 2) imply a relatively quicker response. This lag configuration ensures that both short-term dynamics and long-run equilibrium relationships are captured, providing a robust foundation for subsequent estimation of long-run coefficients and the Error Correction Model (ECM).

#### **4.3.5 Cointegration Test- Bounds Test**

To empirically investigate the short-run and long-run relationships among the variables of interest-Public health financing, inflation, tax revenue, public debt and GDP growth, the Autoregressive Distributed Lag (ARDL) bounds test was used. The ARDL bounds test was chosen because the variables exhibited mixed stationary results, rendering the Johansen test unsuitable (Koizumi, 2009). The determined F-statistic is compared against

critical values for the upper bounds (I(1)) and lower bounds (I(0)) as part of the choice criterion. If the F-statistic is greater than the critical value for the upper bound, the null hypothesis is rejected, indicating that there is a long-run association among the variables (Politano, 2018).

The presence of cointegration suggests a long-run relationship between the variables, leading to further analysis using a vector error correction model (VECM) to understand long-term dynamics. The null hypothesis is not rejected and there is no proof of cointegration if the F-statistic is less than the lower bound's critical value. It is challenging to ascertain whether a long-term association exists if the F-statistic is equivocal and lies between the lower and upper bounds. The ARDL method can be applied even when variables have varied integration orders and provides flexibility in managing mixed stationarity findings.

The ARDL limits test is a recommended technique for analysing short- and long-term relationships in time series data because of its adaptability and the explicit criteria for accepting or rejecting the null hypothesis. The results of these comparisons are summarised in Table 4.7, which also indicates whether the null hypothesis can be rejected. If cointegration is found, this leads to additional analysis using VECM; if not, alternative methods are used.



Rejecting the null hypothesis in favor of the alternative hypothesis has significant implications for further analysis. With the confirmation of cointegration, the focus shifts towards modeling long-run dynamics, typically using a Vector Error Correction Model (VECM) (Kumar, 2019). This approach helps capture both the short-run fluctuations and the long-term equilibrium relationships among the variables. Cointegration indicates that the relationship among these variables is not spurious; they are linked by a long-term equilibrium relationship (Casin & Perron, 2018). Future trends can be predicted using these established links since this connection implies that changes in one variable are likely to result in predictable changes in the others.

#### **4.3. Correlational Analysis**

To ascertain the direction and strength of the correlations between the variables, a correlational analysis was employed. The analysis involves measuring the correlation coefficient ( $R$ ), which ranges from positive one to negative one, to gauge the degree of association between variables (Kumar, 2019). This method also helps identify issues with multicollinearity, which occurs when there is a high correlation between the variables being analyzed. The analysis focused on examining how the dependent variable (Public health financing) correlates with the independent variables (Inflation, Public debt, GDP growth and Tax revenue). Table 4.8 displays the results of the correlational computations.

**Table 4. 8: Correlational Analysis Results****Source: Author, 2024**

	<b>Public Health Financing</b>	<b>Inflation Rate</b>	<b>Total Public Debt</b>	<b>GDP Growth</b>
Inflation	-0.4889 0.0014	1		
Total Public Debt	0.6891 0.000	-0.156 0.3364	1	
GDP Growth	0.406 0.0093	0.1494 0.3577	0.3704 0.0187	1
Tax Revenue	0.584 0.0001	-0.2655 0.0978	0.5021 0.001	0.0797 0.6248

The results show a negative and statistically significant correlation between inflation and public health financing ( $r = -0.4889$ ,  $p = 0.0014$ ). This implies that higher inflation rates are associated with lower levels of health sector funding. Rising prices may erode the real value of government expenditure, reducing the fiscal space available for healthcare. This outcome aligns with macroeconomic theory, which suggests that inflationary pressure diminishes the purchasing power of public resources and constrains budgetary allocation efficiency.

Public debt demonstrates a strong positive and significant correlation with public health financing ( $r = 0.6891$ ,  $p = 0.000$ ). This finding suggests that as Kenya's public debt increases, so does the level of healthcare funding. The result indicates that government borrowing plays a key role in financing public health programs, possibly through external and domestic loans used to bridge fiscal gaps in the health budget. A study by Said and Sani (2020) investigating the relationship between total public debt and public health expenditure in sub-Saharan Africa using longitudinal data from a diverse set of countries.

The study corroborated the findings outlined, demonstrating a moderate positive correlation between public debt and public health financing. The research highlighted the importance of fiscal policy in addressing healthcare needs amidst growing public debt burdens.

GDP growth is positively and significantly correlated with public health financing ( $r = 0.406$ ,  $p = 0.0093$ ). This implies that improved economic performance enhances the government's ability to allocate more resources to the health sector. Economic expansion leads to higher national income, which in turn increases fiscal capacity and supports public investment in health services. Abbott and Jones (2021) conducted a meta-analysis of studies investigating the relationship between GDP growth and public health financing. In contrast to the presented findings, their analysis did not yield consistent evidence supporting a positive correlation between GDP growth and public health expenditure (Abbott, 2021). The researchers emphasized the need for further research to elucidate the complex interplay between economic growth and healthcare investment.

The relationship between tax revenue and public health financing is also positive and statistically significant ( $r = 0.584$ ,  $p = 0.0001$ ). This suggests that an increase in tax revenue collection enhances the government's fiscal space for financing health programs. It underscores the importance of effective domestic revenue mobilization in sustaining health sector funding and reducing reliance on debt financing. Cashin (2022) conducted a comprehensive analysis of tax revenue and public health financing across several countries. The findings echoed the results presented, indicating a strong positive correlation between tax revenue and public health financing. The study emphasized the

critical role of taxation policies in funding public health initiatives and ensuring equitable access to healthcare services.

#### 4.5 Vector Error Correction Matrix

In this study, the Vector Error Correction Model (VECM) was utilized to determine the short- and long-term correlations between the variables, as well as the rate at which the dependent variable (public health financing) changes in response to changes in the independent variables (public debt, tax revenue, GDP growth, and inflation). According to Lutkepohl (2005), The short run variance in the VECM model is shown by the variable coefficient(s). To illustrate the long-term relationship between the variables, cointegrating equations need to have a negative and significant sign attached to them at a 5% level of confidence (Lutkepohl and Kratzik, 2004).

##### 4.5.1 Model Summary

The Vector Error Correction Model (VECM) was employed to examine both the short-run and long-run dynamics between public health financing and its macroeconomic determinants—inflation rate, public debt, GDP growth, and tax revenue—over the period 2013Q1 to 2021Q4

**Table 4. 9: Model Summary**

Sample: 2013q1	-	2021q4	Number of obs	=	36
			R-squared	=	0.9181
			Adj R-squared	=	0.8315
Log likelihood	=	47.70344	Root MSE	=	0.0936

As shown in Table 4.9, the model reports an R-squared of 0.9181 and an adjusted R-squared of 0.8315, indicating that approximately 83% of the variations in public health financing are explained by the included explanatory variables. The Root Mean Square Error (RMSE = 0.0936) shows that the model's prediction errors are relatively small, suggesting a good fit.

#### 4.5.2 Speed of Adjustment

The Error Correction Term (ECT) captures the speed at which short-term disequilibrium is corrected and the system returns to its long-run equilibrium path. The error correction term (ECT), which represents the speed of adjustment, was found to be negative and statistically significant at the 5% level. This satisfies the theoretical condition for cointegration, confirming the existence of a long-run equilibrium relationship among the variables.

**Table 4. 10: Error Correction Term**

<b>D. Public Health Financing</b>	<b>Coef.</b>	<b>Std. Err.</b>	<b>T</b>	<b>P&gt;t</b>	<b>[95% Conf. Interval]</b>
ADJ					
Public Health Financing L1.	-0.95328	0.210886	-4.52	0.000	-1.39822 -0.50835

The coefficient of the error correction term (Public Health Financing L1) is -0.9533, and it is statistically significant at  $p < 0.001$ . This negative and highly significant coefficient confirms the presence of a long-run equilibrium relationship among the study variables. The magnitude of -0.9533 implies that approximately 95.3% of the short-run disequilibrium in public health financing is corrected in each subsequent period. In other words, any deviation from the long-run equilibrium path is rapidly adjusted within one period, indicating a strong speed of convergence. This result demonstrates that public health financing in the model is highly responsive to long-run dynamics, ensuring stability and consistency of adjustment toward equilibrium over time.

### 4.5.3 Long Run Effect

The results in Table 4.11 present the long-run coefficients from the Vector Error Correction Model (VECM), showing how changes in macroeconomic variables influence public health financing in Kenya over time.

**Table 4. 11: Long Run Effect**

LR	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]
Inflation (X <sub>1t</sub> )	-0.10693	0.018365	-5.82	0.000	-0.14568 -0.06818
Public Debt (X <sub>2t</sub> )	0.126205	0.062453	2.02	0.059	-0.00556 0.25797
GDP Growth (X <sub>3t</sub> )	0.274826	0.057964	4.74	0.000	0.152532 0.397119
Tax Revenue (X <sub>4t</sub> )	0.663364	0.081809	8.11	0.000	0.490762 0.835966

$$Y_t = -0.107X_{1t} + 0.126X_{2t} + 0.275X_{3t} + 0.663X_{4t}$$

Where;

Y is the Public Healthcare Financing between 2012/2013 to 2021/2022

X<sub>1</sub> is the Inflation between 2012/2013 to 2021/2022

X<sub>2</sub> is the Tax Revenue between 2012/2013 to 2021/2022

X<sub>3</sub> is the Public Debt between 2012/2013 to 2021/2022

X<sub>4</sub> is the GDP Growth between 2012/2013 to 2021/2022

The coefficient of 0.2748 is positive and statistically significant at the 5%(P<0.05) level (p = 0.000), indicating that a 1% increase in GDP growth leads to a 0.27% increase in public health financing in the long run. This suggests that sustained economic growth expands the government's fiscal capacity and enables greater allocations to the health sector.

The coefficient of 0.1262 is positive but insignificant at the 5% ( $P < 0.05$ ) level ( $p = 0.059$ ). This implies that public debt contributes modestly to increased health financing, suggesting that borrowed funds are occasionally used to support health-related programs, though the relationship is weaker compared to other fiscal indicators. This could reflect Kenya's efforts to balance debt servicing obligations with social spending priorities.

The coefficient of 0.6634 is positive and significant ( $P < 0.05$ ), showing that tax revenue exerts the strongest positive influence on public health financing. A 1% increase in tax revenue is associated with a 0.66% rise in public health expenditure, confirming that domestic revenue mobilization is a key driver of sustainable health funding. This underscores the importance of efficient tax collection and fiscal discipline in financing public health services.

Inflation exhibits a negative and significant coefficient (-0.1069) at the 5% ( $P < 0.05$ ) level, meaning that a 1% rise in inflation leads to a 0.11% decline in public health financing in the long run. This indicates that rising prices erode the real value of health budgets and may crowd out spending as the government reallocates funds to stabilize the economy.

#### 4.5.4 Short Run Effect

<b>Public Health Financing</b>	<b>Coef.</b>	<b>Std. Err.</b>	<b>t</b>	<b>P&gt;t</b>	<b>[95% Conf.</b>	<b>Interval</b>
LD.	-0.31383	0.17121	-1.83	0.084	-0.67505	0.047391
GDP Growth						
D1.	-0.04314	0.053041	-0.81	0.427	-0.15504	0.068769
LD.	-0.09205	0.04397	-2.09	0.042	-0.18482	0.000723
Public Debt						
D1.	-0.0094	0.062629	-0.15	0.882	-0.14154	0.122733
LD.	0.016153	0.047276	0.34	0.737	-0.08359	0.115897
L2D.	0.089223	0.046044	1.94	0.069	-0.00792	0.186367

---

Tax Revenue						
D1.	-0.48929	0.128591	-3.81	0.001	-0.76059	-0.21799
LD.	-0.32342	0.093537	-3.46	0.003	-0.52077	-0.12608
L2D.	-0.13605	0.051002	-2.67	0.016	-0.24366	-0.02845
Inflation						
D1.	0.047701	0.020193	2.36	0.03	0.005098	0.090304
LD.	0.019159	0.014716	1.3	0.21	-0.01189	0.050206
L2D.	0.029332	0.009192	3.19	0.005	0.009938	0.048726
L3D.	0.01122	0.006276	1.79	0.092	-0.00202	0.024461
cons	-1.47131	0.741692	-1.98	0.064	-3.03614	0.093527

---

The lagged difference of public health financing (LD.) was negative ( $-0.31383$ ) and marginally significant ( $p = 0.084$ ), suggesting a moderate short-run adjustment effect. This implies that deviations from equilibrium in public health spending adjust downward in subsequent periods to restore long-run balance. The negative coefficient indicates that when public health financing rises sharply in one period, it tends to slow down in the next as the system self-corrects toward stability. This adjustment mechanism is consistent with the error correction term results, confirming the existence of a long-run equilibrium relationship. In the short term, changes in health financing appear sensitive to previous spending shocks, reflecting fiscal constraints and budgetary realignments. The gradual adjustment implies that public health allocations are influenced by both previous expenditure trends and short-term economic dynamics, leading to delayed but systematic stabilization toward long-term equilibrium levels.

The first lag of GDP growth (LD.) was negative ( $-0.09205$ ) and statistically significant ( $p = 0.042$ ), implying that short-term increases in GDP may initially reduce public health financing before stabilizing over time. This inverse short-run relationship could stem from the reallocation of fiscal resources to other growth-stimulating sectors, temporarily

diverting funds from health. However, the long-run effect was positive, suggesting that once economic growth stabilizes, higher national income enhances the fiscal capacity to fund public health. The short-run negative adjustment reflects the lag in revenue absorption and expenditure execution within government budgeting cycles. Overall, this finding demonstrates that GDP growth exerts a delayed but ultimately beneficial effect on healthcare financing in Kenya, with short-term fluctuations driven by transitional fiscal adjustments and the uneven timing of revenue inflows relative to expenditure commitments in the public sector.

Public debt showed mixed short-run dynamics. The second lag (L2D.) had a positive coefficient (0.089223) and was marginally significant ( $p = 0.069$ ), suggesting that increases in public debt two periods earlier tend to enhance public health financing in the short run. This indicates that borrowed funds are often redirected toward social spending, including healthcare, but only after implementation delays. The insignificance of the immediate and first lag (D1. and LD.) implies that newly acquired debt may not instantly affect health financing due to bureaucratic and procedural bottlenecks. The delayed positive effect underscores the time required for debt-funded programs to be absorbed into public expenditure frameworks. However, excessive debt accumulation could eventually crowd out fiscal space, leading to sustainability concerns. Thus, while debt supports short-term financing gaps in health expenditure, its benefits appear transient and contingent on efficient debt management and allocation practices.

The short-run coefficients for tax revenue (D1., LD., and L2D.) were all negative and highly significant, indicating a strong inverse relationship between tax changes and public health financing in the short term. Specifically, the first difference (D1. =  $-0.48929$ ,  $p =$

0.001) and subsequent lags (LD. =  $-0.32342$ ,  $p = 0.003$ ; L2D. =  $-0.13605$ ,  $p = 0.016$ ) reveal that increases in tax revenue initially correspond with reductions in health financing. This counterintuitive finding may arise from the lag between tax collection and expenditure allocation, where newly collected revenues are used to offset fiscal deficits or service public debt before being redirected toward health. It also reflects rigid budgetary structures and competing fiscal priorities. Nevertheless, in the long run, the relationship becomes strongly positive, implying that once fiscal adjustments are complete, stable and predictable tax inflows significantly enhance public health funding sustainability.

Inflation exhibited significant positive short-run effects on public health financing, with immediate (D1. =  $0.047701$ ,  $p = 0.03$ ) and second lag (L2D. =  $0.029332$ ,  $p = 0.005$ ) coefficients being significant. This suggests that short-term increases in inflation are associated with higher nominal public health expenditures, possibly due to cost-push pressures leading to increased budget allocations to maintain service delivery. The positive association indicates that the government adjusts spending upward to counter rising healthcare input prices, including medicines, equipment, and wages. However, prolonged inflationary trends could erode real purchasing power, reducing the effectiveness of nominal increases. The third lag (L3D.) was marginally significant ( $p = 0.092$ ), further supporting the persistence of inflationary effects across multiple quarters. Overall, inflation appears to drive reactive fiscal adjustments in health financing, where nominal budget expansions aim to preserve operational capacity against rising costs but may not translate into real service improvements.

## 4.6 Post Estimation Tests

### 4.6.1 Normality

For many statistical analyses and regression models used in econometric research, the normality of residuals is a crucial assumption. If residuals, which are the discrepancies between observed and anticipated values, have a normal distribution, the model's validity and dependability are supported. The Jarque-Bera test is a crucial instrument for evaluating normality since it looks at how much the skewness and kurtosis of residuals differ from a normal distribution. For this test, the alternative hypothesis states that the residuals do not follow a normal distribution, whereas the null hypothesis states that they do. According to research by Koizumi (2009), a p-value greater than 0.05 supports the null hypothesis, indicating normality, whereas a p-value less than 0.05 suggests rejection of the null hypothesis, indicating a deviation from normality.

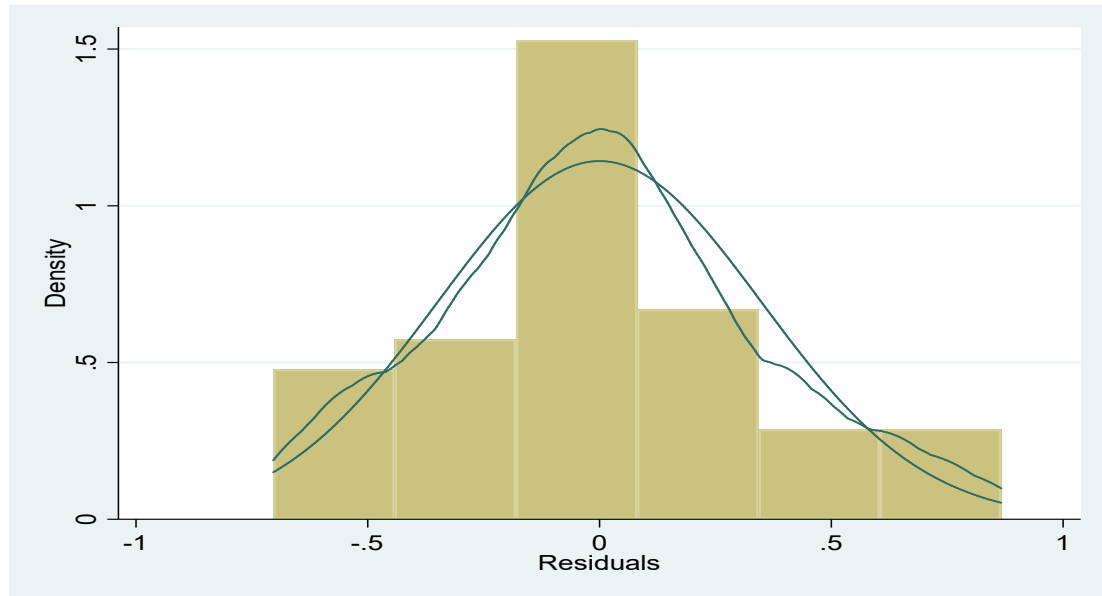
**Table 4. 12: Residual Normality**

<b>Stats</b>	<b>e (Residual)</b>
Kurtosis	1.979707
Skewness	-0.29731
Jarque Bera	1.162
P Value	0.5593

**Source: Author,2024**

The kurtosis value of 1.979707 is below the threshold value of 6 while skewness of -0.29731 which is below the threshold of 2 that the residuals were normally distributed. The p-value of 0.5593 is greater than 0.05 which indicates that there's no significant deviation from normality in the residuals. Since this p-value is well above the 0.05 threshold, it supports the null hypothesis of normality, suggesting that the residuals are likely drawn from a normal distribution. This is a favorable outcome for regression

analysis, indicating that the assumptions of ordinary least squares (OLS) are likely valid, with reliable and consistent results.



**Figure 4. 6: Residual Normality Plot**

**Source: Author,2024**

#### **4.6.2 Autocorrelation/Serial correlation Test**

The Breusch-Godfrey Serial Correlation LM Test was used in this study to determine whether autocorrelation exists in the dataset used for this analysis. The test's results, summarised in table 4.14, help determine whether autocorrelation exists in the time series data. Autocorrelation occurs when an error term from one period affects another period, or if the error term from one observation is influenced by the error term from another observation. As explained by Flick (2020), in a linear regression model, the successive values of the disturbance terms should be unrelated to one another.

**Table 4. 13: Breusch-Godfrey Serial Correlation LM Test**

<b>lags(p)</b>	<b>chi2</b>	<b>Df</b>	<b>Prob &gt; chi2</b>
1	2.366	1	0.124

**Source: Author, 2024**

In Table 4.14, the chi-squared value is 2.366, with a p-value of 0.124. Since the p-value is greater than 0.05, this suggests that the test does not find significant evidence to reject the null hypothesis of no serial correlation. This finding suggests that the regression model's serial correlation at the first lag is probably nonexistent. The assumption of linear regression is supported by the lack of substantial serial correlation, which is represented by a p-value greater than 0.05. This shows that the residuals of the model are generally independent throughout time. Since it suggests that autocorrelation has no effect on the model's estimations, this result is favourable for the regression analysis's robustness and dependability.

### **4.6.3 Heteroscedasticity**

Heteroscedasticity is a condition in regression analysis where the variance of the disturbance term (error term) is not constant across all values of the independent variable(s). This means that the spread or dispersion of the error terms changes depending on the values of the independent variables, often increasing or decreasing with the magnitude of these variables. Regression analysis's assumptions of constant variance (homoscedasticity) are broken when there is heteroscedasticity, as seen by the variance of the error term fluctuating from one observation to the next. The Breusch-Pagan Godfrey test was employed in the study to identify heteroscedasticity. This test determines if the error term's variance is dependent on the independent variable values, a finding that would

suggest heteroscedasticity. The test's alternative hypothesis contends that heteroscedasticity exists, whereas the null hypothesis maintains that it does not.

Table 4. 14: Heteroskedasticity

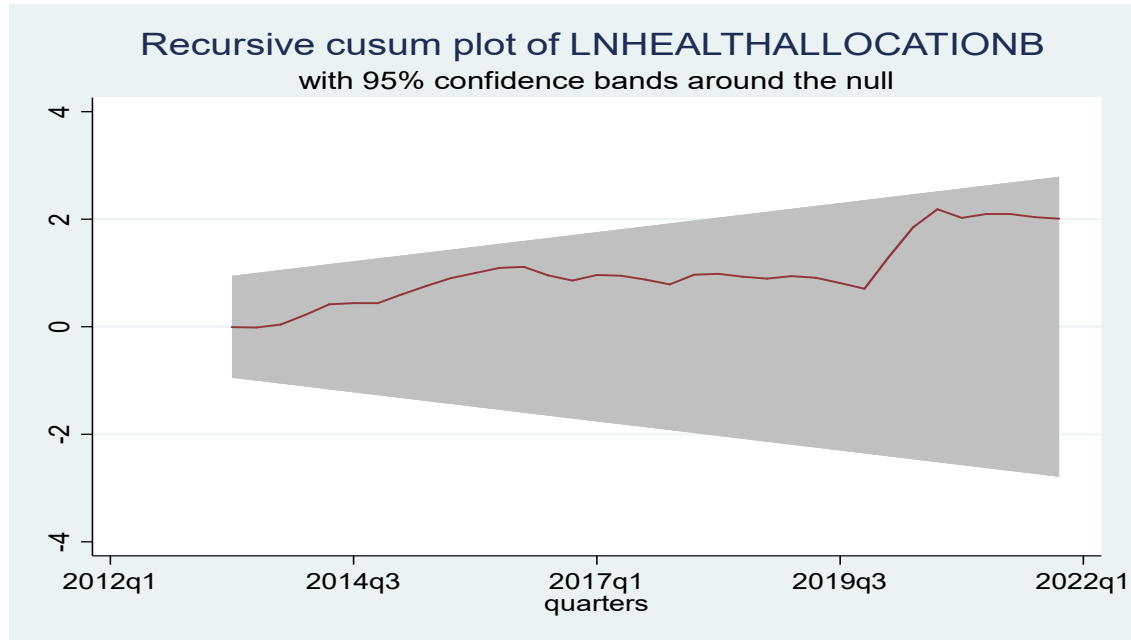
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity		
Ho: Constant variance		
Variables: fitted values of Public Health Financing		
chi2(1)	=	0.790
Prob > chi2	=	0.3726

**Source: Author, 2024**

The model's residuals do not exhibit any discernible heteroskedasticity, according to the results of the Breusch-Pagan/Cook-Weisberg test. With a p-value of 0.3726 and a chi-squared value of 0.790, the null hypothesis of constant variance cannot be rejected. This result implies that the regression model is stable, and the statistical inferences and standard errors are trustworthy, offering a strong basis for further analysis and interpretation.

#### 4.6.4 Model Stability by use of CUSUM Test

The CUSUM test involves plotting the cumulative sum of recursive residuals and comparing it against critical boundaries (Flick, 2020). To evaluate the stability of the regression model, a cumulative sum test (CUSUM) was conducted. According to (Flick, 2020) a stable model is expected to remain within the upper and lower bounds of the 0.05 significance level. As shown in Figure 4.7, all variables stay within these limits at both the upper and lower boundaries, indicating that the model is stable. This outcome confirms that the regression model used for analysis is robust and suitable for the study's purpose.



**Figure 4. 7: CUSUM Test stability Output**

**Source: Author,2024**

If the CUSUM plot would have indicated instability, it would have suggested that the relationship between public healthcare financing and the independent variables had changed over time. This would have necessitated further investigation to identify potential structural breaks or other factors influencing the stability of the model.

**Table 4. 15: CUSUM Test stability Output**

<b>Ho: No structural break</b>							
<b>Statistic</b>	<b>Test Statistic</b>	<b>1% Critical Value</b>	<b>5% Critical Value</b>	<b>10% Critical Value</b>			
recursive	0.8051	1.143	0.9479	0.85			

**Source: Author,2024**

The test statistic of 0.8051 is lower than the critical values for the 1%, 5%, and 10% levels, indicating that it does not exceed the threshold for statistical significance. Since the test

statistic is below these critical values, there's no evidence to reject the null hypothesis, suggesting no structural break in the data. Given that the test statistic does not exceed the critical values, the results suggest that there is no significant structural break in the data. This implies that the model's parameters are stable over time, providing confidence in the consistency of the results and indicating that the model can reliably predict outcomes based on its current parameter estimates (Kumar, 2019).

## **4.7 Discussion of the Results**

### **4.7.1 Impact of Inflation on Public health financing in Kenya**

The study established that inflation has a dual impact on public healthcare financing in Kenya, with contrasting short-run and long-run effects. Correlation analysis revealed a negative and significant relationship, meaning that higher inflation is generally associated with reduced healthcare allocations. In the long run, VECM estimates confirmed this inverse relationship, showing that a 1% increase in inflation reduces healthcare financing by approximately 0.11% (coef. =  $-0.1069$ ,  $p < 0.05$ ). This reflects the erosion of the real value of fiscal resources, where rising prices crowd out spending capacity, limiting funds available for health programs. However, in the short run, inflation showed significant positive effects, suggesting that governments temporarily increase nominal budget allocations to counter rising costs of medicines, wages, and hospital inputs. Nonetheless, prolonged inflationary pressures undermine sustainability, weakening healthcare funding efficiency over time.

Inflation has a complex influence on public healthcare financing in Kenya, with its effects differing over time. In the short term, rising prices often compel the government to

increase nominal allocations to healthcare in order to cushion the sector against escalating costs of drugs, wages, and medical supplies. This creates an appearance of expanded funding, as budgets are adjusted upward to meet immediate needs. However, these adjustments are usually temporary and do not fully address the erosion of real purchasing power caused by inflation. Over the long run, sustained inflation undermines fiscal stability, crowding out resources that could otherwise be directed to essential health services. The rising cost of living and service provision reduces the government's ability to meet growing healthcare demands, weakening efficiency and sustainability. Thus, while short-term measures may mitigate immediate pressures, persistent inflation poses a significant threat to long-term healthcare financing in Kenya

These results are supported by previous studies. A study by Keehan (2020) examined the impact of inflation on public health financing in several African countries. The findings supported the negative correlation between inflation and public health funding, indicating that increases in inflation were associated with decreases in public healthcare spending (Keehan, 2020). The study also identified factors such as erosion of tax revenue and increased debt servicing costs during inflationary periods as key contributors to the negative correlation.

Furthermore, if inflation increases interest rates, governments might prioritize debt repayment over social spending, further squeezing public health budgets. Osaze (2021) established the dynamic relationship between macroeconomic variables and healthcare spending across SSA countries. The study advocated for effective policy efforts towards reducing the high inflation rate, strengthening government institutions, tackling corruption and improving per capita income. Inflation monitoring and forecasts help inform

allocation of adequate funds to healthcare with a view to cater for any future inflationary pressures and trends.

Some studies suggest that inflation might have a short-term negative impact on public health spending due to budgetary pressures. However, in the long run, governments might increase nominal health spending to compensate for inflation, even if real spending power doesn't necessarily improve. Contrary to the findings presented, a study by Montiel (2019) analyzed the relationship between inflation and public health financing across various low-income countries. Their analysis revealed a significant negative correlation between inflation and healthcare financing.

The researcher suggested that other factors, such as government priorities and external funding sources can also substantially influence on healthcare financing decisions other than inflation as an area for further research (Montiel, 2019). According to a study conducted by Morgan (2023) on 'Health care financing in times of high inflation,' spending on healthcare jumped by almost 1% of GDP across middle income and developed countries, on average, during the high inflationary period of 2019-2022 as governments stepped in to cover unexpected public health and treatment costs while maintaining the health standards.

#### **4.7.2 Impact of Public Debt on Public Health Financing in Kenya**

Public debt exhibited a positive association with healthcare financing, though its effects varied between short-run and long-run horizons. Correlation results showed a strong and statistically significant positive relationship, suggesting that borrowing has historically contributed to increased allocations to the health sector. In the long run, the VECM results

indicated a positive but only marginally significant effect (coef. = 0.1262,  $p = 0.059$ ), implying that debt contributes modestly to financing healthcare, though the effect is weaker compared to GDP growth or tax revenue. In the short run, immediate debt effects were insignificant, but the second lag was positive, highlighting that borrowed funds often take time before translating into health financing due to bureaucratic and implementation delays. These findings suggest that while debt plays an important role in bridging fiscal gaps for healthcare, its benefits are often delayed and may pose sustainability risks if debt servicing obligations outpace social spending needs.

Public debt plays an important role in supplementing healthcare financing in Kenya, but its effects are neither immediate nor risk-free. Borrowing allows the government to fill budgetary gaps and fund critical health programs when revenue inflows are inadequate. In some cases, debt has facilitated the expansion of hospitals, procurement of essential medicines, and financing of large-scale health infrastructure. However, the benefits are not always realized quickly, since bureaucratic and administrative processes often delay the translation of borrowed resources into actual spending. In the longer term, heavy reliance on debt creates challenges, as the cost of servicing these obligations may reduce the fiscal space available for healthcare. Rising repayment commitments risk crowding out social expenditure if not managed prudently. Therefore, while debt can provide short-term relief and support, it should be approached cautiously to ensure it does not compromise the sustainability of healthcare financing in future years..

Public debt can positively impact public health financing for several reasons. Governments often borrow to finance essential public services including healthcare. An increase in public debt may indicate that the government is investing in critical public

health infrastructure, new hospitals, or expanded healthcare programs. This type of borrowing can lead to substantial improvements in public health delivery. Public debt might be used to fund broader economic stimulus measures, contributing to overall economic growth (Federspiel *et al*, 2022). As the economy grows, governments may allocate more resources to public health, thereby increasing the funding for these services (Kibigo, 2021). This strategic use of borrowing can support large-scale public health projects, making a noticeable impact on healthcare infrastructure and service quality.

The results are supported by prior studies, for instance, Smith *et al.* (2019) conducted a cross-country analysis of developing nations, including Kenya, and found a significant positive impact of public debt on public health financing. The researchers highlighted the role of borrowing in funding critical public services, including healthcare infrastructure and programs. Basu (2020) focused on case studies from sub-Saharan Africa, providing empirical evidence of the positive impact of public debt on public health financing. The study emphasized the role of borrowing in funding essential healthcare infrastructure projects, leading to improvements in healthcare delivery and outcomes.

Lee (2023) analyzed data from low-income countries and found no significant impact of public debt on public health financing. The researchers suggested that other factors, such as government priorities and debt management strategies, may influence healthcare financing decisions more strongly than public debt alone (Lee, 2023). Kim and Jones (2021) examined the relationship between public debt and public health financing over time and found a negative impact of public debt on healthcare expenditure in several countries, including Kenya. The researchers suggested that high levels of debt servicing obligations may crowd out spending on essential public services like healthcare.

Said and Sani (2020) investigated the connection between the amount of public debt and health spending in 43 SSA nations between 2000 and 2014. The study demonstrated a negative association between the public debt burden and healthcare spending in SSA using the Generalized Method of Moment (GMM) approach. (Lartey, 2018) found out that Many African nations use a large percentage of their annual income to pay off loan interest, leaving little domestic money for other economic sectors, making it difficult to support vital sectors like healthcare.

#### **4.7.3 Impact of GDP Growth on Public Health Financing in Kenya**

The findings revealed that GDP growth significantly influences public healthcare financing in Kenya, with stronger effects in the long run than in the short run. Correlation results showed a positive and significant relationship, suggesting that periods of economic expansion generally coincide with greater investment in health. The long-run VECM estimates reinforced this, with GDP growth exerting a statistically significant and positive effect. This indicates that a 1% increase in GDP growth results in about a 0.27% rise in healthcare financing, reflecting enhanced fiscal capacity and improved government revenues during sustained economic expansion. Conversely, in the short run, the first lag was negative and significant, meaning that initial increases in GDP may reduce health allocations as resources are redirected toward infrastructure or growth-supporting sectors. Overall, while short-run adjustments create temporary trade-offs, GDP growth ultimately supports greater healthcare financing in the long term.

Economic growth strongly influences healthcare financing in Kenya, though its impact tends to be more pronounced over the long run. When the economy expands, the

government's revenue base widens, creating opportunities for increased allocations to the health sector. This provides fiscal space for investment in healthcare infrastructure, staff training, and expanded service delivery. However, the positive outcomes of economic growth are not always immediate. In the short run, growth often redirects resources to other sectors such as infrastructure, manufacturing, and industrial development, which are seen as catalysts for sustaining economic performance. This can temporarily limit the amount directed to healthcare. Over time, however, consistent and inclusive economic growth strengthens fiscal capacity and enables governments to finance health services more reliably. The key implication is that sustained economic development is essential for building a stable foundation for healthcare financing, even though trade-offs may occur in the short term. As the economy expands, the government tends to generate more revenue through taxes, business activity, and consumer spending. This increase in revenue providing greater budgetary flexibility, allowing for more substantial allocations to public health services (Murunga, 2019).

With additional resources, the government can invest in healthcare infrastructure, hire more personnel, and implement new health programs, contributing to overall public health improvements (Agatha *et al.*, 2023). Economic prosperity can also create a more favorable environment for prioritizing public health. Improved economic conditions can lead to a greater focus on social development, including healthcare (Raghupathi, 2020). Additionally, a strong economy often relies on a healthy and productive workforce. Increased GDP growth can incentivize governments to invest in public health to ensure a healthy population capable of supporting and propelling economic activity as stated by Osoro (2015).

The results are supported by other studies. Barro (2017) investigated the determinants of economic growth using cross-sectional data for approximately 100 countries. He discovered a strong positive relationship between economic growth and health care spending, concluding that improved health played a vital role in sustaining economic growth. Mudida (2018) examined conditional convergence and endogenous growth models, revealing a significant positive relationship between output growth and government consumption, which includes public health spending. Murunga (2019) found a positive correlation between GDP per capita and health spending in Kenya, suggesting economic growth can lead to increased public health funding.

A study by Osoro (2015) noted that for every one percent increase in GDP, 0.78 of that goes to public healthcare spending. This explains why Kenya should strive to grow its GDP and increase revenue to expand allocation to sectors like healthcare. Raghupathi (2020) on 'Healthcare Expenditure and Economic Performance' explores the association of public health spending and economic performance across the United States. The overall results strongly showed a positive correlation between GDP growth and healthcare financing.

However, Schuknecht (2022) analyzed public spending trends throughout the twentieth century. While they acknowledged the positive relationship between GDP growth and public health expenditures, he noted that crowding-out effects sometimes occurred when rapid economic growth led to increased private sector competition, diminishing the relative size of the public sector (Schuknecht, 2022).

#### **4.7.4 Impact of Tax Revenue on Public Health Financing in Kenya**

Tax revenue emerged as the most important determinant of public healthcare financing in Kenya, with strong evidence of a positive and highly significant long-run effect. Correlation analysis revealed a significant positive relationship, showing that improved tax collection has historically expanded fiscal space for healthcare. The long-run VECM estimates confirmed this, with tax revenue exerting the strongest effect among all variables. A 1% increase in tax revenue was associated with a 0.66% rise in healthcare funding, underscoring the importance of domestic resource mobilization. Interestingly, the short-run results showed negative and significant coefficients across current and lagged values. This counterintuitive finding suggests that newly collected tax revenues are first absorbed into deficit reduction and debt servicing before being channeled to healthcare. Over time, however, stable and predictable tax inflows become the most reliable and sustainable source of healthcare financing

Tax revenue stands out as the most reliable and sustainable source of public healthcare financing in Kenya. Unlike debt or external aid, taxes provide predictable and recurrent resources that the government can allocate toward health services. When domestic resource mobilization is strong, the state has greater capacity to finance essential medical supplies, infrastructure development, and workforce expansion. Nevertheless, the immediate impact of tax collection is sometimes muted, as newly mobilized revenues are often channeled first into deficit reduction and debt repayment before reaching the health sector. This explains why healthcare financing may not always reflect short-term increases in tax revenue. Over the long run, however, steady tax inflows remain the cornerstone of sustainable financing, reducing dependency on volatile external sources. Strengthening

tax administration and broadening the tax base will therefore be critical for ensuring that Kenya's healthcare system is adequately and consistently funded into the future.

As tax revenue grows, governments have greater flexibility to invest in critical areas like public health, supporting new programs, infrastructure, and personnel. This can lead to better healthcare outcomes and enhanced public health systems. Basu (2015) stated that the primary source of government funding for establishing and improving health systems around the world is revenues from taxes. A nation's ability to pay for essential infrastructure like roads, electricity, social services like health and education, and other public goods depends heavily on its ability to collect taxes.

Gaalya (2017) found consistent evidence supporting the positive relationship between tax revenue and public health financing across different countries. Their analysis revealed that higher tax revenue was associated with increased allocations to public health budgets, contributing to improved healthcare infrastructure, access to essential services, and population health outcomes. Research by Johnson and Brown (2018) investigated the impact of tax policy changes on public health financing in several developing nations. Their findings indicated that countries experiencing growth in tax revenue tended to allocate a larger portion of their budgets to public health sectors, leading to expanded healthcare coverage, reduced disease burden, and improved health indicators.

Doherty (2018) observed that higher tax revenue positively influenced public health financing in urban areas, particularly in regions with well-established healthcare systems. Their analysis suggested that increased tax revenue allowed governments to implement targeted public health interventions, such as disease prevention programs and health

education campaigns, resulting in better health outcomes for the population. Contrary to the expected relationship, a study by Lee and Kim (2017) found limited evidence supporting the direct link between tax revenue and public health financing in low-income countries. Their analysis suggested that while tax revenue was important for overall government revenue, it did not always translate into increased allocations for public health services due to competing budgetary priorities and inefficiencies in resource allocation.

Research conducted by Moore (2018) examined the relationship between tax revenue and public health financing in middle-income countries. Their findings revealed that while tax revenue had a positive association with government spending on healthcare, the impact size varied significantly depending on the country's economic structure, political factors, and healthcare policy frameworks. In a study by Garcia and Martinez (2019), it was found that tax revenue alone may not be sufficient to ensure adequate financing for public health services, especially in contexts where corruption, mismanagement, and budgetary constraints hinder effective resource allocation.

## CHAPTER FIVE

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Introduction

This chapter presents the summary of the findings from preceding chapter. Besides, the chapter also include conclusion as per the specific objectives. Further, recommendations are provided based on findings and observations of the study. The chapter also contains highlights of further studies to future scholars and academicians.

#### 5.2 Summary of the Findings

The purpose of the study was to examine the impact of selected macroeconomic variables on Public Healthcare Financing from 2013 to 2022 in Kenya with key interest on inflation, public debt, GDP growth, and tax revenue. Secondary data was collected on quarterly basis between financial years 2012/2013 to 2021/2022. Quarterly time series data covering the period 2005 to 2024 (80 observations) were utilized. Preliminary diagnostic tests confirmed the suitability of the data for econometric analysis. The Jarque–Bera test results indicated that all variables followed a normal distribution, satisfying one of the key regression assumptions. Stationarity analysis using the Augmented Dickey-Fuller (ADF) test revealed a mix of integration orders, with GDP growth rate, Tax revenue and consumer price index being stationary at level  $I(0)$ , while public debt and public health financing achieved stationarity after first differencing  $I(1)$ . Given this mixture of  $I(0)$  and  $I(1)$  variables, the study employed the Autoregressive Distributed Lag (ARDL) framework for cointegration testing. Lag length selection based on the Akaike Information

Criterion (AIC) identified four lag as optimal, ensuring model parsimony and accuracy. The ARDL bounds test confirmed a long-run equilibrium relationship among the variables, as the calculated F-statistic exceeded the upper bound critical value at the 5% level. Consequently, the study adopted the Vector Error Correction Model (VECM) to capture both the short-term dynamics and long-run adjustments between selected Macroeconomic variables and Public Healthcare Financing in Kenya. The summary of the findings per the objectives are presented below.

### **5.2.1 Impact of Inflation on Public Healthcare Financing in Kenya**

The study established that inflation has a dual impact on public healthcare financing in Kenya, with contrasting short-run and long-run effects. Correlation analysis revealed a negative and significant relationship ( $r = -0.4889$ ,  $p = 0.0014$ ), meaning that higher inflation is generally associated with reduced healthcare allocations. In the long run, VECM estimates confirmed this inverse relationship, showing that a 1% increase in inflation reduces healthcare financing by approximately 0.11% (coef. =  $-0.1069$ ,  $p < 0.05$ ). This reflects the erosion of the real value of fiscal resources, where rising prices crowd out spending capacity, limiting funds available for health programs. However, in the short run, inflation showed significant positive effects (D1. =  $0.0477$ ,  $p = 0.03$ ; L2D. =  $0.0293$ ,  $p = 0.005$ ), suggesting that governments temporarily increase nominal budget allocations to counter rising costs of medicines, wages, and hospital inputs. Nonetheless, prolonged inflationary pressures undermine sustainability, weakening healthcare funding efficiency over time. Therefore, the first null hypothesis was not support whereby there is statistically significant impact of inflation on public healthcare financing in Kenya.

### **5.2.2 Impact of Public Debt on Public Healthcare Financing in Kenya**

Public debt exhibited a positive association with healthcare financing, though its effects varied between short-run and long-run horizons. Correlation results showed a strong and statistically significant positive relationship ( $r = 0.6891$ ,  $p = 0.000$ ), suggesting that borrowing has historically contributed to increased allocations to the health sector. In the long run, the VECM results indicated a positive but insignificant effect (coef. = 0.1262,  $p = 0.059$ ), implying that debt contributes modestly to financing healthcare, though the effect is weaker compared to GDP growth or tax revenue. In the short run, immediate debt effects were insignificant, but the second lag ( $L2D. = 0.0892$ ,  $p = 0.069$ ) was positive, highlighting that borrowed funds often take time before translating into health financing due to bureaucratic and implementation delays. These findings suggest that while debt plays an important role in bridging fiscal gaps for healthcare, its benefits are often delayed and may pose sustainability risks if debt servicing obligations outpace social spending needs. Since the P value was 0.059, the second null hypothesis was supported whereby there is statistically significant impact of tax revenue on public healthcare financing in Kenya

### **5.2.3 Impact of GDP Growth on Public Healthcare Financing in Kenya**

The findings revealed that GDP growth significantly influences public healthcare financing in Kenya, with stronger effects in the long run than in the short run. Correlation results showed a positive and significant relationship ( $r = 0.406$ ,  $p = 0.0093$ ), suggesting that periods of economic expansion generally coincide with greater investment in health. The long-run VECM estimates reinforced this, with GDP growth exerting a statistically

significant and positive effect (coef. = 0.2748,  $p = 0.000$ ). This indicates that a 1% increase in GDP growth results in about a 0.27% rise in healthcare financing, reflecting enhanced fiscal capacity and improved government revenues during sustained economic expansion. Conversely, in the short run, the first lag (LD. =  $-0.0921$ ,  $p = 0.042$ ) was negative and significant, meaning that initial increases in GDP may reduce health allocations as resources are redirected toward infrastructure or growth-supporting sectors. Overall, while short-run adjustments create temporary trade-offs, GDP growth ultimately supports greater healthcare financing in the long term. The third null hypothesis was not supported whereby there is a statistically significant impact of GDP growth on public healthcare financing in Kenya.

#### **5.2.4 Impact of Tax Revenue on Public Healthcare Financing in Kenya**

Tax revenue emerged as the most important determinant of public healthcare financing in Kenya, with strong evidence of a positive and highly significant long-run effect. Correlation analysis revealed a significant positive relationship ( $r = 0.584$ ,  $p = 0.0001$ ), showing that improved tax collection has historically expanded fiscal space for healthcare. The long-run VECM estimates confirmed this, with tax revenue exerting the strongest effect among all variables (coef. = 0.6634,  $p = 0.000$ ). A 1% increase in tax revenue was associated with a 0.66% rise in healthcare funding, underscoring the importance of domestic resource mobilization. Interestingly, the short-run results showed negative and significant coefficients across current and lagged values (D1. =  $-0.4893$ ,  $p = 0.001$ ; LD. =  $-0.3234$ ,  $p = 0.003$ ; L2D. =  $-0.1361$ ,  $p = 0.016$ ). This counterintuitive finding suggests that newly collected tax revenues are first absorbed into deficit reduction and debt servicing before being channeled to healthcare. Over time, however, stable and predictable

tax inflows become the most reliable and sustainable source of healthcare financing. Therefore, the fourth null hypothesis was not supported whereby there is no statistically significant impact of tax revenue on public healthcare financing in Kenya.

### **5.3 Conclusion**

The study rejected the null hypothesis and affirmed that there is a statistically significant impact of inflation on public healthcare financing in Kenya in the long run. Inflation presents a complex challenge for public healthcare financing in Kenya. In the short term, governments often increase budgetary allocations to cushion the sector against rising costs of medicines, hospital equipment, and personnel. This creates the impression of an expanding health budget. However, over time, inflation erodes the real value of these allocations, diminishing the sector's purchasing power and undermining sustainability. Essential services become more expensive to provide, while the same resources finance fewer programs. Ultimately, inflation creates fiscal instability, forcing trade-offs in resource allocation. The conclusion is that unchecked inflation weakens the ability of government to meet long-term healthcare needs, making it a major threat to stable and sustainable health financing in Kenya.

The study accepted the null hypothesis which affirmed that there is no statistically significant impact of public debt on public healthcare financing in Kenya in the long run. Public debt provides an important but double-edged tool for financing healthcare in Kenya. Borrowing allows the government to bridge budgetary gaps and finance health programs when revenues are insufficient. It supports infrastructure development and the procurement of essential medical supplies, ensuring that critical services are not disrupted. However, reliance on debt creates long-term sustainability risks. As debt obligations grow, a larger

portion of government revenue is diverted to servicing loans, leaving less fiscal space for healthcare. Delays in translating borrowed funds into actual health financing further reduce effectiveness. Thus, while debt plays a supportive role in supplementing public healthcare funding, overdependence on it threatens fiscal stability and could compromise future healthcare investments.

The study rejected null hypothesis in favour of alternative hypothesis and affirmed that there is statistically significant positive impact of GDP growth on public healthcare financing in Kenya in the long run. Economic growth remains a key driver of public healthcare financing in Kenya. Periods of strong GDP growth expand the government's revenue base, allowing for higher allocations to the health sector. This creates opportunities for long-term investments in infrastructure, medical training, and service delivery improvements. However, the benefits are not always immediate. In the short run, growth may prioritize infrastructure, industrialization, or other competing demands, leaving health with relatively lower allocations. Over time, however, a stronger economy consistently enhances the state's capacity to fund healthcare. The conclusion is that sustained and inclusive economic growth is vital for expanding fiscal space and ensuring reliable, long-term financing for Kenya's healthcare system.

The study rejected null hypothesis in favour of alternative hypothesis and affirmed that there is statistically significant positive impact of tax revenue on public healthcare financing in Kenya in the long run. Tax revenue is the most reliable and sustainable source of public healthcare financing in Kenya. Unlike debt or external aid, tax income provides predictable and recurring resources that governments can allocate to the health sector. Expanding domestic tax capacity strengthens fiscal independence, allowing for steady

investment in health infrastructure, staff remuneration, and essential medical supplies. However, short-term pressures often divert new tax revenues to other competing priorities, including debt repayment and deficit reduction. Despite these challenges, the long-term role of taxation is central to financing universal health coverage and reducing reliance on unsustainable borrowing. The conclusion is that strengthening tax mobilization and efficiency is essential for achieving sustainable and equitable healthcare financing in Kenya.

#### **5.4 Recommendations of the Study**

The study recommended that;

To mitigate the adverse effects of inflation on healthcare financing, Kenya should adopt strategies that safeguard the real value of health allocations. The government needs to implement indexation mechanisms that adjust healthcare budgets in line with prevailing inflation levels, ensuring purchasing power is maintained. Strengthening procurement efficiency and reducing wastage can also minimize the impact of rising prices on medicines and equipment. Furthermore, fiscal and monetary authorities should pursue policies that stabilize inflation, such as prudent monetary management and effective food and energy pricing policies, given their influence on overall inflation. Medium- and long-term measures should include investing in domestic pharmaceutical and medical equipment production to reduce import reliance, which is particularly vulnerable to inflationary shocks. Stabilizing inflation is therefore essential to sustaining predictable and effective healthcare financing.

Kenya should adopt a strategic borrowing framework to ensure that debt supports healthcare financing without undermining fiscal sustainability. Borrowed funds should be directed toward long-term, high-impact investments in the health sector such as hospitals, diagnostic infrastructure, and digital health systems, rather than recurrent expenditures. The government should also strengthen debt management practices to prevent healthcare allocations from being crowded out by rising debt servicing obligations. Complementary strategies such as diversifying financing sources, leveraging public–private partnerships, and prioritizing concessional borrowing over commercial loans can help balance debt sustainability with healthcare needs. Ultimately, debt should be treated as a supplementary rather than primary source of healthcare financing, ensuring that future fiscal space is not compromised.

Kenya should align its healthcare financing strategy with long-term economic growth planning. Policymakers need to ensure that gains from GDP expansion are systematically translated into higher investments in the health sector. One approach is to adopt fiscal rules that commit a fixed proportion of GDP growth to healthcare spending, thus institutionalizing the link between growth and health investment. Short-term trade-offs should be managed by prioritizing social spending during economic booms, preventing the diversion of resources exclusively toward infrastructure or industrialization.

Kenya should prioritize domestic resource mobilization as the backbone of sustainable healthcare financing. Efforts should focus on expanding the tax base by formalizing the informal sector, broadening coverage of value-added tax, and strengthening compliance through digital tax systems. Moreover, a portion of tax revenue could be earmarked specifically for healthcare through health taxes on alcohol, tobacco, and sugary drinks,

which would both raise funds and promote public health. Building a robust tax system will ultimately reduce over-reliance on debt and external aid, securing long-term financing for universal healthcare.

### **5.5 Areas for Further Studies**

The study involved the impact of selected Macroeconomic variables on Public Healthcare Financing from 2013 to 2022 in Kenya. This research was focused to only one country; therefore, a cross-sectional study can be conducted on panel data covering several countries. Even though the study focused on selected macroeconomic factors, it did not include a moderating or mediating variable. Therefore, further studies should endeavor to include a moderating variable such as unemployment, population growth and/or institutional capacity.

Lastly, from the correlation analysis, Inflation has a positive and insignificant coefficient in the long run. However, in the short run, it has a positive and statistically significant impact, Therefore, further studies should expand the time scope of the study to more than 20 years to capture cyclic changes in inflation.

## REFERENCES

- Abbott, A. (2021). Government response to increased demand for public services: The cyclical nature of government health expenditures. *European Journal of Political Economy*, 68, 101988.
- Agatha A.S. (2023). The costs and financing needs of delivering Kenya's primary health care service package. *Public Health, Health economics, Volume 11*, <https://doi.org/10.3389/fpubh.2023.1226163>, 14, 23 (12).
- Allison, C. (2017). *Spillovers and Tax sovereignty*. McGill University.
- Appiah, S. N., Malec, K., Phiri, J., Maitah, K. M., & Smutka, L. (2022). *Key drivers of public debt levels: empirical evidence from Africa: sustainability*. Prague, Czech Republic: Department of Economics, Faculty of Economics and Management, Czech University of Life Sciences in Prague, 16500 .
- Asante, A. W. (2020). Health financing in sub-Saharan Africa: from analytical frameworks to empirical evaluation. *Applied health economics and health policy*, 743-746.
- Atim, C. A. (2020). An assessment of domestic financing for reproductive, maternal, neonatal and child health in sub-Saharan Africa: potential gains and fiscal space. *Applied Health Economics and Health Policy*, 789-799.
- Barmaasai, A. (2021). *Healthcare Budget Allocation and Economic Growth Among County Governments in the North Rift Region in Kenya* . Nairobi: University press.
- Basu, S. (2015). Financing universal health coverage-impacts of alternative tax structures on public health systems: cross-national modelling in 89 low-income and middle-income countries. *Lancet Global*.
- Bethel, A. (2024). Inflation and health: a global scoping review . . *The Lancet Global Health*, 12(6), e1038-e1048.

- Cashin, C. (2022). Public financing for primary health care, universal health coverage and strengthening health security. *Lancet Global Health*.
- Cashin, C. (2016). *Health Financing Policy, The Macroeconomic, Fiscal, and Public Finance context*. Washington D.C: World Bank,1818 H Street NW,
- Chapin,A, Dieleman, J. & Angela, M. (2015). Trends and drivers of government health spending in sub-Saharan Africa, 1995-2015. *BMJ Global Health*.
- Cooray, A. (2017). How Does Corruption Affect Public Debt? An Empirical Analysis, World Development. *World Development*.
- Dash, D. K. (2019). Impact of macro-fiscal determinants on health financing: empirical evidence from low-and middle-income countries. *Global Health policy*.
- Deepak, K. & Behera, U. D. (2019). Impact of macro-fiscal determinants on health financing: empirical evidence from low-and middle-income countries. *Global Health policy*.
- Doherty, J. K. (2018). Does expanding fiscal space lead to improved funding of the health sector in developing countries?: lessons from Kenya, Lagos State (Nigeria) and South Africa. *Global health action*.
- Emeru, G. M. (2023). Impact of Public Expenditure on Economic Growth in the Case of Ethiopia. *Scientific World Journal*, doi: 10.1155/2023/9305196. PMID: 36776353.
- Eneji, M. J. (2013). Health Care Expenditure, Health Status and National Productivity in Nigeria. *Journal of Economics and International Finance*, 258-272 <https://doi.org/10.5897/JEIF2013.0523>.
- Federspiel, F., Borghi, J., & Martinez-Alvarez, M. (2022). Growing debt burden in low-and middle-income countries during COVID-19 may constrain health financing. *Global Health Action*, 15(1), 2072461.

- Flick, U. (2020). Introducing research methodology: thinking your way through your research project. *Introducing Research Methodology*, 1-416.
- Gaalya, M. S. (2017). Trade openness and tax revenue performance in East African countries. *Modern Economy*, 8(5), 690-711.
- Garcia, L. R. (2019). Predictive capacity of country inflation rate to life expectancy at birth. *International Journal of Advanced and Applied Sciences*, 6(12), 67-70.
- Garrison, P. N. (2018). *Value, Perspective, and Decision Context - A Health Economics Approach*. Seattle WA, USA: University of Washington.
- Gumede, N. & Dipholo, K. (2014). Governance, Restructuring and the New Public Management Reform: South African Perspectives. *Research Gate*.
- Hanson, K. (2022). Financing primary health care: putting people at the centre. *Lancet Glob Health*.
- Hesham, N. (2020). The validity of Wagner's law in Egypt from 1960–2018. *International Journal of Business Research and Development*.
- Jalles, G. (2019). *Wagner's law and governments' functions: granularity matters*. Emerald: Emerald Publishing Limited.
- Kabia, E. M. (2019). Experiences of the poor with health financing reforms that target them in Kenya. *International journal for equity in health*, 18, 1-14.
- Kairu, A. O. (2021). Examining health facility financing in Kenya in the context of devolution. *BMC health services research*, 21, 1-13.
- Kasirye, S. S. (2020). *Estimating Catastrophic Health Expenditures from Household Surveys of Sub Sahara Africa*. Makerere, Uganda: Economic Policy Research Centre (EPRC).

- Keehan, S. P. (2020). *National Health Expenditure Projections: Expected Rebound In Prices Drives Rising Spending Growth: National health expenditure*. London: 34 Street London press.
- Khalifa, M. B. (2017). Healthcare spending and health outcomes: evidence from selected East African countries. . *African health sciences*, .
- Kibigo, C. &. (2021). Influence of public debt on economic growth in kenya: an empirical analysis. *Journal of International Business, Innovation and Strategic Management*, 5(2), 18-30.
- Kiptum, K. (2020). Relationship between Kenya's economic growth and inflation. *The Springer; Business and Economics*.
- Kipyego, S. N. (2022). Relationship between public debt and financial development in Kenya. ., *International Journal of Finance and Accounting*, 7(4), 55-83.
- Koizumi, K. O. (2009). On Jarque-Bera tests for assessing multivariate normality. *Journal of Statistics: Advances in Theory and Applications*, 1(2), 207-220.
- Konczal, M. (2023). *Inflation in 2023: Causes, Progress, and Solutions*. Chicago: Roosevelt Institute.
- Kumar, N. K.-V. (2019). Solidarity for comparative research, design, and practice. *Proceedings of the ACM on Human-Computer Interaction*, 3(CSCW), 1-24.
- Lakin, J. (2020). The politics of tax reform in low and medium income countries. *International budget partnership*.
- Lartey, E. Y. (2018). Public debt and economic growth: Evidence from Africa . *International Journal of Economics and Financial Issues*, 8(6), 35-45.
- Lee, C. (2023). Impact of Public Debt on Economic Growth: A Quantile Regression Approach. *South Asian Journal of Macroeconomics and Public Finance*,, 12(2), 250-278.

- Maritan, C. A., & Lee, G. K. (2017). Resource allocation and strategy. *Journal of Management*, 43(8), 2411-2420.
- Mengiste, B. W. (2019). Public Choice Theory: Its Application and Challenges in Public sector. *International Journal of African and Asian Studies*, Addis Ababa, Ethiopia.
- Montiel, P. J. (2019). Inflation in low-income countries. . *World Bank Policy Research Working Paper*, (8934).
- Moore, M., Prichard, W., & Fjeldstad, O. H. (2018). Taxing Africa: coercion, reform and development. *Bloomsbury Academic*, 288.
- Munyua, N. O. (2020). Public financing for health in Africa: 15% of an elephant is not 15% of a chicken. *Africa Renewal*.
- Murango, J. (2017). *Impact of investment in healthcare on economic development in Kenya*. Nairobi, Kenya: KCA University.
- Musgrave, R. A. (1969). *Fiscal Systems*. . New Haven: Yale University Press.
- Ndajiwo, M. (2020). *Health Financing & Taxation for Sustainable Healthcare*. Jaflo Limited | Block 3 | 106 Brookside Drive | Westlands: Tax Justice Network Africa
- Neumann, L. G. (2018). *Value, Perspective, and Decision Context - A Health Economics Approach*. Seattle, WA, USA: University of Washington,.
- Okorie, G. (2020). Impact of disaggregated public expenditure on inflation rate in selected African countries: A panel cointegration analysis. *West African Journal of Monetary and Economic Integration*, 20(1a), 1-21.
- Oraro, T. (2020). Policy levers and priority-setting in universal health coverage: a qualitative analysis of healthcare financing agenda setting in Kenya. *BMC health services research*,, 20, 1-11.

- Osaze, D. (2021). Modeling the Determinants of Health Spending Across Sub-Saharan African Countries: A Macro Level Study. *International Journal of economics, management and accounting*, 409-432.
- Osoro, K. (2015). *Macroeconomic and public health expenditures in Kenya* . Nairobi, Kenya: University of Nairobi, Kenya.
- Pablo, G. (2022). *Healthcare Financing revisited in Low and Middle Income Countries*. Washington D.C: The International Bank for Reconstruction and Development, World Bank, 1818 H Street NW,.
- Politano, P. M. (2018). *Statistics and research methodology*. Charleston S.C: Hang time publishing limited.
- Raghupathi, V., & Raghupathi, W. (2020). *Healthcare Expenditure and Economic Performance*. Brooklyn, New York, USA: Brooklyn College of the City University of New York.
- Ranucci, R. (2016). Time horizon of investments in the resource allocation process: Review and framework for next steps. *Journal of Management*, 42(5), 1169-1194.
- Rubakula, G. (2014). *The New Public Management and its Challenges in Africa*. Wuhan 430074, P.R. China: Lumo Road, Hongshan District.
- Said, R., & Sani, A. (2020). Relationship between Public Debt Burden and Health Expenditure in Sub-Saharan African Countries: The Role of Institutional Quality. *Journal of Business and social review in emerging economies*.
- Samuel Ojwang', Nehemiah Osoro & John Kamaragi. (2020). *Determinants of Technical Efficiency of Hospitals in Kenya*. Bondo, Kenya: Jaramogi Oginga Odinga University of Science and Technology.
- Saungweme, T. (2021). Inflation and economic growth in Kenya: An empirical examination. *Advances in Decision Sciences*, 25(3), 1-25.

- Savedoff, D. and Wagstaff, A (2020). The Case Against Labor-Tax-Financed Social Health Insurance For Low- and Low-Middle-Income Countries. *Global Health Policy*.
- Schuknecht, L. (2022). Public expenditure and sustainable public finances post-Covid. *The economist voice*, 19(1), 63-71.
- Sharma, R. (2023). A comprehensive examination of the economic impact of out-of-pocket health expenditures. *Health Policy and Planning*.
- Ssewanyana, I. K. (2020). *Estimating Catastrophic Health Expenditures from Household surveys of Sub Sahara Africa*. Makerere: Economic Policy Research Centre (EPRC).
- Tao, R. (2022). inflation, and health outcomes: Evidence from developed economies. *Frontiers in public health*,, 10, 851388.
- Thuku, G. K., Manyasa, E. O., Wawire, N. H., & Omondi, O. V. (2014). *Impacts of tax reforms on buoyancy and elasticity of the tax system in Kenya*. Nairobi, Kenya: Karatina University.
- Tsai, F. (2019). Overview on Macroeconomics: Ideas, Approaches and Importance. *International Journal of Tax Economics and Management*, 21-31.
- Tsofa, B. M. (2016). Health sector operational planning and budgeting processes in Kenya. *The International journal of health planning and management*, 31(3), 260-276.
- Turgut, M. A. (2017). Relationship between health expenditure and inflation in Turkey. *Akademik Sosyal Araştırmalar Dergisi*,, 5(50), 289-299.
- Volkova, O. N. (2024). Empirical testing of Grossman's the demand for health model: the case of Russia. *Journal of applied economic research*, (1).

- Waruingi, V. (2020). *Impact of Healthcare budget allocation on County government economic growth in Kenya*. Nairobi, Kenya: University of NairobiWawire, N.
- (2016). Analysis of Income Tax System Productivity in Kenya. *Amity Journal of Economics*, 1(2), 1-8.
- Wuttaphan, N. (2017). *Human Capital Theory;the theory of human resource development,implications and the future*. Rajabhat University of social sciences.
- Yagmur, D. T. (2022). *Germany's Healthcare System: Funding, Resource Allocation, Provider Payment, Efficiency, and Access*. Munich, Germany: Heidelberg University .
- Yaylali, E. & Lasry, A. (2016). From theory to practice: implementation of a resource allocation model in health departments. *Journal of public health management and practice*, 22(6), 567-575.
- Yiega, V. (. (2022). *The Impact of Foreign Debt on Economic and Social Rights: A Case Study on the Right to Health in Kenya, Nigeria and Zambia. Financing for Developmen*. Nairobi: University press.

## APPENDICES

### APPENDIX I: Data Collection Tool

Financial Year	Quarter	Public Healthcare Financing (KES Billions)	Inflation CPI	Public Debt (KES Billions)	GDP growth Growth rate (%)	Tax revenue (KES Billions)
2012/2013	Q1	14.43	67.30958	1,724.65	5	151.06
	Q2	20.76	68.1127	1,793.24	4.5	324.71
	Q3	26.94	69.836	1,794.61	3.6	483.59
	Q4	34.23	71.23599	1,850.65	4.7	739.89
2013/2014	Q1	12.02	72.01831	2,057.43	3.7	202.79
	Q2	17.67	73.16829	2,111.55	3.2	416.97
	Q3	22.42	74.56788	2,171.59	4.9	608.31
	Q4	27.05	76.24634	2,422.83	5.9	851.80
2014/2015	Q1	24.12	77.44617	2,348.70	5.1	216.26
	Q2	30.36	77.68751	2,478.44	4.3	453.69
	Q3	25.71	78.90523	2,675.23	4.8	699.07
	Q4	32.95	81.57885	2,843.70	5	997.23
2015/2016	Q1	28.51	82.20296	2,938.50	4.7	256.62
	Q2	36.04	83.39848	3,155.20	5.3	526.04
	Q3	38.10	84.50995	3,312.11	3.8	775.88
	Q4	42.33	85.951	3,611.67	3.8	1,111.98
2016/2017	Q1	34.40	87.4065	3,703.57	4.4	289.03
	Q2	40.88	88.81892	3,827.30	4.8	591.17
	Q3	36.19	91.92261	4,104.02	5.4	870.61
	Q4	42.90	95.2226	4,405.86	3.3	1,253.46
2017/2018	Q1	40.66	93.9821	4,483.03	3.2	317.42
	Q2	38.52	93.2422	4,569.63	3.5	630.37
	Q3	42.03	96.04305	4,884.08	5.2	939.35
	Q4	47.14	99.01572	5,047.23	6.1	1,311.69
2018/2019	Q1	56.00	98.39576	5,146.17	5.3	329.34
	Q2	50.23	98.47197	5,272.50	6	680.76
	Q3	48.85	100.2428	5,424.53	4.8	1,018.51
	Q4	57.09	102.9893	5,808.62	6	1,440.21
2019/2020	Q1	54.62	104.0208	5,963.41	5	371.45
	Q2	54.58	105.2093	6,048.93	4.6	756.65
	Q3	52.39	107.0534	6,282.82	4.6	1,096.25
	Q4	56.51	108.4543	6,694.23	-4.1	1,427.51
2020/2021	Q1	60.01	108.4993	7,120.60	-3.6	316.77
	Q2	62.27	110.7497	7,281.83	2	668.69
	Q3	61.33	113.2517	7,339.71	2.4	1,030.49
	Q4	65.05	114.9443	7,696.64	10.3	1,484.76
2021/2022	Q1	63.70	115.7443	8,000.28	9.4	416.37
	Q2	67.43	117.3837	8,206.74	8.6	867.87
	Q3	57.08	119.3033	8,401.33	6.2	1,281.62
	Q4	60.75	123.17	8,579.11	5.2	1,837.22

**APPENDIX II: Map of Kenya**



### APPENDIX III: University Letter of Proposal Approval



MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

Tel: 056-30870  
Fax: 056-30153  
E-mail: [directordps@mmust.ac.ke](mailto:directordps@mmust.ac.ke)  
Website: [www.mmust.ac.ke](http://www.mmust.ac.ke)

P.O Box 190  
Kakamega – 50100  
Kenya

Directorate of Postgraduate Studies

Ref: MMU/COR: 509099

9<sup>th</sup> April 2024

David Misiko Lumbasi  
ECO/G/01-70169/2022  
P.O. Box 190-50100,  
KAKAMEGA.

Dear Mr. Lumbasi

**RE: APPROVAL OF PROPOSAL**

I am pleased to inform you that the Directorate of Postgraduate Studies has considered and approved your masters proposal entitled “*Effect of Selected Macroeconomic Variables on Public Health Financing in Kenya (2013-2022)*” and appointed the following as supervisors:

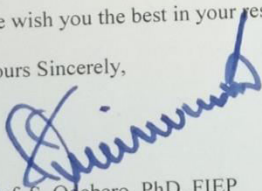
1. Dr. Consolata Ngala - SOBE, MMUST
2. Dr. Edwin Simiyu - SOBE, MMUST

You are required to submit through your supervisor(s) progress reports every three months to the Director Postgraduate Studies. Such reports should be copied to the following: Chairman, School of Business and Economics Graduate Studies Committee and Chairman, Economics Department. Kindly adhere to research ethics consideration in conducting research.

It is the policy and regulations of the University that you observe a deadline of two years from the date of registration to complete your masters thesis. Do not hesitate to consult this office in case of any problem encountered in the course of your work.






We wish you the best in your research and hope the study will make original contribution to knowledge.

Yours Sincerely,

  
Prof. S. Odebero, PhD, FIEP  
DIRECTOR, DIRECTORATE OF POSTGRADUATE STUDIES



## APPENDIX IV: Research License

 <p>REPUBLIC OF KENYA</p>	 <p><b>NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY &amp; INNOVATION</b></p>
Ref No: <b>144970</b>	Date of Issue: <b>06/May/2024</b>
<b>RESEARCH LICENSE</b>	
	
<p><b>This is to Certify that Mr., DAVID Misiko LUMBASI of Masinde Muliro University of Science and Technology, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Kakamega on the topic: EFFECT OF SELECTED MACROECONOMIC VARIABLES ON PUBLIC HEALTHCARE FINACING IN KENYA (2013-2022) for the period ending : 06/May/2025.</b></p>	
License No: <b>NACOSTI/P/24/35215</b>	
<b>144970</b>	
Applicant Identification Number	Director General <b>NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY &amp; INNOVATION</b>
	Verification QR Code
	
<p><b>NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.</b></p>	
<b>See overleaf for conditions</b>	