Impact of Tax Revenue on Public Healthcare Financing in Kenya

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ABSTRACT

Healthcare financing is a critical aspect of ensuring access to quality healthcare in Kenya. However, there are high incidences of catastrophic out of pocket health spending and poor health outcomes. In the effort to achieve Sustainable Development Goal number 3 (SDG 3), Kenya has been having transformations and reforms in the health sector, however, the country still allocates inadequate funds on healthcare falling below the Abuja Declaration of 2001 which derails achieving national and international healthcare goals. The state of macroeconomic environment in a country such as tax revenue, inflation, public debt, Gross Domestic Product among others contribute to financing decisions towards its healthcare systems and its functioning. In this regard, the study examined the impact of tax revenue on public healthcare financing in Kenya from 2013 to 2022. The study provides valuable insights that can inform evidence-based policymaking, improve resource allocation efficiency, enhance healthcare financial stability and sustainability for improved healthcare access. This study was anchored on the Resource allocation and Grossman model of health demand. Quarterly data was collected, cleaned, coded and arranged in table form before subjecting it to pre-diagnostic tests to ensure its reliability. Data was analysed using Stata 15. Post diagnostic tests were conducted and they all met the required threshold for analysis. The study adopted correlational and causal research design. The ordinary least square (OLS) model revealed that tax revenue had positive and significant impact on public healthcare financing with a p value of 0.007. The study noted that however the increasing trajectory of tax revenue collection in Kenya, the country still collects below its potential against the rising need of funds across the sectors of the economy like healthcare with ever increasing population and the inception of county governments which require adequate funding to support healthcare initiatives. The study recommended putting strategies to improve long-term tax collection efficiency and a more robust tax system that can provide a reliable source of funding for public health in the long run.

Keywords: Public Healthcare Financing, Tax Revenue, Universal Health Coverage, Kenya

I. INTRODUCTION

Tax revenue refers to funds that a government agency receives from its citizens for use in public projects (Lakin, 2020), while public healthcare financing refers to the funding mechanisms and resources allocated by the government to support healthcare services for its citizens as pointed by 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 (World Health Organization [WHO], 2022). Overall, tax revenue collection plays 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 (Allin et al., 2015).

Basu (2015) states that the primary source of government funding for developing and extending health systems around the world is tax revenue. A country's capacity to pay for essential infrastructure, social services like health and education, and other necessities relies heavily on its ability to collect taxes. 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 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. He encourages a nation to develop its capacity for economic independence by ensuring sufficient income is available from the financial revenue pool of the state that can realistically support proper investment in sectors that stimulate growth, such as healthcare.

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.

1.1 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 that drive the country's populace into poverty. A Central Bank of Kenya (CBK, 2022) report states that upon achieving lower-middle income status in 2015, Kenya is now perceived by international donors as able to finance its healthcare system. As a result, there is an urgent need to move from relying on donors to becoming self-sufficient by allocating adequate funds to healthcare.

The ability to collect taxes is central to a country’s capacity to finance its critical sectors like healthcare. Kenya is faced with budget deficits hence need to examine how tax revenue affects public healthcare financing. Kenya has seen an increase in the amount of money allocated to healthcare; nonetheless, the country is still short of meeting the Abuja Declaration's 15% target, which would have accelerated up Kenya's progress towards achieving Universal Health Coverage (UHC). Additionally, there are limited studies conducted in Kenya on this topic.

1.2 Research Objectives

To establish the impact of tax revenue on public healthcare financing in Kenya.

1.3 Research Hypothesis

$H0_1$: there is no statistically significant impact of tax revenue on pubic health care financing in Kenya.

II. LITERATURE REVIEW

2.1 Theoretical Review

This study was anchored on Resource Allocation Theory and Grossman model of Health demand. Maritan and Lee (2017) states that Resource Allocation Theory focuses on how limited resources are distributed among various needs and sectors in an economy 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.

Allison (2017) alludes that tax revenue is a primary source of government funding. Resource Allocation Theory suggests that how these revenues are distributed among various sectors depends on government priorities and social needs. 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).

Grossman (2017) highlights the Model of Health Demand which provides theoretical foundation for understanding how individuals make decisions about their health behaviors and healthcare utilization. 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. Higher tax revenue increases the government's ability to finance public healthcare programs and infrastructure. Gaalya (2017) mentions that this can lead to higher public healthcare investment in health infrastructure, personnel and medical supplies. Higher tax revenue can contribute to improved healthcare quality and accessibility.

2.2 Conceptual Review

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 UHC works (Kairu, 2021).

The 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 services (Nanda & 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 et al., 2020).

The structure of the tax system can impact the progressivity of healthcare financing. A more equitable healthcare funding can be achieved through progressive taxation (Lakin, 2020). The amount of funds available for financing healthcare can be directly impacted by changes to tax regulations. It is crucial to investigate how health-specific taxes affect the amount of money set aside for healthcare initiatives and programs.

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, tax revenue is an indispensable component of domestic revenue mobilization. Munyua (2020) alludes that if developing nations wish to prosper, achieve fiscal sustainability, and lessen their excessive reliance on foreign aid, they must examine their tax performance, in countries like 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.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 like Ukraine, Georgia, Liberia and Guyana that had some of the highest revenue gains following tax reform (Tsai, 2019).

2.3 Empirical Review

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.

Basu (2015) states that 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 the huge financial demands faced by low-income countries. 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.

Pablo (2022), 'Health Financing Revisited in Low- and Middle-Income Countries,' World Bank research focused on health finance policies from the standpoints of 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.

According to Omondi et al (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 by enhancing the administration of taxes (Gaalya, 2017).

III. METHODOLOGY

3.1 Research Design

A correlational and causal research design was used to carry out this research. This helped to explain general trends of the study using mean, standard deviation, minimum and maximum values, skewness and kurtosis. Causal research design aided to undertake the multiple regression and also to determine the strength and direction of the relationship between tax revenue and public healthcare financing.

3.2 Data and Data Collection

Time series data was collected for 10 years from FY 2012/2013 to 2021/2022. Tax revenue was 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. Quarterly data was collected and arranged in table form thereafter compiled, cleaned, sorted and coded using excel spreadsheet software and analysed using Stata version 15.

3.3 Data Analysis and Presentation

Pre-diagnostic tests were used to check for outliers and ensure measurement consistency in the data. After then, STATA software 15 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 the validity of the results.

3.3.1 Model Specification

To investigate the dynamic 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), the study adopted the ordinary least square (OLS) regression model for estimation. The model below expresses Public Healthcare financing as a function of these macroeconomic variables as;

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

Where; β_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

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

ε - Error term

β_1, β_2, β_3 and β_4 are coefficients of inflation, tax revenue, public debt and GDP growth respectively.

3.3.2 Description and Measurement of variables

Table 1 presents a summary of the study's key variables, detailing their definitions and methods of measurement. The expected impact of both variables may vary, being either positive or negative.

Table 1

Description and Measurement of Variables

Variable	Description	Measurement	Prior sign
Public Healthcare Financing.	The financial resources allocated to healthcare sector by a government from the budget.	Amount allocated by the government (KES Billions)	+/-
Tax Revenue	Money collected by a government body from its constituents for public spending.	Amount of money collected (KES Billions)	+/-

3.3.3 Pre-Estimated and Post-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, determination of optimum lag length and bounds co-integration. The study also discussed post diagnostic test for Autocorrelation, heteroscedasticity, multicollinearity, Normality and model stability.

3.4 Ethical Considerations

The research respected the ownership rights of data. There was critical evaluation on the quality of the data and considerations done for any potential biases or limitations that would have affected the validity of research findings. The research cited the sources of data to avoid plagiarism and gave credit to the original data creators. By adhering to these ethical considerations, the research ensured data was conducted in a responsible and ethical manner, ultimately contributing to the integrity and trustworthiness of the research findings.

IV. FINDINGS & DISCUSSION

4.1 Descriptive Statistics

Descriptive statistics were employed to identify basic characteristics of the data set. This study used quarterly data from multiple sources, including the Kenya National Bureau of Statistics (KNBS), the Central Bank of Kenya (CBK) and World Bank. The table 4.1 shows the descriptive characteristics of the variables under study.

Table 2

Descriptive Statistics

Stats	**Tax Revenue** (Kes Billions)	**Health Financing** (Kes Billions)
N	40	40
Min	151.0615	12
Max	1837.221	67
Mean	751.0867	41.7
Std Dev.	418.386	15.46079
se(mean)	66.15264	2.444565

The minimum tax revenue recorded during this period was 151.0615 billion Kenyan shillings, while the maximum was 1,837.221 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 751.0867 billion shillings, representing the general level of tax revenue collected by the government. The standard deviation of 418.386 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).

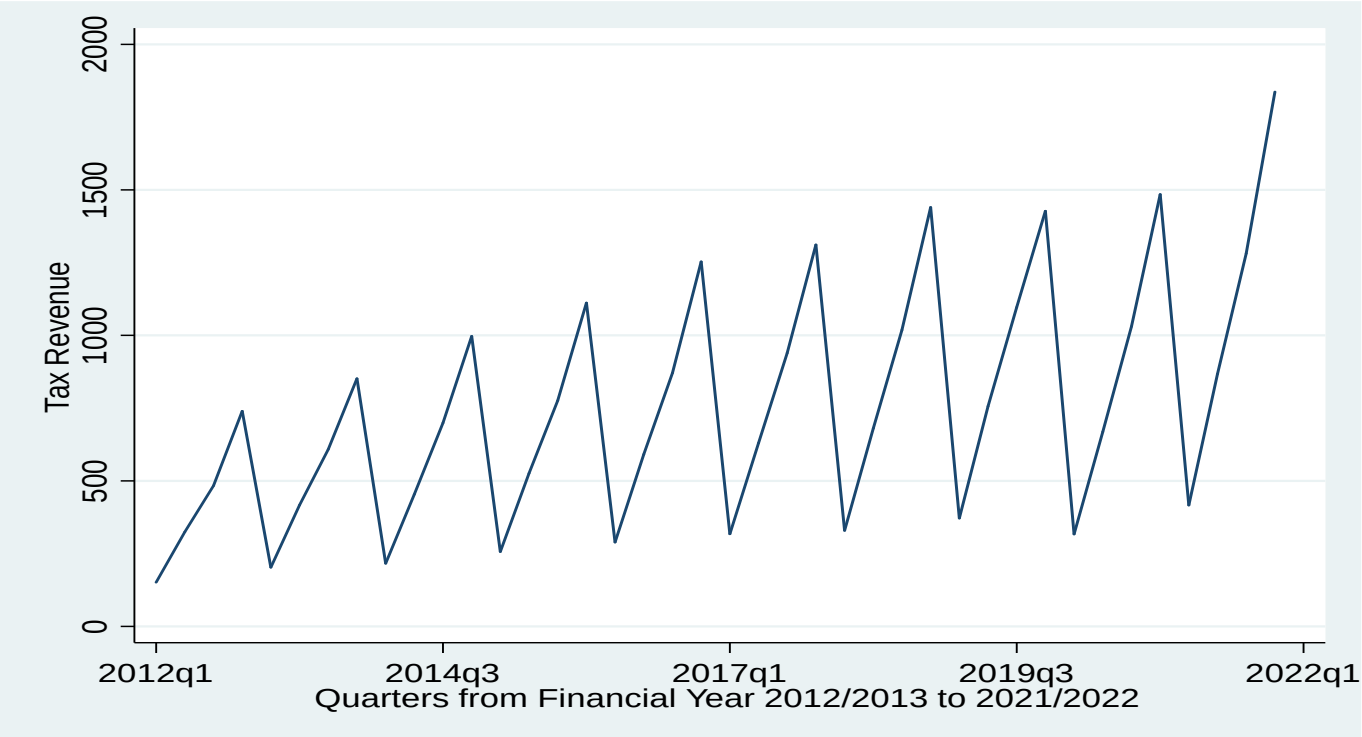

Figure 1

Quarterly Tax Revenue

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 2013 q4 to 1.837 trillion Kenya shillings in 2022q4**.** Lakin (2020) indicates that this is a result of robust transformation undertaken by KRA. This includes customer support programs, tax Base Expansion and digitalizing revenue administration.

The minimum public health financing value during this period was 12 billion Kenyan shillings, while the maximum was 67 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 41.7 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 15.46079 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.

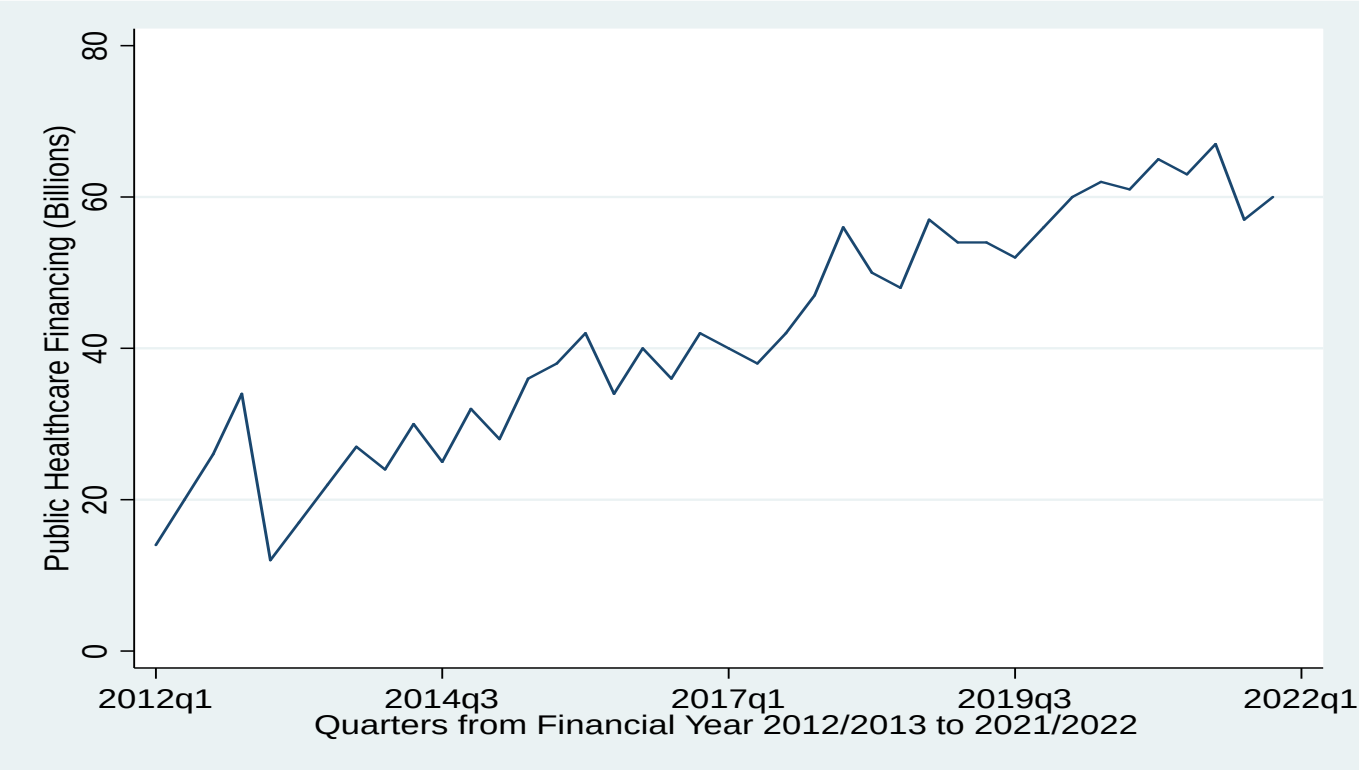

Figure 2
Quarterly Public Health Financing

Generally, 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.

4.2 Correlational Analysis

A correlational analysis was used to determine the strength and direction of the relationships between the variables. 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).

Table 3
Correlational Analysis Results

		Public Health Financing
Public Health Financing	Correlation Coefficient	1
	Sig.	
	N	40
Tax Revenue	Correlation Coefficient	0.5934
	Sig.	0.0001

Tax Revenue with a correlation coefficient of 0.5934 indicated a strong positive correlation with Public Health Financing. This suggests that higher tax revenue is strongly associated with higher public health financing. The p-value of 0.0001 indicates that this relationship is statistically significant.

4.3 Pre-Estimation

4.3.1 Normality Test

This study employed the Jarque-Bera (JB) test to assess normality. The summary table (4.3) shows skewness values below 2 and kurtosis figures under 6, which demonstrate that the observed distribution has limited skewness and relatively flat kurtosis, implying a regular pattern in the data.

Table 4
Normality Test

	Skewness	Kurtosis	Jarque Bera	P-Value
Tax Revenue	0.58671	2.58443	0.649	0.7229
Public Health Financing	-0.1335	1.9182	0.664	0.7174

For tax revenue, the JB test statistic is 0.649, with a p-value of 0.7229 suggesting that the data does not significantly deviate from normality. The skewness value of 0.586708 indicates a slight rightward skew, suggesting a greater frequency of higher tax revenue values. The kurtosis value of 2.584431 indicates a moderate level of extreme values, but not overly heavy tails.

For Public health financing allocation, the JB test statistic is 0.6642, with a p-value of 0.7174 suggesting that the public healthcare allocation data set likely follows a normal distribution. The skewness value of -0.13349 suggests a slightly negative skew, indicating that the distribution leans towards lower health financing values. The kurtosis value of 1.9182 suggests a relatively flat distribution with light tails compared to a normal distribution. The study concluded that both the dependent and independent variables data were normally distributed which led to more reliable results

4.3.2 Test for Unit Root

The study applied both the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test to examine the unit root in individual variables. The Phillips-Perron test was used to correct for autocorrelation and heteroscedasticity without adding lagged difference terms (Kumar, 2019).

Table 5
Unit Root Tests

Variables	Augmented Dickie-Fuller(Prob.)	Phillips-Perron (Prob.)	Integration Level
Public Health Financing	-1.755 (0.4032)	-2.376 (0.1486)	I(0)
Tax Revenue	-5.058 ** (0.0000)	-5.862** (0.0000)	I(0)

Notation; * sig at 5% level, ** sig at 1% level, Values in parenthesis are probability

Tax revenue did not exhibit unit root problem while public health financing demonstrated unit root problem. Due to presence of unit root as shown by the above data, first difference treatment was applied on the data for public healthcare financing as illustrated in table 4.5.

Table 6

Unit Root Tests for First Difference

Variables	Augmented Dickie Fuller (Prob.)	Phillips-Perron (Prob.)	Integration Level
Public Health Financing	-6.306** (0.0000)	-11.568 ** (0.0000)	I(1)
Tax Revenue	-7.509 ** (0.0000)	-24.313** (0.0000)	I(1)

Notation; * sig at 5% level, ** sig at 1% level, Values in parenthesis are probability values

Both the ADF test and PP test have significant values ($p < 0.05$), indicating that this variable becomes stationary after first differencing. The integration level is of order I (1), suggesting that it has a unit root but becomes stationary after differencing.

4.3.3 Multicollinearity

To test for multicollinearity in the model, a Variance Inflation Factor (VIF) test was conducted.

Table 7

Test for Multicollinearity using Variance Inflation Factor

Variable	VIF	1/VIF
Tax revenue	1.43	0.698143

The VIF value was below 10, the model was considered free from multicollinearity issues.

4.4 Ordinary Least Square Regression Analysis

The key objective of the study was to determine the impact of selected macroeconomic variables on public health financing in Kenya. The results are displayed in Table 4.12]

Table 8

OLS Regression

Source	SS	Df	MS	Number of obs	=	39
				F(4, 34)	=	10.98
Model	4.15538	4	1.038845	Prob > F	=	0
Residual	3.311615	34	0.094618	R-squared	=	0.5565
				Adj R-squared	=	0.5058
Total	7.466995	38	0.191461	Root MSE	=	0.3076
Public Health Financing	**Coef.**	**Std. Err.**	**T**	**P**	**[95% Conf.**	**Interval]**
Tax Revenue	0.271724	0.094543	2.87	0.007	0.079792	0.463656
_cons	-0.5433	0.656238	-0.83	0.413	-1.87554	0.788932

The R-squared value of 0.5565 indicates that the model explains about 55.65% of the variance in public health financing. This is a moderate-to-high level of explanation, suggesting that the macroeconomic factors contribute to a significant portion of the variation in public health financing in Kenya. The adjusted R squared value of 0.5058 confirms that, even when adjusting for complexity, the model explains over 50% of the variance, reinforcing the robustness of the findings. The OLS equation is as shown below.

$Y=-0.543+0.272X_1$

Where: Y - Public Healthcare Financing, X_1 –Tax Revenue,

A one-unit increase in tax revenue increased public health financing allocation by 0.2717 percent in the long run. This finding suggested that higher tax revenue generally leads to increased funding for public health services. The relationship is statistically significant with p-value of 0.007. Higher tax revenue increases the government's fiscal capacity, providing more resources to allocate across various public services, including healthcare.

Gaalya (2017) found consistent evidence supporting the positive relationship between tax revenue and public health financing across developing countries. The analysis revealed that higher tax revenue was associated with increased allocations to public health budgets, contributing to improved healthcare. Johnson (2024) investigated the impact of tax policy changes on public health financing in developing nations. The findings indicated that countries experiencing growth in tax revenue tended to allocate a larger portion of their budgets to public health sector, leading to expanded reduced disease burden and improved health outcomes.

Contrary to the expected relationship, Lee and Kim (2017) found limited evidence supporting the direct link between tax revenue and public health financing in low-income countries. The 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.

4.5 Post Estimation Tests

4.5.1 Normality

This study used the Jarque-Bera test to determine if the residuals from the regression model are normally distributed.

Table 9

Residual Normality

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

The kurtosis value of 1.979707 is below the threshold value of 6 while skewness of -0.29731 is below the threshold of 2 which shows 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.

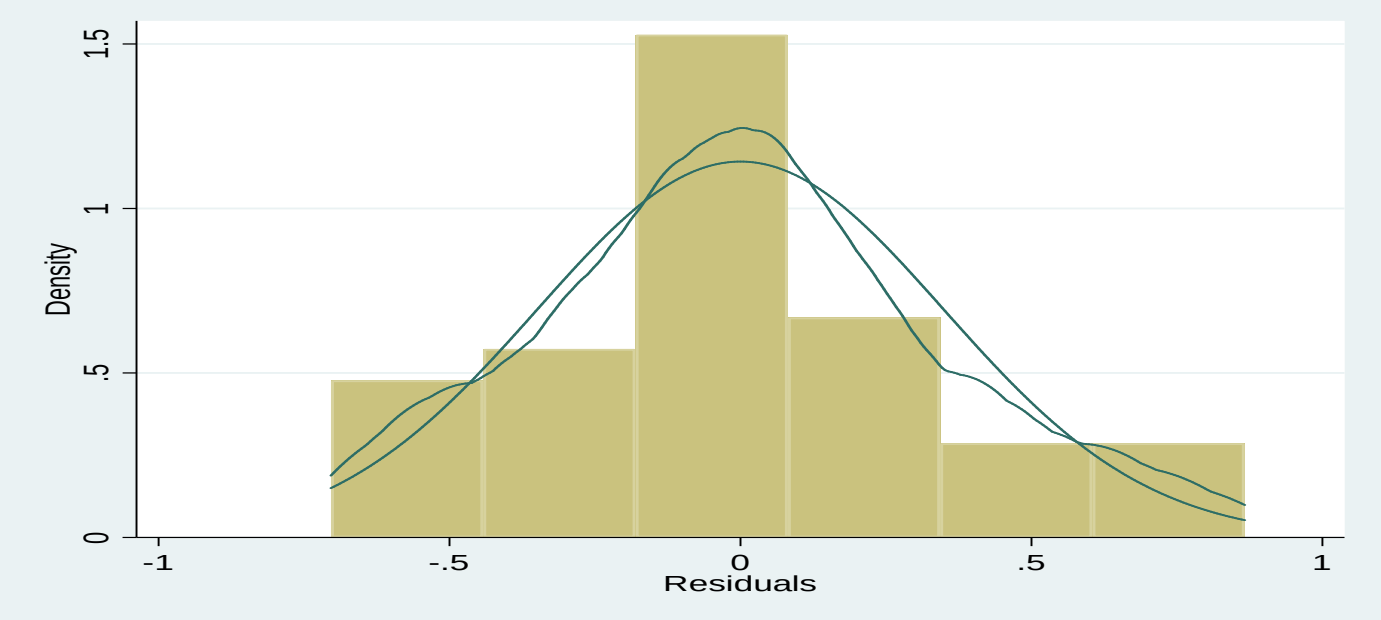

Figure 3

Residual Normality Plot

4.5.2 Autocorrelation/Serial Correlation Test

This study used the Breusch-Godfrey Serial Correlation LM to test autocorrelation. The results from the test, summarized in the table 4.14;

Table 10

Breusch-Godfrey Serial Correlation LM Test

lags(p)	chi2	Df	Prob > chi2
1	2.366	1	0.124

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 there is no serial correlation. This outcome is positive for the reliability and robustness of the regression analysis, as it implies that the model's estimates are not affected by autocorrelation.

4.5.3 Heteroscedasticity

The study used the Breusch-Pagan Godfrey test to detect heteroscedasticity. The null hypothesis for the test is that there is no heteroscedasticity, while the alternative hypothesis suggests its presence.

Table 11

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

The Breusch-Pagan / Cook-Weisberg test results indicate that the model's residuals do not show significant signs of heteroskedasticity. With a chi-squared value of 0.790 and a p-value of 0.3726. This outcome suggests that the regression model is stable, and the standard errors and statistical inferences are likely reliable.

4.5.4 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.

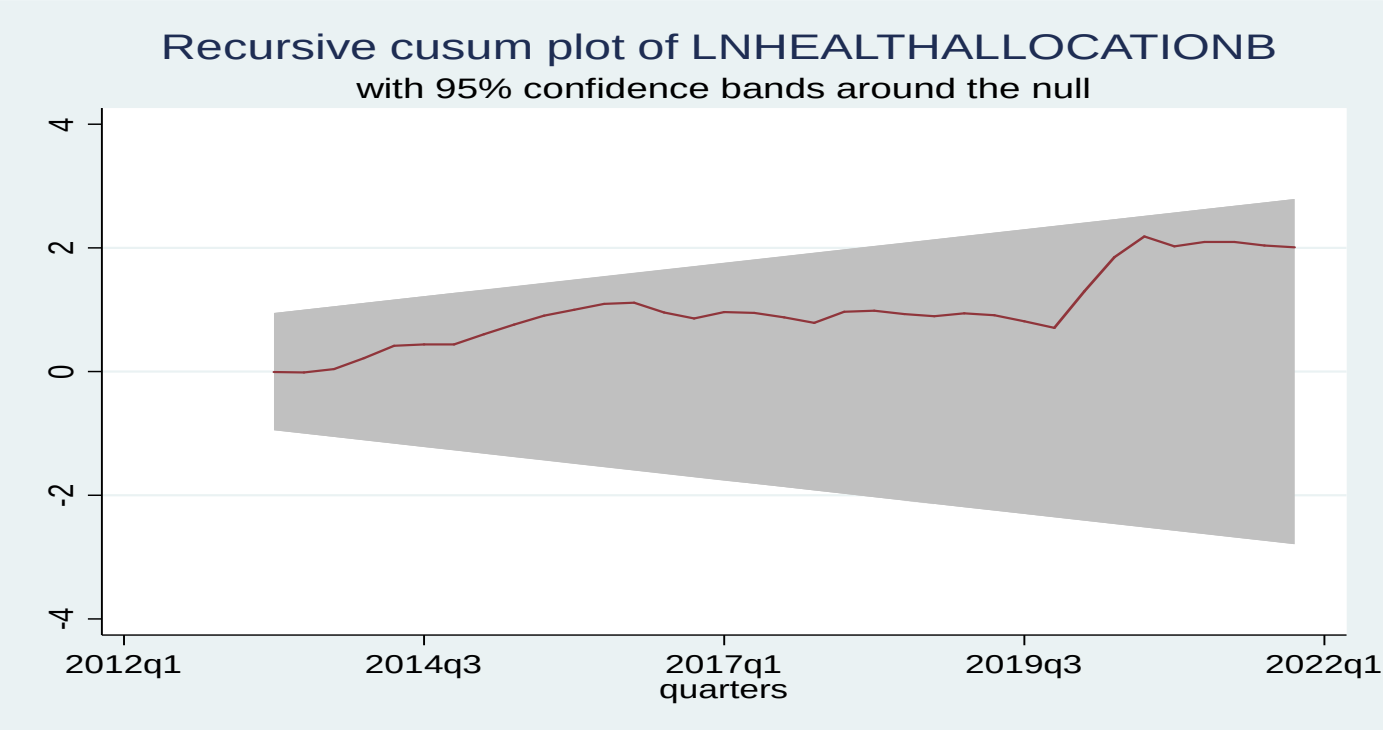

Figure 4

CUSUM Test stability Output

Table 12

CUSUM Test Stability Output

Ho: No structural break							
		1%	**Critical**	**5%**	**Critical**	**10%**	**Critical**
Statistic	**Test Statistic**		**Value**		**Value**		**Value**
recursive	0.8051		1.143		0.9479		0.85

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 which implies that there is no structural breaks in the data.

4.6 Discussion

Tax Revenue with a correlation coefficient of 0.5934 indicated a strong positive correlation with Public Health Financing. The OLS regression analysis results revealed that a one-unit increase in tax revenue is associated with 0.2717 units increase in public healthcare financing allocation. Tax revenue is statistically significant with p value=0.007. Gaalya (2017) and Johnson (2024) found consistent evidence supporting the positive relationship between tax revenue and public health financing across developing countries. In contrast, Lee and Kim (2017) found limited evidence supporting the direct link between tax revenue and public health financing in low-income countries. Asante (2020) points that governments are strategizing to reduce the high out of pocket health expenditures, this is through implementation of healthcare financing systems through streamlined tax system that safeguards everyone from financial risk as suggested by Basu (2015). Aligning finance policies that support resource pooling towards healthcare with clear path to achieving UHC is also necessary, this will fill the disparity gap between the amount of money nations spend on healthcare and what they actually need to finance it as alluded by Pablo (2022). Tsai (2019) points that Kenya needs to undertake robust tax reforms targeting the informal sector which does not meet its potential for tax revenue collection.

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

There was connection between tax revenue and public healthcare financing from 2013 to 2022 in Kenya. There was a strong positive correlation between tax revenue and public health financing, highlighting the crucial role of government income from taxes in funding healthcare initiatives. This suggests that while Kenya might eventually translate increased tax collection into more public health resources, shortfalls in tax revenue have a direct and negative impact on healthcare funding. From the OLS regression analysis, tax revenue was statistically significant and had a positive impact on public healthcare, the study rejects the null hypothesis in favor of alternative hypothesis.

5.2 Recommendations

There should be strategies to improve long-term tax collection efficiency. A more robust tax system can provide a reliable source of funding for public health in the long run. While long-term tax improvements are underway, mechanisms to shield public health funding from short-term tax revenue fluctuations are necessary. Consider creating emergency reserves dedicated to public health or exploring alternative financing sources that are less susceptible to tax revenue variations.

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