



**INTERNATIONAL JOURNAL OF
HEALTH SYSTEMS AND
INTEGRATED HEALTH
SCIENCES**

**International Journal of Health Systems and Integrated Health
Sciences (IJHSIHS)**

**Assessment of Financing Mechanisms Influencing the Acquisition of Diagnostic
Imaging Equipment in Hospitals in Murang'a County, Kenya**

Moreu Alex Kamau, Musa Oluoch and Ben Onyango-Osuga



Assessment of Financing Mechanisms Influencing the Acquisition of Diagnostic Imaging Equipment in Hospitals in Murang'a County, Kenya

Moreu Alex Kamau

Researcher: Kenya Methodist University

Musa Oluoch

Lecturer: Kenya Methodist University,
Nairobi, Kenya

Ben Onyango-Osuga

Lecturer: Kenya Methodist University,
Nairobi, Kenya

Article History:

Published on: 2/26/2026

DOI:

<https://doi.org/10.5281/zenodo.18796299>

How to Cite: Kamau, M. A., Oluoch, M., & Osuga, B. O. (2026). ASSESSMENT OF FINANCING MECHANISMS INFLUENCING THE ACQUISITION OF DIAGNOSTIC IMAGING EQUIPMENT IN HOSPITALS IN MURANG'A COUNTY, KENYA.

International Journal of Health Systems and Integrated Health Sciences (IJHSIHS), 3(1), 1–22.

<https://doi.org/10.5281/zenodo.18796299>

Abstract:

Purpose: This study assessed the financing mechanisms influencing the acquisition of diagnostic imaging equipment in hospitals in Murang'a County, Kenya, with a view to identifying sustainable funding strategies to enhance access to essential diagnostic services and improve healthcare outcomes.

Methodology: A descriptive research design was employed targeting hospital administrators and county health officials involved in financial planning and equipment procurement. Data were collected using structured questionnaires from 75 respondents, with 50 valid responses

obtained (67% response rate). Key informant interviews were conducted with 8 out of the 10 targeted officials (80% response rate). Quantitative data were analyzed using descriptive statistics and regression analysis, while qualitative data were analyzed thematically.

Findings: The results showed that 72% of respondents reported that inadequate funding significantly constrained the acquisition of diagnostic imaging equipment. Government funding was identified as the most preferred financing mechanism, followed by donor funding, community resource mobilization, and public–private partnerships. Regression analysis indicated that financing mechanisms had a significant positive influence on equipment acquisition ($\beta = 0.324$, $p < 0.001$), underscoring the importance of diversified and reliable funding sources.

Unique Contribution to Theory, Practice and Policy: The study contributes to health financing theory by demonstrating the role of blended financing models in strengthening medical technology investment at the county level. Practically, it provides evidence to guide hospital managers in prioritizing sustainable financing options. From a policy perspective, it supports increased government budgetary allocation and the development of structured public–private partnership frameworks to enhance diagnostic capacity.

Keywords: *Financing mechanisms, diagnostic imaging, equipment acquisition, public–private partnerships, Murang'a County, Kenya.*

JEL Codes: H51, I11, I18, O18.

©2026 By The Authors. This Article is an open-access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by-nc-sa/4.0/>)

1.0 INTRODUCTION

Background of the Study

Access to diagnostic imaging services is a fundamental component of quality healthcare delivery. Diagnostic imaging encompasses technologies such as X-ray, ultrasound, computed tomography (CT), and magnetic resonance imaging (MRI), all of which are essential for accurate clinical assessment and disease management. According to the World Health Organization (WHO, 2022), at least 70% of clinical diagnoses depend on some form of diagnostic imaging or laboratory testing, making these services indispensable in modern healthcare systems. Despite their clinical importance, diagnostic imaging facilities remain unevenly distributed and underfinanced in many low- and middle-income countries (LMICs), including Kenya. In Kenya, the availability of diagnostic imaging equipment is critically low relative to the country's population and healthcare needs. Data from the Ministry of Health Kenya (2023) indicate that fewer than 300 health facilities across the country are equipped with functional X-ray imaging devices, yet over 1,000 facilities are required to have them. This shortfall is particularly acute in rural and peri-urban counties such as Murang'a, where the majority of the population relies on public health facilities that are chronically underfunded and inadequately equipped. The inequitable distribution of imaging equipment mirrors broader structural inequalities in Kenya's healthcare system, where urban facilities enjoy disproportionately greater resource allocation compared to rural counterparts (Sahu & Madani, 2024).

Healthcare financing in Kenya operates within a mixed system involving the national government, county governments, private sector actors, non-governmental organizations (NGOs), and development partners. Since the devolution of health services in 2013 under the Constitution of Kenya (2010), county governments bear primary responsibility for managing and financing healthcare infrastructure at the sub-national level. However, financial transfers from the national government to counties have often been inadequate, delayed, or poorly coordinated, resulting in persistent gaps in capital investment for medical equipment (KIPPRA, 2019). This financing inadequacy is compounded by bureaucratic procurement procedures, limited absorption capacity, and weak accountability frameworks at the county level. Globally, innovative financing mechanisms such as equipment leasing, public-private partnerships (PPPs), donor-supported procurement, and community health financing schemes have been explored as alternatives to traditional government budget allocations for medical equipment (Chukwudalu et al., 2024). In contexts such as sub-Saharan Africa, where fiscal space is constrained, these mechanisms offer promising pathways to bridge the equipment gap. For instance, studies in Uganda and Tanzania have demonstrated that equipment leasing and PPPs can reduce capital outlay while maintaining service continuity, provided adequate governance frameworks are in place (Zacharia et al., 2025).

However, the applicability of these mechanisms in the Kenyan county context, and specifically in Murang'a County, remains inadequately studied.

Murang'a County presents a compelling case for investigation. Although it is a largely agrarian county with a growing population of approximately 1.1 million people (Kenya National Bureau of Statistics, 2022), it remains underserved in terms of diagnostic imaging infrastructure. Public hospitals in the county report recurring shortfalls in functional imaging machines, with many facilities relying on outdated or non-functional equipment. This situation directly compromises the quality of care provided to patients, particularly those with chronic diseases such as cancer, tuberculosis, and cardiovascular disorders that require imaging for diagnosis and monitoring. The county government's health budget allocations for equipment procurement remain insufficient relative to demand (Nyanchoka et al., 2025). Against this backdrop, this study sought to systematically assess the financing mechanisms that influence the acquisition of diagnostic imaging equipment in hospitals in Murang'a County, Kenya. By examining the effectiveness and suitability of various financing approaches, including government funding, donor support, leasing, PPPs, bank loans, and community resource mobilization, the study contributes empirical evidence to inform health financing policy and practice at both county and national levels. Such evidence is particularly timely given Kenya's ongoing efforts to achieve Universal Health Coverage (UHC) by 2030 as stipulated under the Big Four Agenda and the Kenya Health Policy 2014–2030.

Statement of the Problem

The availability and functionality of diagnostic imaging equipment in public hospitals in Murang'a County remain severely limited, compromising the quality and completeness of healthcare services provided to the population. Despite the national and county governments' stated commitment to improving healthcare infrastructure under Kenya's Universal Health Coverage agenda, many hospitals in Murang'a County continue to operate without adequate diagnostic imaging facilities, forcing patients to seek services in distant urban centers or to forego necessary diagnostic procedures altogether. This situation is primarily driven by persistent gaps in healthcare financing, as the acquisition of sophisticated diagnostic equipment such as CT scanners, MRI machines, and digital X-ray systems demands substantial capital investment that county health budgets alone cannot sustain.

While various financing mechanisms exist including government budget allocations, donor funding, equipment leasing, public-private partnerships, community resource mobilization, and bank loans—there is limited empirical evidence on how these mechanisms operate in practice and to what extent they effectively support equipment acquisition in Murang'a County's hospitals. Existing studies on healthcare financing in Kenya have largely focused on national-level policies and financing frameworks without examining the specific mechanisms and their influence on

diagnostic imaging equipment acquisition at the county level (Peter, 2020). The absence of context-specific evidence constrains the ability of county health planners, hospital administrators, and policymakers to make informed decisions about the most effective financing strategies for diagnostic imaging.

Furthermore, limited research has examined how factors such as resource mobilization, procurement procedures, budgetary allocations, and institutional partnerships collectively shape the capacity of hospitals in Murang'a County to acquire and maintain diagnostic imaging equipment. Without such evidence, financing decisions risk being ad hoc, inefficient, and poorly aligned with the actual operational needs of county hospitals. This study therefore sought to fill this knowledge gap by assessing the financing mechanisms influencing the acquisition of diagnostic imaging equipment in hospitals in Murang'a County, Kenya, thereby generating empirically grounded insights that can inform targeted policy and resource allocation decisions.

Purpose of the Study

The purpose of this study was to assess the financing mechanisms influencing the acquisition of diagnostic imaging equipment in hospitals in Murang'a County, Kenya.

Research Hypothesis

H01: Financing mechanisms do not significantly influence the acquisition of diagnostic imaging equipment in hospitals in Murang'a County, Kenya.

2.0 LITERATURE REVIEW

Theoretical Framework: Systems Theory

Systems theory, originally advanced by Ludwig von Bertalanffy in the mid-twentieth century, provides a comprehensive framework for understanding how the interrelated components of an organization work together to achieve shared objectives (Drack & Pouvreau, 2015). The core premise of this theory is that organizations function as open systems dynamic structures that continuously interact with their external environment through inputs, transformation processes, outputs, and feedback mechanisms. In healthcare, systems theory offers a useful lens for examining how resources including financial inputs, human capital, equipment, and infrastructure are transformed into health services and patient outcomes (Clarkson et al., 2018). In the context of diagnostic imaging in Murang'a County, systems theory helps to explain how healthcare facilities manage the complex web of interrelated factors that determine whether imaging equipment is acquired, maintained, and effectively utilized. Inputs into the system include government funding, donor contributions, hospital-generated revenues, and community financing. These inputs are

processed through procurement decisions, staff training programs, administrative approvals, and maintenance systems to produce outputs such as functional imaging machines, frequency of scans conducted, and patient access rates (Dadzie et al., 2024). The theory underscores that a breakdown at any stage of this system whether due to insufficient funding, delayed procurement, or inadequate maintenance can disrupt the entire chain of service delivery.

Applying systems theory to this study enables a holistic assessment of the multiple financing mechanisms that influence equipment acquisition, recognizing that no single mechanism operates in isolation. For instance, government budget allocations constitute a primary input, while the processes through which these funds are disbursed and utilized by county hospitals represent the transformation stage. The availability of functional diagnostic imaging equipment constitutes the system output, which in turn generates feedback that informs future financing and procurement decisions (Yadav et al., 2021). Feedback loops are particularly important in this framework: successful equipment acquisition and deployment can justify increased investment, while service gaps signal the need for systemic reform. Despite its strengths, systems theory has limitations. It tends to understate the political dimensions and power imbalances that often influence resource allocation in public health systems, particularly in low-income settings (Griffin et al., 2020). It may also inadequately capture the role of informal networks, individual discretion, and institutional culture in shaping financing decisions. Nevertheless, systems theory provides a valuable and well-established analytical foundation for this study, enabling examination of how financing mechanisms interact within the healthcare system to influence the acquisition of diagnostic imaging equipment in Murang'a County hospitals.

Empirical Review

Financing of Medical Diagnostic Equipment Acquisition

Healthcare financing and equity are two dimensions that dominate policy deliberations on health systems across the globe (Malkin & Keane, 2010). In Kenya, the financing of healthcare infrastructure is constitutionally shared between the national and county governments, with the national government retaining oversight responsibility and counties managing service delivery. Access to quality healthcare, including diagnostic services, directly correlates with the level of financial investment from government, non-governmental organizations, and the private sector (Al-Worafi, 2023). A systematic underfunding of county health budgets has perpetuated gaps in diagnostic imaging infrastructure, particularly in rural and peri-urban counties such as Murang'a. Studies conducted across sub-Saharan Africa confirm that inadequate funding is the primary constraint on the acquisition and maintenance of diagnostic imaging equipment in public health facilities (Azevedo, 2019). In Uganda, for instance, fewer than 40% of district hospitals had functional imaging equipment, with funding shortfalls and bureaucratic procurement procedures

cited as the leading barriers (Zikusooka et al., 2020). Similar patterns have been documented in Tanzania and Ethiopia, where donor-funded equipment often becomes non-functional within two to three years due to the absence of maintenance financing and technical support.

Governments and international organizations have increasingly recognized that equitable health systems are essential for achieving the Sustainable Development Goals, particularly SDG 3 on good health and well-being (WHO, 2022). In response, many developing countries, including Kenya, have introduced reforms in their health financing systems to enhance both efficiency and equity in infrastructure and equipment acquisition. These reforms include increased budgetary allocations, enhanced community health financing, and the introduction of strategic purchasing mechanisms under the National Hospital Insurance Fund (NHIF) and its successor, the Social Health Authority (SHA) (Ministry of Health Kenya, 2023). Equipment leasing has emerged as an innovative financing mechanism that offers healthcare facilities access to modern diagnostic technology without the burden of large upfront capital expenditure. Leasing arrangements transfer the responsibility of equipment maintenance and upgrade to the lessor, thereby reducing operational burdens on hospital administrators and allowing clinical staff to focus on patient care (Waweru et al., 2022). In Kenya, managed equipment service (MES) arrangements introduced under the national government's infrastructure program provided CT scanners, MRI machines, and X-ray equipment to county hospitals on lease terms. Although the program faced implementation challenges including delayed payments and service disruptions, it demonstrated the potential of leasing as a viable financing mechanism for diagnostic imaging (Omondi et al., 2022).

Public-Private Partnerships and Donor Funding in Diagnostic Imaging

Public-private partnerships have gained significant attention as a financing strategy for health infrastructure in low- and middle-income countries. PPPs enable governments to leverage private sector capital, technical expertise, and operational efficiency to expand access to health services that would otherwise be unaffordable through public financing alone (Nyambane et al., 2023). In the context of diagnostic imaging, PPPs typically involve arrangements where private investors finance the procurement and installation of imaging equipment, which is then operated within public health facilities in exchange for a fee-for-service or concession arrangement. Evidence from Kenya suggests that PPPs in the health sector can effectively expand access to diagnostic services, particularly in counties where public financing is insufficient. However, the success of such partnerships is contingent on robust governance frameworks, transparent contracting, and adequate regulatory oversight to prevent inequitable pricing and ensure service quality (Onyango et al., 2021). Without these safeguards, PPP arrangements risk prioritizing cost recovery over patient welfare, thereby undermining equitable access to diagnostic imaging for low-income populations.

Donor funding represents another significant source of financing for diagnostic imaging equipment, particularly for public hospitals in resource-constrained settings. International development organizations, including the Global Fund, the United States Agency for International Development (USAID), and the World Bank, have funded the procurement of diagnostic equipment in Kenya as part of broader health systems strengthening programs (Kimani et al., 2020). However, donor-funded equipment is often subject to conditionalities, project timelines, and limited provisions for long-term maintenance, creating sustainability challenges once donor support is discontinued. A study by Kairu et al. (2021) found that approximately 40% of donor-funded diagnostic equipment in Kenya's county hospitals became non-functional within three years due to the absence of maintenance budgets and technical expertise.

Community Resource Mobilization and Budgetary Allocations

Community resource mobilization represents an emerging approach to financing healthcare infrastructure, particularly in contexts where government and donor funding are insufficient to meet demand. Community health financing schemes, including community health funds, social enterprises, and corporate social responsibility (CSR) contributions, have been utilized in several Kenyan counties to supplement government allocations for health equipment and infrastructure (Otieno et al., 2019). While community mobilization alone is insufficient to finance high-cost imaging equipment, it can play a complementary role in supporting maintenance costs, consumable procurement, and community-based insurance contributions. Budgetary allocation at the county level is the most direct determinant of whether diagnostic imaging equipment can be acquired in public hospitals. Studies confirm that counties that dedicate higher proportions of their health budgets to capital equipment procurement demonstrate significantly better imaging infrastructure outcomes (Njagi et al., 2025). However, competing health priorities, debt servicing obligations, and personnel emoluments often crowd out capital investment in many Kenyan counties. Strengthening county-level health budgeting processes, including the use of Medium-Term Expenditure Frameworks (MTEFs) and performance-based financing, has been recommended as a strategy to improve capital allocation for diagnostic.

3.0 RESEARCH METHODOLOGY

This chapter describes the methods used to assess financing mechanisms influencing the acquisition of diagnostic imaging equipment in hospitals in Murang'a County, Kenya. A descriptive research design was adopted to examine how different financing approaches affect equipment procurement and availability. The study was conducted in selected public and private hospitals within Murang'a County. The target population comprised 75 respondents, including 65 hospital administrators and 10 County Ministry of Health officials directly involved in budgeting, financial planning, and equipment procurement. These respondents were drawn from 30 purposively selected hospitals with established diagnostic imaging services. The study included

all members of the target population to ensure comprehensive data collection. Primary data were collected using structured questionnaires and key informant interviews to gather information on financing sources, allocation processes, partnerships, and maintenance funding. Secondary data were obtained from policy documents and health sector reports. Quantitative data were analyzed using statistical methods, while qualitative data were examined through thematic analysis. Ethical principles, including informed consent and confidentiality, were strictly observed throughout the study.

4.0 RESEARCH FINDINGS AND DISCUSSION

Response Rate

A total of 75 structured questionnaires were distributed to the study participants comprising hospital administrators and county health officials across selected hospitals in Murang'a County. Of these, 50 participants completed and returned valid responses, yielding a response rate of 67%. The response rate was calculated using the following formula:

Table 1: Response Rate Summary

Data Collection Tool	Targeted Respondents	Actual Responses	Response Rate (%)
Questionnaires	75	50	67%
Key In-depth Interviews (KIIs)	10	8	80%

Source: Research Data, 2025

Both response rates achieved in this study are considered satisfactory and representative of the target population. According to Mugenda and Mugenda (2003), a response rate of 50% is adequate for analysis and reporting purposes, 60% is considered good, while 70% and above is rated as excellent. The questionnaire response rate of 67% falls within the 'good' category, while the key informant interview response rate of 80% is classified as 'excellent.' These response rates provide sufficient data for meaningful analysis and ensure the reliability and validity of the study findings. The combination of quantitative and qualitative data collection methods strengthens the overall research design and enhances the comprehensiveness of the results.

Descriptive Analysis

Acquisition of Diagnostic Imaging Equipment

The study sought to establish whether insufficient funding adversely affected the effective acquisition of diagnostic imaging equipment in the respondents' health facilities. Findings revealed that the majority of respondents (72%) confirmed that inadequate funding negatively impacted their facility's ability to acquire diagnostic imaging equipment, while 28% indicated that funding

constraints did not significantly affect equipment acquisition. This finding underscores the centrality of financial resources in determining whether hospitals can access the imaging technologies necessary for quality diagnosis and patient care.

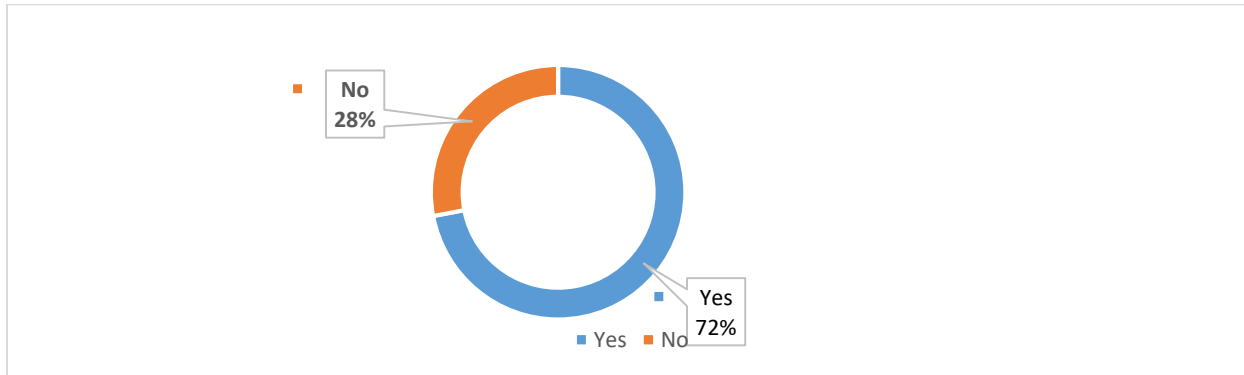


Figure 4.1: Effect of Insufficient Funds on Acquisition of Diagnostic Imaging Equipment
Source: Research Data, 2025

Among the respondents who acknowledged that funding gaps affected equipment acquisition, the following strategies were identified as the most efficient mechanisms for accessing resources to procure imaging equipment: government funding (38%), donor funding (21%), community mobilization (17%), public-private partnerships (12%), leasing (5%), bank loans (4%), and increasing hospital charges (3%). These findings highlight the diversity of available financing options while also indicating a strong reliance on government and external donor support, which may not always be reliable or sustainable in the long term.

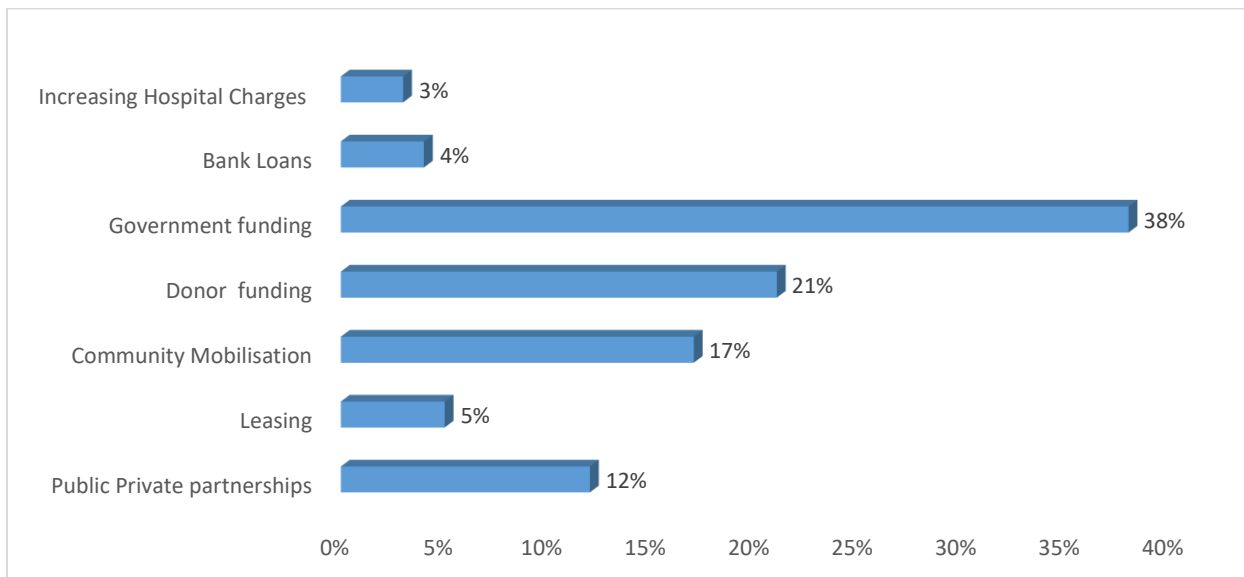


Figure 1: Mechanisms for Accessing Resources to Acquire Diagnostic Imaging Equipment
Source: Research Data, 2025

These findings are consistent with those of Omondi et al. (2022), who demonstrate that public hospitals in Kenyan counties remain predominantly dependent on government transfers for capital expenditure, including medical equipment. The strong preference for government funding reflects both its perceived reliability and the constitutional mandate for government to finance public health infrastructure. However, the heavy reliance on a single funding stream makes hospitals vulnerable to fiscal shocks, budget freezes, and delays in fund disbursement, all of which can interrupt equipment acquisition timelines.

Proper Acquisition of Resources

Respondents were asked to suggest ways in which proper resource acquisition for medical diagnostic imaging equipment could be ensured in county hospitals. Three strategies emerged as the most prominent: increasing the health budget allocation for medical equipment (68%), fostering partnerships between stakeholders in the health sector (59%), and reducing bureaucracy in procurement procedures (56%). These findings suggest that while financing is the primary constraint, institutional and administrative inefficiencies compound the challenge of equipment acquisition, even when resources are theoretically available.

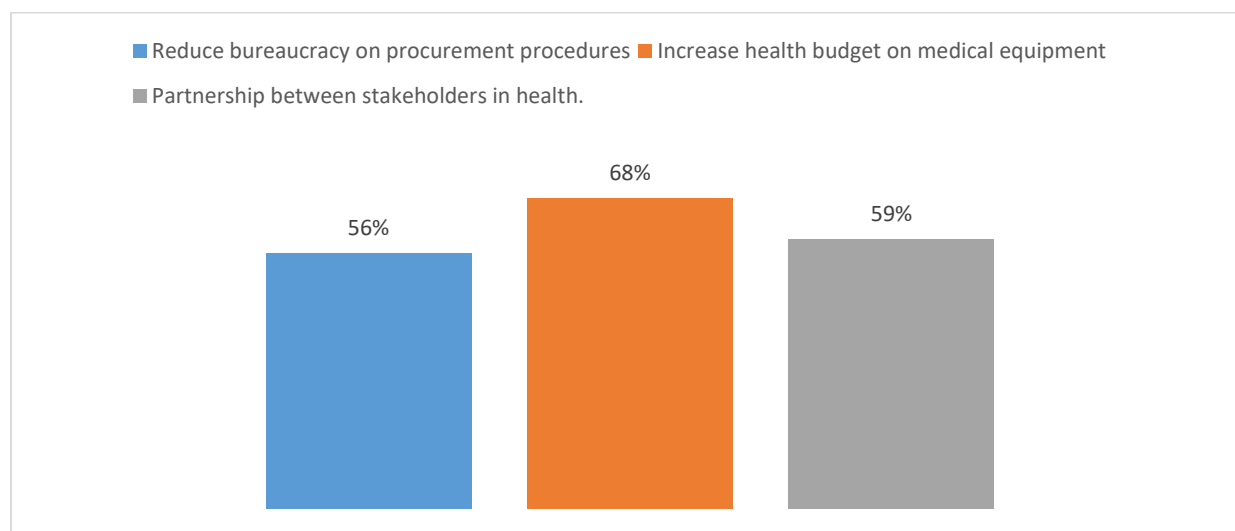


Figure 2: Strategies for Proper Acquisition of Resources for Diagnostic Imaging Equipment
Source: Research Data, 2025

The call for increased health budget allocations resonates strongly with evidence from the broader Kenyan health financing literature. Kiptui et al. (2021) found that counties allocating less than 15% of their total budgets to health capital expenditure consistently reported lower rates of

functional medical equipment relative to demand. Murang'a County's health budget has historically fallen below the Abuja Declaration target of 15% of total government expenditure for health, contributing to persistent gaps in diagnostic infrastructure. The emphasis on stakeholder partnerships reflects growing recognition that no single actor can adequately finance the complex needs of modern diagnostic services, necessitating coordinated multi-sectoral approaches (Otieno et al., 2019).

Availability and Affordability of Diagnostic Imaging Services

Respondents were asked to indicate the extent to which they perceived diagnostic imaging services to be unavailable to local communities. The majority (56%) indicated that imaging services were unavailable to a very great extent, 23% to a great extent, 16% to a moderate extent, and 5% to a lesser extent. Cumulatively, 79% of respondents perceived diagnostic imaging as significantly or very significantly unavailable, confirming a widespread and severe service gap in the county.

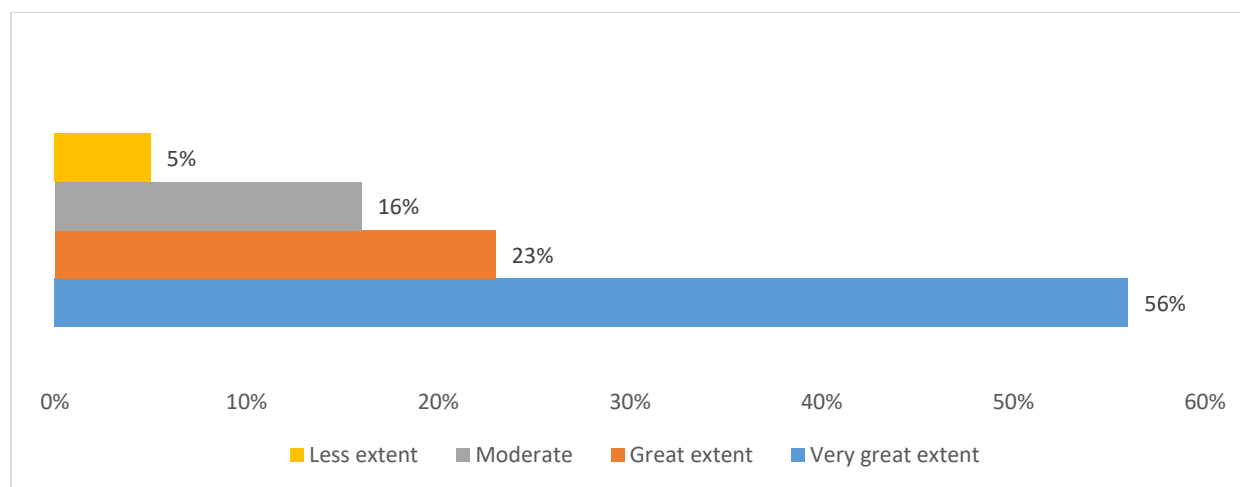


Figure 3: Availability of Diagnostic Imaging Services to Local Communities Source: Research Data, 2025

This finding is consistent with national-level evidence indicating that over 1,000 health facilities in Kenya that should be equipped with X-ray imaging devices lack such equipment (Ministry of Health Kenya, 2023). In Murang'a County, the distribution of imaging equipment is skewed toward higher-level facilities concentrated in the county headquarters, leaving peripheral health centers and rural populations with severely limited access. This inequitable distribution reflects systemic financing disparities that require targeted policy interventions to address.

Resource Mobilization

Respondents were required to rate their level of agreement with a series of statements related to resource mobilization for diagnostic imaging in Murang'a County. Mean scores and standard deviations were computed using SPSS Version 25 and are presented in Table 2 below.

Table 2: Resource Mobilization for Diagnostic Imaging Equipment

Statement	Mean	Std. Deviation
There are sufficient finances to avail medical diagnostic services at both county and national levels.	3.72	1.011
Proper utilization of government funds can ensure acquisition of basic diagnostic equipment in major hospitals.	3.62	0.830
The initial cost of equipment installation is high, but long-term healthcare costs are reduced.	3.56	1.232
Collaboration between the health sector and private stakeholders can generate adequate resources for equipment.	3.00	1.629
Leasing of medical diagnostic equipment is an opportunity to enhance service efficiency in health facilities.	2.94	1.252

Source: Research Data, 2025

Table 2 shows that respondents most strongly agreed that there are sufficient finances at the national and county levels to fund diagnostic imaging services (Mean = 3.72), though this perception may reflect aspirational rather than actual resource availability. The view that proper utilization of existing funds can secure basic diagnostic equipment (Mean = 3.62) suggests that financial mismanagement and administrative inefficiency are perceived as significant contributors to the equipment gap, independent of the absolute level of funding. The acknowledgment that initial installation costs are high but long-term healthcare costs decrease (Mean = 3.56) aligns with the economic rationale for investing in diagnostic capacity as a cost-saving measure over time. The moderate agreement on the potential of public-private collaboration (Mean = 3.00) and equipment leasing (Mean = 2.94) suggests that while these mechanisms are recognized as potentially valuable, there remains uncertainty or limited practical experience with their implementation in the county context. These findings are consistent with Waweru et al. (2022), who note that the uptake of leasing arrangements in Kenyan county hospitals has been constrained by contractual complexity, unfamiliarity among county procurement officials, and concerns about service continuity.

Factors Enhancing the Acquisition of Medical Diagnostic Imaging Equipment

Respondents were asked to rate the extent to which specific factors could enhance the acquisition of medical diagnostic imaging equipment in Murang'a County hospitals. The resulting mean scores and standard deviations are presented in Table 3 below.

Table 4: Factors Enhancing the Acquisition of Medical Diagnostic Imaging Equipment

Factor	Mean	Std. Deviation
Government funding	4.08	0.986
Leasing from credible companies	3.76	1.117
Public-private partnerships (PPPs)	3.46	1.092
Community resource mobilization	3.16	1.235
Donor funding	2.86	1.702
Bank loans to facilitate equipment acquisition	2.36	1.411
Increasing hospital charges	2.12	1.649

Source: Research Data, 2025

Government funding ranked highest as a factor capable of enhancing diagnostic imaging equipment acquisition (Mean = 4.08), confirming its dominant role in the healthcare financing landscape of Murang'a County. Leasing from credible companies ranked second (Mean = 3.76), suggesting growing awareness of this mechanism's potential among health administrators. Public-private partnerships ranked third (Mean = 3.46), reflecting their recognized but not yet fully realized potential in the county. Community resource mobilization (Mean = 3.16) was considered moderately effective, likely reflecting its complementary rather than primary financing role. Donor funding (Mean = 2.86), bank loans (Mean = 2.36), and increasing hospital charges (Mean = 2.12) were rated less favorably, suggesting that respondents perceive these mechanisms as either less reliable, financially risky, or ethically problematic in the context of public healthcare delivery. The low rating for increasing hospital charges is particularly significant, as it underscores awareness among health officials that cost-shifting to patients would undermine equitable access to diagnostic services for low-income communities (Kimani et al., 2020).

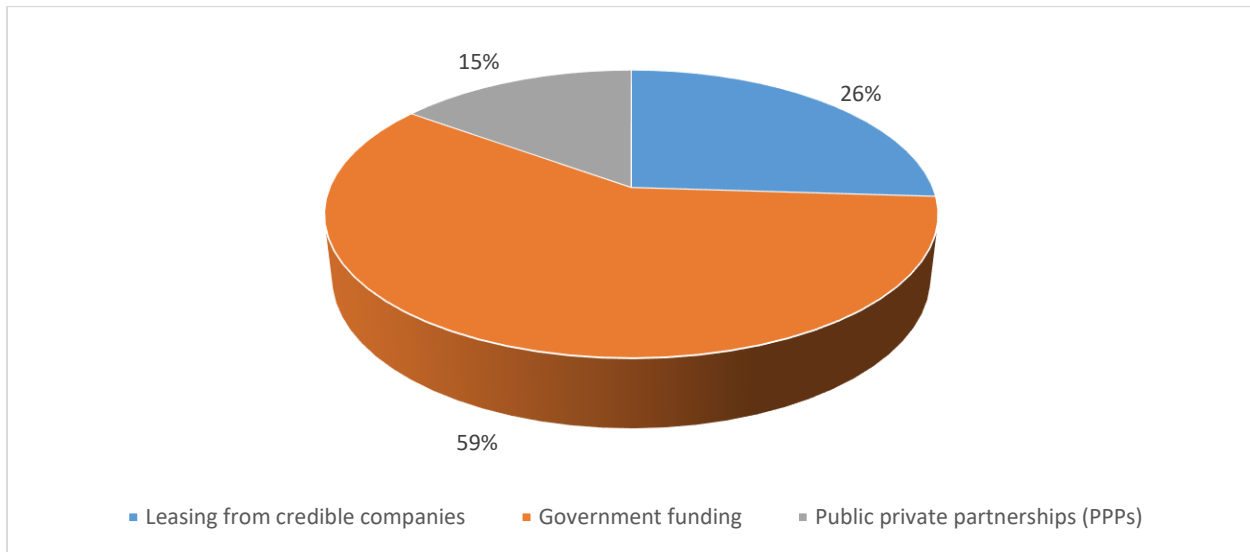


Figure 4.5: Strategies for Ensuring Availability and Affordability of Diagnostic Imaging Services Source: Research Data, 2025

When respondents were further asked to identify the primary strategies for ensuring the availability and affordability of diagnostic imaging services, 59% identified government funding as the leading approach, followed by leasing from credible companies (26%) and public-private partnerships (15%). These findings align with those of Omondi et al. (2022) and Nyambane et al. (2023), who emphasize that sustainable improvement in diagnostic imaging access in Kenyan counties requires a combination of enhanced government investment and well-structured alternative financing mechanisms.

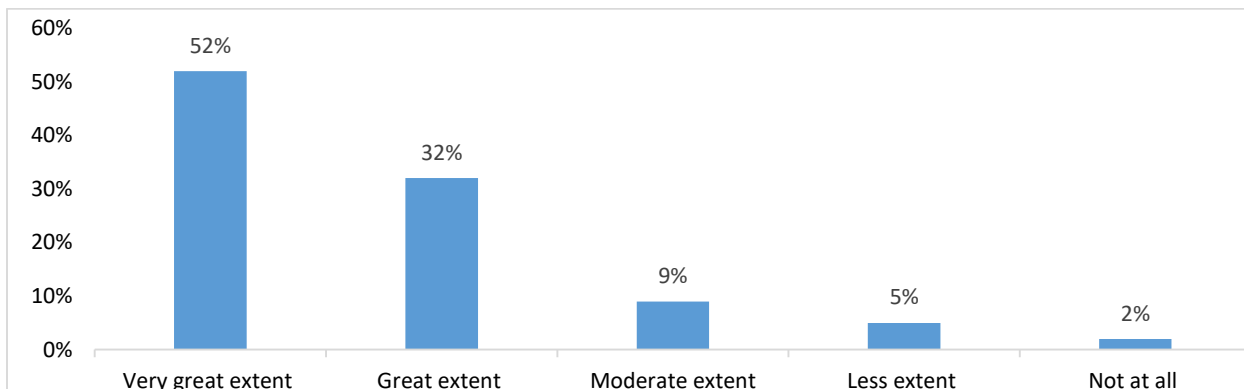


Figure 4.6: Extent to Which National and County Governments Can Ensure Effective Financing for Diagnostic Imaging Source: Research Data, 2025

Regarding the role of county and national governments in ensuring effective financing for diagnostic imaging, 52% of respondents indicated that both levels of government could achieve

this to a very great extent, 32% to a great extent, 9% to a moderate extent, 5% to a lesser extent, and only 2% expressed that governments were not at all capable of ensuring effective financing. Cumulatively, 84% of respondents held a positive view of government capacity to deliver effective financing when the political will and governance systems are in place. This finding underscores the critical importance of government leadership in health financing while also pointing to the need for enhanced institutional capacity for procurement, fund management, and accountability.

Qualitative Findings from Key Informant Interviews

Key informant interviews were conducted with eight senior health officials, including hospital administrators and Ministry of Health representatives in Murang'a County. Thematic analysis of the interview responses yielded four dominant themes related to financing mechanisms for diagnostic imaging equipment acquisition. On probable solutions to address the lack of effective diagnostic imaging services in Murang'a County, a hospital administrator stated that strategic increases in budget allocations dedicated to diagnostic imaging equipment procurement and preventive maintenance are critical. The administrator further observed that leveraging innovative financing mechanisms such as equipment leasing alongside fostering strong partnerships with donor agencies can significantly close the existing funding gaps. This perspective aligns with Ngunjiri et al. (2021), who argue that healthcare systems with limited resources require diversified and sustainable financing strategies to ensure uninterrupted availability of critical diagnostic technologies. A Ministry of Health official commented on the enhancement of funding for diagnostic imaging equipment, arguing that diagnostic imaging must be explicitly prioritized within both county and national health budgets. The official further observed that expanding health insurance schemes to comprehensively cover diagnostic services and mobilizing public-private partnerships can substantially augment resource availability. Kimani et al. (2020) substantiate this position, demonstrating that the integration of health insurance coverage and PPPs effectively mobilizes funds and reduces out-of-pocket expenditure, thereby expanding equitable access to diagnostic technologies.

A private hospital administrator speaking on the role of private sector engagement observed that well-regulated PPPs introduce much-needed capital investment and technical expertise, reducing service costs and broadening access. However, the administrator cautioned that safeguarding transparency and accountability mechanisms is essential to maintain equitable service delivery. Onyango et al. (2021) similarly caution that while PPPs can significantly enhance service capacity, robust governance frameworks are vital to mitigate risks of inequity and ensure quality assurance in public healthcare provision. A Ministry of Health official articulating a comprehensive resource mobilization strategy observed that community engagement in innovative health financing schemes, tapping into corporate social responsibility contributions, and strengthening coordination between county and national governments to optimize pooled resources are all essential

components. This approach is supported by Otieno et al. (2019), who emphasize multi-sectoral partnerships and community participation as pillars of sustainable health financing in resource-constrained contexts. A health sector professional concluded that sustained and targeted funding, availability of trained personnel, streamlined procurement processes, robust maintenance systems, and political commitment collectively determine the accessibility and affordability of diagnostic imaging equipment, a perspective reflecting the World Health Organization's (2022) integrated systems approach to medical equipment management.

Regression Analysis

To test the research hypothesis, a simple linear regression analysis was conducted with financing mechanisms as the independent variable and acquisition of diagnostic imaging equipment as the dependent variable. The results are presented in Tables below.

Table 5: Model Summary for Financing Mechanisms and Equipment Acquisition

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.651	0.424	0.411	0.503

a. Predictors: (Constant), Financing Mechanisms

Source: Research Data, 2025

The model summary in Table 5 shows a correlation coefficient of $R = 0.651$, indicating a strong positive relationship between financing mechanisms and the acquisition of diagnostic imaging equipment. The coefficient of determination ($R^2 = 0.424$) indicates that financing mechanisms explain 42.4% of the variance in diagnostic imaging equipment acquisition in Murang'a County hospitals. The adjusted R^2 of 0.411 confirms the robustness of the model after accounting for the number of predictors. This finding suggests that while financing mechanisms are a substantial predictor of equipment acquisition, additional factors such as procurement governance, technical capacity, and maintenance frameworks also play significant roles in the remaining unexplained variance.

Table 6: ANOVA–Financing Mechanisms and Equipment Acquisition

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	14.769	1	14.769	58.213	.000
Residual	20.031	79	0.254		
Total	34.800	80			

a. Dependent Variable: Acquisition of Diagnostic Imaging Equipment
b. Predictors: (Constant), Financing Mechanisms
Source: Research Data, 2025

The ANOVA results in Table 7 confirm that the regression model is statistically significant ($F = 58.213, p < 0.001$). This result demonstrates that financing mechanisms have a statistically significant overall effect on the acquisition of diagnostic imaging equipment in Murang'a County hospitals, and that the model provides a reliable fit to the observed data.

Table 7: Regression Coefficients – Financing Mechanisms and Equipment Acquisition

Model	Unstandardized B	Std. Error	Standardized Beta	t	Sig.
(Constant)	2.149	0.353		6.081	.000
Financing Mechanisms	0.324	0.082	0.391	3.939	.000***

a. Dependent Variable: Acquisition of Diagnostic Imaging Equipment
***** $p < 0.001$ Source: Research Data, 2026**

The regression coefficients in Table 7 indicate that financing mechanisms positively and significantly predict the acquisition of diagnostic imaging equipment ($B = 0.324, \beta = 0.391, t = 3.939, p < 0.001$). A one-unit improvement in financing mechanisms is associated with a 0.324-unit increase in the acquisition of diagnostic imaging equipment, holding all else constant. This finding supports the rejection of the null hypothesis, confirming that financing mechanisms significantly influence the acquisition of diagnostic imaging equipment in hospitals in Murang'a County, Kenya. The positive beta coefficient underscores that improvements in the diversity, adequacy, and efficiency of financing mechanisms directly translate into improved equipment acquisition outcomes

SUMMARY OF THE STUDY

This study assessed the financing mechanisms influencing the acquisition of diagnostic imaging equipment in hospitals in Murang'a County, Kenya. The study adopted a descriptive research design and collected data from 50 hospital administrators and county health officials through structured questionnaires, supplemented by key informant interviews with 8 senior health officials. The findings reveal that the majority of respondents (72%) confirmed that insufficient funding adversely affected their facility's ability to acquire diagnostic imaging equipment. Government funding was identified as the most preferred and effective financing mechanism (38%), followed by donor funding (21%), community mobilization (17%), public-private partnerships (12%), leasing (5%), bank loans (4%), and increasing hospital charges (3%). Respondents further indicated that increasing the health equipment budget (68%), strengthening stakeholder

partnerships (59%), and reducing procurement bureaucracy (56%) are the most critical strategies for improving resource acquisition for imaging equipment.

The resource mobilization analysis showed that respondents generally agreed on the adequacy of finances at national and county levels (Mean = 3.72) and the potential of proper fund utilization to secure basic diagnostic equipment (Mean = 3.62). However, there was more moderate agreement on the potential of equipment leasing (Mean = 2.94) and cross-sector collaboration (Mean = 3.00), indicating that these mechanisms remain underutilized. The regression analysis confirmed that financing mechanisms significantly and positively influence the acquisition of diagnostic imaging equipment ($B = 0.324$, $\beta = 0.391$, $p < 0.001$), with the model explaining 42.4% of the variance in equipment acquisition outcomes. Qualitative findings from key informant interviews corroborated these quantitative results, emphasizing the need for diversified financing strategies, explicit budgetary prioritization of diagnostic imaging, expanded health insurance coverage, robust PPP governance frameworks, and sustained political commitment to improving diagnostic services in the county.

CONCLUSION

The study concludes that financing mechanisms are a fundamental and statistically significant determinant of the acquisition of diagnostic imaging equipment in hospitals in Murang'a County, Kenya. The positive and significant regression coefficient confirms that improvements in the availability, diversity, and efficiency of financing mechanisms directly enhance hospitals' capacity to acquire the imaging equipment necessary for quality diagnostic services. The strong preference for government funding among health administrators underscores the central role of public investment in sustaining diagnostic imaging infrastructure, while the recognition of alternative mechanisms such as leasing, PPPs, and community mobilization points to the need for a more diversified financing portfolio. The study further concludes that the persistent gap in diagnostic imaging equipment availability in Murang'a County is not solely attributable to insufficient overall resources but also to institutional inefficiencies, bureaucratic procurement barriers, and inadequate long-term planning for equipment maintenance and replacement. Addressing these structural and governance-related constraints is as important as increasing the absolute level of financing. The findings demonstrate that achieving equitable access to diagnostic imaging services in Murang'a County requires a coherent, multi-pronged financing strategy that integrates increased government budget allocations, well-governed public-private partnerships, sustainable donor engagement, and community health financing schemes, all supported by a robust accountability and performance management framework.

RECOMMENDATIONS

Based on the research findings and conclusions, the following recommendations are proposed for policy and practice: The Murang'a County Government should significantly increase the

proportion of its health budget dedicated to the procurement of diagnostic imaging equipment. Budget allocations should explicitly identify diagnostic imaging as a capital investment priority within county health sector plans and Medium-Term Expenditure Frameworks, ensuring predictable and adequate funding flows for equipment acquisition and maintenance (Kairu et al., 2021). County health administrators and the Ministry of Health should actively pursue and formalize public-private partnership arrangements for diagnostic imaging services. These partnerships should be structured within transparent contractual frameworks that include service quality standards, pricing regulations, and accountability mechanisms to ensure equitable access for all patients regardless of their economic status.

County governments should explore and institutionalize equipment leasing arrangements with credible and technically capable companies as a means of accessing modern diagnostic technology without prohibitive upfront capital expenditure. Leasing contracts should incorporate provisions for regular maintenance, consumable supply, staff training, and equipment upgrading to ensure sustained service continuity (Njagi et al., 2025). The county and national governments should work collaboratively to streamline procurement procedures for diagnostic imaging equipment, reducing bureaucratic delays that impede timely acquisition. The adoption of framework contracts, pre-qualified supplier lists, and digital procurement platforms can significantly reduce procurement lead times and transaction costs. Community health financing mechanisms, including county health funds, corporate social responsibility contributions, and community health insurance schemes, should be strengthened and expanded to complement government and donor funding for diagnostic imaging (Zacharia et al., 2025). These mechanisms can generate additional resources while building community ownership and accountability for health service delivery.

AREAS FOR FURTHER RESEARCH

Future research should consider replication of this study in other Kenyan counties with varying socioeconomic and governance profiles to assess the generalizability of the findings. Longitudinal studies examining the sustained impact of specific financing mechanisms on diagnostic imaging equipment functionality and patient outcomes over time would provide valuable insights into the long-term effectiveness of different financing strategies. Additionally, comparative studies examining the performance of public-private partnerships and equipment leasing arrangements across multiple county hospitals would enhance understanding of the governance structures and contractual arrangements that best support successful implementation. Research focusing on the maintenance financing gap that is, the mechanisms available for sustaining equipment operability after initial procurement would also address a critical but underexplored dimension of diagnostic imaging infrastructure management in resource-constrained settings.

REFERENCES

- Al-Worafi, Y. M. (2023). Healthcare Access and Equitable Access Services in Developing Countries. *Springer EBooks*, 1–24. https://doi.org/10.1007/978-3-030-74786-2_217-1
- Azevedo, M. J. (2019). The State of Health System(s) in Africa: Challenges and Opportunities. *Historical Perspectives on the State of Health and Health Systems in Africa, Volume II*, 2(3), 1–73. https://doi.org/10.1007/978-3-319-32564-4_1
- Chukwudalu, C., Ebulue, R., & Ekesiobi, S. (2024). PUBLIC-PRIVATE PARTNERSHIPS IN HEALTH SECTOR INNOVATION: LESSONS FROM AROUND THE WORLD. *International Medical Science Research Journal*, 4(4), 484–499. <https://doi.org/10.51594/imsrj.v4i4.1051>
- Clarkson, J., Dean, J., Ward, J., Komashie, A., & Bashford, T. (2018). A systems approach to healthcare: from thinking to -practice. *Future Healthcare Journal*, 5(3), 151–155. <https://www.rcpjournals.org/content/futurehosp/5/3/151.full.pdf>
- Dadzie, E. B., Amoah, J., Egala, S. B., Keelson, S. A., & Bashrisu, A. J. (2024). THE IMPACT OF PROCUREMENT TRAINING ON PROCUREMENT PROCESS EFFICIENCY AND ORGANIZATIONAL PERFORMANCE: A PLS-SEM ANALYSIS. *International Journal of Entrepreneurial Knowledge*, 12(1), 24–42. <https://doi.org/10.37335/ijek.v12i1.228>
- Drack, M., & Pouvreau, D. (2015). On the history of Ludwig von Bertalanffy’s “General Systemology”, and on its relationship to cybernetics – part III: convergences and divergences. *International Journal of General Systems*, 44(5), 523–571. <https://doi.org/10.1080/03081079.2014.1000642>
- Griffin, S., Kataika, E., Revill, P., Sibandze, S., & Walker, S. (2020). Methods to promote equity in health resource allocation in low- and middle-income countries: An overview. *Globalization and Health*, 16(1), 1–12. <https://doi.org/10.1186/s12992-019-0537-z>
- Kairu, A., Orangi, S., Mbuthia, B., Ondera, J., Ravishankar, N., & Barasa, E. (2021). Examining health facility financing in Kenya in the context of devolution. *BMC Health Services Research*, 21(1). <https://doi.org/10.1186/s12913-021-07123-7>
- KIPPRA. (2019). *Revenue Sharing Stalemate between National Government and County Governments – KIPPRA*. Kippra.or.ke. <https://kippra.or.ke/revenue-sharing-stalemate-between-national-government-and-county-governments/>
- Ministry of Health. (2022). *KENYA HEALTH FACILITY CENSUS REPORT*. www.bing.com. <https://www.bing.com/ck/a?>
- Njagi, E., Iloka, K., Wawira, S., Laban Thiga, & Muraguri, N. (2025). Learning from the Kenyan experiment: key takeaways for implementing managed equipment services in developing countries. *Frontiers in Health Services*, 5. <https://doi.org/10.3389/frhs.2025.1361261>
- Nyanchoka, M., Munywoki, J., Kanya, L., Guleid, F., Oyando, R., Gathara, D., Mugo, P., Kagwanja, N., Nzinga, J., & Tsofa, B. (2025). *Beyond Expansion: A Decade of Health*

- Infrastructure Development in Kenya's Devolved System (2010–2023) - Trends, Equity, and Policy Implications.* <https://doi.org/10.12688/verixiv.2419.1>
- Peter, K. N. (2020). Determinants of Adherence and Retention in Care of Hiv Positive Adolescents in Murang'a County Hospital, Kenya. *89.31.5.*
<https://repository.kemu.ac.ke/handle/123456789/1054>
- Sahu, B., & Madani, G. (2024). Imaging inequality: exploring the differences in radiology between high- and low-income countries. *Clinical Radiology*, *79*(6), 399–403.
<https://doi.org/10.1016/j.crad.2024.03.009>
- WHO. (2022). *World Health Statistics 2022.* Www.bing.com. <https://www.bing.com/ck/a?>
- Yadav, H., Shah, D., Sayed, S., Horton, S., & Schroeder, L. F. (2021). Availability of essential diagnostics in ten low-income and middle-income countries: results from national health facility surveys. *The Lancet Global Health*, *9*(11), e1553–e1560.
[https://doi.org/10.1016/S2214-109X\(21\)00442-3](https://doi.org/10.1016/S2214-109X(21)00442-3)
- Zacharia, M., Abdullah, K., Caleb, M., & And, A. (2025). Evaluation Of Predictive Maintenance Techniques For Reducing Equipment Downtime In Manufacturing... *ResearchGate*, *4*(10), 110–121.
https://www.researchgate.net/publication/396925410_Evaluation_Of_Predictive_Maintenance_Techniques_For_Reducing_Equipment_Downtime_In_Manufacturing_Industries_In_Uganda
- Zikusooka , C., Kyomuhang, R., Orem, J., & Tumwine, M. (2020). Is health care financing in Uganda equitable? *African Health Sciences*, *9*(Suppl 2), S52.
<https://pmc.ncbi.nlm.nih.gov/articles/PMC2877292/>