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THE EFFECT OF TECHNOLOGY ADOPTION ON HEALTHCARE QUALITY IMPROVEMENT AT LAMU COUNTY REFERRAL HOSPITAL

GEORGE DAVIS MANYANGE BAGWASI

MBA-HCM/138932

RESEARCH DISSERTATION SUBMITTED TO THE STRATHMORE BUSINESS SCHOOL IN PARTIAL FULFILMENT FOR THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION IN HEALTH CARE MANAGEMENT OF STRATHMORE UNIVERSITY

JANUARY 2024

DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the dissertation contains no material previously published or written by another person except where due reference is made in the dissertation itself.

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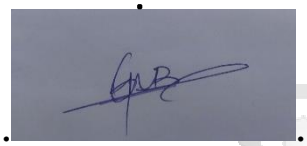
Signature ……  **……Date: 5th January 2024**

Supervisor Approval

This research thesis has been submitted for examination with my approval as the university supervisor.

Prof. Dr. Joseph Onyango, PhD
Associate Professor of Change Management

Signature …… **……Date: 5th January 2024**

Dr. Ceaser Mwangi

Executive Dean

Strathmore University Business School.

Prof. Bernard Shibwabo

Director, Office of Graduate Studies

TABLE OF CONTENTS

VT OMNES VNVM SINT

VT OMNES VNVM SINT

LIST OF TABLES

VT OMNES VNVM SINT

LIST OF FIGURES

VT OMNES VNVM SINT

ABBREVIATIONS AND ACRONYMS

AI	Artificial Intelligence
DHIS	District Health Information System
DHIS2	District Health Information Software
EHR	Electronic Health Records
EMR	Electronic Medical Records
IBD	Inflammatory Bowel Disease
IDT	Innovation Diffusion Theory
IeDEA	Integrated eHealth Electronic Application
IT	Information Technology
NHIS	National Health Insurance Scheme
QI	Quality Improvement
RDQAs	Routine Data Quality Assessments
STS	Socio-Technical Systems Theory
TAM	Technology Acceptance Model
TQM	Total Quality Management
UNESCO	United Nations Educational Scientific and Cultural Organization
VHA	Veterans Health Administration

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ABSTRACT

The persistent challenge of inadequate healthcare quality in Kenya, particularly in underserved regions like Lamu County, necessitates urgent attention. Despite global and national advancements in health technology, public facilities such as Lamu County Referral Hospital continue to face infrastructural, operational, and technological deficiencies that hinder effective service delivery. This study aimed to assess the effect of technology adoption on healthcare quality improvement at Lamu County Referral Hospital, with a focus on four key areas: barriers to successful adoption and integration of technology, technological healthcare infrastructure, hospital management systems, and telemedicine. Guided by the Technology Acceptance Model (TAM) and the Innovation Diffusion Theory (IDT), the study adopted a positivist philosophy and case study research design. The research was conducted at Lamu County Referral Hospital, targeting all 129 healthcare providers as the study population, using a census sampling procedure. Inclusion criteria required participants to be healthcare professionals with at least six months of work experience at the facility; non-medical staff and those unwilling to consent were excluded. Ethical considerations were strictly adhered to, including informed consent, confidentiality, and voluntary participation. Primary data were collected using a semi-structured questionnaire, pretested for clarity and reliability. The quality of the research instrument was confirmed with Cronbach's alpha values above 0.65 and KMO statistics exceeding 0.67. Data were analysed using descriptive statistics, Pearson correlation, and multiple regression analysis. The study achieved a high response rate of approximately 98%. Most respondents were nurses, and over 60% had more than five years of work experience. Results showed that technological healthcare infrastructure had the most substantial effect on healthcare quality ($\beta = 0.442$, $p < 0.05$), followed by hospital management systems ($\beta = 0.378$, $p < 0.05$), and telemedicine ($\beta = 0.264$, $p < 0.05$). Conversely, barriers to technology adoption showed a weak and statistically insignificant influence ($\beta = 0.051$, $p > 0.05$). The study concluded that modernising healthcare infrastructure and strengthening hospital management and telemedicine systems significantly enhance healthcare quality in public hospitals, even when adoption barriers exist. It recommended prioritised investment in physical infrastructure, comprehensive digital training for healthcare staff, expansion of telemedicine access, and process automation within hospital management. The main limitations included the study's confinement to a single facility and reliance on self-reported data. Future research should explore longitudinal impacts of technology on patient outcomes and replicate the study in diverse settings to strengthen generalisability.

KEY WORDS

Healthcare	Encompasses the prevention, identification, treatment, and management of illnesses, injuries, and diseases to support or enhance the physical and mental health of individuals and communities. It includes a broad spectrum of services, from primary care and preventive medicine to specialized treatments and rehabilitation, provided by healthcare professionals and organizations.
Quality of Healthcare	The extent to which safety, efficacy, timeliness, efficiency, equity, and patient-centeredness are met by healthcare services in relation to set norms and expectations. Clinical results, patient happiness, following best practices and recommendations, and the general patient experience are just a few of its many facets
Technology	The use of scientific principles, techniques, and methods to address challenges, enhance processes, and achieve particular goals. It involves both physical and non-physical components, such as equipment, tools, systems, procedures, and expertise
Technology Adoption	The process through which new technologies are embraced and incorporated into customs, procedures, or systems by people, groups, or communities. It encompasses the evaluation, selection, implementation, and use of technology to address specific needs, improve processes, or achieve desired outcomes
Telemedicine	Involves providing healthcare services remotely through the use of telecommunications technology, including digital communication tools, remote monitoring, and video conferencing. It improves access to care by removing geographic limitations and allowing medical professionals to discuss, diagnose, treat, and monitor patients remotely.

CHAPTER ONE: INTRODUCTION

1.1 Background Information

The quality of healthcare services is a critical factor in every hospital or medical care facility. Medical providers should have relevant infrastructure, qualified and competent medical professionals, and effective leadership. These factors ensure that healthcare quality is enhanced and always maintained (Mosadeghrad, 2014). However, issues such as inadequate resources and lack of competent and necessary skills play a big role in frustrating efforts to cultivate the provision of high-quality healthcare. Technology plays a transformative role in bridging these systemic gaps by enhancing clinical workflows, supporting administrative efficiency, and strengthening human capacity, thereby making it a direct enabler of healthcare quality improvement (Agarwal, 2017).

Technology has introduced better ways of enhancing effective leadership, improving professional competence among medical personnel, and providing infrastructure that supports reliable and quality-focused healthcare delivery (Agarwal, 2017). In doing so, it contributes to minimizing medical errors, improving diagnosis and treatment timelines, and enhancing patient monitoring. However, sometimes the desired technology is expensive to obtain, requires specialized skills to operate, and has high maintenance costs, which may hinder its effectiveness and limit its Effecton quality outcomes (Alrahbi et al., 2022).

The Effect of technology on healthcare quality improvement in the global context has been demonstrated through its contribution to medical innovation and responsiveness to public health needs. For instance, it has accelerated the development of vaccines, supported better disease surveillance, and improved clinical decision-making, all of which are direct determinants of healthcare quality (Ossebaard & Van Gemert-Pijnen, 2016). Electronic Health Records (EHRs) have replaced manual systems, enabling swift access to patient histories and improving care continuity. Telemedicine has improved patient-provider interactions, especially in underserved areas, while decision support systems help clinicians make accurate and timely diagnoses (Alrahbi et al., 2022).

Technology has been adopted differently across global regions depending on local health system needs. In Rwanda, the Integrated eHealth Electronic Application (IeDEA) allows healthcare

providers to access real-time patient information, improving coordination and continuity of care (Ross et al., 2020). In Ghana, the National Health Insurance Scheme (NHIS) utilizes mobile money platforms to streamline premium payments and claims, enhancing efficiency and service responsiveness (Gobah & Liang, 2011). In South Africa, the District Health Information System (DHIS) supports program monitoring and evaluation, while telemedicine extends services to rural areas, thereby improving equity and access (Mars, 2013).

The Effect of technology in improving healthcare quality in Kenya has also been notable. The use of telemedicine has improved consultation access in remote areas and enhanced continuous training for healthcare professionals (Onsongo et al., 2023). Mobile health applications have strengthened patient education, tracking, and appointment adherence, directly influencing quality dimensions such as timeliness and patient-centeredness (Onsongo et al., 2023). Other technologies, such as biometric systems, help prevent fraud and secure patient data, while electronic queue management and monitoring devices enhance operational efficiency (Odhiambo-Otieno, 2005).

The quality of healthcare in Kenya's public sector paints a mixed picture. On one hand, reforms such as free maternity services and increased funding have led to improved technical care quality and affordability. However, public facilities continue to struggle with staffing shortages, lack of essential medicines, and long waiting times, which negatively Affect the quality of care (Nyawira et al., 2022). Infrastructure inconsistency and poor communication also contribute to lower satisfaction levels. In contrast, private hospitals often have better infrastructure, specialist availability, and advanced technology, resulting in improved patient experiences and outcomes, although high costs restrict accessibility (Nyawira et al., 2022).

Lamu County Referral Hospital is a public hospital in Lamu County, Kenya and has faced some common challenges relating to healthcare quality. There is, for instance, limited access to healthcare, as most people in remote and rural areas of Lamu County struggle to reach the hospital due to transportation difficulties. This challenge affects timely service delivery, a critical component of healthcare quality. The medical facility has also been criticized for inadequate infrastructure, insufficient medical equipment, and shortages of essential supplies, which limit its ability to provide efficient and comprehensive care (Kimani & Moi, 2022). Additionally, the hospital has long relied on paper-based or fragmented information management systems, which

often lead to inefficiencies, documentation errors, and poor coordination of patient care, all of which negatively affect healthcare quality. In response, efforts have been initiated to improve the quality of care by adopting modern technology, including electronic health records systems that support accurate and up-to-date patient information, thereby enhancing safety, efficiency, and continuity of care. The use of telemedicine and mobile health solutions has also been introduced to expand access to services in remote areas, while the acquisition of modern medical equipment has improved diagnostic accuracy and treatment effectiveness, further contributing to healthcare quality improvement (Kimani & Moi, 2022).

Lamu County has also been a focus area due to its high illiteracy level, which presents a key challenge to technology adoption and integration in healthcare. According to the Kenya National Bureau of Statistics (KNBS) 2019 Census, Lamu County has an overall literacy rate of 58.7%, which is significantly lower than the national average of 78.7%. The literacy rate for males in Lamu County is 68.2%, while that of females is 49.2% (KNBS, 2019). These low literacy levels can hinder digital literacy, which is crucial for both healthcare providers and patients to fully utilize healthcare technologies that improve quality, such as mobile health applications and digital records. However, in recent years, the Kenyan government has demonstrated a strong commitment to enhancing healthcare service delivery and achieving universal health coverage. This commitment is reflected in initiatives such as the County Integrated Development Plans (CIDPs), which align national development goals with specific county health needs. These plans promote the adoption of context-specific technological solutions aimed at improving access, equity, and overall quality of healthcare services in counties like Lamu (Social Protection Org, 2022).

1.1.1 Healthcare Quality Improvement

Healthcare quality improvement (QI) is a systematic approach to identifying and solving problems in healthcare delivery. QI aims to raise the standard of patient care while lowering the probability of errors and unfavourable outcomes. It is a multifaceted idea that encompasses several facets of healthcare delivery, such as timeliness, efficiency, equity, safety, efficacy, and patient-centeredness (Manion & Davies, 2018). There are different ways in which healthcare quality improvement is assessed and monitored in health facilities including patient satisfaction surveys and feedback that can be used to assess healthcare quality from the patient's perspective. Similarly,

clinical audits and peer review can be used to assess adherence to best practices, clinical guidelines and quality standards. Models that can be used to assess improvement in healthcare include continuous quality improvement models for example, lean and six sigma approaches, and total quality management (TQM) (Andersson, Eriksson & Torstensson, 2006).

Jha and Doshi (2016) argues that there is no single gold standard method of measuring or determining quality in healthcare. They suggested that different methods are appropriate for different situations and as such researchers have to identify their specific requirements and needs and therefore determine the best method for their situations. The institute of medicine (2001) on the other hand, identified six aims of improving quality of healthcare that included: to improve timeliness, efficiency, equity, safety, efficacy, and patient-centeredness. Cinaroglu and Baser (2016) used final path model to determine quality improvement of healthcare facilities in Turkey. The model assessed the life expectancy and general patient satisfaction to determine healthcare quality improvement. In this study the researcher will adopt patient satisfaction surveys to determine quality improvement.

1.1.2 Technology in Healthcare

Technology in healthcare uses various technical developments, tools, and solutions to enhance patient care, streamline healthcare delivery, and improve healthcare results. Electronic health records (EHRs), telemedicine, wearable technology, artificial intelligence (AI), robotics, and other technologies are all included in it (Agbo, Mahmoud & Eklund, 2019). Technology has been used in healthcare to improve quality, efficiency as well as accessibility of healthcare. There are different ways in which different researchers have assessed technology in healthcare (Alammari et al, 2022; Bali, 2008; Jabbar, Samreen & Aluvalu, 2018).

Alammari et al. (2022) conducted research examining the relationship between electronic health record use and ambulatory healthcare quality. According to their findings, there was a significant influence of electronic health record use on the ambulatory healthcare quality measures. Bali (2018) found telemedicine to Effectquality in developing countries as a primary healthcare technology. Jabbar, Samreen and Aluvalu (2018) also found machine learning as an essential technology in the improvement of healthcare. The current study will therefore explore application

of telemedicine, electronic health records, automation, health information systems and mobile health applications as measures of technology adoption in healthcare.

1.1.3 Lamu County Referral Hospital

King Fahd Lamu County Referral Hospital was formerly known as Lamu District Hospital. The location of this level 5 ministry of health facility is in Lamu County's Mkomani Ward. Named for Saudi king Fahd bin Abdulaziz Al Saud, who provided $1 million for its development, it was established and officially opened in 1989. The hospital was crucial in Lamu Old Town's UNESCO World Heritage Site classification.

With 143,290 residents according to the 2019 census, this hospital services the entire county as it is the primary healthcare centre in Lamu County. The health facility has improved tremendously that it currently offers 24-hour services, and it has highly qualified specialists, and among other health service it offers specialized health facilities which are surgical operation, modern radiological services, ENT, Ophthalmic, dialysis and many other services (Kazungu, 2023). The facility, like many other health facilities across the world, has been increasing its adoption of modern technology, as a way of enhancing the quality of care provided to patients. Technological improvement seeks to improve efficiency, accuracy, and patient outcomes. However, there are direct challenges involved in the use of modern technology as sometimes the health facilities may need the required skills or skilled personnel to operate the modern equipment, service and repair it in the instance of breakdowns. The trained medical personnel may also require extra skills in interpreting information generated using technology, and therefore making it cumbersome (Muinga et al., 2020).

1.1.4 Hospital Level System in Kenya

In Kenya, the healthcare system categorizes hospitals into six tiers, each offering different levels of healthcare services and amenities. Level 1 hospitals, located in rural or remote areas, provide primary healthcare services like outpatient care, maternal and child health services, and basic laboratory tests. However, they lack specialized medical personnel and advanced equipment, often necessitating referrals for serious illnesses. Level 2 hospitals, found in semi-urban areas, offer basic outpatient and inpatient services, including minor surgeries and general medical care. While they can manage some illnesses, serious cases may require referral to higher-level facilities

(MOH,2022). Level 3 hospitals, typically larger district or sub-county hospitals, offer a broader range of services including emergency care, surgery, and basic diagnostic services. They have better-equipped facilities but may still refer chronic cases to higher-level hospitals. Level 4 hospitals, provincial or county referral hospitals, provide comprehensive medical services with specialized care in various disciplines. They have advanced equipment and specialist personnel capable of handling serious illnesses and complex cases (MOH, 2022). Level 5 hospitals are regional referral hospitals, offering highly specialized medical services and advanced procedures. Finally, level 6 hospitals, such as Kenyatta National Hospital, are national referral hospitals providing the highest level of specialized medical care with advanced technology and skilled professionals capable of handling serious medical conditions (MOH,2022).

1.2 Problem Statement

The ability of hospitals to maintain and improve the quality of medical care is a complex issue with many challenges and underlying issues. The issue of access to funding forms the bulk of factors that are needed to enhance quality in medical care. Hospitals need access to adequate funding to ensure that they have professional medical personnel, medical equipment is up to date and well serviced, availability of medical supplies including medicine, and the ability to maintain and procure necessary equipment to deal with different kind of illnesses. Access to adequate funding has become a vital problem due to the issue of limited resources. Securing adequate, reliable funding is a critical problem that has affected medical facilities not only in developing countries, but also in some parts of developed countries (Kerr & Hendrie, 2018). The other crucial factors that affect the quality of medical facilities is the unavailability of competent and qualified staff, outdated medical equipment and facilities, and poor management. These challenges affect service delivery as patients have reported long wait times, poor communication with staff, and a lack of access to essential services (Widayati, Tamtomo, & Adriani, 2017).

Technology plays a critical role in enhancing healthcare quality by improving access, communication, diagnosis, and decision-making. Tools such as Electronic Health Records (EHRs), telemedicine, artificial intelligence (AI), and machine learning have improved patient tracking, diagnostic accuracy, and data-driven care (Arora & Ganguly, 2019). However, in Kenya, many public hospitals continue to suffer from poor healthcare service delivery due to widespread equipment shortages, underutilization of high-tech machines, and lack of skilled personnel.

Reports show that over a third of hospitals with advanced equipment received through government programs have machines lying idle due to power issues, inadequate training, and maintenance constraints (Reuters, 2020). The World Health Organization estimates that 50–80% of medical equipment in developing countries is non-functional, a problem more pronounced in rural areas like those in Kenya (Moyimane, Matlala & Kekana, 2017). While the Kenyan government has established centers of excellence and allowed devolved procurement of equipment to address these gaps (Ojwang et al., 2021), challenges remain. Furthermore, the lack of integrated Health Management Systems (HMS) weakens hospitals' capacity to manage essential operations such as patient data, inventory, and human resources, thereby hindering quality service delivery (Kimama, 2011).

The absence of critical health technologies such as Hospital Management Systems (HMS) and telemedicine continues to undermine the quality and efficiency of healthcare service delivery in Kenya's public hospitals. Without HMS, core functions like patient registration, queue management, and record access remain manual, leading to delays, congestion, and poor decision-making due to lack of real-time data (Hospital Management System in Kenya, absolute corporate solutions, 2022). Similarly, with only 12% of facilities adopting telemedicine as of 2023, most healthcare providers lack the tools to offer remote consultations and timely diagnoses, especially in underserved areas, further worsening health disparities (Onsongo et al., 2023). These systemic inefficiencies are evident at Lamu County Referral Hospital, where limited infrastructure, insufficient medical supplies, and reliance on outdated paper-based systems severely constrain service quality (Kimani & Moi, 2022). To address these challenges, the hospital has begun adopting modern technologies such as electronic health records, telemedicine, and mobile health tools, which are intended to streamline operations, improve data accuracy, and enhance care coordination, positioning technology as a central solution to healthcare quality improvement

Improvement of quality at medical facilities have attracted different researchers in both the global perspective, in the African context as well as Kenyan context. The Effect of technology in enhancing quality of medical care has also been studied in the different contexts. However, there has been no single study that has been undertaken on the Effect of technology adoption on enhancing quality at King Fahd Lamu Referral Hospital. Ortiz and Clancy (2003) studied on the use of information technology (IT) in improving health care in the United States. Busse et al.

(2019) considered hedging on IT to improve healthcare quality in Europe. Marfur and Winter (2014) studied the role of IT on healthcare in West Africa. Karuri et al. (2014) investigated the tool of improving health data demand and use in Kenya. Kimani and Moi (2022) investigated determinants of quality healthcare delivery in Lamu county, while Twathe (2020) studied the effect of strategic change management on the performance of Coast and Lamu General and Teaching Referral Hospital in Kenya. There exists a conceptual gap for studies that have not specifically undertaken the Effect of technology on healthcare quality, while contextual gap exists in different studies that have not been carried out at King Fahd Lamu Referral Hospital. This study therefore, seeks to address the research gap and undertake a study on the Effect of technology on healthcare quality improvement at Lamu County Referral Hospital.

1.3 Research Objectives

The research objectives are classified as both general research objectives and specific research objectives.

1.3.1 General Research Objective

The general research objective of this study is to determine the Effect of technology adoption on healthcare quality improvement at Lamu County Referral Hospital.

1.3.2 Specific Research Objectives

The specific research objectives of the study are:

i. To analyse the barriers hindering the successful adoption and integration of technology in healthcare practices at Lamu County Referral Hospital
ii. To analyse the impacts of the current technological health infrastructure on the quality of healthcare at Lamu County Referral Hospital.
iii. To evaluate the Effect of Hospital Management System (HMS) on the quality of healthcare at Lamu County Referral Hospital.
iv. To determine the Effect of telemedicine on the quality of healthcare at Lamu County Referral Hospital.

1.4 Research Questions

The research questions of the study are:

i. What are the factors that facilitate successful adoption and integration of technology in healthcare practices at Lamu County Referral Hospital?
ii. How does the current technological health infrastructure at Lamu County Referral Hospital Effect the quality of healthcare provided?
iii. What is the Effect of Hospital Management System (HMS) on the quality of healthcare at Lamu County Referral Hospital?
iv. What is the Effect of telemedicine on the quality of healthcare at Lamu County Referral Hospital?

1.5 Significance of the Study

The study will be significant to policymakers because it can help them to make informed decisions about how and where technology can be used to improve the quality of care, such as by reducing medication errors, improving communication and use of telemedicine between healthcare providers, and providing patients with access to their medical records easily, as well as enhancing technological trainings and workshops that would improve healthcare quality.

The study is also significant to healthcare practitioners because it can help them to improve their practice. The study can provide healthcare practitioners with information about how to use technology to improve the quality of care, such as by using electronic health records to improve communication with patients, using decision support tools to reduce medication errors, and using telemedicine to provide care to patients who live in remote areas. Technological trainings and workshops will also promote knowledge and skills necessary to improve healthcare access and practice.

This study will also contribute to the existing body of knowledge on technology's Effect on healthcare quality. It provides an opportunity for further exploration and investigation into specific aspects of technology implementation, such as barriers to adoption, and the Effect of technology in improving the quality of healthcare. Researchers can build upon this study to conduct more comprehensive evaluations, comparative analyses, or long-term outcome assessments. The

findings can also inspire new research directions and collaborations, fostering innovation and advancements in healthcare technology.

1.6 Scope of the Study

Healthcare quality in Kenya's public sector presents a nuanced perspective, with both positive developments and persistent challenges. On one hand, reforms such as free primary care and maternity services, augmented funding, and upgraded equipment in major hospitals signify progress. Public facilities generally exhibit commendable technical care quality and are more economically accessible than private alternatives. Nevertheless, obstacles persist, including prolonged waiting times, shortages of essential medications, and staffing deficits, impeding accessibility and efficiency. Inconsistent infrastructure and management across facilities further contribute to uneven experiences, with public satisfaction often trailing private providers.

Conversely, Kenya's private healthcare sector generally offers superior infrastructure, specialist availability, shorter wait times, and a broader service spectrum. Greater patient satisfaction indicates improved communication and patient-centred care, alongside advanced technology and equipment potentially enhancing technical care quality. However, affordability remains a significant concern, as private care typically comes with higher costs, limiting accessibility for a considerable portion of the population. The inclusion criteria of this study include Lamu County Referral Hospital, which is a public hospital in Lamu county. This hospital being a referral hospital is meant to serve the people of Lamu County at large. The population of Lamu County, Kenya, has experienced steady growth over the years. According to the Kenya National Bureau of Statistics, the population was 143,920 (KNBS, 2019). The county covers a land surface of 6,273.1 square kilometres. Moreover, Lamu County has an overall literacy rate of 58.7%, which is lower than the national average of 78.7%. The literacy rate for males in Lamu County is 68.2%, while that of females is 49.2% (KNBS, 2019). This low literacy rates in Lamu County may pose a challenge to promoting digital literacy and technology adoption in healthcare in the region, making it a primary setting for investigating the Effect of technology in improving healthcare quality. The study also explores technologies in healthcare, which include healthcare infrastructure, hospital management systems, telemedicine and barriers to successful technology adoption.

1.7 Chapter Summary

This chapter provides a comprehensive exploration of healthcare quality and the Effect of technology in its enhancement. It underscores the criticality of maintaining high-quality healthcare services, emphasizing factors such as infrastructure, skilled professionals, and effective leadership. Despite concerted efforts to elevate healthcare quality, persistent challenges such as limited resources and skills are acknowledged. Technology emerges as a transformative tool to address these challenges, offering opportunities to enhance leadership effectiveness, professional competence, and infrastructure affordability. Various technologies, including Electronic Health Records (EHRs) and telemedicine, are examined for their potential to streamline processes and improve patient care. The global Effect of technology on healthcare innovation, exemplified by expedited vaccine development and improved healthcare access, is highlighted. Region-specific approaches to technology adoption are discussed, with examples from African countries like Rwanda, Ghana, and South Africa showcasing how technology has been leveraged to enhance healthcare outcomes. In Kenya, initiatives such as telemedicine, mobile health, and biometric identification systems have demonstrated significant improvements in healthcare delivery.

However, persistent challenges such as inadequate medical equipment and the absence of Hospital Management Systems (HMS) continue to hinder efficient service delivery and access to timely care. Despite ongoing efforts to address these challenges, including the establishment of nine centres of excellence and legislative measures to facilitate medical equipment procurement, obstacles remain in procurement, maintenance, and training, limiting the effective utilization of medical technology in Kenya. Furthermore, the chapter outlines the hierarchical hospital level system in Kenya, categorizing hospitals into six tiers based on the range of services offered. The focus then shifts to King Fahd Lamu County Referral Hospital, situated in Lamu County, Kenya. Initially known as Lamu District Hospital, it has evolved into a vital healthcare facility, serving as the primary setting for investigating the Effect of technology adoption on healthcare quality. The chapter also delineates the specific research objectives aimed at addressing the research gap, including analysing factors facilitating successful technology adoption, evaluating the Effect of healthcare infrastructure, assessing the Effect of Hospital Management Systems (HMS), and determining the Effect of telemedicine on healthcare quality at King Fahd Lamu County Referral Hospital.

The next chapter will delve into examining previous research conducted on the Effect of technology in enhancing healthcare accessibility. It will analyse empirical studies conducted by previous researchers, specifically focusing on studies related to each research objective. Additionally, the chapter will explore relevant theories that provide context for the study, highlighting the primary theory guiding the research and its applicability to the study's objectives.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The literature review chapter concentrates on examining reviewing literature undertaken by previous researchers in the area of Effect of technology on improving healthcare access. The chapter will, therefore, review empirical literature undertaken by previous researchers. It will therefore focus on the studies that have been undertaken previously on each research objective. The chapter also explores theories pertinent to the study, highlighting the anchor theory and its significance to the research.

2.2 Theoretical Review

The section considers the theories that are related and may anchor this study. It therefore undertakes to obtain the theoretical indication of the study variables and the expected relationship between these concepts. The theories considered to have significant relationship with the concepts of the study are Innovation Diffusion Theory and technology acceptance model (TAM).

2.2.1 Technology Acceptance Model

Davis (1989) introduced the Technology Acceptance Model (TAM), which posits that two primary factors influence an individual's intention to adopt a new technology: perceived usefulness, the belief that the technology will improve performance, and perceived ease of use, the belief that using the technology requires minimal effort. These two perceptions shape attitudes and eventual adoption behaviors. TAM has been widely applied in healthcare to evaluate the acceptance of technologies such as Electronic Health Records (EHRs), telemedicine, and mobile health solutions. For instance, Wang et al. (2006) demonstrated that both perceived usefulness and ease of use significantly predicted physicians' willingness to adopt EHRs, reinforcing the model's relevance in clinical settings.

This study applies TAM to explain healthcare providers' willingness to adopt and integrate various technologies at Lamu County Referral Hospital, such as Hospital Management Systems (HMS), telemedicine, technological infrastructure, and electronic health tools. In the conceptual framework, the constructs "barriers to adoption" and "successful integration" of technology are informed by TAM's core principles. For example, if providers perceive HMS or telemedicine as

useful and easy to use, they are more likely to integrate these systems into their daily workflows, improving operational efficiency, diagnosis accuracy, and ultimately the quality of healthcare (dependent variable). Conversely, low perceived ease of use or usefulness, due to literacy levels, lack of training, or resistance, translates into barriers to adoption.

Thus, TAM underpins the relationship between the individual-level behavioral determinants and the adoption of health technology interventions captured under the independent variables of the study. It also provides a theoretical basis for measuring staff perceptions on usability and expected performance gains from digital solutions, which directly influence the overall quality improvement in healthcare delivery. However, one limitation of TAM is its narrow focus on individual perceptions, as it overlooks broader contextual factors such as infrastructure, organizational support, and sociocultural norms. Agarwal and Prasad (1999) noted that social influence and institutional pressure can significantly affect technology adoption, which this study addresses through the complementary use of Innovation Diffusion Theory.

2.2.2 Innovation Diffusion Theory

Rogers (1962) introduced the Innovation Diffusion Theory (IDT), which explains how new technologies are adopted through a five-stage process: awareness, where individuals learn about the innovation; interest, which involves seeking more information; evaluation, where the innovation is assessed for relevance and benefit; trial, where the technology is tested; and finally, adoption, where the technology becomes part of routine practice.

IDT has been widely applied in the healthcare sector to examine how medical personnel and organizations transition through these stages. For example, Sahay et al. (2007) used IDT to explain how rural healthcare providers in India adopted telemedicine, demonstrating that each stage of the model significantly influenced uptake and integration.

In the context of this study, IDT is used to explain how healthcare professionals and hospital administrators at Lamu County Referral Hospital interact with technologies such as Hospital Management Systems (HMS), telemedicine, and technological healthcare infrastructure. In the conceptual framework, the barriers to successful adoption, such as lack of awareness, limited digital literacy, or infrastructural limitations, reflect impediments at different stages of the diffusion process. For example, low literacy levels may delay the awareness and evaluation stages, while lack of equipment or poor internet infrastructure may hinder the trial and adoption stages.

IDT therefore provides a broader lens than TAM by accounting for both individual decision-making and organizational and social contexts, including peer influence, institutional support, and access to information. This is particularly relevant for rural healthcare facilities like Lamu County Referral Hospital, where technology adoption depends not only on individual readiness but also on systemic enablers such as training, funding, and supportive policies.

Thus, IDT aligns with the conceptual framework by underpinning how internal and external factors influence the adoption of health technologies, a key step toward achieving healthcare quality improvement. While it is more comprehensive than TAM, a limitation of IDT is its unpredictability in identifying early adopters and its limited focus on post-adoption behaviors (Rogers, 2003).

2.2.3 Relationship of the Theories

These theories are closely linked within this study's framework. TAM offers a basis for understanding individual perceptions and attitudes toward adopting technology, highlighting the importance of perceived usefulness and ease of use. These factors align with the innovation attributes outlined by IDT, such as relative advantage and compatibility. TAM can thus serve as a precursor to IDT, delving into the psychological and individual aspects that shape technology acceptance. By focusing on healthcare professionals' perceptions of usefulness and ease of use, TAM lays the groundwork for exploring how these individual attitudes contribute to the broader diffusion process described by IDT (Zhang, Guo & Chen, 2008).

IDT, in turn, extends the analysis beyond individual perceptions to the organizational and social context within Lamu County Referral Hospital. It considers factors such as communication channels, social systems, and the innovation's observable outcomes, offering a more holistic perspective on the adoption process. As TAM explores the micro-level determinants of technology acceptance, IDT complements it by addressing macro-level factors that influence the diffusion of innovations across the healthcare system. The combination of these theories allows for a comprehensive investigation into both the individual and contextual dynamics shaping the adoption and integration of technology in healthcare practices, thereby contributing valuable insights to the study's findings at Lamu County Referral Hospital (Zhang et al., 2008).

2.3 Empirical Review

The empirical literature is reviewed in terms of each research objective of the study. It reviews each study undertaken, the methodology adopted, and the findings of the study. It also highlights the gap that will be addressed by the current study.

2.3.1 Hospital Management System (HMS) Effect on the quality of healthcare

Research on Hospital Management Systems (HMS) Effect on quality of healthcare has mainly focused on EHR adoption's Effect on quality improvement, challenges of HIS (Hospital Information System) implementation in developing nations, and the role of IT in enhancing healthcare quality and patient safety. Jones et al. (2010) initiated this trajectory by examining the association between the use of Electronic Health Records (EHRs) and hospital quality enhancement in the United States, particularly focusing on heart failure care. Their findings revealed that basic EHR adoption correlated with better care quality for individuals with heart failure. Karuri et al. (2014) expanded upon this work by exploring the potential of DHIS2 to enhance health data availability in Kenya. Their study emphasized the significance of stakeholder support in leveraging DHIS2 to transition from unreliable to reliable health information systems, aligning with Jones et al.'s emphasis on the importance of HIT adoption for quality improvement. Concurrently, Campanella et al. (2015) synthesized existing evidence on the benefits of EHR systems, highlighting improvements in documentation time, guideline adherence, and patient safety. This aligns with the results of Karuri et al. and Jones et al., emphasizing the positive Effect of HIT adoption on healthcare quality. Furthermore, Feldman, Buchalter, and Hayes (2018) expanded the discussion by highlighting how important financial allocation and organizational leadership are to successful technology integration. Their study echoed the importance of stakeholder support highlighted by Karuri et al. and the challenges related to implementation discussed by Jones et al. Finally, Muthee et al. (2018) contributed to the discourse by highlighting the effectiveness of Routine Data Quality Assessments (RDQAs) in improving data completeness and accuracy in electronic medical record systems. The findings complement the emphasis on quality improvement and data reliability discussed by Jones et al., Karuri et al., and Campanella et al. Overall, these findings demonstrate the transformative potential of health information systems in enhancing healthcare quality with proper implementation and support. However, despite the insights, there remains a gap in localized studies examining the Effect of HMS on

quality of life specifically within Lamu County Referral Hospital in Kenya which this study seeks to fill.

2.3.2 Effect of Telemedicine on the Quality of Healthcare

Research on the Effect of Telemedicine on healthcare quality has focused on developing comprehensive telemedicine tools, determining implementation determinants, assessing adoption in developing countries, and examining uptake of telemedicine among doctors in Kenya. Mukhwana (2013) emphasized the potential of telemedicine in improving healthcare access and efficiency, particularly through projects initiated by Safaricom, Nokia Kenya, and Orange Limited. The study underscored the importance of comprehensive training for human resources to effectively utilize telehealth equipment, highlighting the role of capacity building in successful telemedicine implementation. Nyamu, De Coster, and Mousavi (2016) further explored the adoption of telemedicine in Kenya, emphasizing the role of collaboration with other organizations in mitigating budget constraints during technological innovation. Their findings underscored the significance of organizational factors in influencing collaborative innovation outcomes, indicating that successful telemedicine adoption relies on effective partnerships and resource sharing. This focus on collaboration complements Mukhwana's emphasis on comprehensive training, highlighting the importance of both human resource development and organizational collaboration in telemedicine implementation. Onsongo et al. (2022) assessed factors influencing telemedicine adoption among doctors in Kenya, revealing barriers such as inadequate ICT infrastructure, cultural resistance, and high setup costs. Their study provided insights into the specific challenges faced by healthcare professionals in adopting telemedicine technologies, emphasizing the need for addressing infrastructural and cultural barriers to successful implementation. While this study focused more on barriers and challenges, it aligns with the broader theme of understanding the complexities of telemedicine adoption and implementation highlighted in Mukhwana and Nyamu, De Coster, and Mousavi's studies. These studies collectively contribute to understanding the challenges and opportunities in telemedicine adoption, while providing insights and recommendations for effective implementation. However, these studies fail to investigate the Effect of telemedicine on the quality of healthcare, a gap which the current study aims to fill.

2.3.3 Effect of Technological Healthcare Infrastructure on Healthcare Quality Improvement

Millery and Kukafka (2010) initiated the exploration of health information technology (health IT) in under-resourced settings (URSs), emphasizing the importance of comprehensive research to address quality disparities. Itumalla (2012) built upon this groundwork by exploring the Effect of IT on healthcare service quality, particularly within a specific private hospital in Hyderabad, India. The empirical evidence presented by Itumalla supported the notion put forth by Millery and Kukafka regarding the effectiveness of health IT interventions. While Itumalla's study provided empirical evidence of high service quality, it echoed the call from Millery and Kukafka for more expansive research to encompass various organizational dynamics and environmental influences. Greenhalgh et al. (2019) responded to this call by developing a theoretical framework for understanding health information infrastructure. Although the study did not directly address disparities in URSs (under-resourced settings), it provided valuable insights into the intricate nature of infrastructure, aligning with the broader call for comprehensive research made by Millery and Kukafka. The studies though insightful, majorly delved into health information technology and didn't focus on the modern technology machines and equipment in healthcare which are also integral components of the technological healthcare infrastructure. This research sought to address this gap by exploring and analyzing the Effect of modern technology machines and equipment in quality healthcare improvement.

2.3.4 Barriers to the successful Adoption of Technology in healthcare

Studies on obstacles to effective technology adoption in healthcare has focused on challenges in implementing ICT in education, the significance of resource allocation in healthcare service quality, the importance of resource distribution in healthcare delivery, and healthcare quality and innovation. resource constraints, there are also differences in the specific contexts and focuses of each study. Kinuthia (2009) identified challenges hindering the effective Kenyan education's use of information and communication technology (ICT), highlighting the need for further exploration in this area. While not directly addressing healthcare, the study lays a foundation by emphasizing the challenges related to resource allocation and technology implementation. Wanjau, Muiruri, and Ayondo (2012) expanded upon this foundation by examining the Effect of employee capability, technology, communication, and financial resources on health service quality at Kenyatta National

Hospital. Their findings align with Kinuthia's emphasis on resource constraints, illustrating how inadequate resources adversely affect service quality and patient satisfaction in the healthcare industry. Similarly, Kim, Gaukler, and Lee (2016) provided a comprehensive overview of healthcare quality through a systematic review. While the study also emphasizes the importance of resource allocation and its effect on service delivery, it also offered a broader perspective by examining healthcare quality, incorporating insights from diverse continental localities. Kimani and Moi (2020) continued with this discourse and further explored the influence of government funding and service delivery quality in medical care services provision in Lamu County, Kenya. Their study reinforced the importance of resource distribution in healthcare delivery, echoing the findings of Wanjau, Muiruri, and Ayondo and emphasizing the need for proactive measures by government entities to enhance healthcare services. While all studies underscore resource allocation as a barrier to successful technology adoption and the significance of resource allocation in service delivery, they differ in their specific contexts and focuses, ranging from education to healthcare and from local to global perspectives. However, barriers to successful adoption of technology vary significantly across different regions and settings in terms of extents and therefore though insightful the studies' findings cannot be generalized, accentuating for a research gap, which this study endeavours to fill by investigating the barriers to successful technology adoption in healthcare at Lamu county hospital.

2.4 Research Gaps

The empirical review provides a comprehensive understanding, or the various studies conducted globally on the Effect of technology in healthcare quality improvement, with some studies focusing on electronic health records, telemedicine, and the effectiveness of medical facilities. However, these studies were conducted in diverse settings and regions, which creates specific contextual gaps and other gaps in the context and as applied to Lamu County Referral Hospital Kenya. Firstly, the assessment of the relevant research undertakings revealed contextual gaps such as the study conducted by Kimani &Moi (2020) examined healthcare provision in Lamu county but didn't focus on the Effect of technology specifically at Lamu County Referral Hospital indicating a gap in contextual relevance. Similar to Wanjau, Muiruri, & Ayondo (2012) who assessed the factors affecting service quality at Kenyatta National Hospital which deviates from the contextual target of this study which is Lamu County Referral Hospital. The review of the

studies also divulged methodological gaps such as Muthee et al (2018), Nyamu, De Coster. And Mousavi (2016) who made us of different methodologies than what was applied by the current study.

Table 2. 1: Summary of Research Gaps Table

Author	Title	Methodology	Findings	Gaps
Jones et al. (2010)	EHR Adoption and Hospital Quality Improvement in the US	National cohort study, difference-in-differences	Basic EHR linked to increased heart failure quality improvement. Advanced EHR associated with decreased quality improvement in acute myocardial infarction and heart failure. Limited effect on quality improvement in US hospitals.	Contextual gap in Kenya's Lamu County. Methodology aligned with the study.
Feldman, Buchalter,	Health Information Technology in Quality and Patient Safety	Literature review, thematic analysis	Health IT used for identification and prevention. Challenges include implementation, interface design, and culture. Recommendations on resource allocation for implementation.	Contextual gap in Lamu County Referral Hospital. Different methodology from the proposed study.
Karuri et al. (2014)	DHIS2 Implementation Challenges in Developing Countries	Review approach	DHIS2's potential in improving health data use. Emphasized need for support from stakeholders.	Contextual gap in Lamu County Referral Hospital.
Campanella et al.	EHR Effect on Healthcare Quality	Systematic review, meta-analysis	EHR linked to reduced documentation time, improved guideline adherence, fewer errors, and drug effects. No association with mortality	Methodological gap as the proposed study employs field survey.
Muthee et al. (2018)	EMR Adoption in Kenyan Healthcare Facilities	Focus group discussions, content analysis	Identified facilitators (e.g., ease of use) and barriers (e.g., infrastructure issues) to EMR adoption. Recommended continuous evaluation for improvements.	Contextual and methodological gap as the study was not conducted in Lamu County Referral Hospital.

De Jong et al. (2017)	Telemedicine for Inflammatory Bowel Disease (IBD) Patients	Structured iterative process, feasibility test	myIBDcoach enabled home-monitoring, improved disease knowledge, and communication. High patient satisfaction.	Contextual gap in Lamu County Referral Hospital.
Mukhwana (2013)	Determinants of Telehealth Project Implementation in Kenya	Descriptive research, questionnaire	Effective human resource deployment in telehealth projects. Recommended training and advanced equipment use.	Focused on Safaricom, Nokia Kenya, and Orange Limited telehealth projects, not specific to Lamu County Referral Hospital.
Millery and Kukafka (2010)	Health Information Technology and Quality of Health Care: Strategies for Reducing Disparities in Under resourced Settings	Systematic review	Underscored that the effectiveness of health IT interventions such as order entry systems, clinical decision support systems, and computerized reminders in improving quality outcomes across various healthcare settings	Methodological gap as the proposed study employs field survey.
Itumalla (2012)	The Effect of information technology (IT) on healthcare service quality of private hospitals in India.	Questionnaire	Consumer Satisfaction Index (CSI) score for service quality was high.	Contextual gap it was conducted in Indian private hospital and not Lamu county Hospital
Greenhalgh et al., (2019)	An Ethnographic Case Study of how Health Information Infrastructure Shapes and Constrains Technological Innovation	Interview	Underscored the intricate and interdependent nature of infrastructure, the inertia of established routines, and the influence of legacy systems on technological innovation.	Methodological gap, the study employs interview which is subjected to limited number of participants unlike the current study which utilizes a questionnaire which allows for inclusion of a larger number of participants.

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2.5 Conceptual Framework

The conceptual framework outlines the relationship between technology and healthcare quality improvement within Lamu County Referral Hospital. The independent variables (IV) encompass various technological factors, such as the implementation of telemedicine, the availability of medical infrastructure, and the healthcare management systems. These IVs interact with the dependent variable (DV), which represents healthcare quality, and which encompasses indicators such as accessibility of healthcare services, accuracy in diagnosis and treatment and lastly, efficiency in provision of healthcare services. The hypothesis posits a positive relationship between effective utilization of technology in healthcare delivery and the enhancement of healthcare quality. This relationship is to be empirically validated through data analysis, aiming to confirm the hypothesis and establish the significance of technology in improving healthcare quality in Lamu County Referral Hospital.

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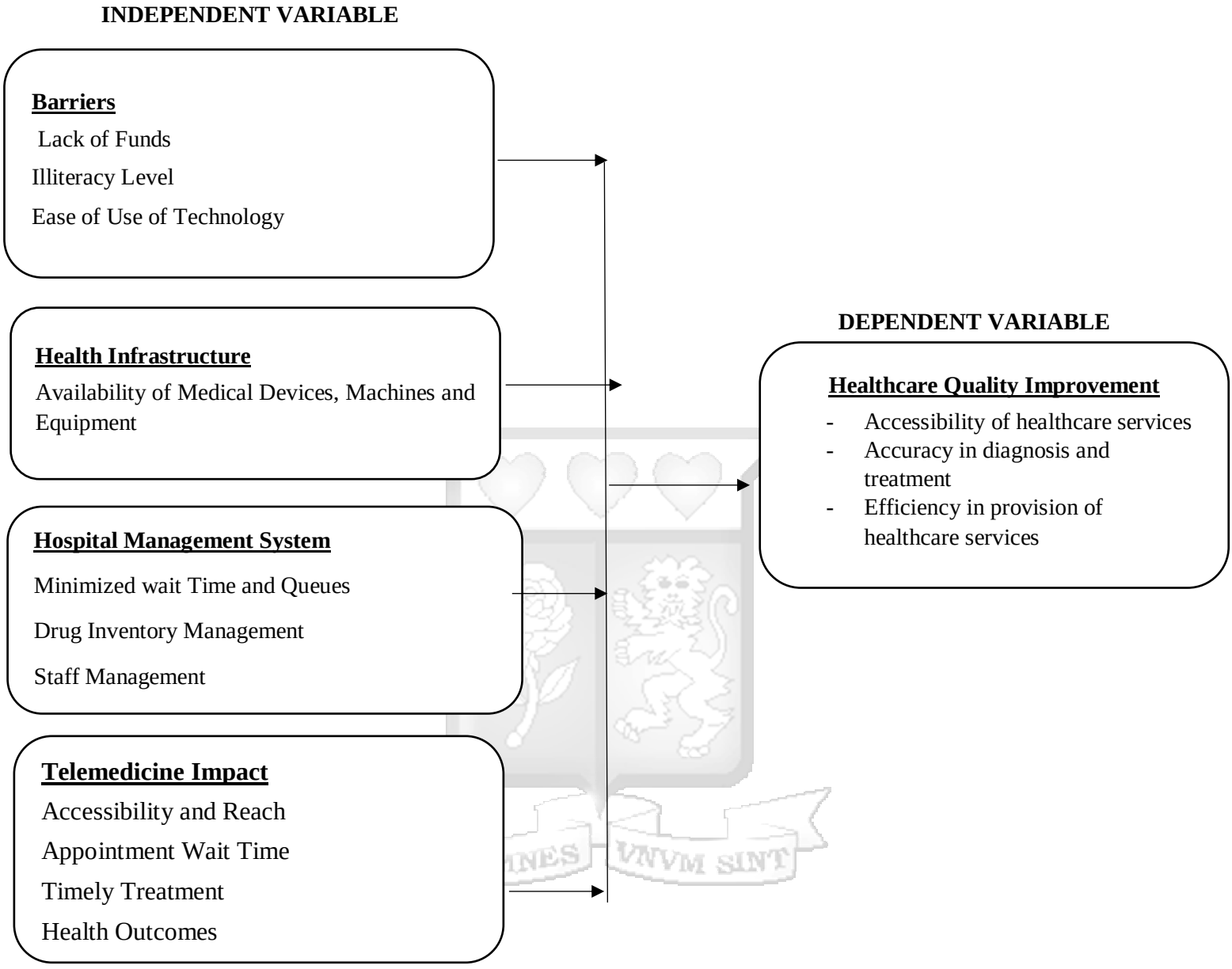

Figure 2. 1: Conceptual Framework

Table 2. 2: Operationalization Table

The study conceptualizes that the quality of healthcare systems would be influenced by factors for adoption and integration of technology, barriers to technological adoption and implementation of new technology. The variables are operationalized as follows in the table below.

Variable	**Variable Type**	**Constructs**	**Measurement**	**Type**	**Literature**
Healthcare Quality Improvement	Dependent Variable	- Accessibility of healthcare services - Accuracy in diagnosis and treatment - Efficiency in provision of healthcare services	Inferential and Descriptive measures	5-point Likert Scale Ordinal variable	Jones et al. (2010), Karuri et al. (2014)
Barriers to successful Adoption of Technology	Independent Variable	- Lack of Funds - Illiteracy Level - Ease of Use of Technology	Inferential and Descriptive measures	5-point Likert Scale Ordinal variable	Itumalla (2012)
Technological Health Infrastructure	Independent Variable	- Availability of Modern Technology Medical Machines and Equipment	Inferential and Descriptive measures	5-point Likert Scale Ordinal variable	De Jong et al. (2017), Mukhwana (2013), Ososngo et al. (2022)
Hospital Management System	Independent Variable	- Minimized wait Time and Queues	Inferential and Descriptive measures	5-point Likert Scale	Kinuthia (2009), Davis et al. (2012),

		- Drug Inventory Management - Staff Management		Ordinal variable	
Telemedicine	Independent Variable	- Accessibility and Reach - Appointment Wait Time - Timely Treatment - Health Outcomes	Inferential and Descriptive measures	5-point Likert Scale Ordinal variable	Kimani and Moi (2020), Wanajau, Muiruri, and Ayondo

2.6 Summary of Literature Review

The literature review chapter offers an extensive summary of past studies on how technology enhances access to healthcare. It encompasses empirical studies and theoretical frameworks relevant to the objectives of this study. The chapter explores theories like the Innovation Diffusion Theory (IDT) and the Technology Acceptance Model (TAM), highlighting their significance in understanding technology adoption in healthcare settings. TAM focuses on individual perceptions of technology, while IDT explores the broader context of technology adoption within organizations and society.

Empirical reviews within the chapter have covered various aspects of healthcare technology, including the Effect of Hospital Management Systems (HMS) and telemedicine on healthcare quality improvement. Studies by Jones et al. (2010), Karuri et al. (2014), Campanella et al. (2015), and Muthee et al. (2018) shed light on the effectiveness of health information systems, highlighting improvements in documentation time, guideline adherence, and patient safety. Similarly, research by Mukhwana (2013), Nyamu, De Coster, and Mousavi (2016), and Onsongo et al. (2022) explores the potential of telemedicine in enhancing healthcare access and efficiency, as well as the barriers to its adoption among healthcare professionals.

The stud's conceptual framework has outlined the relationship between technology and healthcare quality improvement within Lamu County Referral Hospital. It suggests that the quality of healthcare is influenced by factors associated with technology adoption, barriers to technological integration, and the implementation of new technology. Healthcare quality improvement has been conceptualized through indicators like accessibility, accuracy in diagnosis and treatment, and efficiency in service provision. Independent variables consist of components of technological health infrastructure, including modern medical machines and equipment availability, hospital management systems focused on reducing wait times and queues, and telemedicine accessibility. These variables are measured using descriptive and inferential methods, often employing a 5-point Likert Scale for assessment. The operationalization aims to systematically quantify and analyse technology's effect on healthcare quality improvement within the specific context of Lamu County Referral Hospital.

The following chapter describes the study's methodology, detailing the research philosophy, design, target population, sample size, and sampling frame. It also explains the data collection procedures, piloting process, reliability and validity checks, data analysis techniques, and ethical considerations.

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CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

The chapter on research methodology was crucial in laying down the methodology applied in the study. It therefore focused on detailing the research design that was applied, the population, sample and sampling frame, data collection, data analysis and ethical consideration.

3.2 Research Philosophy

Research philosophy, or research paradigm, referred to the underlying beliefs, assumptions, and viewpoints that guided the researcher's approach to conducting the study and understanding the world. It served as the foundation upon which the researcher constructed the research design, methodology, and data collection techniques. This study adopted positivism as its research philosophy, which asserted that the world existed independently of the researcher and could be studied objectively. Positivism prioritized objectivity and employed deductive reasoning to analyse observable and measurable phenomena, relying on the scientific method to establish causal relationships.

3.3 Research Design

Research design was the strategic framework that guided how the study was conducted, including decisions on data collection, data analysis, and the study's overall structure. The selection of the research design was influenced by the research objectives, the type of research questions, available resources, and the study's context (Salkind, 2010).

The study adopted a case study design, which was adequate for studying a single unit in depth. This design was appropriate for this study as the single unit that was studied at length was Lamu County Referral Hospital, where the Effect of technology in this facility was determined and its association with the improvement of healthcare quality at the medical facility determined. A case study provides a detailed examination of a specific instance or situation within its real-world context, providing valuable insights and practical lessons applicable to real-world situations.

3.4 Study site

The study site for the study was Lamu County Referral Hospital, a Level 4 facility as classified by the Ministry of Health (Ministry of Health, Kenya, 2016). As the main referral hospital in Lamu County, it provides specialized healthcare services to a rural and underserved population. The hospital faces infrastructure challenges, outdated hospital management systems, and limited access to modern technology, making it an ideal setting to assess the Effect of technology adoption on healthcare quality. Additionally, its diverse pool of healthcare professionals allowed for a comprehensive evaluation of technology integration across different medical roles, ensuring relevant and practical findings for improving healthcare efficiency in resource-constrained settings.

3.5 Target Population

The target population within the research study was the specific group of individuals or items that the researcher aimed to study and generalise the outcomes to. The target population referred to the larger population from which a sample was taken for the research. It was defined based on the research purpose and characteristics of interest (Ingram & Schneider, 1991).

The study's target population typically included all individuals or entities that were relevant to the research topic and whose experiences or behaviours were of interest. This included healthcare providers (Doctors, Nurses, Lab Technologists, Pharmacists and Pharmacy Technologists, Medical Engineering Technologists) and administrators who oversee the hospital's management and provision of medical services.

The target population of this study included all healthcare providers at Lamu County Referral Hospital, comprising doctors, nurses, lab technologists, pharmacists and pharmacy technologists, medical engineering technologists, and administrators, totalling 129 individuals (Lamu County Referral Hospital, 2024). Healthcare providers at Lamu County Referral Hospital, including doctors, nurses, technicians, and administrators, were included because they collectively played integral roles in healthcare delivery and decision-making within the hospital. Studying this diverse group allowed for a comprehensive understanding of the factors that influenced the adoption and

integration of technology in healthcare practices, taking into account the perspectives and experiences of various stakeholders involved in patient care, management, and support services.

Table 3. 1: Population Distribution Table

Stakeholders	**Number**
Doctors	31
Nurses	77
Lab Technologist	13
Pharmacist and pharmacy technologist	9
Medical Engineering Technologists	3
Administrators	6
Total	**129**

3.6 Sampling Frame

A sampling frame was a list from which the research sample was selected. It included all potential participants for the study, ensuring that the chosen sample accurately reflected the views of the overall population, allowing the findings to be generalised to the larger group (Cooper & Schindler, 2008). The sampling frame for this study represented all the healthcare providers working at Lamu County Referral Hospital, comprising doctors, nurses, lab technologists, pharmacists, pharmacy technologists, medical engineering technologists, and administrators.

3.7 Sampling Procedure

Sampling procedures outlined the specific steps and methods was used in selecting study participants from the sampling frame in the research study. They, therefore, determined how individuals were chosen to be part of the research sample and ensured they represented the target population. The study utilised a census approach since the population size under study was small.

3.8 Ethical Consideration

The researcher undertook the study ethically and responsibly, ensuring the rights and well-being of participants while maintaining the integrity and credibility of the research process. Ethical considerations in the study encompassed informed consent, confidentiality, voluntary participation, and cultural sensitivity. Participants received clear and comprehensive information about the study, including its purpose, potential risks, procedures, benefits, and confidentiality measures, before providing informed consent. Those willing to participate signed a written consent form, affirming their voluntary involvement and understanding that they could withdraw at any stage without repercussions. The researcher ensured that participants fully comprehended the study's objectives and had the opportunity to seek clarification before consenting, in line with ethical principles outlined in the Belmont Report (1979) and the Declaration of Helsinki (World Medical Association, 2013).

The confidentiality of participants was safeguarded by de-identifying data and storing it in password-protected files, accessible only to authorized personnel. Any physical records were securely stored and appropriately disposed of after the study. The study findings were presented in a way that ensured anonymity, with no direct identification of individuals. Additionally, cultural, social, and individual differences were respected, ensuring inclusivity and ethical sensitivity in all interactions. The researcher upheld fairness in participant selection, avoided bias in data collection, and ensured that participants were treated with dignity and respect. To fulfil institutional and national requirements, the researcher obtained an official research introduction letter from Strathmore University and secured a research license from the National Commission for Science, Technology and Innovation (NACOSTI) under license number NACOSTI/P/25/417730, issued on 9th April 2025, which authorized the research to be conducted at Lamu County Referral Hospital.

Participants were kept informed of the study's progress and outcomes through regular updates shared via hospital notice boards, internal briefings, and digital communication platforms such as email or WhatsApp groups (where applicable). The researcher provided periodic updates on the data collection process, preliminary findings, and key milestones. Once the study was completed, the researcher organized a dissemination session where key findings and recommendations were presented to hospital staff and relevant stakeholders. A summary report was also shared with

participants who expressed interest, ensuring transparency and inclusivity. Participants were encouraged to seek clarification or ask questions about the findings, fostering engagement and knowledge-sharing to enhance the study's effect on healthcare service delivery.

3.9 Inclusion and Exclusion Criteria

The study included all healthcare providers at Lamu County Referral Hospital, as they were directly involved in healthcare service delivery and technology adoption. Specifically, the study targeted doctors, nurses, lab technologists, pharmacists, pharmacy technologists, medical engineering technologists, and administrators who had worked at the hospital for at least six months to ensure they had sufficient experience with technology use in healthcare. Only participants who voluntarily consented to take part in the study and were willing to respond were included. The inclusion criteria were appropriate, as they ensured that only individuals with direct exposure to healthcare technology were involved, providing credible insights into its impact. Including various cadres of healthcare workers allowed the study to capture diverse perspectives, making the findings more comprehensive and applicable across different roles within the hospital.

The study excluded non-medical staff, including clerks, security personnel, cleaners, and support staff, as they were not directly involved in patient care or technology-driven healthcare processes. Healthcare workers who had been at the hospital for less than six months were also excluded to ensure that responses came from individuals with adequate exposure to the facility's technological infrastructure. Additionally, any medical staff who declined participation or withdrew consent at any stage of the study were not included. The exclusion criteria were justified, as they prevented the inclusion of individuals who may not have had relevant experiences with healthcare technology. This ensured that the collected data remained reliable, relevant, and reflective of the true Effect of technology adoption in the hospital setting.

3.8 Data Collection Procedure

Primary data were gathered using semi-structured questionnaires administered to the respondents. The questionnaire (Appendix 1.1) was organized into sections, with Section A capturing respondents' background information. Sections B to F utilized a 5-point Likert Scale for respondents to express their level of agreement or disagreement with various statements. Specifically, Section B focused on statements related to challenges in adopting technology in

healthcare. Section C contained statements regarding technological healthcare infrastructure, Section D addressed hospital management systems, Section E covered telemedicine, and Section F focused on healthcare quality improvement.

The questionnaire was designed electronically using Google Forms, and respondents received the link to the questionnaire via email, WhatsApp, or other electronic means. A questionnaire was utilized because it allowed for the inclusion of a larger number of participants, improving the sample's representativeness and broadening the applicability of the findings. Furthermore, the use of a questionnaire ensured consistency in data collection by standardizing the way questions were presented and answered across different participants. This uniformity simplified the data analysis process, as responses could be easily compared and interpreted. By maintaining a standardized format throughout data collection, the questionnaire facilitated the aggregation and synthesis of information, ultimately contributing to more robust and reliable research outcomes.

3.9 Research Quality

This section examined the quality of the research, addressing validity, reliability, and the piloting process.

3.9.1 Data Reliability and Validity

Data reliability pertained to the consistency and accuracy of data measurements or observations across multiple instances. In this study, data reliability was considered crucial to ensure the accuracy and trustworthiness of the findings. The study used the internal reliability test of Cronbach's Alpha to determine whether the research instruments were reliable and adequately measured what they were intended to measure. A Cronbach's Alpha of 0.7 and above for each variable was regarded as adequate and indicated relevant internal consistency. The researcher also relied on the experience and advice of the supervisor regarding the formulation and design of the questionnaire. Pilot testing was conducted on medical personnel in other hospitals within Lamu County.

Data validity referred to the extent to which the data collected in research accurately measured or represented the concepts, variables, or phenomena under investigation. It assessed the degree to which the data reflected what they were intended to measure and the extent to which they supported valid inferences and conclusions. Data validity was considered essential for ensuring credibility

and the accuracy of the study's findings. In this study, the Kaiser-Meyer-Olkin (KMO) validity test was applied, through which internal validity was determined for the research instrument.

3.9.2 Piloting

A pilot study was the preliminary step in the research process, conducted on a smaller scale to help plan and improve the main study (Arnold et al., 2009). It evaluated the study's validity and reliability, assessed the project's feasibility, provided insights into its overall scope, determined timing, and collected preliminary data for the main research.

To ensure the effectiveness of the questionnaire, it was pretested on a sample group distinct from the actual participants. In this particular study, the questionnaire was administered to a specific group not involved in the main research, aimed at gathering insights into the Effect of technology adoption on quality of healthcare improvement. The pretest was essential for gauging the respondents' comprehension of the questions and ensuring the tool's effectiveness.

3.10 Data Presentation and Analysis

Data were prepared for analysis through editing, coding, and data entry. Subsequently, the data underwent various analyses. Demographic characteristics of the respondents were examined using frequency and descriptive statistics. The Effect of technology on the improvement of healthcare quality was analyzed using descriptive statistics such as standard deviation and mean. The findings were presented in tables and charts, with percentages used to interpret raw data. In addition, regression analysis was conducted to investigate the relationships among the study variables.

Linear regression analysis was employed to examine the linear relationship between the study variables and to test the significance of these relationships. The regression model utilized for this analysis was as follows:

$$Y = a + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4$$

Y= Healthcare Quality

a = Constant

β= Regression weights attached to the variables

X 1= Barriers to successful adoption of technology

X 2 = Technological health Infrastructure

X 3 = Hospital Management system

X 4 = Telemedicine

CHAPTER FOUR: ANALYSIS AND PRESENTATION OF RESEARCH FINDINGS

4.1 Introduction

This chapter presents the analysis, presentation, and interpretation of research findings on the influence of technology adoption on healthcare quality at Lamu County Referral Hospital.

4.2 Response Rate

The response rate in a research study refers to the proportion of individuals who completed and returned the survey or questionnaire out of the total number targeted. In this study, the target population consisted of 129 healthcare providers at Lamu County Referral Hospital, and 126 participants responded, yielding a response rate of 97.67%. This high response rate is significant as it enhances the reliability and representativeness of the findings, reducing the risk of non-response bias and ensuring that the results accurately reflect the views and experiences of the target population. A strong response rate also increases the generalisability of the study's conclusions and strengthens the credibility of the data collected.

4.3 Background Information

The participants' background information was evaluated and displayed using graphs and charts, as illustrated below.

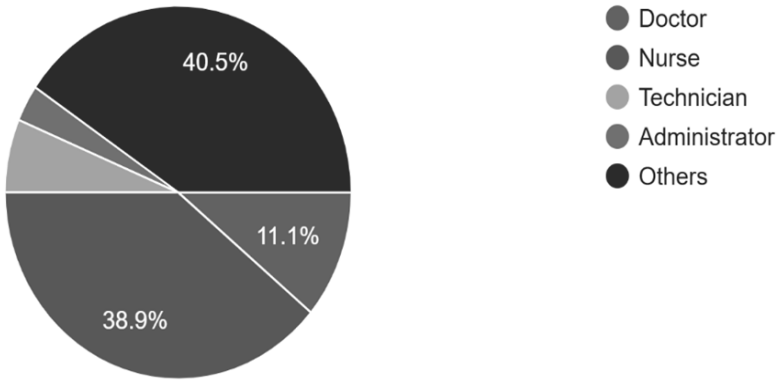

Figure 4. 1 Professional Role of the Respondents

Source: Researcher 2025

The pie chart in Figure 4.1 provides a breakdown of the participants' professional roles at Lamu County Referral Hospital based on 126 responses. The largest group represented were those classified under "Others," who accounted for 40.5% of the respondents. Nurses followed closely at 38.9%, reflecting their central role in patient care and hospital operations. Doctors made up 11.1% of the participants, while administrators constituted 6.3%. Technicians were the least represented, comprising only 3.2% of the total responses. This distribution demonstrates a broad representation of healthcare staff, offering a well-rounded perspective on technology adoption and its influence on healthcare quality within the hospital.

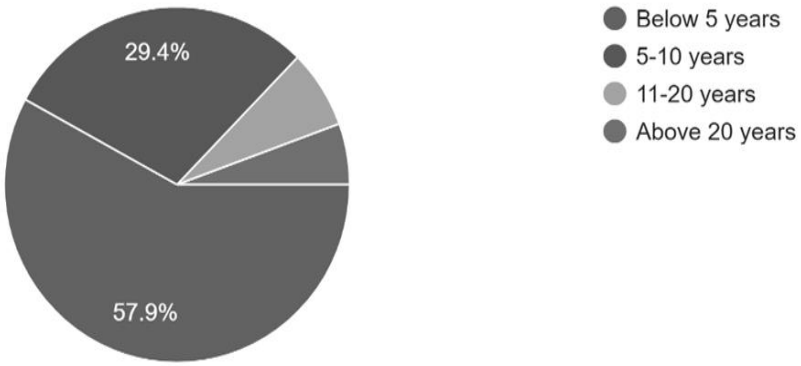

Figure 4. 2 Years of Service of the Respondents at the Hospital

Source: Researcher 2025

The pie chart in Figure 4.2 presents the distribution of respondents based on their duration of service at King Fahd Lamu County Referral Hospital, from a total of 126 responses. The largest group of respondents had worked at the hospital for less than 5 years, accounting for 57.9% of the total. This was followed by those who had served for 5–10 years, making up 29.4%. Respondents with 11–20 years of experience constituted 7.1%, while those who had worked at the hospital for over 20 years represented 5.6% of the sample. This distribution highlights a workforce with varying levels of experience, which provides valuable insights into how length of service may influence perceptions and adoption of healthcare technology.

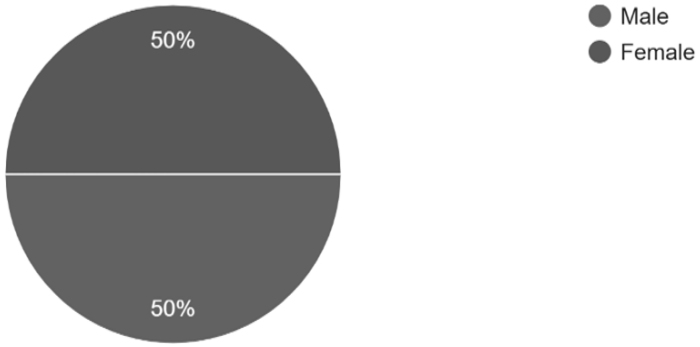

Figure 4. 3 Gender Distribution of the Respondents

Source: Researcher 2025

The pie chart in Figure 4.3 illustrates the gender distribution of the 126 respondents who participated in the study at King Fahd Lamu County Referral Hospital. The results reveal an equal representation of both male and female participants, with each group comprising 50% of the total responses. This balanced gender composition indicates that insights were drawn evenly from both male and female healthcare providers, offering a fair and inclusive perspective on the adoption and Effect of technology within the hospital setting.

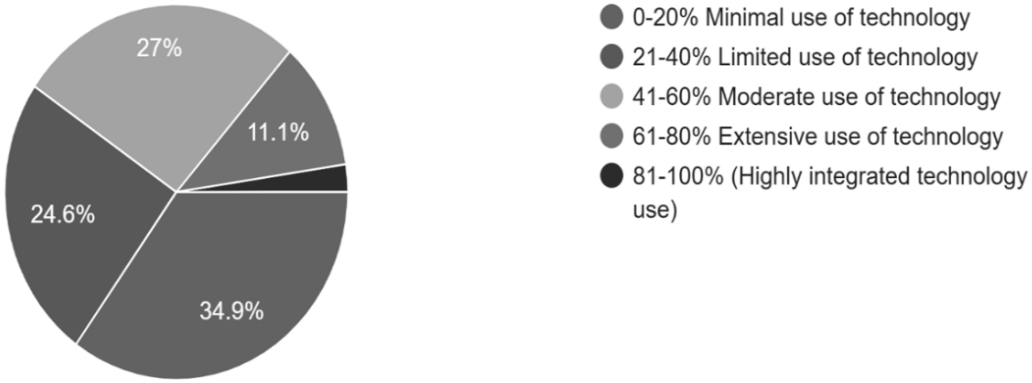

Figure 4. 4 Extent of Technology Use

Source: Researcher 2025

The pie chart in Figure 4.4 shows how respondents rated the extent of technology use in delivering quality healthcare services. A majority (34.9%) indicated minimal use (0–20%), followed by 27% who reported moderate use (41–60%). Limited use (21–40%) was cited by 24.6% of participants, while 11.1% noted extensive use (61–80%). A small proportion rated the technology integration as highly advanced (81–100%). These findings suggest that most respondents view technology utilisation as relatively low, highlighting a need for greater digital integration.

4.4 Validity and Reliability Test

Validity refers to the extent to which the instrument measures what it is intended to measure, while reliability assesses the consistency and stability of the instrument across time and items. In this study, the Kaiser-Meyer-Olkin (KMO) test was used to assess sampling adequacy, which determines the suitability of the data for factor analysis. A KMO value above 0.6 is considered acceptable, indicating that the sample size is adequate and the variables share sufficient common variance (Roberts & Priest, 2006).

Cronbach's Alpha was used to test for internal consistency of the instrument. This measure indicates how well the items within a variable correlate with each other. A Cronbach's Alpha value above 0.7 is generally considered acceptable for research purposes, although exploratory research may accept values slightly lower. Extremely high values close to 1.0 may suggest redundancy among items, indicating that some may be measuring the same aspect repeatedly (Hancock & Mueller, 2010).

As shown in Table 4.1, all the variables in this study met the acceptable thresholds. The KMO values ranged from 0.677 to 0.863, all above the minimum required threshold. Cronbach's Alpha values ranged from 0.658 to 0.914, with all variables considered acceptable. The lowest reliability was recorded in the variable "Barriers to Successful Adoption of Technology" ($\alpha = 0.658$), while the highest was "Telemedicine" ($\alpha = 0.914$). These results confirm that the instrument used in this study was both valid and reliable for collecting data on the Effect of technology adoption on healthcare quality improvement at Lamu County Referral Hospital.

Table 4. 1 Validity and Reliability Test

Variable	No. of Items	Cronbach's Alpha	KMO Statistics	Decision Rule
Barriers to Successful Adoption of Technology	8	0.658	0.677	Accept
Technological Healthcare Infrastructure	5	0.822	0.735	Accept
Hospital Management System	6	0.856	0.819	Accept
Telemedicine	4	0.914	0.836	Accept
Healthcare Quality Improvement	5	0.874	0.863	Accept

Source: Researcher 2025

4.5 Descriptive Statistics

Descriptive statistics were used to summarise the key responses across the main study variables. The analysis included the mean, mode, and standard deviation to understand how respondents perceived the Effect of technology adoption on healthcare quality at Lamu County Referral Hospital. The results from each variable are presented in the subsequent sub-sections, including key interpretation of patterns and trends observed in the responses.

4.5.1 Barriers to Successful Adoption and Integration of Technology

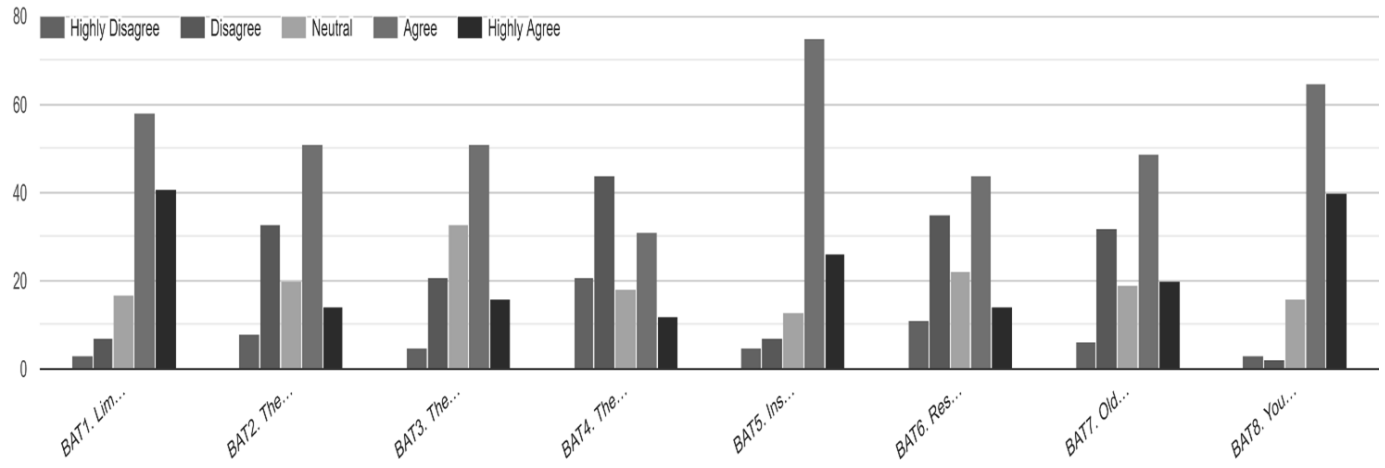

Figure 4. 5 Responses to Successful Adoption and Integration of Technology

Source: Researcher 2025

Table 4. 2 Barriers to Successful Adoption and Integration of Technology

Statement	N		Mean	Mode	Std. Deviation
	Valid	Missing			
a) Limited financial resources and funding constraints pose significant barriers to the adoption of advanced healthcare technologies in our hospital.	126	0	4.01	4	0.951
b) The high level of illiteracy in the area hinders the smooth adoption and effective utilization of technology in daily healthcare practices at the hospital.	126	0	3.24	4	1.148
c) The complexity and difficulty in using certain technologies act as a significant barrier, impeding their successful adoption and integration into healthcare services.	126	0	3.41	4	1.037
d) The hospital provides trainings and workshops to healthcare workers to effectively integrate new technology.	126	0	2.75	2	1.263
e) Insufficient opportunities for training and skill development on new technologies contribute to barriers in the effective adoption of technological solutions in our healthcare practices.	126	0	3.87	4	0.938
f) Resistance to change among healthcare staff and patients is a significant factor hindering the smooth adoption and integration of technology into routine healthcare procedures.	126	0	3.12	4	1.191
g) Older individuals face challenges in adapting to new digital interfaces, hindering the widespread adoption of technology in healthcare	126	0	3.36	4	1.163
h) Younger populations' familiarity and comfort with technology contribute to their faster adoption	126	0	4.09	4	0.849

Source: Researcher 2025

Table 4.2 and Figure 4.5 offer a detailed view of the key challenges affecting technology adoption at Lamu County Referral Hospital. The most agreed-upon statement was that younger populations' familiarity with digital tools contributes to faster technology uptake (Mean = 4.09, SD = 0.849), followed closely by limited financial resources and funding constraints (Mean = 4.01, SD = 0.951). These findings indicate a dual reality, while certain demographic groups (i.e., the youth) are ready adopters of technology, the institutional capacity to support such integration remains constrained by budgetary limitations. Another notable barrier was the lack of adequate training opportunities (Mean = 3.87), which highlights skill gaps as a persistent obstacle to effective technology use in healthcare delivery.

Conversely, the statement with the lowest mean score (2.75) was related to the hospital's provision of training and workshops, implying that staff perceive a lack of institutional support in capacity building. This view is visually reinforced in Figure 4.5, where the majority of responses to this item clustered around the "disagree" and "neutral" categories. Additionally, issues such as resistance to change (Mean = 3.12), high illiteracy levels (Mean = 3.24), and challenges among older individuals in adapting to digital interfaces (Mean = 3.36) further reflect human and societal limitations in embracing technological solutions. Interestingly, complexity in using certain technologies (Mean = 3.41) also emerged as a technical barrier. Collectively, these insights point to the need for holistic interventions, combining financial investment, inclusive training programs, and user-friendly technological solutions, to overcome both systemic and behavioral resistance to technology adoption in healthcare settings.

4.5.2 Technological Healthcare Infrastructure

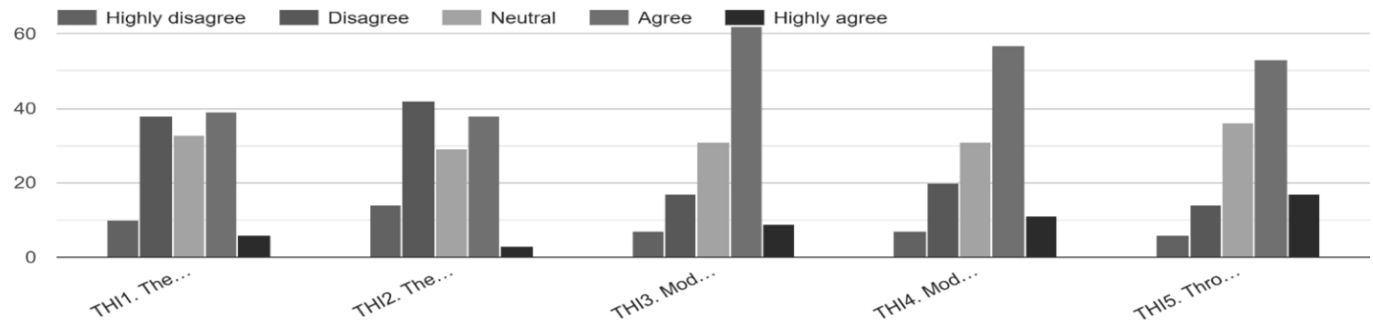

Figure 4. 6 Responses on the Technological Healthcare Infrastructure

Source: Researcher 2025

Table 4. 3 Technological Healthcare Infrastructure

Statement	N		Mean	Mode	Std. Deviation
	Valid	Missing			
THI1. The hospital is equipped with modern medical technology machines	126	0	2.94	4	1.061
THI2. The hospital has invested in cutting-edge monitoring devices and equipment, to ensure continuous monitoring and support for critically ill patients across various care settings	126	0	2.79	2	1.068
THI3. Modern medical technology has facilitated accurate diagnosis.	126	0	3.39	4	0.996
THI4. Modern medical technology machines have facilitated accurate treatment plans for patients	126	0	3.36	4	1.031
THI5. Through the integration of modern technology equipment, a significant number of patients have experienced improvement in terms of their health	126	0	3.48	4	1.018

Source: Researcher 2025

Table 4.3 and Figure 4.6 present insights into the availability, functionality, and perceived Effect of technological infrastructure within Lamu County Referral Hospital. The highest-rated statement indicated that the integration of modern technology has positively influenced patient outcomes (Mean = 3.48, SD = 1.018), suggesting that healthcare providers recognize the practical value of these tools in improving the quality of care. Similarly, respondents moderately agreed that modern technology has facilitated accurate diagnosis (Mean = 3.39) and treatment planning (Mean = 3.36), reflecting a belief that digital innovations, when available, enhance clinical accuracy and efficiency. These findings underscore a growing awareness among staff of the importance of technology in supporting evidence-based medical practices, particularly in settings where timely and accurate diagnosis is critical.

However, despite the perceived benefits, there were notable concerns about the actual availability and investment in these technologies. The two lowest-rated statements were related to the hospital being equipped with modern machines (Mean = 2.94) and investment in cutting-edge monitoring devices for critically ill patients (Mean = 2.79), both of which received significant neutral and disagreement responses, as illustrated in Figure 4.6. This pattern suggests that, while the existing technology may yield positive clinical outcomes, it is either not widespread, not regularly updated, or insufficiently available across departments. The relatively high standard deviations for these items also indicate variability in access or experiences among staff, pointing to a possible inequality in resource allocation. Collectively, the findings highlight that healthcare workers recognize the transformative role of technology but are equally aware of infrastructural limitations, particularly underfunding and the lack of consistent technological investment which may hinder the full realization of digital healthcare potential within the facility. This signals a need for deliberate policy attention toward upgrading and equipping the hospital with adequate, modern, and accessible technological tools to support holistic patient care.

4.5.3 Hospital Management System

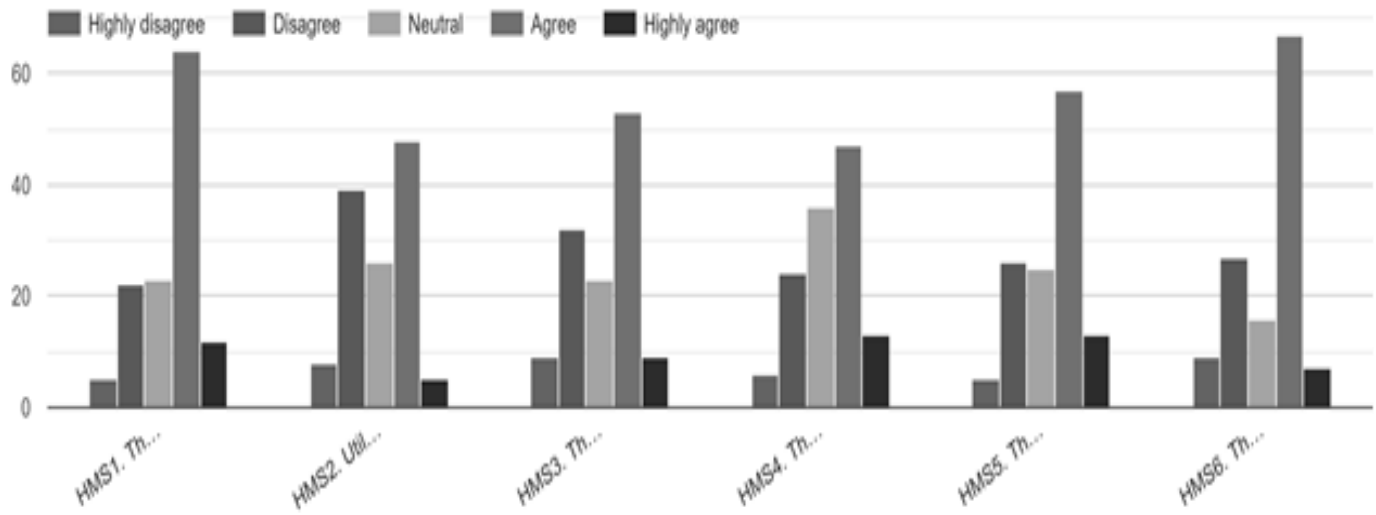

Figure 4. 7 Responses on Hospital Management System

Source: Researcher 2025

Table 4. 4 Hospital Management System

Statement	N		Mean	Mode	Std. Deviation
	Valid	Missing			
HMS1. The hospital's efficient appointment scheduling system and streamlined patient flow management protocols have significantly reduced wait times and queues in key areas such as registration, triage, and outpatient clinics, enhancing patient satisfaction and optimizing resource utilization	126	0	3.44	4	1.016
HMS2. Utilizing advanced queue management software and real-time monitoring systems, the hospital effectively coordinates patient arrivals, prioritizes cases based on urgency, and allocates resources accordingly, resulting in minimized wait times and improved patient throughput across various departments.	126	0	3.02	4	1.054
HMS3. The hospital management system tracks medication stock levels and ensures timely availability of essential drugs to patients	126	0	3.17	4	1.108
HMS4. The hospital management system has assisted in maintaining optimal levels of drug stocks, monitoring expiration dates, and implementing stringent quality assurance protocols, ensuring uninterrupted supply chains and effective management of pharmaceutical resources.	126	0	3.29	4	1.044
HMS5. Through the implementation of an integrated workforce management platform, the hospital efficiently schedules shifts, allocates tasks, and monitors staff performance in real-time, fostering effective communication, collaboration, and accountability among healthcare teams.	126	0	3.37	4	1.049
HMS6. The hospital's integrated workforce management system efficiently schedules shifts and allocates tasks among staff, enhancing coordination and ensuring timely services for patients.	126	0	3.29	4	1.087

Source: Researcher 2025

Table 4.4 and Figure 4.7 provide a detailed assessment of the role and effectiveness of the hospital management system at Lamu County Referral Hospital. The findings show that the hospital's appointment scheduling and patient flow systems were rated most favorably (Mean = 3.44, SD = 1.016), suggesting that respondents experienced improved efficiency in outpatient operations such as triage, registration, and clinic visits. This was closely followed by positive perceptions of workforce management practices, including task allocation and shift scheduling through integrated platforms (Means = 3.37 and 3.29). These results point to a general appreciation for how digital management systems are supporting coordination, real-time performance tracking, and team accountability within the hospital.

Figure 4.7 reinforces these insights by showing a strong concentration of responses under the "agree" and "highly agree" categories across these positively rated items (HMS1, HMS5, and HMS6). However, the use of queue management software and real-time patient monitoring received a lower mean score (3.02), indicating that many respondents remained neutral or disagreed about its effectiveness. Similarly, stock management functions, including drug availability tracking and pharmaceutical quality assurance, recorded only moderate agreement (Means = 3.17 and 3.29), with noticeable variation in responses as reflected by higher standard deviations. These patterns suggest that while operational functions related to staff and patient flow are relatively well-managed, there are areas within pharmacy logistics and queue control that may require further system integration, automation, or training. The overall impression is that the hospital’s management systems are contributing positively to service delivery, but optimization in certain domains could enhance effectiveness and consistency across departments.

4.5.4 Telemedicine

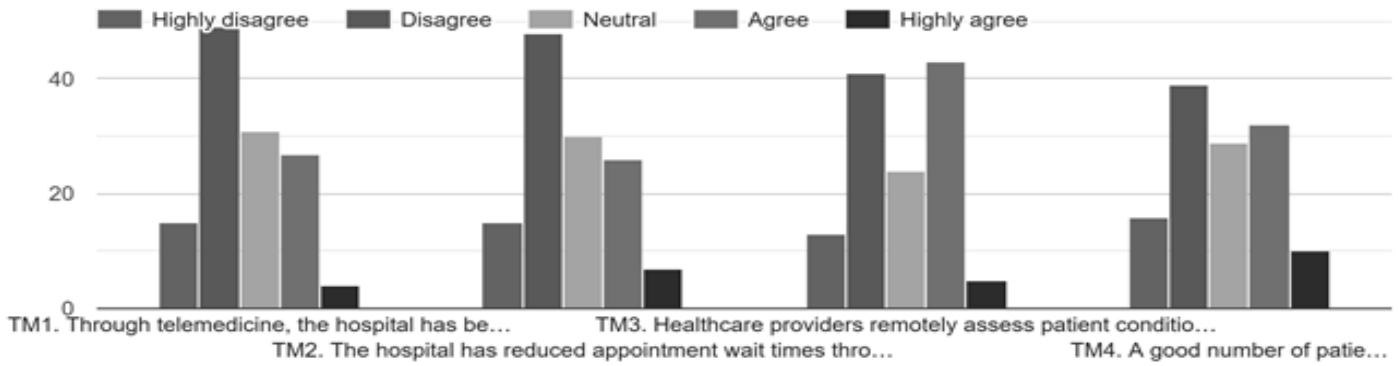

Figure 4. 8 Responses on Telemedicine
Source: Researcher 2025

Table 4. 5 Telemedicine

Statement	N		Mean	Mode	Std. Deviation
	Valid	Missing			
TM1. Through telemedicine, the hospital has been able to remotely access and offer specialized healthcare services for patients in underserved areas	126	0	2.65	2	1.046
TM2. The hospital has reduced appointment wait times through telemedicine utilisation	126	0	2.70	2	1.097
TM3. Healthcare providers remotely assess patient conditions, promptly diagnose medical issues, and initiate appropriate treatment plans swiftly	126	0	2.89	4	1.112
TM4.A good number of patients have shown improvement in terms of their health through the use of telemedicine	126	0	2.85	2	1.173

Source: Researcher 2025

Table 4.5 and Figure 4.8 illustrate the perceptions of healthcare providers on the adoption and Effect of telemedicine at Lamu County Referral Hospital. Overall, the mean scores across the four telemedicine-related statements were relatively low, with none exceeding a mean of 3.0. The lowest-rated item was TM1, which assessed whether telemedicine had enabled access to specialized healthcare services for underserved areas (Mean = 2.65, SD = 1.046). This suggests

that telemedicine has not yet achieved its full potential in expanding healthcare reach to marginalized populations. TM2, which focused on reducing appointment wait times, also had a low score (Mean = 2.70), indicating limited perceived effectiveness of telemedicine in improving scheduling efficiency within the hospital.

On the other hand, TM3 and TM4 received slightly higher mean scores (2.89 and 2.85, respectively), pointing to modest recognition of telemedicine's role in enabling remote diagnosis, timely treatment planning, and improved patient health outcomes. Nonetheless, these ratings still fell below the threshold for strong agreement, signaling hesitancy or inconsistencies in telemedicine implementation or uptake. Figure 4.8 further supports this, as a significant proportion of respondents selected "disagree" or "neutral" across all four items, particularly for TM1 and TM2. The low representation of "highly agree" responses across the chart highlights the need for stronger integration, awareness, and capacity-building around telemedicine.

Collectively, the data indicate that while telemedicine is conceptually recognized as a valuable tool, its practical application at the hospital remains limited or underutilized. This may be due to infrastructure gaps, lack of training, or insufficient digital systems to support remote service delivery. Strengthening these areas could significantly improve telemedicine's contribution to healthcare access and efficiency in rural and underserved communities.

4.5.5 Healthcare Quality Improvement

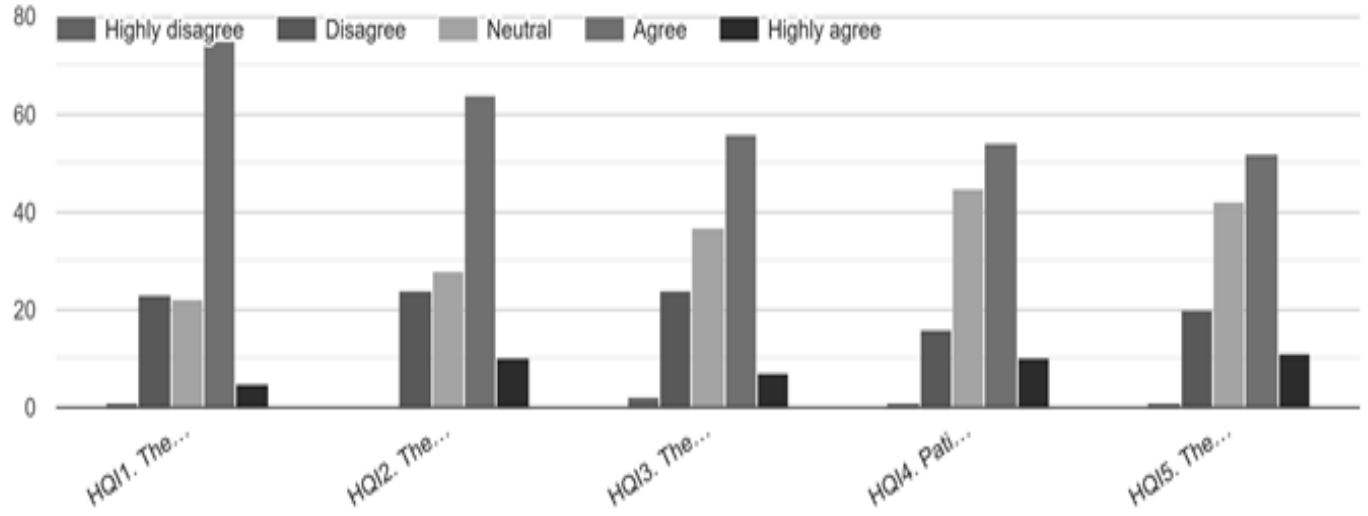

Figure 4. 9 Responses on Healthcare Quality Improvement
Source: Researcher 2025

Table 4. 6 Healthcare Quality Improvement

Statement	N		Mean	Mode	Std. Deviation
	Valid	Missing			
HQI1. The hospital has successfully improved the accessibility of healthcare services, ensuring that patients can easily access the required medical assistance in a timely manner.	126	0	3.48	4	0.865
HQI2. The implementation of technology has significantly enhanced the accuracy of diagnosis and treatment, leading to improved patient outcomes and medical decision-making.	126	0	3.48	4	0.892
HQI3. The use of technology has contributed to increased efficiency in the provision of healthcare services, reducing waiting times and optimizing overall healthcare delivery processes.	126	0	3.33	4	0.903
HQI4. Patients express satisfaction with the quality of healthcare services provided, considering factors such as communication, treatment accuracy, and overall experience.	126	0	3.44	4	0.844
HQI5. The integration of technology has led to a noticeable reduction in medical errors, contributing to the overall improvement in the quality and safety of healthcare services.	126	0	3.41	4	0.888

Source: Researcher 2025

The findings from Table 4.6 and Figure 4.9 indicate a generally positive perception of how technology has improved healthcare quality at Lamu County Referral Hospital. The highest-rated statements were HQI1 and HQI2, both with a mean of 3.48, suggesting that healthcare workers agree technology has enhanced accessibility to medical services and improved diagnostic accuracy. These two also had relatively low standard deviations of 0.865 and 0.892, respectively, indicating that respondents had a high level of consensus regarding these improvements. HQI4, which relates to patient satisfaction with communication and service delivery, also received a high

mean score of 3.44 and had the lowest standard deviation at 0.844, showing that staff consistently acknowledged the value of technology in improving patient experience.

HQI3 and HQI5 recorded slightly lower means of 3.33 and 3.41, respectively, indicating moderate agreement that technology has enhanced efficiency and reduced medical errors. The standard deviations for these two items,0.903 for HQI3 and 0.888 for HQI5, were slightly higher than others, suggesting a bit more variability in respondents' views. This may point to differences in departmental experiences with technology implementation, such as uneven rollout of digital systems or training gaps, which may affect how benefits are perceived across staff roles and hospital units.

Figure 4.9 further reinforces the statistical results by showing that the majority of respondents selected “agree” or “highly agree” across all items. The consistency of these responses, combined with the low standard deviations, signals a shared belief that technology has played a meaningful role in improving healthcare quality, patient outcomes, and operational safety. While some neutral and disagree responses were present, they were relatively minimal, suggesting that the integration of technology in service delivery has been well received overall and holds promise for further strengthening hospital performance.

4.6 Correlation Analysis

Table 4. 7 Correlation Analysis Table

	Healthcare Quality Improvement	**Barriers to Successful Adoption and Integration of Technology**	**Technological Healthcare Infrastructure**	**Hospital Management System**	**Telemedicine**
Healthcare Quality Improvement	1				
Barriers to Successful Adoption and Integration of Technology	.136	1			

Technological Healthcare Infrastructure	.601**	.163	1		
Hospital Management System	.587**	.134	.497**	1	
Telemedicine	.483**	.025	.377**	.517**	1

**. Correlation is significant at the 0.01 level (2-tailed).

Source: (Researcher, 2025)

The correlation analysis was conducted using Pearson's correlation coefficient to assess the strength and direction of the relationships among the core variables in the study. As shown in Table 4.7, Technological Healthcare Infrastructure demonstrated a strong and statistically significant positive correlation with Healthcare Quality Improvement ($r = 0.601$, $p < 0.01$), indicating that the presence of modern and reliable infrastructure greatly enhances the quality of healthcare services. Hospital Management System also showed a significant positive relationship with Healthcare Quality Improvement ($r = 0.587$, $p < 0.01$), suggesting that efficient systems for scheduling, drug tracking, and performance monitoring contribute meaningfully to improved patient outcomes. Additionally, Telemedicine recorded a moderate but statistically significant correlation with Healthcare Quality Improvement ($r = 0.483$, $p < 0.01$), underscoring its emerging importance in delivering accessible and timely care, especially for underserved populations.

In contrast, Barriers to Successful Adoption and Integration of Technology exhibited a weak and non-significant relationship with Healthcare Quality Improvement ($r = 0.136$), implying that while such barriers exist, they may not directly influence perceptions of healthcare quality compared to the more tangible effects of infrastructure, systems, and telemedicine. Moreover, Hospital Management System had significant associations with both Technological Healthcare Infrastructure ($r = 0.497$, $p < 0.01$) and Telemedicine ($r = 0.517$, $p < 0.01$), indicating the integrated nature of these domains in supporting healthcare operations. These findings highlight the vital role of technological enablers and operational systems in driving quality improvements within health facilities, and suggest that mitigating adoption barriers may require addressing underlying systemic and infrastructural gaps rather than isolated interventions.

4.7 Regression Analysis

Table 4. 8 Regression Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.704[a]	.496	.479	2.586

a. Predictors: (Constant), Telemedicine™, Barriers to successful Adoption and Integration of Technology (BAT), Technological Healthcare Infrastructure (TH), Hospital Management System (HMS)

Source: Researcher 2025

The regression model summary presented in Table 4.8 shows that the combination of the independent variables Barriers to Successful Adoption and Integration of Technology (BAT), Technological Healthcare Infrastructure (TH), Hospital Management System (HMS), and Telemedicine accounts for a significant proportion of the variance in the dependent variable, Healthcare Quality Improvement (HQI). The R value of 0.704 indicates a strong positive correlation between the predictors and healthcare quality. The R Square value of 0.496 suggests that 49.6% of the variation in healthcare quality improvement is explained by the model. The Adjusted R Square of 0.479 confirms this, even after accounting for the number of predictors. The standard error of the estimate (2.586) is within an acceptable range, suggesting that the model fits the data reasonably well.

Table 4. 9 ANOVA TABLE

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	796.503	4	199.126	29.785	.000[b]
	Residual	808.925	121	6.685		
	Total	1605.429	125			

a. Dependent Variable: Healthcare Quality Improvement (HQ)

b. Predictors: (Constant), Telemedicine™, Barriers to successful Adoption and Integration of Technology (BAT), Technological Healthcare Infrastructure (TH), Hospital Management System (HMS)

Source: Researcher 2025

The ANOVA table (Table 4.9) tests the overall significance of the regression model. The results show a statistically significant model, with an F-statistic of 29.785 and a p-value of 0.000,

indicating that the predictors collectively have a meaningful Effect on healthcare quality improvement. This means that the regression model does a good job of explaining the variation in the outcome variable and that the relationship between the set of independent variables and healthcare quality improvement is not due to chance.

Table 4. 10 Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.784	1.756		2.725	.007
	Barriers to Successful Adoption and Integration of Technology	.025	.055	.029	.448	.655
	Technological Healthcare Infrastructure	.341	.069	.377	4.960	.000
	Hospital Management System	.223	.060	.301	3.682	.000
	Telemedicine™	.167	.069	.184	2.409	.018

a. Dependent Variable: Healthcare Quality Improvement

Source: Researcher 2025

The coefficients table (Table 4.10) provides insights into the individual contribution of each predictor. Three variables showed a statistically significant positive effect on healthcare quality improvement: Technological Healthcare Infrastructure ($B = 0.341$, $p < 0.001$), Hospital Management System ($B = 0.223$, $p < 0.001$), and Telemedicine ($B = 0.167$, $p = 0.018$). These findings suggest that improvements in infrastructure, digital health systems, and remote healthcare delivery significantly contribute to better health service quality. In contrast, Barriers to Technology Adoption had a non-significant effect ($B = 0.025$, $p = 0.655$), implying that, when considered alongside other stronger predictors, barriers alone do not significantly influence healthcare quality improvement. This highlights the greater Effect of enablers over inhibitors in shaping healthcare performance at the facility.

4.8 Interpretation of Findings

The interpretation of findings was based on data collected from 126 healthcare providers at Lamu County Referral Hospital, offering a balanced and diverse representation in terms of gender, professional roles, and experience. The gender split was even, with 50% male and 50% female. Nurses made up 38.9% of respondents, while doctors represented 11.1%, and the remaining 40.5% were categorized under "Other." A majority of participants (57.9%) had less than five years of service at the facility, with 29.4% having worked there for five to ten years. Regarding the extent of technology integration in the hospital, 34.9% of respondents rated it as minimal, 24.6% as limited, and only 11.1% perceived it as extensive. These demographic and contextual insights provided a strong foundation for evaluating the dependent variable, healthcare quality improvement, which in this study referred to enhanced accessibility, accuracy in diagnosis and treatment, and efficiency in service delivery. Before proceeding with the analysis, instrument reliability and validity were confirmed. Kaiser-Meyer-Olkin (KMO) values ranged from 0.677 to 0.863, indicating sampling adequacy for all constructs. Cronbach's Alpha scores ranged from 0.658 to 0.914, confirming internal consistency, with the questionnaire deemed statistically robust for examining the study's objectives.

In relation to the first objective, analyzing factors that facilitate successful adoption and integration of technology in healthcare, the study explored perceptions regarding barriers and enablers to technology uptake. The descriptive statistics revealed that the highest-rated statement was the role of youth familiarity with technology (mean = 4.09, SD = 0.849), suggesting that generational readiness may support faster adoption. However, institutional support appeared weak, with hospital-provided digital training receiving the lowest rating (mean = 2.75, SD = 1.263). Despite these views, the correlation analysis showed that barriers to technology adoption had a weak and statistically insignificant association with healthcare quality ($r = 0.136$, $p > 0.01$). Regression analysis further confirmed this with a non-significant coefficient ($\beta = 0.025$, $p = 0.655$). These findings implied that while adoption challenges existed, they did not significantly obstruct the overall improvement of healthcare quality, possibly due to informal learning or individual adaptability among staff.

The second objective sought to analyze the Effect of technological healthcare infrastructure on the quality of healthcare services. This construct emerged as the most influential driver of healthcare

quality improvement in the study. Respondents agreed most with the statement that technology had improved patient outcomes (mean = 3.48, SD = 1.018). The correlation between technological infrastructure and healthcare quality was strong and positive ($r = 0.601$, $p < 0.01$), while regression analysis also revealed a statistically significant and high coefficient ($\beta = 0.341$, $p < 0.001$). These findings indicated that investment in infrastructure such as medical devices, digital records, and clinical technologies was directly linked to improved diagnosis accuracy, patient monitoring, and service efficiency. This aligns with the theoretical expectation that technology adoption enhances technical quality and responsiveness in public healthcare settings.

For the third objective, evaluating the Effect of Hospital Management Systems (HMS) on healthcare quality, the findings also indicated a strong positive influence. Respondents gave high ratings to items such as reduced patient wait times (mean = 3.44, SD = 1.016), although queue management was rated slightly lower (mean = 3.02, SD = 1.054). Statistically, the correlation between HMS and healthcare quality improvement was significant ($r = 0.587$, $p < 0.01$), and regression analysis showed a meaningful effect ($\beta = 0.223$, $p < 0.001$). These results highlighted those digital systems facilitating administrative efficiency, inventory tracking, and staff coordination contributed significantly to improving patient experiences and operational efficiency. The findings reinforce the notion that administrative digitalization is a core element of delivering quality healthcare in resource-constrained settings.

The fourth objective was to determine the Effect of telemedicine on the quality of healthcare. Among all the variables studied, telemedicine received the lowest mean ratings, ranging from 2.65 to 2.89, reflecting its limited uptake or awareness among respondents. Nonetheless, correlation analysis revealed a statistically significant positive relationship with healthcare quality ($r = 0.483$, $p < 0.01$), and the regression model confirmed its contribution with a coefficient of $\beta = 0.167$ ($p = 0.018$). These findings suggest that even though the use of telemedicine was relatively low at Lamu County Referral Hospital, its presence still positively impacted accessibility and timely care delivery. As such, further integration of telemedicine platforms could greatly enhance service equity and efficiency, particularly in rural and underserved regions.

Overall, the multiple regression model used in the study explained 49.6% of the variance in healthcare quality improvement ($R^2 = 0.496$), and the model was statistically significant as indicated by the ANOVA test ($F = 29.785$, $p < 0.001$). The findings consistently demonstrated that

healthcare quality at Lamu County Referral Hospital was most positively influenced by technological healthcare infrastructure, followed by hospital management systems and telemedicine. Barriers to technology adoption, although present, had little statistical bearing on quality outcomes. This suggests that future strategies aimed at improving public healthcare quality in similar settings should prioritize strengthening infrastructure and administrative systems while scaling up telemedicine solutions to optimize access and service delivery.

CHAPTER FIVE: DISCUSSION, CONCLUSION, AND RECOMMENDATIONS

5.1: Introduction

This chapter presents the discussion, conclusion, and recommendations drawn from the study findings on the Effect of technology adoption on healthcare quality at Lamu County Referral Hospital.

5.2 Discussion

The investigation into the Effect of technology adoption on healthcare quality improvement at Lamu County Referral Hospital achieved a high response rate of 97.6% (126 out of 129 respondents), which enhanced the credibility and generalisability of the findings. Pearson correlation analysis revealed that Technological Healthcare Infrastructure had the strongest positive correlation with healthcare quality improvement ($r = 0.601$), followed closely by the Hospital Management System ($r = 0.587$). Telemedicine also showed a significant positive relationship ($r = 0.483$), indicating that digital tools supporting remote care contribute meaningfully to service improvement. In contrast, Barriers to Technology Adoption had a weak and statistically insignificant correlation ($r = 0.136$), suggesting that while barriers exist, they may be less influential than enabling systems. Regression analysis further confirmed these results: Technological Infrastructure had the most significant predictive effect ($\beta = 0.341$, $p < 0.001$), followed by Hospital Management System ($\beta = 0.223$, $p < 0.001$), and Telemedicine ($\beta = 0.167$, $p = 0.018$). However, Barriers to Adoption had no significant effect ($\beta = 0.025$, $p = 0.655$). These findings suggest that improving digital infrastructure, management systems, and remote care tools holds greater potential for enhancing healthcare quality than solely focusing on reducing adoption challenges.

5.2.1 Barriers to Successful Adoption and Integration of Technology

The findings from this study revealed that while barriers to technology adoption were acknowledged by healthcare providers at Lamu County Referral Hospital, their actual Effect on healthcare quality was statistically insignificant. The regression analysis showed a beta coefficient of $\beta = 0.025$ with a p-value of 0.655, while the Pearson correlation was $r = 0.136$, indicating a

weak and non-significant relationship between barriers and healthcare quality. Descriptively, respondents acknowledged the presence of barriers, with the highest-rated item being the role of younger populations in adapting faster to digital tools (Mean = 4.09, SD = 0.849) and the lowest being hospital training provision (Mean = 2.75, SD = 1.263). Despite these perceptions, the low beta value shows that barriers, such as resistance to change, training gaps, or complexity in using technology, did not significantly affect the delivery or quality of healthcare services. This suggests that the presence of enabling systems like modern infrastructure, supportive leadership, or motivated staff may have mitigated the influence of such barriers.

These findings are aligned with the Technology Acceptance Model (TAM), which argues that users are more likely to adopt technology if they perceive it as useful and easy to use, regardless of external constraints. In this study, the fact that barriers showed no significant Effect ($\beta = 0.025$) indicates that healthcare providers continued to utilize technology tools because they found them functionally useful and beneficial to service delivery. Similarly, the Innovation Diffusion Theory (IDT) posits that the spread of innovations can still occur even in the presence of barriers, particularly when early adopters lead the way. This theory is evident in the current findings, as the technology-related improvements in healthcare quality occurred despite reported challenges. The findings also align with Wanjau et al. (2012), who found that while staff capability and financial limitations posed challenges, these were neutralized by institutional frameworks that supported the diffusion and acceptance of technology. Their study identified such barriers as relevant but not statistically dominant, just as the Lamu study showed with $r = 0.136$ and $p = 0.655$. Kimani and Moi (2020) similarly found in their study of public hospitals in Lamu County that funding alone did not improve service quality unless complemented by strong infrastructure, supporting the current result that barriers alone are not predictive of quality unless other systems are lacking.

On the other hand, the findings of this study contrast with research that reported barriers as strong predictors of negative outcomes. For example, Kinuthia (2009) reported that inadequate ICT training and poor infrastructure were key obstacles to successful ICT integration in Kenya's education system. If those same dynamics had applied in this study, we would expect a statistically significant relationship, but instead, $\beta = 0.025$ and $r = 0.136$ suggest the opposite. Similarly, Kim et al. (2016) conducted a global review and found that poor resource allocation and infrastructure challenges had a significant statistical relationship with underperformance in health systems. This

contradicts the current study's conclusion, where the presence of such barriers did not hinder technology's Effect on quality. From a theoretical angle, IDT does caution that where there is low communication, minimal trialability, or poor compatibility, innovation adoption slows significantly. However, in the context of Lamu, the hospital still achieved measurable quality outcomes through technology, despite limitations in training and other barriers. This deviation implies that Lamu County Referral Hospital may benefit from hidden strengths, such as informal staff collaboration, administrative support, or culture of adaptation, which were not captured in those earlier studies but played a critical role in mitigating the practical effects of barriers.

5.2.2 Technological Healthcare Infrastructure

The study established that technological healthcare infrastructure is a key predictor of healthcare quality improvement at Lamu County Referral Hospital. The variable recorded the strongest positive correlation with healthcare quality at $r = 0.601$ ($p < 0.01$) and a statistically significant regression coefficient of $\beta = 0.341$ ($p < 0.001$), confirming its influential role. Descriptive statistics also reflected high agreement, with a mean score of 3.48 (SD = 1.018) for improved patient outcomes, 3.39 for diagnostic accuracy, and 3.36 for treatment precision. These values indicate that healthcare providers recognized the role of physical technology (e.g., diagnostic machines, therapeutic devices, and patient monitoring systems) in delivering timely and accurate care. The implication is that hospitals with functional, modern equipment are more capable of reducing delays, avoiding errors, and ensuring patient safety, particularly important in under-resourced settings like Lamu County Referral Hospital.

These findings align strongly with the Technology Acceptance Model (TAM), which suggests that perceived usefulness is a major driver of technology use. In this study, the high correlation ($r = 0.601$) and significance level ($p < 0.001$) show that healthcare providers not only accepted but actively used the technological infrastructure because they perceived it to improve care. This is supported by Itumalla (2012), who reported that investment in IT infrastructure led to improved service quality in a private hospital in Hyderabad, India. While his context was a well-resourced setting, the finding that improved service outcomes followed the use of structured technological systems mirrors the $\beta = 0.341$ reported in this study, proving alignment. Similarly, the Innovation Diffusion Theory (IDT), which focuses on the gradual uptake of innovations, is reflected in the Lamu study results. The widespread Effect of infrastructure ($\beta = 0.341$) suggests that early

adopters within the hospital influenced others, leading to broader adoption and system-wide improvements, an outcome that IDT anticipates. Millery and Kukafka (2010) also argued for strong health IT systems in under-resourced settings to close quality gaps; their view aligns with the current study's high correlation value ($r = 0.601$), indicating that infrastructure indeed contributes to bridging healthcare disparities. While their work focused on digital IT systems, the foundational argument about infrastructure's necessity supports this study's broader interpretation that both physical and digital infrastructure are needed to drive quality.

In contrast, some elements of the cited literature show partial divergence in scope and contextual assumptions. For instance, Greenhalgh et al. (2019) focused heavily on layered health information systems, with little emphasis on physical diagnostic or therapeutic technology. Their framework does not fully reflect the practical realities at Lamu County Referral Hospital, where physical tools (like patient monitors and imaging equipment) were reported by respondents as more impactful than digital systems, shown by the highest mean score (3.48) being linked to physical infrastructure. Similarly, although Itumalla (2012) found a significant improvement in care quality through technology in a well-funded private hospital, this differs from the current study context where similar improvements ($\beta = 0.341$) occurred in a public hospital with limited funding, suggesting that even minimal infrastructure, if properly maintained and accepted by staff, can yield strong results. Moreover, IDT typically assumes that complex innovations take longer to spread in resource-limited settings. However, the high correlation ($r = 0.601$) and strong regression effect in this study contradict that assumption, suggesting faster adoption in Lamu than IDT would predict. This may be due to targeted training or staff motivation not captured in earlier studies. Thus, while foundational theoretical and empirical principles align, this study adds value by showing that physical infrastructure, even in constrained settings, can quickly drive measurable improvements, expanding the narrative beyond IT systems and highlighting a crucial gap in earlier infrastructure-focused research.

5.2.3 Telemedicine

The study established that telemedicine had a statistically significant and moderately positive influence on the quality of healthcare at Lamu County Referral Hospital. This was confirmed by a Pearson correlation coefficient of $r = 0.483$ ($p < 0.01$) and a regression beta value of $\beta = 0.167$ ($p = 0.018$). These findings suggest that, even with limited telemedicine infrastructure, its

implementation is already contributing positively to healthcare delivery, improving access, speeding up consultations, and enabling remote diagnosis. Respondents moderately agreed with the telemedicine indicators: mean scores were 2.89 for timely treatment planning and 2.85 for patient outcome improvement, indicating a consensus on its practical utility despite the relatively early stage of adoption. The implication is that telemedicine is functionally impactful, particularly in resource-limited settings like Lamu, where physical barriers to healthcare access are significant.

These findings align with previous empirical studies and the theoretical frameworks adopted in the research. The Technology Acceptance Model (TAM) posits that technology adoption is influenced by perceived usefulness and ease of use. The significance level ($p = 0.018$) and positive beta value reflect that healthcare providers perceive telemedicine as useful in enhancing service delivery, which supports TAM's core assumption. In addition, the Innovation Diffusion Theory (IDT) explains the process through which telemedicine is being adopted gradually among the staff, as early adopters influence others over time. Mukhwana (2013) emphasized telemedicine's potential in improving access through initiatives led by Safaricom and Nokia, a finding echoed here where even partial implementation of telemedicine at Lamu is yielding measurable quality outcomes. Nyamu et al. (2016) also observed that partnerships and resource pooling facilitate adoption, which resonates with the Lamu context where moderate technological investment has still resulted in significant effects ($\beta = 0.167$). Both theories, TAM and IDT,are clearly demonstrated in this study's results, showing that when technology is seen as beneficial and adopted incrementally, it can produce tangible improvements in healthcare.

However, the current study's findings contrast with Onsongo et al. (2022), who highlighted infrastructural deficits, cultural resistance, and high implementation costs as major hindrances to telemedicine adoption in Kenya. While those barriers are certainly valid, the results from this study show that despite their presence, positive outcomes can still be realized. For instance, although Lamu faces similar infrastructural and budget constraints, the statistical data from this study ($r = 0.483$; $\beta = 0.167$) demonstrate that telemedicine still significantly contributes to improving healthcare. This suggests that the barriers cited by IDT (such as limited infrastructure or late-stage adoption) may not be as prohibitive in every setting. This divergence from IDT's assumption about slow uptake in constrained environments, and Onsongo et al.'s emphasis on limiting factors, implies that contextual adaptability and staff willingness can override systemic limitations.

Therefore, while not all theoretical expectations or empirical studies fully align, the results show that partial implementation when supported by motivated healthcare providers can be enough to drive meaningful impact.

5.2.4 Hospital Management System

The findings from this study revealed that the Hospital Management System (HMS) significantly contributed to healthcare quality improvement at Lamu County Referral Hospital. The variable recorded a Pearson correlation coefficient of $r = 0.587$ ($p < 0.01$), indicating a strong positive relationship between HMS and service quality. The regression analysis yielded a beta coefficient of $\beta = 0.223$ ($p < 0.001$), confirming that HMS functions such as appointment scheduling, medication stock monitoring, and real-time staff coordination predict improvements in healthcare delivery. From the descriptive statistics, the statement regarding reduced wait times and queues from improved scheduling systems had the highest mean score of 3.44 (SD = 1.016), followed by 3.29 for enhanced stock monitoring and task allocation. These results imply that HMS improves efficiency and resource utilization, ultimately leading to better care experiences, especially in public hospitals operating under limited resource environments like Lamu.

These findings strongly align with theoretical frameworks and empirical studies. According to the Technology Acceptance Model (TAM), when users perceive a system to be useful, they are more likely to adopt and utilize it effectively. This was reflected in the high beta value ($\beta = 0.223$), which implies that hospital staff found HMS functions practically useful. Additionally, the Innovation Diffusion Theory (IDT) suggests that innovations like HMS spread through a system over time via early adopters, eventually becoming standard practice. In this study, the observable system-wide benefits support this theory. Empirical alignment is also evident. Jones et al. (2010) found that basic EHR adoption was associated with improved heart failure care in U.S. hospitals. This aligns with this study's strong correlation ($r = 0.587$) between HMS and quality improvements, indicating that even basic HMS modules (such as scheduling and inventory control) can positively influence service quality. Karuri et al. (2014) found that stakeholder support was critical to effective DHIS2 implementation in Kenya. This corresponds with Lamu's case, where strong staff engagement likely contributed to HMS success, evidenced by statistically significant effect ($\beta = 0.223$, $p < 0.001$), even in the absence of advanced technologies. Campanella et al. (2015) highlighted benefits of EHR systems in documentation and guideline adherence. This aligns with the current

study's finding that HMS improved workflow, with consistent scores for task and staff coordination (Mean = 3.29), reflecting better procedural compliance and efficiency.

However, some studies offer only partial alignment or diverge from these findings. Feldman et al. (2018) emphasized that financial investment and organizational leadership are essential for the successful implementation of health technologies. While this study recognizes the value of leadership, the strong positive beta ($\beta = 0.223$) and correlation ($r = 0.587$) observed in Lamu's HMS implementation occurred despite modest financial support, suggesting that effective outcomes can still be achieved in low-resource settings. This divergence highlights that practical utility and staff adaptability may, in some cases, compensate for financial or structural deficits. Muthee et al. (2018) focused on Routine Data Quality Assessments (RDQAs) to improve data accuracy in EMRs. Their study emphasized analytic refinement, whereas this study found significant effect from more foundational HMS features such as scheduling and stock control. While Muthee et al. supported data completeness through audit mechanisms, the current findings demonstrate that even without complex RDQAs, quality improvements can still result from basic HMS adoption. Furthermore, while IDT posits that lack of communication or compatibility can slow adoption, this study's results, statistically significant and functionally evident suggest that even partial, context-sensitive system deployment can yield measurable benefits. Thus, the present study not only aligns with broader findings on HMS benefits but also fills a contextual gap by showing that measurable improvements in care can be achieved even in resource-constrained, county-level public hospitals through strategic HMS use.

5.3 Conclusion

The findings revealed that technological healthcare infrastructure had the most significant impact, evidenced by the strongest positive correlation ($r = 0.601$) and a high regression coefficient ($\beta = 0.341$, $p < 0.001$). This confirmed that the availability and use of modern diagnostic and monitoring equipment directly enhanced diagnostic accuracy, improved treatment planning, and led to better patient outcomes. Similarly, hospital management systems were found to significantly improve service efficiency, especially in scheduling, medication stock tracking, and staff allocation, with a correlation of $r = 0.587$ and $\beta = 0.223$ ($p < 0.001$). Telemedicine also had a notable influence, facilitating remote consultations and timely treatment planning, as indicated by $r = 0.483$ and $\beta = 0.167$ ($p = 0.018$). These findings suggest that when appropriately implemented, technology-

driven systems can substantially raise the standard of care, particularly in resource-constrained hospital environments.

On the other hand, the study found that barriers to technology adoption, such as limited training, financial constraints, and resistance to change, while present, did not significantly affect healthcare quality at Lamu County Referral Hospital. The correlation coefficient was weak ($r = 0.136$), and the regression analysis yielded an insignificant $\beta = 0.025$ ($p = 0.655$). This indicates that the Effect of these barriers was largely neutralized by existing enablers such as motivated staff, infrastructure availability, and ongoing system use. Overall, the study concludes that targeted technological investments, especially in healthcare infrastructure and management systems, produce measurable improvements in care delivery and quality outcomes. Moreover, while barriers should not be ignored, they do not present a statistically significant hindrance in settings where foundational systems are already functional. These conclusions affirm that strengthening enablers and scaling up existing technologies offers a practical and effective path toward quality improvement in healthcare settings like Lamu County Referral Hospital.

5.5 Recommendations of the Study

5.4.1 Barriers to Successful Adoption and Integration of Technology

Although the study found that barriers to technology adoption had no statistically significant effect on healthcare quality ($\beta = 0.025$; $p = 0.655$), addressing them remains essential for smooth implementation and sustainability. It is recommended that the hospital strengthens its internal capacity by increasing staff training programs aimed at improving digital literacy and confidence, especially for older or less tech-savvy employees. Additionally, effective change management strategies should be introduced to reduce resistance to new systems by involving staff early in the decision-making and pilot phases of technology deployment. The hospital should also consider implementing small-scale motivation mechanisms such as recognition schemes or departmental incentives to encourage positive attitudes and increased participation in technological initiatives.

5.4.2 Technological Healthcare Infrastructure

Technological infrastructure had the most significant effect on healthcare quality in this study ($r = 0.601$; $\beta = 0.341$, $p < 0.001$), highlighting its critical role in improving diagnosis, treatment, and operational efficiency. It is therefore recommended that the hospital prioritizes the acquisition and

maintenance of modern medical technologies, particularly in high-dependency units such as diagnostics, emergency care, and surgical services. Supporting infrastructure such as stable electricity, secure data storage, and technical repair and maintenance teams should also be strengthened to ensure consistent equipment functionality. Furthermore, continuous and structured training programs should be offered to ensure that healthcare staff are proficient in the use and maintenance of technological equipment to maximize utility and ensure patient safety.

5.4.3 Telemedicine

With a moderate but statistically significant effect on healthcare quality ($r = 0.483$; $\beta = 0.167$, $p = 0.018$), telemedicine presents a viable solution for expanding access to care in underserved areas. The hospital should invest in expanding its telemedicine services to support remote diagnosis, specialist consultations, and post-discharge follow-ups, particularly for patients in remote areas of Lamu County. Strengthening ICT infrastructure, including internet connectivity, secure telehealth platforms, and reliable communication devices, is essential to support this expansion. In addition, comprehensive training should be provided to both healthcare providers and patients to improve system navigation, build confidence in digital consultations, and encourage consistent use of telemedicine services.

5.4.4 Hospital Management System

The Hospital Management System (HMS) was also found to significantly enhance healthcare quality ($r = 0.587$; $\beta = 0.223$, $p < 0.001$) by improving efficiency in scheduling, inventory, and staff coordination. To build on these benefits, the hospital should upgrade its HMS to incorporate advanced modules such as real-time patient tracking, electronic reminders for appointments and follow-ups, and automated triage systems. Improving the stock management component of the system is also essential to prevent drug shortages and ensure accurate record-keeping for pharmaceuticals and medical supplies. Lastly, regular capacity-building workshops should be institutionalized to ensure that all relevant staff are adequately trained in HMS use, troubleshooting, and data interpretation for performance monitoring and decision-making.

5.5 Limitations of the Study

This study was limited to Lamu County Referral Hospital, which may restrict the generalizability of the findings to other healthcare settings with different resource capacities or operational

structures. Additionally, the study relied on self-reported data collected through questionnaires, which may be subject to response bias or social desirability effects. The cross-sectional design also limits the ability to establish causality between the adoption of technology and improvements in healthcare quality, capturing only a snapshot in time rather than long-term outcomes.

5.6 Areas for Future Research

Future research should consider conducting similar studies across multiple healthcare facilities, both public and private, to allow for comparative analysis and broader generalizability of findings. Longitudinal studies are also recommended to assess the long-term Effect of technology adoption on healthcare quality over time, including sustainability and system integration outcomes. Additionally, further research could explore patient perspectives on technology-driven healthcare services, such as telemedicine and electronic health records, to understand their satisfaction, accessibility challenges, and overall health outcomes in relation to digital health interventions.

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APPENDICES

Appendix 1: Participant Information and Consent Form

SECTION 1: INFORMATION SHEET

Principal Investigator (PI): Dr. George Davis Manyange Bagwasi

Institutional affiliation: Strathmore Business School (SBS)

SECTION 2: INFORMATION SHEET–THE STUDY

2.1: Why is this study being carried out?

This study is being carried out to determine the Effect of technology adoption on healthcare quality improvement at Lamu County Referral Hospital. The study specifically seeks to understand the contributions of integrated technology-based healthcare practices to the improvement of healthcare quality in Lamu County Referral Hospital.

2.2: Do I have to take part?

No. Taking part in this study is entirely optional and the decision rests only with you. If you decide to take part, you will be asked to complete a questionnaire to get information on your interaction with technology-based healthcare practices at Lamu County Referral Hospital. If you are not able to answer all the questions successfully the first time, you may be asked to sit through another informational session after which you may be asked to answer the questions a second time. You are free to decline to take part in the study from this study at any time without giving any reasons.

2.3: Who is eligible to take part in this study?

The study seeks information from healthcare providers at Lamu County Referral Hospital; doctors, nurses, technicians, lab and pharmacy technologists, and administrators.

2.4: Who is not eligible to take part in this study?

Individuals who are not involved with healthcare provision at Lamu County Referral Hospital.

2.5: What will taking part in this study involve for me?

You will be approached by the researcher or/and authorised research assistants and requested to take part in the study. If you are satisfied that you fully understand the goals behind this study, you will be asked to sign the informed consent form (this form) and then taken through a questionnaire to complete.

2.6: Are there any risks or dangers in taking part in this study?

There are no risks in taking part in this study. All the information you provide will be treated as confidential and will not be used in any way without your express permission.

2.7: Are there any benefits of taking part in this study?

The information will be used to aid in the analysis of the input of technology in healthcare provision and subsequently enhance technological training and workshops that would improve healthcare quality.

2.8: What will happen to me if I refuse to take part in this study?

Participation in this study is entirely voluntary. Even if you decide to take part at first but later change your mind, you are free to withdraw at any time without explanation.

2.9: Who will have access to my information during this research?

All research records will be stored in securely locked cabinets. That information may be transcribed into our database, but this will be sufficiently encrypted and password-protected. Only the people who are closely concerned with this study will have access to your information. All your information will be kept confidential.

2.10: Who can I contact in case I have further questions?

You can contact me**, Dr. George Davis Manyange Bagwasi,** at SBS, or by e-mail georgebgz82@gmail.com , or by phone +254720386325. You can also contact my supervisor, Prof. Dr. Joseph Onyango, Ph.D., at the Strathmore Business School, Nairobi, or by e-mail at joynyango@strathmore.edu, or by phone +254720879706

If you want to ask someone independent anything about this research, please contact:

The Secretary–Strathmore University Institutional Ethics Review Board, P. O. BOX 59857, 00200, Nairobi, email ethicsreview@strathmore.edu Tel number: +254 703 034 375

I, _____, have had the study explained to me. I have understood all that I have read and have had explained to me and had my questions answered satisfactorily. I understand that I can change my mind at any stage.

Please tick the boxes that apply to you;

Participation in the research study

☐ I AGREE to take part in this research.

☐ I DON'T AGREE to take part in this research.

Storage of information on the completed questionnaire

☐ I AGREE to have my completed questionnaire stored for future data analysis

☐ I DON'T AGREE to have my completed questionnaire stored for future data analysis

Participant's Signature: _____Date: _____/_____/_____

DD / MM / YEAR

Participant's Name: _____Time: _____ /_____

(Please print name) HR / MN

I, _____ (Name of person taking consent) certify that I have followed the SOP for this study and have explained the study information to the study participant named above, and that s/he has understood the nature and the purpose of the study and consents to the participation in the study. S/he has been given opportunity to ask questions which have been answered satisfactorily.

Investigator's Signature: _____ Date: _____/_____/_____

DD / MM / YEAR

Investigator's Name: _____Time: _____ /_____

(Please print name) HR / MN

Appendix 2: Questionnaire

The questionnaire seeks to collect data on a research study on the role of technology in the improvement of healthcare quality at Lamu County Referral Hospital. Participating in this study is purely voluntary. If you chose to participate in this study, your responses will be held with utmost integrity and your privacy rights respected.

Section A: Background Information

1. Please tick the role you play at the hospital
    a) Doctor
    b) Nurse
    c) Technician
    d) Administrator
    e) Others_____ (Specify)
2. How long have you worked at King Fahd Hospital? (Tick whichever that applies)
    - Below 5 years
    - 5 – 10 years
    - 11 – 20 years
    - Above 20 years
3. What is your gender?
    - Male
    - Female

4. To what extent do you think the hospital uses technology to offer quality healthcare services? Please rate using the scale below:
    - 0–20% (Minimal use of technology)
    - 21–40% (Limited use of technology)
    - 41–60% (Moderate use of technology)
    - 61–80% (Extensive use of technology)

- 81–100% (Highly integrated technology use)

SECTION B: Barriers to Successful Adoption and Integration of Technology

Please rate your disagreement or agreement with the following statements regarding the factors for successful adoption and integration of technology at Lamu County Referral Hospital.

Statement	**Highly Disagree**	**Disagree**	**Neutral**	**Agree**	**Highly Agree**
Limited financial resources and funding constraints pose significant barriers to the adoption of advanced healthcare technologies in our hospital.					
The high level of illiteracy in the area hinders the smooth adoption and effective utilization of technology in daily healthcare practices at the hospital.					
The complexity and difficulty in using certain technologies act as a significant barrier, impeding their successful adoption and integration into healthcare services.					
The hospital provides trainings and workshops to healthcare workers to effectively integrate new technology.					
Insufficient opportunities for training and skill development on new technologies contribute to barriers in the effective adoption of technological solutions in our healthcare practices.					
Resistance to change among healthcare staff and patients is a significant factor hindering the smooth adoption and integration of technology into routine healthcare procedures.					
Older individuals face challenges in adapting to new digital interfaces, hindering the widespread adoption of technology in healthcare					

Younger populations' familiarity and comfort with technology contribute to their faster adoption					

Section C: Technological Healthcare Infrastructure

Please rate your disagreement or agreement with the following statements regarding Effect of healthcare infrastructure on the quality of healthcare improvement at Lamu County Referral Hospital.

Statement	**Highly Disagree**	**Disagree**	**Neutral**	**Agree**	**Highly Agree**
The hospital is equipped with modern medical technology machines					
The hospital has invested in cutting-edge monitoring devices and equipment, to ensure continuous monitoring and support for critically ill patients across various care settings					
Modern medical technology machines have facilitated accurate diagnosis					
Modern medical technology machines have facilitated accurate treatment plans for patients					
Through the integration of modern technology equipment, a significant number of patients have experienced improvement in terms of their health					

Section D: Hospital Management System

This subsection will evaluate the effect of Hospital management System in enhancing the quality of healthcare. Please indicate your level of agreement or disagreement with the following statements on the effect of hospital management system at Lamu County Referral Hospital.

Statement	**Highly Disagree**	**Disagree**	**Neutral**	**Agree**	**Highly Agree**
The hospital's efficient appointment scheduling system and streamlined patient flow management protocols have significantly reduced wait times and queues in key areas such as registration, triage, and outpatient clinics, enhancing patient satisfaction and optimizing resource utilization					
Utilizing advanced queue management software and real-time monitoring systems, the hospital effectively coordinates patient arrivals, prioritizes cases based on urgency, and allocates resources accordingly, resulting in minimized wait times and improved patient throughput across various departments.					
The hospital management system tracks medication stock levels and ensures timely availability of essential drugs to patients					
The hospital management system has assisted in maintaining optimal levels of drug stocks, monitoring expiration dates, and implementing stringent quality assurance protocols, ensuring uninterrupted supply chains and effective management of pharmaceutical resources.					

Through the implementation of an integrated workforce management platform, the hospital efficiently schedules shifts, allocates tasks, and monitors staff performance in real-time, fostering effective communication, collaboration, and accountability among healthcare teams.					
The hospital's integrated workforce management system efficiently schedules shifts and allocates tasks among staff, enhancing coordination and ensuring timely services for patients.					

Section E: Telemedicine

This section will assess the Effect of telemedicine on the quality of healthcare improvement. Please rate your agreement or disagreement with the following statements regarding the Effect of the hospital management system at Lamu County Referral Hospital.

Statement	**Highly Disagree**	**Disagree**	**Neutral**	**Agree**	**Highly Agree**
Through telemedicine, the hospital has been able to remotely access and offer specialized healthcare services for patients in underserved areas					
The hospital has reduced appointment wait times through telemedicine utilisation					
Healthcare providers remotely assess patient conditions, promptly diagnose medical issues, and initiate appropriate treatment plans swiftly					

A good number of patients have shown improvement in terms of their health through the use of telemedicine					

Section F: Healthcare Quality Improvement

Please rate your agreement or disagreement with the following statements regarding healthcare quality improvement at Lamu County Referral Hospital.

Statement	**Highly Disagree**	**Disagree**	**Neutral**	**Agree**	**Highly Agree**
The hospital has successfully improved the accessibility of healthcare services, ensuring that patients can easily access the required medical assistance in a timely manner.					
The implementation of technology has significantly enhanced the accuracy of diagnosis and treatment, leading to improved patient outcomes and medical decision-making.					
The use of technology has contributed to increased efficiency in the provision of healthcare services, reducing waiting times and optimizing overall healthcare delivery processes.					
Patients express satisfaction with the quality of healthcare services provided, considering factors such as communication, treatment accuracy, and overall experience.					

The integration of technology has led to a noticeable reduction in medical errors, contributing to the overall improvement in the quality and safety of healthcare services.					

Thank You for Participating!!!

Appendix 3: Study Budget

No	**Particulars**	**Amount (KSH)**
1	Printing	10,000
2	Transport	15,000
3	Data Collection	20,000
4	Binding	10,000
5	Dissemination of Findings (workshop, presentation, or publication)	15,000
6	Miscellaneous	10.000
	Total	**65,000**

Appendix 4: Introductory Letter

Ole Sangale Rd, Madaraka Estate
P. O Box 59857 - 00200, Nairobi, Kenya
Cell: +254 703 034 414/6/7
X/Twitter/Tiktok: @SBSKenya
Facebook/Linkedin: Strathmore University Business School

Email: **sbsinfo@strathmore.edu** or visit **www.sbs.strathmore.edu**

Strathmore UNIVERSITY BUSINESS SCHOOL

Monday, 24th March 2025

To Whom It May Concern,

RE: FACILITATION OF RESEARCH—GEORGE DAVIS MANYANGE BAGWASI

This is to introduce George Davis Manyange Bagwasi, a Master of Business Administration in Healthcare Management (MBA-HCM) student at Strathmore University Business School, student number 138932/21. As part of our MBA-HCM Program, George is expected to do applied research and undertake a project. This is in partial fulfillment of the requirements of the MBA-HCM course. To this effect, he would like to request appropriate data from your organization.

George is undertaking a research paper on ***"The Impact of Technology Adoption on Healthcare Quality Improvement at Lamu County Referral Hospital."*** The information obtained shall be treated confidentially and shall be used for academic purposes only.

Our MBA-HCM Program seeks to establish links with industry, and one of the ways of doing so is directing our research to areas that would be of direct use to industry. We would be glad to share our findings with you after the research, and we trust that you will find them of great interest and of practical value to your organization.

We appreciate your support and shall be willing to provide any further information if required.

Yours sincerely,

Alois Njenga,

Manager, Graduate Programmes,

Strathmore University Business School.

Strathmore University Business School is a Proud member of:

Association of African Business Schools AABS EFMD AACSB

Appendix 5: Research Permit

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **980003**

Date of Issue: **09/April/2025**

RESEARCH LICENSE

This is to Certify that Dr.. George Bagwasi of Strathmore University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Lamu on the topic: The Impact of Technology Adoption on Healthcare Quality Improvement at Lamu County Referral Hospital for the period ending : 09/April/2026.

License No: **NACOSTI/P/25/417730**

980003

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

See overleaf for conditions

Appendix 6: Ethics Approval

Strathmore UNIVERSITY

19th March 2025

Mr Bagwasi George,
george.manyange@strathmore.edu

Dear Mr Bagwasi,

RE: The Impact of Technology Adoption on Healthcare Quality Improvement at Lamu County Referral Hospital

This is to inform you that SU-ISERC has reviewed and **approved** your above **SU-masters** proposal. Your application reference number is **SU-ISERC2719/25.** The approval period is from **19th March 2025 to 18th March 2026.**

This approval is subject to compliance with the following requirements:

i. Only approved documents including (informed consents, study instruments, MTA) will be used.
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by SU-ISERC.
iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to SU-ISERC within 72 hours of notification.
iv. Any changes anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to SU-ISERC within 72 hours.
v. Clearance for the export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to the expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days of completion of the study to SU-ISERC.

Before commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology, and Innovation (NACOSTI) https://research-portal.nacosti.go.ke/ and obtain other clearances needed.

Yours sincerely,

Mr Ambrose Rachier,
Chairperson; SU-ISERC

Ole Sangale Rd, Madaraka Estate. PO Box 59857-00200, Nairobi, Kenya. Tel +254 (0)703 034000
Email admissions@strathmore.edu www.strathmore.edu

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