UPTAKE OF E-HEALTH TECHNOLOGIES AMONG HEALTHCARE WORKERS IN PUBLIC HEALTH FACILITIES IN KITENGELA SUB-COUNTY, KAJIADO COUNTY, KENYA

BY

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DEFINITION OF TERMS

Information Communication Technology: The umbrella term for hardware, software, and networks (computers, mobile devices, and telecommunications systems) used to create, store, exchange, and manage information. In healthcare, ICTs have the potential to promote patient-centred care at a lower cost, improve quality of care and information sharing, educate health professionals and patients, encourage a new form of relationship between patients and their health providers, and reduce travel time

e-Health: Refers to cost-effective and secure use of information and communication technologies in support of health and health-related fields, including health care services, health surveillance, health literature, and health education.

Uptake: The overall extent to which a target population, in this study, health workers at Kitengela Sub-County have taken up e-Health technologies into routine practice. Uptake is the umbrella construct for this study and is operationalized through three dimensions corresponding to the study's specific objectives: (i) the level of utilization of e-Health technologies, (ii) health workers' perception and acceptability of these technologies, and (iii) the level of healthcare facility preparedness enabling their use. Framed within Rogers' (2003) Diffusion of Innovation theory, uptake in this study captures where health workers and their facilities sit along the innovation-decision process from awareness through to sustained use rather than a single yes/no adoption event.

Adoption: Following Rogers (2003), adoption is "a decision to make full use of an innovation as the best course of action available", the individual-level decision point at which a health worker chooses to accept and begin using an e-Health technology. Adoption precedes and is distinct from utilization: a health worker may adopt (decide to use) a technology without yet reaching consistent or extensive utilization in daily practice.

Among the technologies included under the eHealth umbrella are:

The use of mobile devices in medical care (m-Health), such as wearables, electronic diaries or adherence monitors; Telemedicine, which is the adaptation of information and network technologies to clinical practice and medical education; Social media platforms and health informatics, such as electronic health records and clinical decision support systems. Finally, the analysis of information acquired through these tools can be

performed using ‘big data’ technologies

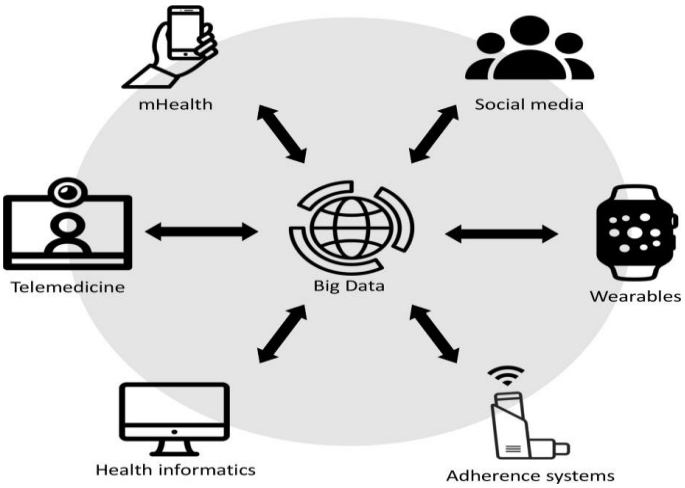


Figure 1.0: eHealth Technologies. Source: Author (2025)

eHealth includes a variety of technologies that can be applied to the health care industry. The information generated by these tools can be used as a source of big data which, in turn, may improve the systems used to plan, monitor, and deliver healthcare services

Level of the utilization of e-Health Technologies: The behavioural construct describing the actual extent, frequency, and manner in which health workers apply e-Health technologies for diagnosis and treatment, following their decision to adopt. Where adoption is the decision, utilization is the observed practice.

Perception and acceptability of e-Health Technologies: Healthcare workers’ opinion about the ease of use of the available technology in e-Health plays a key role in the use of healthcare technologies

Level of healthcare facilities' preparedness towards utilization of e-Health Technologies: Utilization is heavily dependent on the healthcare infrastructure and, therefore, the need for healthcare preparedness.

GLOSSARY OF E-HEALTH TOOLS AND TECHNOLOGIES

Big data: Recording and analysis of datasets that are too large, multidimensional, diverse and complex to be adequately processed by traditional software solutions.

eHealth: Abbreviation for electronic health. It includes a diverse group of tools that use computers and the internet to improve the efficacy and efficiency of the health care industry.

Health Informatics: Integration of health care and computer science. It comprises electronic health records, computerized physician order entry, clinical decision support systems and software solutions for administrative tasks.

m-Health: Abbreviation for mobile health. Integration of mobile devices (e.g., smartphones) in the practice of health care.

Social media: Interactive web-based applications where users can share text posts, comments and multimedia files. They can be used to develop personal or professional social networks.

Telemedicine: Delivery of health-related services performed via electronic information and telecommunication technologies. They can be real-time interactive services or store-and-forward, which means acquiring data that is subsequently transmitted to a specialist for assessment.

Wearable: Hands-free electronic device that can be worn as an accessory, clothing or as a part of the body (e.g., smart watches and bracelets and epidermal electronics resembling tattoos).

ABSTRACT

Background: The embrace of e-Health Technologies in healthcare systems is globally acknowledged, yet its adoption among healthcare workers remains inconsistent. In Kenya, particularly in Kitengela sub-County, Kajiado County; a rapidly growing population, there is a positive relationship between e-Health technology and enhancing healthcare efficacy. Although e-Health technologies offer significant advantages, their adoption in Kitengela Sub-County faces challenges related to healthcare workers' perceptions, acceptance, and the preparedness of healthcare facilities. This highlights the need to understand these barriers in order to develop effective strategies for successful implementation.

Objectives: To assess the current level of e-Health Technology utilization, establish healthcare workers' perceptions and acceptability of these technologies, and examine the preparedness of healthcare facilities to support their adoption**.**

Methods: This study applied a cross-sectional approach in data collection. Purposive sampling was used to select the two public health facilities, targeting various cadres of health care workers. Quantitative data were collected through a structured self-administered questionnaire assessing demographic characteristics, attitudes, perceptions, and knowledge of e-Health Technologies. Data were analysed using descriptive statistics, including frequencies and percentages, to summarize key findings. Qualitative data were collected through Focus Group Discussions (FGDs) with purposively selected healthcare workers. Thematic analysis was conducted, with coding and categorization used to identify patterns, particularly in patient monitoring and telemedicine use.

Results: We surveyed 150 healthcare workers; the gender distribution of respondents was 49% female and 51% male. Familiarity with e-Health technologies was reported by 38% of healthcare workers, with actual utilization at 36%. When broken down by cadre, 45% of nurses, 32% of physiotherapists, and 28% of medical officers reported using e-Health technologies in their daily practice. Although 91% of respondents acknowledged the importance of technology access, only 42% perceived these technologies as beneficial to their practice. Confidence in using e-Health systems varied across cadres, with 48% of nurses, 34% of physiotherapists, and 29% of medical officers expressing confidence. Despite 98% of respondents who

believed their facilities were prepared, significant gaps remained in user training and technical support, which were highlighted as areas needing improvement across all cadres.

Conclusion: The study revealed that e-Health technology uptake in Kitengela Sub-County is influenced not only by access but also by factors such as perceptions and institutional preparedness to successfully entrench and optimize the utilization of e-Health technology in the healthcare delivery system. There were significant differences in utilization across cadres. There was high awareness of the importance of e-Health, but gaps in user confidence and training were barriers to adoption.

Recommendations: Training programs should enhance healthcare workers' technical proficiency, which would build confidence in e-Health use. Continuous mentorship and user support should be integrated into implementation strategies. Facility-level policies should align infrastructure investments with staff capacity-building to optimize adoption.

CHAPTER ONE: INTRODUCTION

1.1 Background

Support among national policymakers and health officials for digital health (e-Health) remains strong, with current global frameworks positioning digital tools as enablers of access, quality, and efficiency rather than replacements for core health system functions (WHO, 2021/2025). Evidence-based guidance from WHO highlights benefits for client communication, provider decision support, supply-chain and data use, and targeted telemedicine, while also cautioning that effects vary by context and outcome (WHO, 2019). For chronic conditions, recent reviews show digital interventions can improve elements of self-management (e.g., adherence, symptom monitoring, physical activity), though impact sizes differ across populations and endpoints (Ambrosi et al., 2025; Polus et al., 2024; Pong et al., 2024).

As an umbrella concept, e-Health spans telemedicine, telehealth, m-Health, telecare, public/mental health applications, and IT-supported secondary processes (e.g., electronic records, logistics, appointments, quality systems). These tools enable “blended care,” combining face-to-face and digital interactions and reshaping roles, behaviors, and expectations of patients and providers (Pong et al., 2024; WHO, 2019). Societal and scientific expectations remain high because digital health can expand self-care, patient participation, prevention reach, and system innovation when implemented within supportive governance and financing arrangements (WHO, 2021/2025).

Digital channels also strengthen communication between providers and clients. The WHO’s guideline endorses targeted use of client reminders and digital adherence technologies and summarizes graded evidence for provider decision support (WHO, 2019). In sub-Saharan Africa, a recent review finds community-health-worker–mediated m-Health can increase uptake of maternal and newborn services, illustrating how mobile tools support continuity of care when embeded in local workflows (Kachimanga et al., 2024).

Across low- and middle-income countries, including Kenya, governments and implementers continue to adopt digital health to address access constraints, quality gaps, and rising demand (Achieng & Ogundaini, 2022; WHO, 2021/2025). Telemedicine and virtual care expanded markedly during and after COVID-19, yet persistent barriers—digital literacy, financing, interoperability, and regulation—shape heterogeneous adoption trajectories (Agbeyangi et al., 2025; Achieng & Ogundaini, 2022). Implementation quality depends not only on infrastructure but also on a workforce with appropriate digital skills and on change-management that aligns tools to clinical and administrative tasks (WHO, 2019, 2021/2025).

Health-workforce constraints remain a binding bottleneck in Sub-Saharan Africa. Updated estimates project a global shortfall of 11.1 million health workers by 2030, with significant deficits in the African Region (WHO, 2024). Regionally, analyses documented continuing gaps in density, skills mix, and geographic distribution. Kenya has increased its workforce in recent years but still remain below recommended thresholds — the national health-worker density stands at 13.8 per 10,000 population, well below the WHO benchmark of 44.5 per 10,000 needed for high coverage of essential services (Karan et al., 2023) in several cadres and counties (Asamani et al., 2024; Okoroafor et al., 2022). In this context, well-designed digital solutions (e.g.,

task support, referral coordination, remote consultation) are often pursued as efficiency multipliers rather than substitutes for staffing.

Barriers to digital health uptake in Sub-Saharan Africa include infrastructure reliability (power/connectivity), cost, device access, fragmented governance, and "pilotitis," (the proliferation of small, donor-funded digital health pilots that are rarely scaled or integrated into routine systems) whereas opportunities arise from rapidly improving mobile and broadband coverage and an expanding evidence base for scalable use-cases (Agbeyangi et al., 2025; Kachimanga et al., 2024). In Kenya specifically, sector statistics show continued year-on-year growth in mobile and fixed broadband subscriptions, supporting feasibility for facility- and community-level digital services (Communications Authority of Kenya [CA], 2024, 2025).

Kenya's service delivery is organized from national referral hospitals to county referral facilities, sub-county hospitals, health centres, dispensaries and community platforms. The Kenya Community Health Strategy, 2020–2025, formalizes community health workers as Community Health Promoters (CHPs) and underpins the national roll-out of the electronic Community Health Information System (eCHIS) initiated in 2023–2024 to digitize community registers, referrals, and supervision (Ministry of Health [MOH], 2020; Exemplars in Global Health, 2024). The Kenya Health Information System (KHIS/DHIS2) and Kenya EMR strengthen routine reporting and continuity of care across programs (Farnham et al., 2023; Griffin et al., 2025). Despite these foundations, studies still describe referral inefficiencies linked to transport, communication, and staffing constraints, particularly for chronic disease pathways (Thakkar et al., 2022). The policy environment continues to evolve (e.g., ongoing litigation affecting elements of the Digital Health Act, 2023), underscoring the importance of governance and standards for scale-up and interoperability.

It is against this background that this study seeks to understand the level of uptake of e-Health technology by healthcare workers to increase access to healthcare services among residents of Kitengela sub-County in Kajiado County.

1.2 Problem Statement

While several developing countries, including Uganda have made notable progress in applying e-Health systems to improve healthcare delivery, national-level documentation of Kenya's e-Health landscape has improved in recent years — through instruments such as the Digital Health Act, 2023 and the Kenya Health Facility Census — yet sub-county and facility-level evidence on actual uptake by front-line healthcare workers remains sparse. Despite the Government of Kenya's recognition of e-Health as a pillar for healthcare transformation, there is limited empirical data on its actual uptake and integration into daily practice by front-line healthcare workers. The current status of implementation, existing barriers, and opportunities for scale-up remain unclear.

Few studies have been undertaken in Kitengela Sub-County, which is part of the Nairobi metropolitan area that has witnessed rapid urbanisation with associated growth in health facilities. The extent to which healthcare workers in this region utilize e-Health technologies remains under-researched.

1.3 Research Questions

i. To what extent is the utilization of e-Health technologies among health workers in enhancing access to healthcare in Kitengela Sub-County, Kajiado County?

ii. To what extent is the utilization of e-Health technologies among its health workers in enhancing access to healthcare in Kitengela Sub-County, Kajiado County?

iii. What is the level of healthcare facilities' preparedness towards utilization of e-Health technologies among health workers in enhancing access to healthcare in Kitengela Sub-County, Kajiado County?

1.4 Objectives of the Study

1.4.1 General Objective

To assess the uptake of e-Health technologies among health workers in enhancing access to healthcare in Kitengela Sub-County, Kajiado County.

1.4.2 Specific Objectives

The objectives of the study were:

i. Assess the level of utilization of e-Health technologies among health workers in enhancing access to healthcare in Kitengela Sub-County, Kajiado County

ii. Establish the perception and acceptability of e-Health technologies among health workers in enhancing access to healthcare in Kitengela Sub-County, Kajiado County

iii. Examine the level of healthcare facilities' preparedness towards utilization of e-Health technologies among health workers in enhancing access to healthcare in Kitengela Sub-County, Kajiado County

1.5 Justification

E-Health is increasingly recognised as a transformative tool in modern healthcare systems due to its ability to improve efficiency, expand access, and enhance the quality of care. In resource-constrained settings such as Kenya, and more specifically Kitengela sub-County in Kajiado County, e-Health technologies offer critical opportunities to overcome challenges related to workforce shortages, poor infrastructure, and limited access to specialist services. Yet despite this potential, empirical evidence on how e-Health technologies are actually being used, perceived, and supported at the facility level in Kitengela sub-County remains scarce; existing national-level statistics do not capture the sub-county and facility-level realities that determine whether these technologies translate into improved access to care. This study addresses that gap by generating facility-level evidence to inform targeted interventions and policy in this specific context.

1.6 Scope and limitations of the study

The study sought to establish the uptake of e-Health technologies among health workers. The target population comprised health workers at Kitengela Sub-County Hospital and Kitengela GK Prison Dispensary. Specifically, the study determined the level of utilization, perception and acceptability, and healthcare facilities' preparedness for e-Health technologies among health workers in enhancing access to healthcare in Kitengela Sub-County, Kajiado County.

There were several limitations that arose while gathering data from the field. First, the respondents of the study were busy with their daily operations at the time of data collection. This affected how data was collected, as it was not possible to gather data in a single day. To overcome this challenge, a drop and pick later method was used in the distribution of questionnaires. The study further strived to overcome the challenge of data collection: the resistance of respondents to voluntarily giving the required information for fear that the information collected could be used to intimidate the respondents. This challenge was, however, mitigated by providing an introduction letter from the university and from the County Medical Superintendent to the respondents, which authorised the study as being for academic purposes only. Further, data collection proceeded only after authorisation was granted by the sub-county hospitals' administration to conduct the research.

CHAPTER TWO:
LITERATURE REVIEW

2.0 Introduction

2.1 This chapter presents a review of literature relevant to the study. It examines three core concepts: the utilisation of e-Health technologies, healthcare workers' perception and acceptability of these technologies, and the level of healthcare facility preparedness for their use. The chapter also reviews the theoretical framework underpinning these concepts and the empirical studies that inform them. It concludes by identifying the research gaps that this study seeks to address.

Empirical Review

2.1.1Utilization of e-Health Technologies by healthcare workers

Digital technologies have become ubiquitous across various sectors, with mobile devices, connected sensors, and data platforms increasingly embedded in routine care. Contemporary literature positions “digital health” as an umbrella spanning telemedicine/telehealth, mHealth, electronic records, clinical decision support and data systems; its benefits for access, quality and self-management are real but contingent on context, workflow fit and user capability (WHO, 2019; Wosny et al., 2023).

While early narratives emphasized disruption, the last five years (2021-2026) have consolidated a more nuanced view: digital tools can improve timely communication, adherence and coordination, but outcomes depend on governance, human factors and implementation quality. Systematic reviews show that infrastructure reliability, workload and usability are persistent barriers, whereas training, perceived usefulness and organizational support facilitate uptake among health professionals (Borges do Nascimento et al., 2023; Alotaibi et al., 2025).

In sub-Saharan Africa, adoption trajectories reflect both constraints and momentum. Recent multi-country evidence documents growing telemedicine and mHealth use, shaped by policy frameworks and connectivity gains in countries such as Kenya (Agbeyangi et al., 2025; Waiyaiya et al., 2024). At the same time, studies highlight the need to design for frontline realities: power and network reliability, device availability, and workload so that digital tools act as efficiency multipliers rather than adding clicks (Wosny et al., 2023).

Healthcare-worker attitudes, skills and social/organizational context remain central determinants of utilization. Across hospital and primary-care settings, unified models of technology acceptance (e.g., UTAUT/UTAUT3) consistently implicate performance expectancy, effort expectancy, facilitating conditions and digital literacy as predictors of intention and use, with mixed effects for social influence (Ngusie et al., 2024; Hailu et al., 2025; Demsash et al., 2024). Complementary evidence from developing-economy EMR studies emphasizes the enabling role of computer literacy, training, and user-centred design, and the limiting role of time, cost and interoperability gaps (Derecho et al., 2024).

Diffusion of Innovations remains a useful theoretical lens for characterizing adoption heterogeneity (innovators → laggards) and assessing the attributes that shape uptake, relative advantage, compatibility, complexity, trialability and observability. Recent empirical applications in digital health reinforce that fit-to-task, perceived advantages, and manageable complexity drive provider adoption of portals and telemedicine, particularly when coupled with digital literacy interventions (Wurster et al., 2024; Rauner et al., 2025; Alotaibi et al., 2025). Accordingly, this study treats healthcare-worker digital capability and local facilitating conditions as critical moderators of e-Health uptake.

In Kenya, national initiatives including the Kenya Health Information System (KHIS/DHIS2), KenyaEMR, and the electronic Community Health Information System (eCHIS) are strengthening data use and continuity of care; policy convenings have articulated a Digital Health Superhighway with a standardized health information exchange (Griffin et al., 2025; Waiyaiya et al., 2024). These foundations underscore the importance of aligning facility- and community-level workflows to digital tools to translate

availability into routine utilization by clinicians and Community Health Promoters.

2.1.2 Perception and acceptability of e-Health Technologies among health workers

Recent evidence suggests health workers generally hold favourable views of digital health when tools are perceived as useful, easy to use, and supported by training and infrastructure. Unified acceptance models (UTAUT/UTAUT2/UTAUT3) consistently show that performance expectancy, effort expectancy, facilitating conditions, and digital literacy predict intention and actual use among clinicians, with social influence and workload pressures exerting context-specific effects (Admassu, 2024; Demsash et al., 2024; Hailu et al., 2025; Kumpulainen & Juntunen, 2025). Studies in Kenya similarly report positive attitudes toward telemedicine alongside pragmatic concerns about connectivity, medico-legal clarity, and reimbursement (Muriuki et al., 2023).

Telemedicine functions as a complementary mode of care across diagnosis, follow-up and prevention. In ophthalmology, tele-retinal screening programs improve screening completion and timely referrals for diabetic retinopathy, though image quality and workflow integration remain limiting factors (Chokshi et al., 2024; Ha et al., 2025). In chronic disease management, remote monitoring for heart failure is associated with reduced HF-related hospitalizations and, in some analyses, mortality (Scholte et al., 2023; De Lathauwer et al., 2024; Teleanu et al., 2025). For COPD, effectiveness varies by program design: some reviews show reduced exacerbation-related admissions or emergency visits, while others find neutral effects, highlighting the importance of patient selection, escalation protocols, and integration with usual care (Stergiopoulos et al., 2024; Hu et al., 2025; Hyldgaard et al., 2025).

Policy and organizational levers influence acceptability. Internationally, legal recognition, reimbursement pathways, clinical standards, and workforce development have accelerated routine adoption since COVID-19. Portugal, for example, has a national regulatory framework for telemedicine and a strategic plan that institutionalized telehealth within the National Health Service (Rocha, 2023; SPMS, 2019). Such levers, paired with local training and clear workflows, tend to increase provider willingness to use digital tools in everyday practice.

2.1.3 Level of healthcare facilities' preparedness towards utilization of e-Health Technologies among health workers:

Recent evidence from low and middle-income countries (LMICs) shows that facility preparedness for health information systems (HIS) and broader e-health hinges on dependable infrastructure (electricity, connectivity), available hardware and support, and the digital readiness of health workers. Systematic and umbrella reviews since 2020 identify recurrent barriers such as infrastructure reliability, software/hardware issues, workload and usability concerns and facilitators such as targeted training, perceived usefulness, and managerial support (Borges do Nascimento et al., 2023; Wang et al., 2024; Yew et al., 2025; Alotaibi et al., 2025).

Power and connectivity remain binding constraints for rural facilities. WHO's global tracking shows that a substantial share of facilities in sub-Saharan Africa still lack reliable electricity, which undermines routine digital operations and device maintenance; SDG7 tracking confirms persistent gaps in access and reliability (WHO, 2024; World Bank, 2024). In Kenya, national assessments and county initiatives increasingly pair digitalization with energy solutions (e.g., solar + battery) to stabilize services (Ministry of Health-Kenya, 2023).

Provider capability is central to preparedness. Reviews and multi-country studies report that clinicians' confidence and digital literacy, combined with visible workflow benefits, predict acceptance and sustained use of DHIS2, EHRs, and telemedicine; conversely, insufficient training and limited onsite support depress utilization (Longhini et al., 2022; Guadie et al., 2025; Alotaibi et al., 2025). Kenya-based studies similarly find generally positive attitudes toward ICT with pragmatic concerns around connectivity, medico-legal clarity and time burden (Tareh et al., 2023).

Mobile phone-based tools often bridge facility gaps. Community and primary-care programs across Sub-Saharan Africa use smartphones for data capture, reminders, and clinical communication; evidence indicates that feasibility is highest when applications are integrated with supervision, feedback loops and

referral workflows (Thomas et al., 2024; Kachimanga et al., 2024). However, mobile reliance is not a panacea: without data governance, reimbursement and integration with facility systems, benefits plateau and staff workload may rise (Yew et al., 2025; Wang et al., 2024).

Overall, facility preparedness is best understood as the alignment of infrastructure readiness, digital competencies, and organizational processes. Strengthening electricity and connectivity, provisioning durable devices and help-desk support, and delivering skills training tied to clear use-cases (registration, referral, reporting) are consistently associated with higher HIS/e-health uptake (Borges do Nascimento et al., 2023; Alotaibi et al., 2025).

2.2 Theoretical Review

2.2.1Diffusion of innovation theory

2.2.1.1 Diffusion of Innovation (DOI) Theory

This study is grounded in Rogers' Diffusion of Innovation (DOI) theory, a foundational lens for explaining how individuals and organizations adopt new ideas and technologies (Rogers, 2003). In health care and digital health, DOI remains widely used to conceptualize adoption dynamics across patient, provider and organization levels, including the roles of communication channels, time, and social systems (Greenhalgh et al., 2004; Wurster et al., 2024).

The DOI appreciates that adoption decisions are shaped by perceived attributes of an innovation this include relative advantage, compatibility, complexity, trialability, observability and proceed through the innovation-decision process (knowledge → persuasion → decision → implementation → confirmation) (Rogers, 2003). Recent applications in digital health report that perceived relative advantage and compatibility with workflow, as well as manageable complexity and opportunities for trialability, are associated with higher provider uptake (Wurster et al., 2024).

In this study, DOI's perceived attributes and innovation-decision stages provide the primary individual-level lens for explaining why health workers vary in their uptake of e-Health technologies, directly informing the study's objectives on the level of utilization and on perception and acceptability of e-Health technologies.

2.2.1.2 Non-adoption, Abandonment, Scale-up, Spread and Sustainability (NASSS) Framework

The NASSS framework extends DOI to explain why some health technologies are not adopted, are abandoned after early use, or fail to scale, spread, or become sustainable within health and care settings. It examines complexity across seven interacting domains: the condition or task the technology addresses, the technology itself, its value proposition, the adopter system (health workers, patients, and lay carers), the organization(s) involved, the wider institutional and policy system, and how these domains interact and adapt over time (Greenhalgh et al., 2017; Shin et al., 2025).

For this study, NASSS is used to explain facility- and system-level barriers that an individual-level theory such as DOI does not capture on its own — for example, why a health worker may be willing to adopt an e-Health technology yet a facility's organizational readiness or the wider infrastructure environment prevents sustained use. NASSS domains therefore inform the study's objective on the level of healthcare facility preparedness towards utilization of e-Health technologies.

2.2.1.3 Human, Organization, Technology-fit (HOT-fit) Model

The HOT-fit model evaluates health information systems along three interacting dimensions: the human dimension (system use and user satisfaction), the organization dimension (organizational structure and environment), and the technology dimension (system quality, information quality, and service quality) — which together determine the net benefits realized from a health information system (Zhai et al., 2022; Yusof et al., 2024).

HOT-fit is applied in this study as a structured lens for examining how human factors (health workers' perception and acceptability), organizational factors (facility preparedness), and technology factors interact to shape the utilization of e-Health technologies, rather than treating these three dimensions as independent, unrelated determinants.

2.2.1.4 Unified Theory of Acceptance and Use of Technology (UTAUT)

Contemporary acceptance models in the UTAUT family identify performance expectancy (perceived usefulness for job performance), effort expectancy (perceived ease of use), social influence (the effect of colleagues' and supervisors' expectations), and facilitating conditions (available organizational and technical infrastructure and support) as proximal predictors of behavioral intention and use, moderated by factors such as age, gender, experience, and voluntariness of use (Demsash et al., 2024; Hailu et al., 2025; Lee et al., 2025).

UTAUT constructs operationalize DOI's more abstract innovation attributes (relative advantage, complexity) into measurable, survey-ready items, and its moderators — age, gender, and experience — map onto demographic variables already collected in this study's questionnaire. UTAUT therefore informs how health workers' perception and acceptability of e-Health technologies is measured in this study.

Accordingly, this study adopts DOI as the underpinning theory to explain variation in health-worker uptake of e-health tools, while drawing on NASSS, HOT-fit and UTAUT constructs to specify context, organizational readiness and proximal acceptance mechanisms relevant to facilities in Kenya.

2.2.2 New Public Management Theory

New Public Management (NPM) emerged in Anglophone countries from the late 1970s as a reform doctrine emphasizing results, performance measurement, competition and customer-orientation in the public sector (Hood, 1991; Pollitt & Bouckaert, 2017). In NPM logic, information and communication technologies (ICT) support managerial control, transparency and efficiency by enabling standardized processes, performance data, and service channels oriented to users as 'customers'. Subsequent public administration paradigms have complemented or challenged NPM for example, New Public Governance (Osborne, 2006; Krogh, 2024) and digital-era governance and platform models that stress ecosystems and public value (Mergel, Edelmann, & Haug, 2019; Cordella & Paletti, 2019; OECD, 2020).

Across the last five years, digital government research has clarified how ICT restructures production of public services: moving from siloed, agency-specific systems to shared building blocks and "government-as-a-platform" capabilities (identity, payments, data exchange, analytics) that can improve effectiveness and user experience while reframing citizens beyond a narrow 'customer' role toward co-producers of public value (Cordella & Paletti, 2019; OECD, 2020; Yang et al., 2024). These developments align with NPM goals on efficiency and accountability but also extend them by emphasising collaboration, interoperability and trust.

Positioning ICT for e-health within an NPM-informed thesis therefore means: (i) clarifying the expected performance gains (access, timeliness, cost, quality) and how ICT will be measured; (ii) designing for user-centred service delivery and channel choice; and (iii) acknowledging governance trade-offs data protection, interoperability, procurement, and long-term capability highlighted in contemporary digital

government frameworks (Mergel et al., 2019; OECD, 2020; Desai & Nanduri, 2024).

2.2.3Critical Mass Theory

Another perspective used to explain the adoption of innovations has been the "critical mass theory", which looks at innovations that require collective action and collaboration among potential participants (Bouchard 1993). Bouchard (1993) states that an organization's decision to engage in a collective action will be dependent on its perceptions of what the group is doing, not on the characteristics of the innovation. She further argues that an organization's participation decision will depend on the number of the organizations that have already participated and/or soon plan to participate, who these participants are, and their level of contribution. Kuan and Chau (2001) refer to the same issue, arguing that an organization's decision to adopt technology is influenced by its business partners a Critical Mass Theory explains adoption in settings where outcomes depend on coordinated, collective participation. In such contexts, perceived uptake among peers and partners can matter as much as the technology's intrinsic attributes. Foundational work linked collective action and thresholds to tipping points (Bouchard, 1993), while contemporary studies in digital environments show how early seeding and visible participation accelerate diffusion (Spann et al., 2022; Iacopini et al., 2022).

A core mechanism is the generation of network externalities utility rises with the number and composition of adopters. Recent reviews distinguish same-side and cross-side effects and emphasise complementors and interoperability in platform settings (Jacobides et al., 2024; Schüler et al., 2023). In health and online-care contexts, network externalities and peer effects predict both initial and continuous use (Bailey et al., 2022; Zhang et al., 2024).

Perceived critical mass (PCM) the belief that "most others" will use a system has been operationalised in health IT acceptance models. Studies integrating PCM with UTAUT/TAM in mobile clinical communication and patient-facing apps show that PCM shapes usefulness and intention, and that social context moderates these pathways (Byrd et al., 2021; Yang et al., 2024).

Managerially, critical mass logic implies that organisations should (i) target influential early adopters and partner sites, (ii) design interoperability and incentives that raise cross-side value, and (iii) make usage visible (dashboards, peer benchmarks) to strengthen expectations of participation. For e-health in Kenya, this translates to coordinated roll-outs across facilities and community platforms, leveraging referral linkages and program champions to reach self-sustaining uptake.

2.2.4 E-Information Strategy

E-information in this thesis is aligned with contemporary digital-government usage. Following the United Nations' long-standing definition "a government that applies ICT to transform its internal and external relationships" the concept today is framed more broadly as digital government: the strategic use of data, platforms and technology to design and deliver public value (United Nations, 2003; United Nations, 2022/2024; OECD, 2020). Digital government is increasingly characterised by six capabilities digital by design, data-driven public sector, government as a platform, open by default, user-driven, and proactiveness that guide how ICT supports accessibility, effectiveness and accountability (OECD, 2020).

Rather than static, sequential "stages," recent practice emphasises maturity frameworks and shared building blocks. The UN E-Government Survey (2022; 2024) tracks countries' progress via the EGDI and e-participation indices, while the World Bank's GovTech Maturity Index updated in 2022 assesses core public platforms and cross-government capabilities. Together with the OECD Digital Government Index, these instruments reflect a shift from single-portal service delivery toward interoperable identity, payments, data exchange, and analytics platforms that enable multi-channel public services (United Nations, 2022/2024; World Bank, 2023; OECD, 2020/2023). Evidence syntheses show that well-implemented digital government can improve administrative efficiency, transparency, and accountability, and expand access to services; however, effects are contingent on governance, inclusion, and organisational capacity (Zou et al., 2023; Abdulnabi et al., 2024; OECD, 2020). Benefits commonly cited in earlier literature speed, reach, reduced transaction costs, and 24/7 availability are now framed within

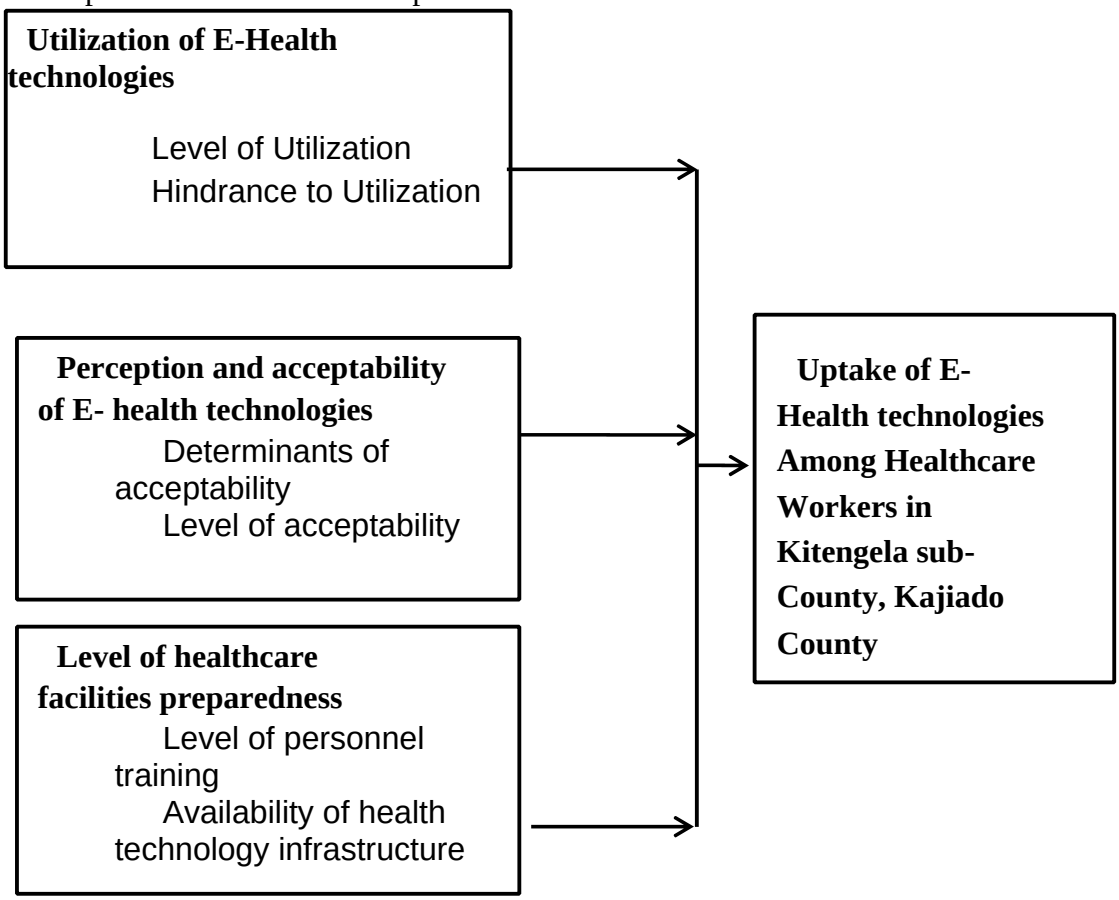
platform-based service models and public-value outcomes (OECD, 2020; United Nations, 2022/2024).

Critical reflections remain central for LMIC settings. The well-known "design–reality gap" continues to explain project risks when proposed systems mismatch institutional, informational and infrastructural realities (Heeks, 2003). More recent analyses emphasise digital inequality and the need to leave no one behind in digital service delivery, highlighting skills, affordability and accessibility constraints (Heeks, 2022; United Nations, 2022).

Implication for this study: positioning e-health within an e-information strategy means aligning with digital-government capabilities (platform building blocks, data governance, user-centred design) and with inclusion safeguards (connectivity, literacy, accessibility). Evaluation should therefore consider not only adoption and cost/time savings but also equity, transparency, and accountability metrics in line with UN/OECD/World Bank frameworks.

2.3 Conceptual Framework

The conceptual framework illustrates the relationship between two independent variables and one dependent variable. The dependent variable is the level of utilization of e-Health technologies among



health workers, which in this study is treated as the behavioral measure of e-Health uptake. The two independent variables are health workers' perception and acceptability of e-Health technologies, and the level of healthcare facility preparedness towards utilization of e-Health technologies; both are hypothesized to influence the extent to which health workers utilize e-Health technologies in enhancing access to healthcare. Together, these relationships aim to explain variation in service delivery through the utilization of technology in health service delivery.

Independent Variables **Dependent Variable**

Figure 2.1: Conceptual Framework: Source, Author (2025)

It is acknowledged that perception and acceptability, and facility preparedness are not the only factors that can influence the utilization of e-Health technologies. The literature reviewed in this chapter points to other potential influences that fall outside the scope of this study\u2019s two independent variables, including the wider policy and regulatory environment, funding and procurement arrangements, and patient-side factors such as digital literacy and access to devices (Section 2.1; Section 2.2.4). These factors are not measured in this study but are noted here as a boundary of the conceptual framework and

a direction for future research.

2.4 Chapter Summary

This chapter covered theoretical review, empirical literature review, summary of gaps and a conceptual framework. Differences in culture, health systems, and perceptions of the application of technology in health service delivery were reviewed. The social status and existing rates of training on e-Health could affect the feasibility and effectiveness of uptake of e-Health. There are no sufficient studies on the application of health technology to manage life among people attending comprehensive care clinics in most regions of Kenya. This study, therefore, aims to address this gap by attempting to explore the application of e-Health technology in the management of e-Health services.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This chapter describes the research methodology and the instruments used to conduct the study. It elaborates details related to the location of the study, study population, the study design, dependent and independent variables, sample size, sampling technique and construction and research instruments, pre-testing, data collection techniques, data analysis, and logistical and ethical considerations.

3.2 Study area

The study was carried out in Kitengela Sub-County, Kajiado County. Kitengela is a town in Kajiado County, 30 km south of Nairobi and is part of the Nairobi Metropolitan area. Kitengela borders Athi River town in Machakos County and is located in Kajiado County.

Kitengela falls under Kajiado East sub-County, which has 89 registered health facilities, including 2 public health facilities operated by the Ministry of Health, three by NGOs, four faith-based, and 82 privately owned. The Kitengela Sub-County Hospital, a Level four facility, serves as the primary government public hospital in the area and has recently (2020-2021) undergone infrastructure and service upgrades, including the establishment of a surgical theatre, laboratory, radiology unit, and emergency care services, largely supported by the Korean International Cooperation Agency (KOICA) program. The second facility included in this study, the Kitengela GK Prison Dispensary, is a level two healthcare facility that did not benefit from the KOICA-supported infrastructure upgrades.

3.3 Study Population

Kajiado East Sub-County, which contains Kitengela Ward, which has 89 registered health facilities, including 2 public health facilities operated by the Ministry of Health, three by NGOs, four faith-based, and 82 privately owned.
Ministry of Health data reported by KIPPRA. It gives Kajiado County a **total health workforce of approximately 2,672 in 2019/20**, of whom **1,044 were technical human resources for health**.

The study was conducted at two health facilities in Kitengela: Kitengela Sub-County Hospital and Kitengela GK Prison Dispensary. The study population consisted of all healthcare workers across these

two facilities, drawn from various departments including Nurses, Pharmacists, Clinical Officers, Laboratory Technicians/Assistants, Dietitians, Physiotherapists, HTS Providers, and Public Health Officers, as detailed by facility in Table 3.1 below. Table 3.1: Study Population

Role (Designation)	Kitengela Sub-County Hospital	Kitengela Completes	GK Dispensary Hospital	GK Completes	Total headcount	Total completes	% of N
Nurse	54	44	21	17	75	61	**81.3%**
Lab technician	28	23	2	1	30	24	**80.0%**
HTS provider	24	20	5	4	29	24	**82.8%**
Clinical Officer	15	12	6	5	21	17	**81.0%**
Physiotherapist	8	6	1	1	9	7	**77.8%**
Dietician	9	7	0	0	9	7	**77.8%**
Pharmacist	7	6	1	1	8	7	**87.5%**
Public health	2	2	1	1	3	3	**100%**
Totals	**147**	**120**	**37**	**30**	**184**	**150**	81.5%

Table 3.1 shows the study population by professional role and by facility. For each of the two facilities, the "headcount" columns report the total number of healthcare workers in that role and facility (the study population, N = 184), and the "Completes" columns report the number of respondents in that role and facility who returned a fully completed questionnaire (the achieved sample, n = 150). The final two columns aggregate these across both facilities as "Total headcount" and "Total completes," and the last column expresses the completion rate as a percentage of the role's total headcount. For example, of the 75 nurses across both facilities (54 at Kitengela Sub-County Hospital and 21 at the GK Prison Dispensary), 61 returned completed questionnaires, an 81.3% completion rate for that role.

3.4 Study design

The study adopted a descriptive cross-sectional design with both qualitative and quantitative components aimed at collecting information from the study participants who are healthcare workers from facilities in Kitengela Sub-County.

The study adopted a descriptive cross-sectional design employing a convergent mixed-methods approach, in which quantitative and qualitative data were collected concurrently and then merged at the interpretation stage to provide a more complete understanding of e-Health technology uptake than either strand alone. Quantitative data, gathered through structured questionnaires, addressed the extent

and pattern of utilization, perception, and facility preparedness across the full study population. Qualitative data, gathered through key informant interviews with facility leadership, provided contextual depth on why these patterns exist and complemented and helped explain the quantitative findings. The two strands were combined at the discussion and interpretation stage in Chapters Four and Five, rather than analyzed as two separate, disconnected studies.

Table 3.0 below maps each research objective to the type of data used to answer it.

Objective	Data type	Instrument and example
1. Level of utilization of e-Health technologies	Quantitative	Structured questionnaire (Appendix II) — e.g., closed-ended items on frequency of use of specific e-Health tools
2. Perception and acceptability of e-Health technologies	Quantitative + Qualitative	Questionnaire Likert-scale items (Appendix II) for level of acceptability; FGD guide (Appendix III) and KII with facility leadership for perspectives on why acceptability varies
3. Level of healthcare facility preparedness towards utilization	Quantitative + Qualitative	Questionnaire items on infrastructure and training (Appendix II); key informant interviews with the medical superintendent, Nurse In-charge, and public health officer in charge on facility-level readiness

3.5 Sample size calculation

In this study, rather than calculating a sample size based on survey formulas, we included *all* healthcare workers in the healthcare facilities within Kitengela Sub-County. Since the total population of healthcare workers in these facilities is manageable (N = 184), we opted for a census approach, ensuring comprehensive data collection without the need for sampling or size estimation adjustments.

3.6 Sampling Technique

The study adopted purposive sampling to select 2 facilities within Kitengela Sub-County. This method was used to select health facilities around the study area. The researcher also adopted a census method to select all the target individuals in the health facilities until the desired sample size was met.

The sample size was based on all three objectives of the study.

i. Assess the level of utilization of e-Health technologies among health workers in enhancing access to healthcare in Kitengela Sub-County, Kajiado County

ii. Establish the perception and acceptability of e-Health technologies among health workers in enhancing access to healthcare in Kitengela Sub-County, Kajiado County

iii. Examine the level of healthcare facilities preparedness towards utilization of e-Health technologies among health workers in enhancing access to healthcare in Kitengela sub-County, Kajiado County

The size of the sample was therefore influencing two statistical properties: 1) the precision of our

estimates and 2) the power of the study to draw conclusions

3.7 Data Collection Procedures and Instruments

Three instruments were used to collect data for the three study objectives. Quantitative data were collected using a structured, self-administered questionnaire with both open- and closed-ended items (Appendix II), addressing utilization, perception and acceptability, and facility preparedness. Qualitative data were collected through two complementary methods: four Focus Group Discussions (FGDs) and Key Informant Interviews (KIIs) with facility leadership — the medical superintendent, Nurse In-charge, and public health officer in charge at each facility — both guided by the same interview guide (Appendix III), adapted for the one-on-one KII format. The four FGDs were conducted two at Kitengela Sub-County Hospital and two at Kitengela GK Prison Dispensary. The construction of all instruments was based on the study objectives, literature review, and study variables. Findings from the FGDs and KIIs were used to complement and contextualize the quantitative findings from the questionnaires. Before each questionnaire was administered and before each FGD or KII began, participants were given an introduction letter (Appendix I) explaining the purpose, procedures, and voluntary nature of the study; consenting to participate was treated as informed consent, consistent with the voluntary-participation principle described in Section 3.11. Each FGD was audio-recorded with participants' consent and later transcribed verbatim for content analysis. The KIIs were likewise audio-recorded with participants' consent and conducted at each facility. The four FGDs were conducted over a period of more than a week to accommodate participant availability and facility operating schedules. Questionnaires were physically distributed to healthcare workers at each facility and collected later using a drop-and-pick method (Section 1.6), to accommodate respondents' daily operational duties.

Quantitative approaches through structured questionnaires were used to collect data on level of utilization of e-Health technologies among health workers in enhancing access to healthcare, knowledge perception, and acceptability of e-Health technologies among health workers in enhancing access to healthcare and the level of healthcare facilities preparedness towards utilization of e-Health technologies among health workers in enhancing access to healthcare.

A structured self-administered anonymous questionnaire was designed to assess healthcare worker (HCW) demographic characteristics, attitudes, perceptions, and knowledge level regarding uptake of e-Health technologies.

Qualitative Content analysis was used to evaluate patterns within the piece of content (for example, words or phrases) across multiple pieces of content or sources of communication from the questionnaire, especially on the Focus Group Discussions. I was keen for instance to identify the frequency with which an idea is shared or spoken about like the number of times e-Health technologies use is mentioned by participants. Furthermore, I could identify patterns of deeper underlying interpretations – for instance, by identifying phrases or words that highlight the use of E-Health technologies in a Health Facility in Kitengela.

3.8 Pilot study

The research instruments were pretested at Namanga Health Centre in Kajiado Central sub-County to test for clarity, validity, and reliability of the questions after which the tools were revised accordingly and finalized for use

3.9 Validity and reliability

3.9.1 Validity

The validity and reliability of the instruments of the study was established through the pilot study. Validity is the degree to which the research instrument measures what they are designed to indicate (Brannen, 2017). The validity of the instruments was established by engaging the supervisor in the

review of the contents.

3.9.2 Reliability

Reliability is used to determine the consistency of the measures used in the instruments of the study. The study adopted an internal measure of reliability called the Cronbach Alpha in establishing the reliability of the instruments. The piloted instruments were coded into Statistical Package for Social Sciences (SPSS) and the Cronbach Alpha coefficient values were computed. According to Quinlan, Babin, Carr, and Griffin (2019), values of Cronbach Alpha above 0.7 show that the instruments are reliable.

3.10 Data analysis

A Data Management Plan (DMP) was developed. It describes how data that was acquired or produced during research; in this case how the data was managed, described, and stored, what standards were used, and how data was handled and protected during and after the completion of the project. (Chatfield, et al, 2011)

Data analysis is the process of generating the findings from the collected data. Data analysis helps in drawing inferences and making appropriate deductions (Hair et.al 2015). Descriptive statistics were used to analyze quantitative data. After collection, data were edited, coded, and analyzed using a statistical package for social science version 23. The quantitative data collected were described using tables, charts, and graphs. The findings were presented using frequency distribution tables as well as pie charts and graphs. The collected data was entered into SPSS, and the analysis was done with the aid of descriptive and inferential statistics. The descriptive statistics included the use of means and standard deviations. With content analysis, large amounts of text were grouped into categorizes, summarised into codes, and tabulated the data to calculate the frequency of certain concepts or variables

The inferential analysis used regression analysis as modeled below;

$$Y = \beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \varepsilon$$

Where, Y = Uptake of e-Health technology in health service delivery

X1 = Utilization of E-Health Technologies

X2=Perception and Acceptability of E-Health Technologies,

X3 = Level of Healthcare facilities preparedness

$\beta 0$= Constant Term.

$\beta 1$, $\beta 2$, $\beta 3$ and $\beta 4$ = Beta coefficients; ε = Error Term.

Data analysis was performed in two main steps. In the first step, univariate analysis with descriptive statistics was followed by a bivariate analysis conducted using Spearman's correlation, chi-square test analysis of variance, and median test to estimate the associations between the dependent variable, namely Willingness to Respond WTR (defined as the mean score of the two items used to measure this element), and the other survey variables.

In the second step, two multivariate regression models (multivariate linear regression and multivariate quantile regression) were developed in order to identify associations between explanatory variables and WTR: gender, age, professional role, marital status, collected 'knowledge' score (number of correct answers), efficacy' measure, and four potential barriers and facilitators for WTR.

Linear regression modelling relies on finding a best-fitting regression line that minimizes the sum of squared errors of prediction. This simple and traditional model, which uses the mean values of data to calculate the regression line and is therefore sensitive to outliers, may not be an ideal method for

capturing a central tendency of the data. Quantile regression, on the other hand, is a non-parametric method that consists of finding a regression line by minimising the sum of the absolute residuals using the median rather than the mean value of the data across various quantiles of the dependent variable. Thus, not only may quantile regression is expected to reflect the data in a more precise manner, but it also illuminates associations between variables at different levels of the dependent variable and offers additional insights about the nature of these relationships.

Data was analyzed using IBM Statistical Package for the Social Sciences (version 23.0; IBM Corp, Armonk, NY) and STATA software (version 12.1; Stata Corp, College Station, TX).

The organization, storage, preservation, and sharing of data collected and used in this research project involved the everyday management of research data during the lifetime of the research project. There was the use of consistent file naming conventions, and data is preserved on hard disks and only used for the study. Audio recordings from the four FGDs and the KIIs were transcribed verbatim and the transcripts were stored electronically alongside the coded quantitative dataset, following the same file-naming and storage conventions.

3.11 Ethical Consideration

The term ethics can be described as the prescribed code of conduct that guides behavior (Jackson, 2015). The researcher ensured that approval of the study was obtained from Moi University Graduate School. Ethical clearance to conduct the research was obtained from Moi University Institutional Research and Ethics Committee (IREC). The permit to carry out the research was obtained from the National Council for Science and Technology (NACOSTI) and the Ministry of Health, Kajiado County. The researcher ensured that the principle of voluntary participation which requires that people are not coerced into participating in research is followed. The Informed consent was obtained from the study participants before the study commenced, and further the informed consent of the participants was also ensured by explaining the aim of the study and the procedures involved. The researcher guaranteed the participants of confidentiality. They were assured that the information provided will be used only for academic purposes. Further, the principle of anonymity was also adhered to. The participant remained anonymous throughout the study.

3.12 Chapter Summary

This chapter described the methodology used to address the study's three objectives. It presented the study area and population, drawn from two healthcare facilities in Kitengela — Kitengela Sub-County Hospital and Kitengela GK Prison Dispensary — and explained the study design as a mixed-methods approach combining quantitative and qualitative data. It described the census approach used to include all 184 healthcare workers across the two facilities, alongside purposive sampling of the two facilities themselves, and the key informant interviews used to gather complementary qualitative data. The chapter also outlined the pilot study, the validity and reliability procedures, the data analysis approach, and the ethical considerations that guided the research. Chapter Four presents the results obtained through this methodology.

CHAPTER FOUR: RESULTS

4.1 Introduction

This chapter presents the main results obtained from analyzing the data collected. Findings are presented using a combination of tables, figures, and narrative description of descriptive and inferential statistics, alongside qualitative findings from the Focus Group Discussions and Key Informant Interviews. The chapter opens with respondents' participation and demographic profile (Sections 4.2 and 4.3), before presenting the results by study objective: the level of utilization of e-Health technologies (Section 4.4.1), perception and acceptability of e-Health technologies (Section 4.4.2), and the level of healthcare facility preparedness towards utilization of e-Health technologies (Section 4.4.3). 4.2 General information about

respondent's participation

The study was conducted at two health facilities: Kitengela sub-County Hospital and Kitengela GK Prison Dispensary. From a target population of 184 healthcare workers, a total of 184 questionnaires were distributed, 147 at Kitengela sub-County Hospital and 37 at the GK Dispensary. Of these, 150 were returned fully completed, representing an overall response rate of 81.5%. The facility-specific response rates were 81.6% for Kitengela sub-County Hospital (120 out of 147) and 81.1% for Kitengela GK Dispensary (30 out of 37).

Table 4.1 General information about respondents' participation

Sector	**Target population**	**Questionnaires distributed**	**Responses**	**Response rate**
Kitengela sub-County Hospital	147	147	120	81.60%
Kitengela GK Dispensary	37	37	30	81.10%
Total	**184**	**184**	**150**	**81.50%**

Source: (Kitengela sub-County, 2025)

There was 82% response rate in this study, which is attributed to the consistent follow up by the research team who were on standby to provide explanation and answer any questions from the respondents. The fact that permission was sought from immediate superiors, some of whom participated in the research and requested their juniors to participate is also a factor in this response rate. This response rate therefore means that the study is valid. According to the study population, there was a response rate of 81 % since data was successfully collected and coded from 150 respondents from the 184 respondents who were given the questionnaires. This gives a sufficient sample size considering the total number of staff who utilize the E-Health technology at Kitengela sub-County Hospital and Kitengela GK prison dispensary as recommended by Anderson, Sweeney and Williams (2003), who opine that a relatively large response rate gives better precision and provides a smaller margin of error.

4.3 Profile of Respondents

The study collected the demographic profile of the respondents, including position, education, and organizational role, level of adoption of eHealth technology, utilization of different eHealth technologies, perception and acceptability of eHealth technology; and level of health facility preparedness in the implementation of eHealth technology. The profile of respondents was important towards understanding the suitability of the respondents considering their experiences and interaction with eHealth technology in health service delivery. The results are presented in this section.
Gender, age, and years of experience are reported alongside the study's three main variables because the Unified Theory of Acceptance and Use of Technology (UTAUT), which underpins this study's acceptance-related constructs (Section 2.2.1.4), identifies these three as moderating variables that shape the strength of the relationship between perceived attributes of a technology and its acceptance and use (Demsash et al., 2024; Hailu et al., 2025; Lee et al., 2025). They are therefore examined here as moderators of perception, acceptability, and utilization, rather than as a fourth independent variable longside

utilization, perception and acceptability, and facility preparedness.

Table 4.2: a and b Professional and Organizational Profile of Participants (N = 150)

Role (Designation)	Kitengela Sub-County Hospital	Kitengela Completes	GK Dispensary Hospital	GK Completes	Total headcount	Total completes	% of N
Nurse	54	44	21	17	75	61	**81.3%**
Lab technician	28	23	2	1	30	24	**80.0%**
HTS provider	24	20	5	4	29	24	**82.8%**
Clinical Officer	15	12	6	5	21	17	**81.0%**
Physiotherapist	8	6	1	1	9	7	**77.8%**
Dietician	9	7	0	0	9	7	**77.8%**
Pharmacist	7	6	1	1	8	7	**87.5%**
Public health	2	2	1	1	3	3	**100%**
Totals	**147**	**120**	**37**	**30**	**184**	**150**	**81.5%**

Characteristic	Category	Frequency (n)	Percentage (%)
Professional cadre	Nurse	56	37.3
	Laboratory Technician	23	15.3
	Clinical Officer	16	10.7
	HTS Provider	11	7.3
	Dietician	7	4.7
	Physiotherapist	7	4.7
	Pharmacist	6	4.0
	Public Health Officer	1	0.7
	Not specified (n/a)	22	14.7
	Subtotal	150	100.0
Educational qualification	Diploma	94	62.7
	Postgraduate	4	2.7
	Other qualifications (Certificates degree and secondary degrees)	52	34.7
	Subtotal	150	100.0
Organizational responsibility	Non-supervisory staff	140	93.3
	Supervisory/management	10	6.7
	Subtotal	150	100.0
Work experience	1-3 years	30	20.0

Characteristic	Category	Frequency (n)	Percentage (%)
	4-6 years	68	45.3
	7-9 years	46	30.7
	10 years and above	5	3.3
	Missing/not stated	1	0.7
	Total	150	100.0

Source: Study data (2025); frequencies from SPSS outputs and cross-tabulations in Study.

Table 4.2 summarizes the professional and organizational profile of the 150 respondents. Nurses constituted the largest professional cadre at 37.3% (n = 56), followed by laboratory technicians at 15.3% (n = 23) and clinical officers at 10.7% (n = 16). HTS providers accounted for 7.3% (n = 11), while dieticians and physiotherapists each represented 4.7% (n = 7), pharmacists 4.0% (n = 6), and public health officers 0.7% (n = 1). Professional designation was not specified for 14.7% (n = 22) of respondents. Regarding educational qualification, diploma holders formed the majority at 62.7% (n = 94), while postgraduate-qualified respondents accounted for 2.7% (n = 4); the remaining 34.7% (n = 52) had other qualifications. Most respondents, 93.3% (n = 140), held non-supervisory positions, while 6.7% (n = 10) had supervisory or management responsibilities. With respect to work experience, 45.3% (n = 68) had worked for 4-6 years, 30.7% (n = 46) for 7-9 years, 20.0% (n = 30) for 1-3 years, and 3.3% (n = 5) for 10 years or more; one respondent (0.7%) had no experience category recorded. These characteristics indicate that the study included healthcare workers with varied professional backgrounds, organizational responsibilities, and levels of experience relevant to the uptake and use of e-Health technologies.

Table 4.3: Distribution of Respondents by Age

Respondents Age	Frequency	Percent	Valid percent	Cumulative percent
18-29	21	14.1	14.1	14.1
30-40	69	46.3	46.3	60.4
41-45	47	30.9	30.9	91.3
41-50	1	.7	.7	91.9
46-50	7	4.7	4.7	96.6
50 and above	5	3.4	3.4	100.0
Total	**150**	**100.0**	**100.0**	

From these findings, the majority of the respondents were between the ages of 30-40 years 69 (46.3%). Those between 41-45 were also significant in number at 47 (30.9%). The majority of the respondents were

male 76 (50.7%) where female respondents were 74 (49.3%).

Table 4.4 Distribution of cases by gender

		Frequency	Percent	Valid percent	Cumulative percent
Valid	F	74	49.3	49.3	49.3
	M	76	50.7	50.7	100.0
	Total	150	100.0	100.0	

4.4 Descriptive statistics of the study variables

Descriptive statistics of standard deviation, standard errors and means were obtained for the variable's utilization of eHealth technologies, perception and acceptability of eHealth technologies and level of health facility preparedness on uptake of eHealth technologies in Kitengela Sub-County Hospital. The results are presented in this section.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Adoption of eHealth Technology	150	1	3	1.03	.231
Utilization of eHealth Technology: m-Health	150	1	4	3.64	.680
Adequate Access: eHealth	150	1	5	2.88	.568
Health facility preparedness m-Health	150	1	5	3.07	.613
Valid N (listwise)	150				

4.4.1 Extent of utilization of eHealth technologies among healthcare workers

The results are summarized in Figure 4.1. Adequate provision of tools for utilization of eHealth technologies was reported by 38% of respondents overall. By cadre, this was highest among nurses at 37%, followed by clinical officers at 10.7%, and lowest among public health officers at 0.7%. Respondents who declined to answer this question were similarly few, shown in the bar chart as "n/a". Utilisation of e-Health based on provision of tools was also more supported by those with a diploma highest regarding use of social media at 94 (62.6%), and lowest among postgraduates with regard to same aspect at 4 (2.7%). Generally, utilization of e-Health technology was more supported for social media as compared to health

informatics, telemedicine, and m-Health. It was therefore concluded that the majority of the respondents had not fully embraced utilization of eHealth technologies in health service delivery; hence their responses on the implementation, utilisation, motivating strategies, benefits and impact on service delivery is from a familiar perspective.

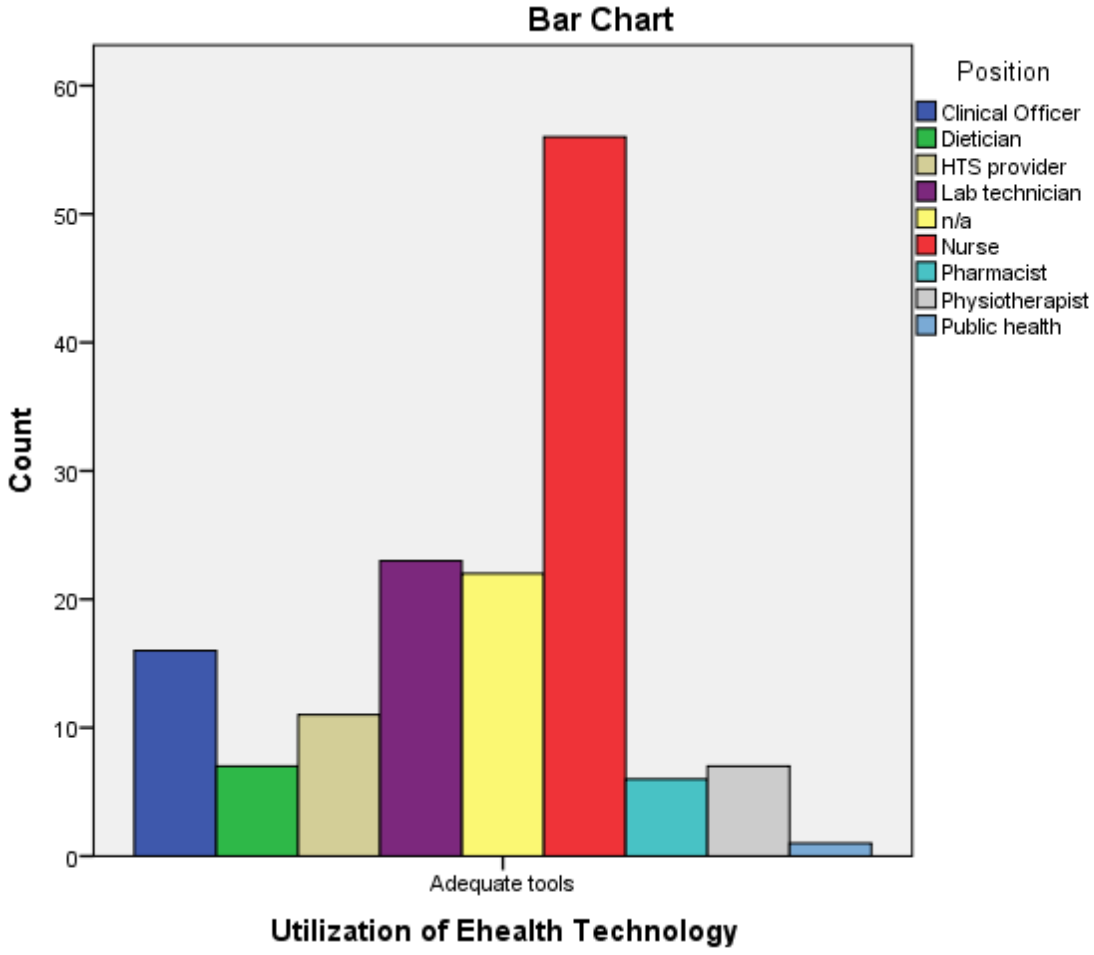


Figure 4.1: Utilization of eHealth Technologies-Adequate Tools-Position

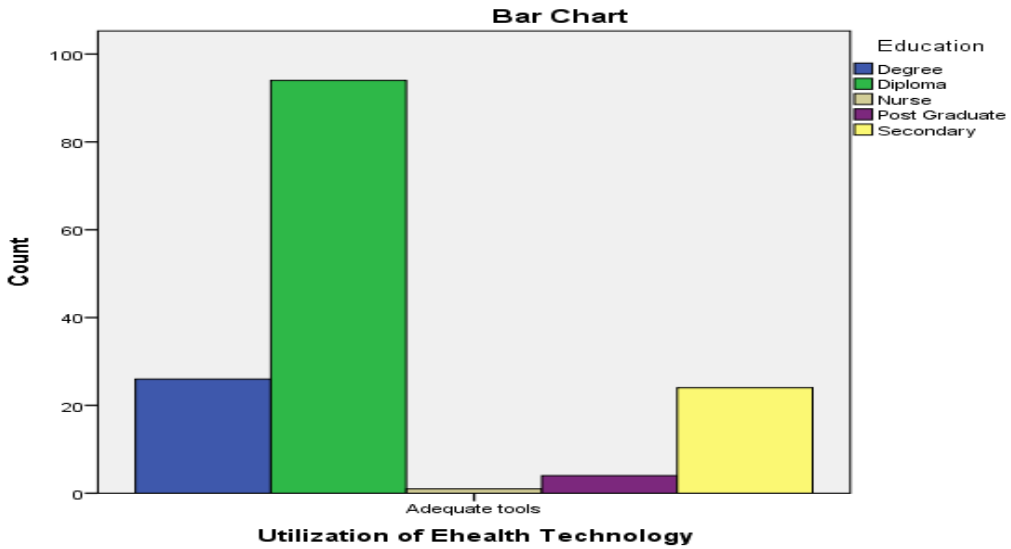


Figure 4.2: Utilization of eHealth Technologies-Adequate Tools-Education

In terms of performance of the various technologies, m-Health was more supported and adopted by majority of nurses as compared to other cadres. Fig 4.3 illustrates performance of different cadres with regard to performance of m-Health technologies, using the same 5-point rating scale as item 8 (Appendix II): 1 = Strongly Disagree, 2 = Disagree, 3 = Neither Disagree nor Agree, 4 = Agree, 5 = Strongly Agree. No respondent selected 5 (Strongly Agree) for this item, which is why the chart's x-axis stops at 4.

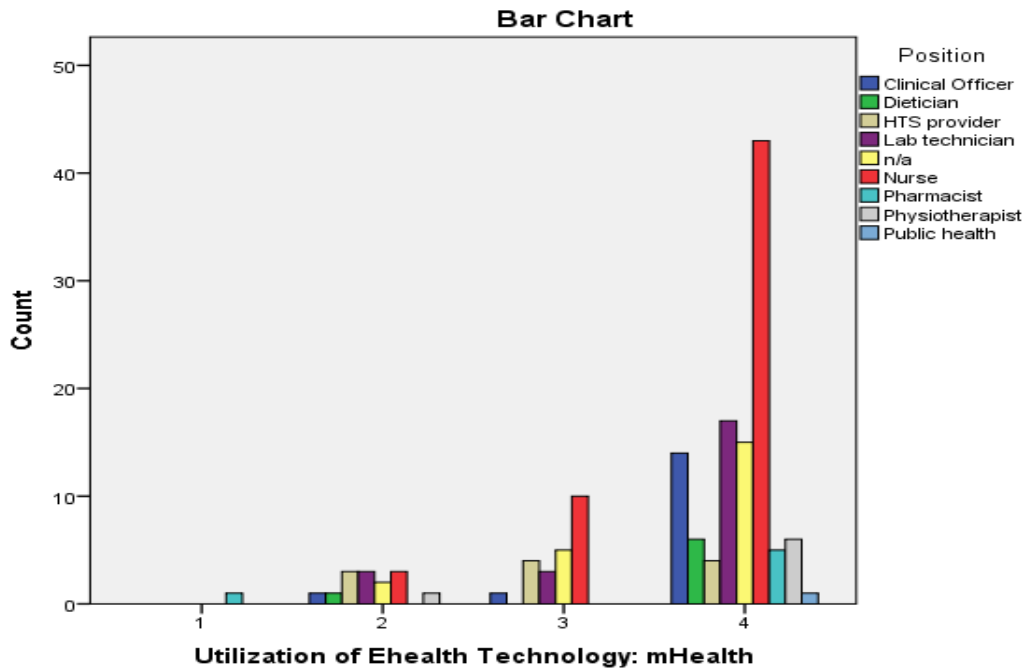


Figure 4.3: Utilization of eHealth Technologies-m-Health-Position

As to how else they think utilisation can be hindered, the respondents said there was inadequate training offered to the staff. They also suggested regularised training for all staff involved in the day-to-day management of patients' details across all cadres.

4.4.1 Extent of perception and acceptability on e-Health technologies among healthcare workers

As per the second objective of this study, perception and acceptability of eHealth technologies among healthcare workers were determined and the results are depicted below. The study sought to understand the extent of perception and acceptability of e-Health technologies among healthcare workers through understanding if perception and acceptability would affect uptake of e-Health technologies in health service delivery. Respondents were asked to respond through 5-point Likert scale on their uptake of e-Health technologies in health service delivery across various e-Health technologies: m-Health, telemedicine, social media platforms, and health informatics. The respondents agreed that perception and acceptability affect uptake of e-Health technologies in health service delivery: 137 (91.3%).

In terms of gender response with regard to perception and acceptability (health informatics), the majority of the respondents, 102 (68%), strongly agreed that perception and acceptability affect uptake of e-Health technologies among healthcare workers. The response was positively skewed toward women, as women 54(52.9%) than men 48(47.1%) said perception regarding health informatics affects uptake of e-Health

technologies.

Table 4.5: Gender * Effects of Perception and Acceptability on Health Informatics

Gender * Effects of Perception and Acceptability on Health Informatics						
Count						
		Effects of Perception and Acceptability on Health Informatics				Total
		Disagree	Neither disagree nor agree	Agree	Strongly agree	
Gender	F	7	3	11	54	75
	M	9	3	15	48	75
Total		16	6	26	102	150

In terms of age response with regard to perception and acceptability (social media platform), the majority of the respondents, 102(68%), strongly agreed that perception and acceptability affect uptake of e-Health technologies among healthcare workers. The response was high among those between the ages of 30-40 which had 50(49%) of the respondents said perception regarding social media platform affects uptake of e-Health technologies.

Table 4.6: Perception and acceptability, gender * effects of culture on social media in relation to age

Count						
		Effects of Perception and Acceptability on Social Media				Total
		Disagree	Neither Agree nor Disagree	Agree	Strongly agree	
Age	18-29	4	2	5	10	21
	30-40	4	2	13	50	69
	41-45	5	1	7	33	46
	41-50	0	1	0	0	1
	46-50	2	0	1	4	7
	50 and above	1	0	0	5	6
Total		16	6	26	102	150

In terms of age response with regard to perception and acceptability (Telemedicine), the majority of the respondents between the ages of 30-40 strongly agreed that perception and acceptability affect uptake of telemedicine as one of the e-Health technologies among healthcare workers. The response was the lowest

among those of ages 41-50 years who to some extents were of a contrary opinion. (include percentages and numbers)

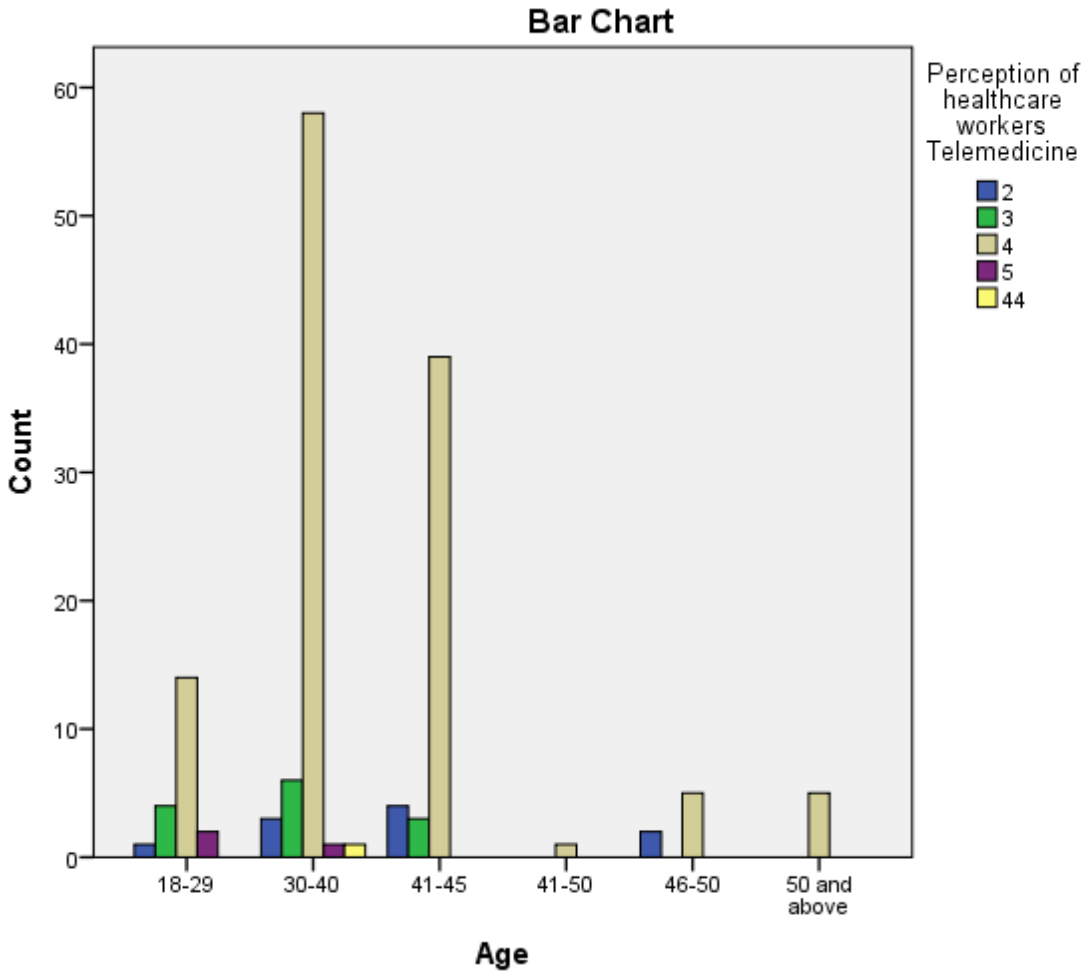


Figure 4.4: Perception and Acceptability-Telemedicine-Age

Figure 4.4 uses the same 5-point rating scale as item 8 (Appendix II): 1 = Strongly Disagree, 2 = Disagree, 3 = Neither Disagree nor Agree, 4 = Agree, 5 = Strongly Agree.

In terms of work experience regarding perception and acceptability (Telemedicine), majority of respondents with 4-6 years' experience agreed that perception and acceptability affect uptake of telemedicine as one of the e-Health technologies among healthcare workers. The response was the lowest

among those with 10 years of experience and over who majority of them disagreed that perception and acceptability affects uptake of e-Health technologies in health service delivery.

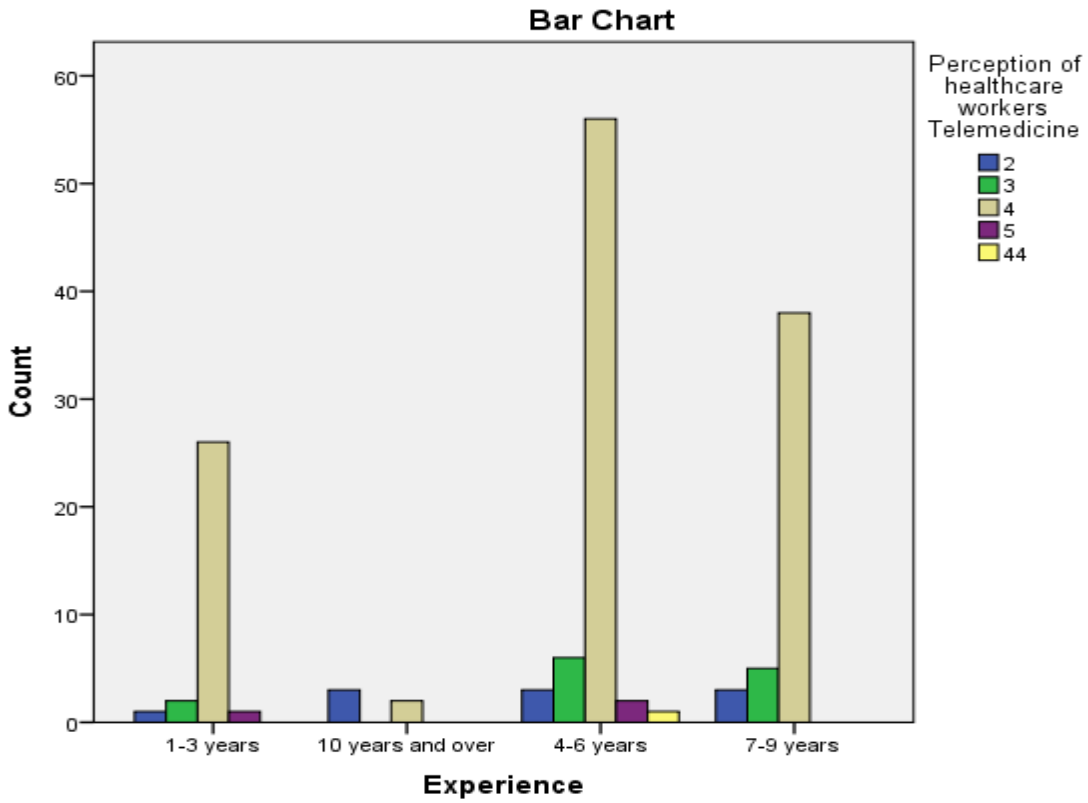


Figure 4.5: Whether Perception and acceptability use of using telemedicine, experience Figures 4.5 uses the same 5-point rating scale as item 8 (Appendix II): 1 = Strongly Disagree, 2 = Disagree, 3 = Neither Disagree nor Agree, 4 = Agree, 5 = Strongly Agree.

On other ways through which perception and acceptability affect uptake of e-Health technologies, the majority believed there was some level of opaqueness in the implementation of these technologies in the health facilities. In fact, the majority suggested that there is a need for openness and continuous training for all health staff.

4.4.3 Extent to which level of healthcare facilities preparedness affects uptake of e-Health technologies among healthcare workers

Considering the third objective of the study, the level of healthcare facilities preparedness affects uptake of e-Health technologies among healthcare workers was studied. Respondents were asked to indicate their level of healthcare facility preparedness and their effects on various e-Health technologies. The data collected were analysed, and the results show that, regarding whether health facility preparedness affects uptake of e-Health technologies, the majority at 147 (98%) affirmed that health facility preparedness was

key to the implementation of e-Health technologies in health service delivery.

Table 4.6a: Whether Health Facility Preparedness Affects Uptake of e-Health Technologies

Response	Frequency	Percent
Disagree	17	11.3%
Neither Agree nor Disagree	6	4.0%
Agree	26	17.3%
Strongly Agree	101	67.3%
Total	150	100.0%

On analysis of the effect of health facility preparedness towards implementation of e-Health technology, the results are as indicated below in Table 4.7.

Concerning work experience, the majority of workers with experience of 4-6 years, 50 (33.3%), strongly agreed that health facility preparedness affects uptake and utilization of e-Health technologies; this was followed by those who had worked for between 7-9 years who had 30(20%) strongly agreeing that health facility preparedness affects uptake and utilization of e-Health technologies in health service delivery.

Nurses rated highest on the effect of health facility preparedness on utilization of health service delivery, 56 (37.3). Results are in Table 4.7

Table 4.7: Health facility preparedness effects on utilization of e-Health technologiesCount

Experience			Position/Designation									Total
			Clinical Officer	Dietician	HTS provider	Lab technician	n/a	Nurse	Pharmacist	Physiotherapist	Public health	
1-3 years	Effects of health facility preparednesson utilization	Disagree	0	0	0	1	1	1	0	0		3
		Neither Disagree nor Agree	1	0	0	0	0	1	0	0		2
		Agree	0	0	2	1	1	0	1	0		5
		Strongly Agree	2	2	2	2	0	7	3	2		20
	Total		3	2	4	4	2	9	4	2		30
10 years an	Effects of	Disagree				0	1	1				2

Table 4.7: Health facility preparedness effects on utilization of e-Health technologiesCount

Experience			Position/Designation									Total
			Clinical Officer	Dietician	HTS provider	Lab technician	n/a	Nurse	Pharmacist	Physiotherapist	Public health	
dover	health facility prepardness on utilization	Neither Disagree nor Agree				1	1	0				2
		Agree				0	1	0				1
	Total					1	3	1				5
4-6 years	Effects of health facility prepardness on utilisation	Disagree	0	0	1	0	0	2	0	1		4
		Neither Disagree nor Agree	0	0	1	1	0	1	0	0		3
		Agree	2	2	1	1	0	5	0	0		11
		Strongly Agree	9	2	0	8	3	24	2	2		**50**

Table 4.7: Health facility preparedness effects on utilization of e-Health technologiesCount

Experience		Position/Designation									Total
		Clinical Officer	Dietician	HTS provider	Lab technician	n/a	Nurse	Pharmacist	Physiotherapist	Public health	
Total		11	4	3	10	3	32	2	3		68
7-9 years	Effects of health facility preparednesson utilization	Disagree	0	0	1	2	3	1		0	0	7
		Neither Disagree nor Agree	1	0	0	0	0	0		0	0	1
		Agree	0	0	2	3	1	1		0	1	8
		Strongly Agree	1	1	1	3	10	12		2	0	**30**
	Total		2	1	4	8	14	14		2	1	46
Total	Effects of	Disagree	0	0	2	3	5	5	0	2	0	17

Table 4.7: Health facility preparedness effects on utilization of e-Health technologiesCount

Experience		Position/Designation									Total
		Clinical Officer	Dietician	HTS provider	Lab technician	n/a	Nurse	Pharmacist	Physiotherapist	Public health	
health facility prepardness on utilization	Neither Disagree nor Agree	2	0	1	1	0	2	0	0	0	6
	Agree	2	2	5	6	3	6	1	0	1	26
	Strongly Agree	12	5	3	13	14	43	5	6	0	101
Total		16	7	11	23	22	**56**	6	7	1	150

Regarding health facility preparedness on provision of adequate tools, majority of nurses indicated that lack of provision of tools due to inadequate preparedness by the health facility had a far-reaching effect on the uptake and utilization of e-Health technologies by healthcare workers.

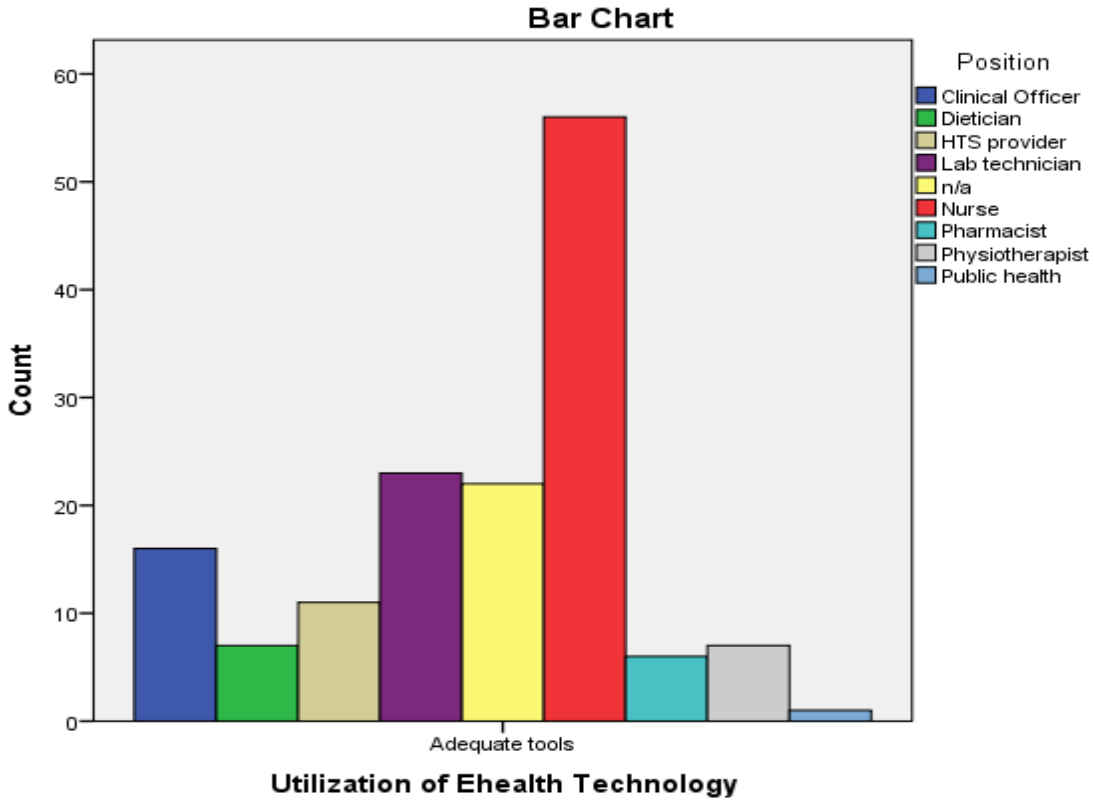


Figure 4.6: Effects of provision of tools Utilization of e-Health technologies

About health facility preparedness on provision of adequate tools, the majority rated neither agree nor disagreed if provision of adequate tools will affect utilization of telemedicine, and nurses were the majority in this rating on the same 5-point scale as item 8 (Appendix II): 1 = Strongly Disagree, 2 = Disagree, 3 = Neither Disagree nor Agree, 4 = Agree, 5 = Strongly Agree. Figure 4.7 shows responses concentrated at

3 (Neither Disagree nor Agree), consistent with this description.

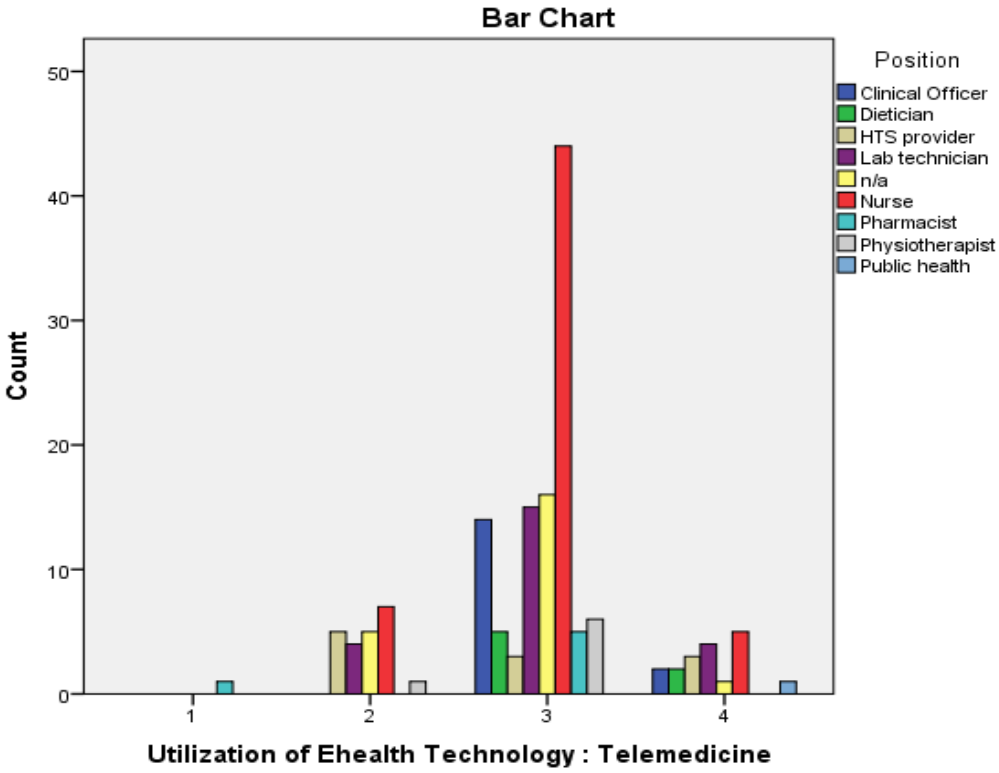


Figure 4.7: Effects of provision of tools on utilization of e-Health technologies with regard to use of telemedicine

About health facility preparedness on provision of adequate tools, majority rated neither disagree nor that failure of health facilities to provide adequate tools will affect utilization of social media platform by health workers as they said social media was available in current phones and therefore has no effect on

health service delivery.

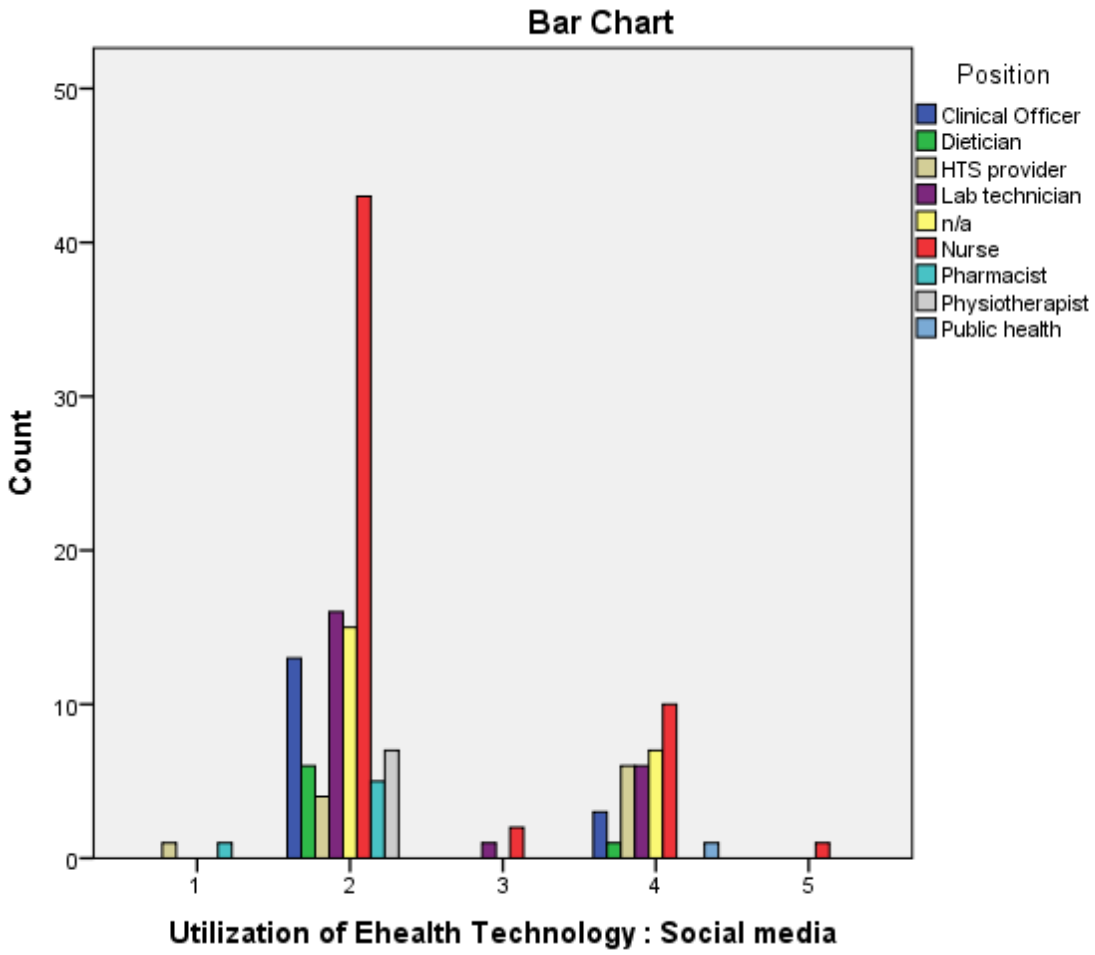


Figure 4.8: Whether provision of tools affect Utilization of e-Health technologies with regard to use of Social media platform

There were varied views on the benefits of health facility preparedness on service delivery from the interviewees, some respondents felt that "We thought the e-Health shall be the panacea of service delivery challenges in the Hospital, we are still experiencing customer complaints even with the implementation of e-Health", one of the respondents said, however a number of respondents were contented that with proper provision of network by the facility e-Health uptake by the health service providers shall increase. In addition, some of the respondents believed "With e-Health implementation, the Hospitals patients' queue shall be significantly reduced.

4.4.4 Integration of Qualitative Findings

This section draws together the qualitative themes raised during the Focus Group Discussions and Key Informant Interviews, and relates them to the quantitative findings presented in Sections 4.4.1-4.4.3, consistent with this study's mixed-methods design (Section 3.4).

On utilization: quantitatively, e-Health utilization was strongest for social media and weakest for m-Health and telemedicine (Section 4.4.1). Qualitatively, respondents attributed gaps in utilization to inadequate training, and recommended regularized training for all staff involved in day-to-day patient management

across cadres (Section 4.4.1). The two strands agree: low utilization of some tools is linked to a skills/training gap rather than to the tools themselves.

On perception and acceptability: quantitatively, the large majority of respondents (91.3%) agreed that perception and acceptability affect uptake, with responses skewed toward strong agreement among women and among the 30-40 age band (Section 4.4.2). Qualitatively, respondents pointed to a perceived lack of openness in how e-Health technologies were rolled out, and again recommended continuous, facility-wide training as a way of improving perception and acceptability (Section 4.4.2). The qualitative theme of transparency adds an explanation the quantitative data alone does not provide: positive perception is not just about the technology's usefulness, but about how its rollout was communicated.

On facility preparedness: quantitatively, responses on whether facility preparedness affects uptake were concentrated at Strongly Agree (Table 4.6a), and nurses rated highest on this effect (Table 4.7). Qualitatively, interview respondents were more divided: some felt e-Health had not yet resolved service-delivery challenges ("We thought the e-Health shall be the panacea of service delivery challenges in the Hospital, we are still experiencing customer complaints even with the implementation of e-Health"), while others were optimistic that improved network provision would increase uptake, and that e-Health would significantly reduce patient queues. This is a genuine point of tension between the two strands: the quantitative data shows strong agreement that facility preparedness matters, while the qualitative data suggests some staff remain unconvinced that current e-Health implementation has delivered on that promise.

4.5 Effect of E-Health on service delivery

Regression Results

The results are presented in Table 4.8.

Table 4.8: Regression analysis results

Model Summary						
Model		R	R Square	Adjusted R Square	Std Error of the Estimate	
ANOVA		.274a	0.075	0.056	0.225	
Model			Sum of Squares	df	Mean Square	
1		Regression	0.592	3	0.197	
		Residual	7.3	144	0.051	
		Total	7.892	147		
Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig
		B	Std. Error	Beta		
(Constant)		-0.928	0.183		2.065	0.189
1	Utilization of e-Health Technology	0.52	0.029	0.153	-1.788	0
	Adequate Access	0.36	0.031	0.098	1.148	0
	Health facility preparedness	0.67	0.03	0.178	2.208	0

Regression Results

The results of the regression analysis suggested that E-technology utilization (β= .0.52, p<0.05), E-technology adequate access (β= 0.36, p<0.05) and E-technology Health facility preparedness (β= .0.67, p<0.05), had a positive significant effect on uptake of e-technology. Hence, the null hypothesis is rejected. Although the model was statistically significant, it explained only a modest proportion of the variation in uptake, suggesting that other unmeasured factors also play an important role. The coefficient of determination value of $R^2 = 0.075$ means that 7.5% of the variation in uptake of e-Health services at the hospital can be explained by Utilization of E-technology, Adequate access of E-technology and Health facility preparedness to use E-technology, and benefits combined; the remaining variation is attributable to factors outside the model. The regression equation constructed from the regression results took the form

$$Y = 0.189 + 0.052X1 + .036X2 + .067X3 + \varepsilon$$

Where:

Y = Uptake of e-technology in health service delivery

X1 = Utilization of E-technology extent

X2 = Adequate access to e-technology tools

X3= Level of health facility preparedness

4.6 Chapter Summary

This chapter presented the results of the study, organized by respondent participation and profile (Sections 4.2-4.3) and then by the study's three objectives. On utilization, the achieved sample of 150 healthcare workers across Kitengela Sub-County Hospital and Kitengela GK Prison Dispensary showed e-Health utilization concentrated in social media, with weaker utilization of m-Health and telemedicine, and training gaps identified as a key barrier (Section 4.4.1). On perception and acceptability, the large majority of respondents (91.3%) agreed that perception and acceptability affect uptake, with variation by gender, age, and work experience consistent with UTAUT's moderating variables (Section 4.4.2). On facility preparedness, responses were concentrated toward agreement that facility preparedness affects utilization, with nurses rating this effect most strongly, though qualitative findings surfaced some skepticism about whether e-Health implementation had yet delivered on its promise (Sections 4.4.3-4.4.4). The regression results (Section 4.5) indicated that utilization, perceived access, and facility preparedness were jointly associated with uptake of e-Health technology in health service delivery, though the model's low R^2 (7.5%) indicates these three variables explain only a small part of the variation in uptake, leaving most of it unexplained. Chapter Five discusses these findings in relation to the study's objectives and the existing literature.

CHAPTER FIVE: DISCUSSION

This chapter discusses the study's findings in relation to each of the three research objectives — the level of utilization of e-Health technologies, health workers' perception and acceptability of e-Health technologies, and the level of healthcare facility preparedness towards utilization of e-Health technologies — situating them within the theoretical frameworks reviewed in Chapter Two (Sections 2.2.1.1-2.2.1.4, 2.2.2-2.2.4) and integrating the qualitative findings presented in Section 4.4.4. The chapter closes with the practical and theoretical implications of the findings and a conclusion.

5.2 Utilization of e-Health Technologies

In line with the first objective, the study established that respondents were largely familiar with and moderately utilized e-Health technologies, with utilization concentrated in social media and weaker for m-Health and telemedicine (Section 4.4.1). Read through Rogers' (2003) Diffusion of Innovation theory (Section 2.2.1.1), this pattern is consistent with an innovation-decision process still in its early-to-middle stages for most respondents: social media, the technology with the greatest compatibility with tools health workers already use in their personal lives, shows the highest utilization, while less familiar, more complex tools such as telemedicine remain at an earlier stage of adoption. This aligns with recent evidence from Sub-Saharan Africa showing that Kenya demonstrates strong integration of mobile health (mHealth) services, particularly in maternal health, HIV care, and reproductive health, though infrastructural and regulatory barriers persist (Okeyo et al., 2025). Likewise, the rapid digital transformation across the region enabled by mobile penetration and innovation has accelerated adoption of digital health tools even in the face of limited internet access (Owoyemi et al., 2025). These findings confirm that mobile-based systems can act as entry points for scaling digital health in low-resource settings such as Kitengela.

The findings on shorter outpatient times, improved throughput, drug availability, and higher patient satisfaction resonate with the documented benefits of mHealth interventions. A recent review demonstrated that mobile-enabled remote monitoring improves patient outcomes, expands access, and reduces costs, though it also highlighted ongoing issues such as privacy, infrastructure, and the digital divide (Kumar & Singh, 2024). These outcomes substantiate the positive effects observed in Kitengela while emphasizing that sustainability requires systematic safeguards and investment. Qualitatively, this pattern is nuanced by the training gap respondents identified as a barrier to fuller utilization (Section 4.4.4): the quantitative finding that utilization is moderate, not high, is consistent with health workers who understand what e-Health tools can offer but have not yet been equipped to use them fully.

The gap between mHealth and telemedicine uptake is supported by broader evidence that telemedicine faces significant technological, infrastructural, socio-cultural, and regulatory challenges, limiting its expansion in low- and middle-income countries (Nanyonga et al., 2025). By contrast, mHealth services often require fewer resources and leverage existing mobile networks, which explains their wider acceptance. An umbrella review of telemedicine similarly emphasized the need for robust frameworks, interoperable technologies, and supportive policy environments to ensure success (Bassi & Ghezzi, 2025).

This gap between mHealth and telemedicine uptake raises a further question this study did not directly measure: whether the mHealth tools health workers are using generate records that feed into the facility's or county's formal electronic health records (EHR) system, or whether they instead function as informal, parallel channels (e.g., WhatsApp-based coordination) disconnected from the official patient record. This distinction matters because the interoperability literature is clear that mHealth's benefits for continuity of care are only realized when mHealth data is integrated with, rather than parallel to, the facility's EHR (Mensah et al., 2023); offline-capable EHR designs suited to low-resource settings such as Kitengela offer one practical route to this integration (Akintola et al., 2023).

[AUTHOR TO CONFIRM: this study did not collect data on whether the mHealth tools reported here (e.g., WhatsApp, SMS-based communication) feed into Kitengela Sub-County Hospital's or Kajiado County's formal EHR/health information system, or operate as informal parallel channels. If you know

the answer from your fieldwork or facility context, a sentence stating it here would strengthen this discussion considerably; if not, this is worth flagging as a limitation and a direction for future research.]

5.3 Perception and Acceptability of e-Health Technologies

In line with the second objective, the large majority of respondents agreed that perception and acceptability affect uptake of e-Health technologies, with variation by gender, age, and work experience (Section 4.4.2). The Unified Theory of Acceptance and Use of Technology (UTAUT; Section 2.2.1.4) provides a direct lens for this finding: UTAUT identifies performance expectancy, effort expectancy, social influence, and facilitating conditions as proximal predictors of acceptance, moderated by age, gender, and experience — precisely the pattern of variation observed in this study's perception and acceptability results. The concentration of strong agreement among the 30-40 age band and among women is consistent with UTAUT's account of moderated, rather than uniform, acceptance across a workforce.

Qualitatively, respondents linked weaker acceptance to a perceived lack of transparency in how e-Health technologies were rolled out, and recommended continuous, facility-wide training (Section 4.4.4). This qualitative theme extends the quantitative finding: it is not only what health workers think of the technology's usefulness (captured by UTAUT's performance expectancy) but how the change was communicated to them that shapes acceptance — a dimension closer to the NASSS framework's emphasis on the adopter system and organizational context (Section 2.2.1.2) than to UTAUT's more individual-level constructs. Read together, the quantitative and qualitative strands suggest that improving acceptance in Kitengela requires attention to both the technology's perceived usefulness and the organizational process of introducing it.

5.4 Facility Preparedness and Utilization

In line with the third objective, the study found that responses on whether facility preparedness affects utilization were concentrated toward agreement, with nurses rating this effect most strongly, and with strategies to address staff fears, enhance user satisfaction, and secure management and stakeholder involvement identified as central to preparedness (Sections 4.4.3, 4.6a, 4.7). This is reinforced by recent reviews noting that health informatics in developing countries continues to be constrained by infrastructural, financial, and human resource gaps, yet opportunities exist through mHealth, telemedicine, and AI integration (Sarkar & Bello, 2025). Similarly, organizational preparedness, training, and change-management remain critical factors for successful adoption (Mwangi, 2025).

The HOT-fit model (Section 2.2.1.3) offers a structured way to read this finding: facility preparedness corresponds to HOT-fit's organization and technology dimensions (infrastructure, training, management support), which this study finds respondents consistently link to the human dimension of utilization and acceptance. The NASSS framework's organizational and wider-system domains (Section 2.2.1.2) similarly explain why facility-level readiness, not just individual willingness, shapes uptake. At the same time, the qualitative findings introduce a genuine tension the quantitative data alone does not show: while quantitative responses skew toward agreement that facility preparedness matters, interview respondents expressed skepticism that e-Health implementation had yet resolved service-delivery challenges in practice, with some noting persistent patient complaints despite e-Health rollout (Section 4.4.4). This gap between stated agreement (facility preparedness matters, in principle) and lived experience (implementation has not yet delivered, in practice) is consistent with Critical Mass Theory's account of adoption stalling before a technology reaches the threshold of users needed for its full benefits to materialize (Section 2.2.3), and suggests Kitengela's e-Health rollout may still be short of that threshold.

5.5 Implications of the Findings

5.5.1 Practical Implications

For healthcare workers, the findings point to a clear need for regularized, role-specific training rather than one-off onboarding, since respondents across cadres identified training gaps as a barrier to utilization and as a route to improved acceptance (Sections 4.4.1, 4.4.2, 4.4.4). For system developers and implementers, the gap between mHealth and telemedicine utilization suggests design priorities: telemedicine tools that are compatible with existing workflows and require modest infrastructure are more likely to see the kind

of uptake mHealth has already achieved (Section 5.2), and integrating informal mHealth channels into the facility's EHR would strengthen continuity of care (Section 5.2). For policymakers and facility management, the study's facility-preparedness findings indicate that infrastructure and training investment should be paired with deliberate change-management — addressing staff fears and securing visible management involvement — rather than treated as a purely technical rollout (Section 5.4).

5.5.2 Theoretical Implications

The findings broadly support Rogers' (2003) Diffusion of Innovation theory as the study's underpinning framework: utilization varies with perceived compatibility and complexity in the pattern DOI predicts (Section 5.2), and the innovation-decision process is visibly incomplete for several e-Health tools rather than a single adoption event. The findings also support UTAUT's account of moderated acceptance (Section 5.3) and HOT-fit's and NASSS's emphasis on organizational and technological context alongside individual attitudes (Section 5.4). At the same time, the tension between quantitative agreement and qualitative skepticism about facility preparedness (Section 5.4) suggests that DOI and UTAUT, which center on individual-level decisions and acceptance, may understate how far an organization is from Critical Mass Theory's adoption threshold (Section 2.2.3) — a gap NASSS's organizational and wider-system domains are better placed to capture. This points to a theoretical implication for future e-Health adoption research in similar settings: individual-acceptance models (DOI, UTAUT) and organizational-readiness models (NASSS, HOT-fit, Critical Mass) are complementary rather than substitutable, and a mixed-methods design combining both, as this study did, is well suited to surfacing gaps that either framework alone would miss.

5.6 Conclusion

In summary, the study findings are consistent with the most recent literature, confirming that e-Health technologies, particularly mHealth, hold significant potential for improving health service delivery. However, disparities in uptake between modules, persistent infrastructural and socio-cultural challenges, and the critical role of organizational preparedness underscore the need for systemic reforms. Read against the study's theoretical frameworks, uptake in Kitengela reflects an adoption process that is underway but incomplete: individual health workers show DOI- and UTAUT-consistent patterns of moderated acceptance, while the facility as a whole has not yet reached the organizational readiness that NASSS, HOT-fit, and Critical Mass Theory suggest is needed for e-Health's full benefits to be realized. Strengthening interoperability, investing in staff readiness, and leveraging mobile platforms will be essential for sustaining gains in health service delivery at Kitengela and similar settings across Kenya

CHAPTER SIX:
CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This chapter contains the summary of the research findings analyzed in chapter five, the conclusions drawn from the summary of the findings, and the recommendations made arising from the conclusions made. This study was structured around three research objectives and their corresponding research questions (Section 1.3-1.4) rather than a priori formal hypotheses; no hypotheses were stated in Chapter One. The conclusions below are therefore based on the descriptive and inferential findings addressing each objective. Where Chapter Four's regression results describe rejecting or failing to reject a null hypothesis, this refers only to the standard statistical null hypothesis for each regression coefficient (that the coefficient equals zero, i.e., no effect) — a routine convention in reporting inferential statistics — and not to a set of formally pre-stated study hypotheses.. Recommendations on the implications of the research on theory, management practice and policy, and suggestions for further research are discussed.

6.2 Summary

E-Health technologies offer significant potential to improve healthcare access and service delivery, yet evidence on how health workers actually utilize, perceive, and are supported to use these technologies at facility level in Kitengela remains scarce (Section 1.2, Problem Statement). This study therefore sought to establish the uptake of e-Health technologies among health workers in enhancing access to healthcare in Kitengela sub-County, Kajiado County, guided by three objectives: to determine the level of utilization of e-Health technologies, to establish perception and acceptability of e-Health technologies, and to examine the level of healthcare facility preparedness towards utilization of e-Health technologies among health workers (Section 1.4). The study adopted a descriptive cross-sectional, mixed-methods design combining quantitative and qualitative data (Section 3.4). The target population was health workers at two facilities in Kitengela: Kitengela Sub-County Hospital and Kitengela GK Prison Dispensary. A total of 184 questionnaires were distributed across both facilities and 150 were filled and returned, a response rate of 81.5% (Section 3.3, Table 3.1). Descriptive statistics of frequencies, percentages, mean, standard deviation, and standard error were used to summarize the data, complemented by qualitative findings from Focus Group Discussions and Key Informant Interviews at both facilities (Section 3.7). Inferential statistics of multiple regression were used to establish the combined effect of utilization, perception and acceptability, and facility preparedness on uptake of e-Health technology in service delivery (Section 4.5). With respect to familiarity with e-Health technology, results indicated that the majority of respondents were familiar with most of the e-Health technologies used in health service delivery across both facilities.

6.2.1 Level of utilization of E-Health technology in health service delivery in Kitengela Sub-County Hospital

Considering the first objective of the study on Level of utilization of E-Health technology in health service delivery in Kitengela sub-County Hospital, the respondents moderately agreed that the utilization was on course, though there was skewness in the e-Health technology being utilized with m-Health and social media being the highest and Telemedicine being the lowest utilized. All the responses on the factors determining the level of utilization of e-Health technology in health service delivery where above average (Mean 3.4), therefore utilization of e-Health technology is covered in all the core areas in the hospital, there was an optimum environment for utilization of e-Health technology, current Kenyan laws fostered the utilization. In terms of access to the tools needed for utilization, mean scores were also above average on the five-point Likert scale, indicating that e-Health tools have generally replaced legacy paper-based systems and that measures are in place to monitor their use, although the hospital has not yet procured enough tools to fully meet demand. Access was further supported by staff training and by risk-management policies and procedures, while the reliability of underlying infrastructure scored comparatively lower than other utilization factors, and the presence of a technical oversight committee

helped sustain utilization. Consistent with this pattern, m-Health and social media had the highest level of access and utilization, while telemedicine remained the least utilized technology.

6.2.2 Perception and Acceptability of e-Health Technology on Health Service Delivery

As per the second objective of this study, on perception and acceptability of e-Health technology in health service delivery, the majority of respondents, 137 (91.3%), agreed that perception and acceptability affect the uptake of e-Health technologies. Regarding health informatics specifically, 102 (68%) of respondents strongly agreed that perception affects uptake, with the response skewed slightly toward female respondents. For social media, the strongest agreement was concentrated among respondents aged 30–40 years, who accounted for the largest share of those who strongly agreed that perception affects uptake. A similar pattern held for telemedicine, where agreement was highest among the 30–40 age bracket and among staff with 4–6 years of work experience, while agreement was lowest among respondents aged 41–50 years and those with 10 or more years of experience, some of whom expressed a contrary view. Qualitatively, respondents raised concerns about a perceived lack of openness in how e-Health technologies were rolled out, and recommended continuous, facility-wide training as a way of improving both perception and acceptability. Taken together, these findings indicate that perception and acceptability of e-Health technology vary meaningfully by gender, age, and work experience, and that addressing this variation particularly through transparent communication and ongoing training is central to improving uptake.

6.2.3 Health facility preparedness on uptake of e-Health technology in health service delivery

As per the third objective, on health facility preparedness towards utilization of e-Health technology in health service delivery, results indicate that allaying staff perceptions and fears about e-Health technology was the strategy most consistently deployed across both Kitengela Sub-County Hospital and Kitengela GK Prison Dispensary to improve uptake. Consistent with the first objective's findings, m-Health and social media had the highest access and utilization levels at both facilities, while telemedicine posted the lowest utilization level.

6.3 Conclusions

This study set out to examine the uptake of e-Health technology at Kitengela Sub-County Hospital and Kitengela GK Prison Dispensary, guided by three objectives: the level of utilization of e-Health technologies, health workers' perception and acceptability of e-Health technologies, and the level of healthcare facility preparedness towards utilization of e-Health technologies. The conclusions below are organized around each objective in turn.

Conclusion 1 (Objective 1, level of utilization): The findings reveal that e-Health technology is already a familiar concept across cadres, though utilization is uneven: nurses demonstrate comparatively higher utilization, particularly in m-Health and social media platforms, while public health officers exhibit the lowest levels of engagement, and telemedicine remains the least adopted technology overall (Section 6.2.1). Significant barriers to fuller utilization persist in the form of limited user confidence and inadequate training.

Conclusion 2 (Objective 2, perception and acceptability): The study establishes that perception and acceptability of e-Health technology vary meaningfully by gender, age, and work experience, and that a perceived lack of transparency in how e-Health technologies were rolled out is a barrier to more positive perception (Section 6.2.2). Addressing this variation through transparent communication and ongoing training is central to improving both acceptability and, in turn, utilization.

Conclusion 3 (Objective 3, facility preparedness): The study also establishes that facility preparedness affects utilization, with strategies to allay staff fears and secure management involvement identified as the most consistently deployed interventions across both facilities (Section 6.2.3). However, qualitative findings suggest the full institutional potential of e-Health will only be realized when management addresses staff perceptions and ensures comprehensive change-management, since some staff remain

skeptical that current e-Health implementation has yet resolved service-delivery challenges in practice (Section 4.4.4).

Taken together, these conclusions carry significant implications. By tailoring interventions to specific healthcare cadres, addressing the transparency and training gaps identified under perception and acceptability, and strengthening institutional readiness through change-management, both Kitengela Sub-County Hospital and Kitengela GK Prison Dispensary can accelerate the integration of e-Health technologies into service delivery. Such efforts not only improve efficiency and patient outcomes but also lay a strong foundation for broader health system digitization in Kenya.

6.4 Recommendation

Based on the general objective of assessing the uptake of e-Health services in Kitengela Sub-County hospital and the research findings, the study makes the following recommendations

i) There is a need to extend the department's training for which e-Health technology has been implemented in Kitengela Sub-County hospital, to ensure that a complete integrated system is achieved.

ii) Considering that the core of the Hospital is clinical function, there is need to ensure utilization in clinical areas such as doctors consultation module to have seamless service provision between clinical and administrative areas of the hospital.

iii) The factors that enable access and motivate utilization of e-Health technology such as adequate resources, incentives, and stakeholder involvement, should be strengthened to support effective implementation and sustainability to motivate utilization, including allocation of more resources and involving all stakeholders.

iv) The Kajiado County Department of Health, in collaboration with the national Ministry of Health, should anchor on the benefits that have been realized in the uptake of E-Health technology in Kitengela Sub-County hospital and entrench policy to implement a national health service delivery.

6.5 Areas for further Research

This study was carried out to assess the uptake of e-Health services on service delivery in Kitengela Sub-County hospital. The following areas of concern can be considered for further research:

i. A similar study with the same hypotheses could be done in the future, but to take care of data rages relative to the time element, the study could be implemented as a longitudinal rather than a cross-sectional design

ii. This study can be extended to other contexts and other factors impacting service delivery, since uptake of e-Health technology is not the sole factor affecting service delivery.

iii. The moderating effect of leadership style on the relationship between uptake of e-Health technology and service delivery needs to be researched on.

REFERENCES

Abdulnabi, S. M., et al. (2024). Issues and challenges of implementing e-governance in developing countries. Cogent Social Sciences, 10(1), 2340579. https://doi.org/10.1080/23311975.2024.2340579.

Achieng, M. S., & Ogundaini, O. O. (2022). Digital health and self-management of chronic diseases in

sub-Saharan Africa: A scoping review. SA Journal of Information Management, 24(1), 1–8. https://doi.org/10.4102/sajim.v24i1.1550.

Admassu, W. (2024). Analyzing health service employees' intention to use e-health systems using UTAUT-2. BMC Health Services Research, 24, 932. https://doi.org/10.1186/s12913-024-10766-7.

Agbeyangi, A. O., et al. (2025). Telemedicine adoption and prospects in sub-Saharan Africa: A systematic review. Healthcare, 13(…), e11989057. https://doi.org/10.3390/healthcare13000000.

Agbeyangi, A. O., et al. (2025). Telemedicine adoption and prospects in Sub-Saharan Africa: A systematic review with a focus on South Africa, Kenya, and Nigeria. Healthcare, 13, e11989057.

Akintola, O., Brown, T., & Wanjohi, M. (2023). Designing offline-capable electronic health records for low-resource settings. Journal of Global Health Informatics, 15(2), 45–59.

Alotaibi et al. (2025) systematic review on digital readiness/capability (uses UTAUT framing). BioMed Central.

Alotaibi, N., Brown Wilson, C., & Traynor, M. (2025). Enhancing digital readiness and capability in healthcare: A systematic review of interventions, barriers, and facilitators. BMC Health Services Research, 25, 500. https://doi.org/10.1186/s12913-025-12663-3.

Alotaibi, N., Brown Wilson, C., & Traynor, M. (2025). Enhancing digital readiness and capability in healthcare: A systematic review of interventions, barriers, and facilitators. BMC Health Services Research, 25, 500.

Ambrosi, E., et al. (2025). Effectiveness of digital health interventions for chronic diseases: A systematic review (2015–2024). International Journal of Medical Informatics, 190, 105421. https://doi.org/10.1016/j.ijmedinf.2025.105421.

Anderson, D. R., Sweeney, D. J., & Williams, T. A. (2003). Statistics for Business and Economics (8th ed.). South-Western College Publishing.

Bailey, M., Johnston, D., Kuchler, T., Stroebel, J., & Wong, A. (2022). Peer effects in product adoption. American Economic Journal: Applied Economics, 14(3), 284–315. https://doi.org/10.1257/app.20190125.

Bassi, J., & Ghezzi, P. (2025). Building blocks for successful telemedicine implementation: An umbrella review. Journal of Medical Internet Research, 27(1), e70276.

Borges do Nascimento et al. (2023) umbrella review of barriers/facilitators for healthcare professionals. Nature.

Borges do Nascimento, I. J., et al. (2023). Barriers and facilitators to utilizing digital health technologies by health care professionals: An umbrella review of systematic reviews. npj Digital Medicine, 6, 196. https://doi.org/10.1038/s41746-023-00899-4.

Borges do Nascimento, I. J., et al. (2023). Barriers and facilitators to utilizing digital health technologies by healthcare professionals: An umbrella review of systematic reviews. npj Digital Medicine, 6, 196. https://doi.org/10.1038/s41746-023-00899-4.

Bouchard, G. (1993). Decision criteria in the adoption of EDI. Information & Management, 24(5), 227–235. https://doi.org/10.1016/0378-7206(93)90045-B.

Byrd, T. F., IV, Cochran, J. D., Smith, M. K., & Stichler, J. F. (2021). Technology acceptance and critical mass: A consolidated model for mobile healthcare communication tools. Journal of Nursing

Management, 29(6), 1658–1671. https://doi.org/10.1111/jonm.13304.

Chokshi, T., et al. (2024). Advances in tele-ophthalmology and artificial intelligence for diabetic retinopathy screening: A review. Annals of Eye Science, 9, 18. https://doi.org/10.21037/aes-23-58.

Communications Authority of Kenya. (2024). Sector Statistics Report, Q2 FY 2024/2025. Nairobi: CA.

Communications Authority of Kenya. (2025). Sector Statistics Report, Q3 FY 2024/2025. Nairobi: CA.

Cordella, A., & Paletti, A. (2019). Government as a platform, orchestration, and public value creation: The Italian case. Government Information Quarterly, 36(4), 101409. https://doi.org/10.1016/j.giq.2019.101409.

De Lathauwer, I. L. J., et al. (2024). Remote patient monitoring in heart failure: A meta-analysis of randomized trials. European Journal of Heart Failure. https://doi.org/10.1002/ejhf.3568.

Demsash et al. (2024) UTAUT-based study of clinicians' acceptance of mobile guideline apps. BioMed Central.

Demsash, A. W., et al. (2024). Health professionals' acceptance of mobile-based clinical guideline applications: A UTAUT study. BMC Medical Education, 24, 5680. https://doi.org/10.1186/s12909-024-05680-z.

Demsash, A. W., et al. (2024). Health professionals' acceptance of mobile-based clinical guideline applications: Using a modified UTAUT model. BMC Medical Education, 24, 5680. https://doi.org/10.1186/s12909-024-05680-z.

Demsash, A. W., et al. (2024). Health professionals' acceptance of mobile-based clinical guideline apps: A UTAUT study. BMC Medical Education, 24, 5680.

Derecho et al. (2024) systematic review on EMR adoption in developing economies (physicians). PMC.

Derecho, K. C., et al. (2024). Technology adoption of electronic medical records in developing economies: A systematic review on physicians' perspective. Informatics in Medicine Unlocked, 39, 101438.

Desai, A., & Nanduri, M. (2024). Digital transformation and public administration: Public digital infrastructure and public value. International Journal of Public Administration, 47(10), 807–813.

Exemplars in Global Health. (2024, December 19). Kenya's eCHIS: Revolutionizing community health with digital innovation. https://www.exemplars.health.

Farnham, A., et al. (2023). A roadmap for using DHIS2 data to track progress in key public health programs. BMC Public Health, 23, 15979. https://doi.org/10.1186/s12889-023-15979-3.

Greenhalgh, T., Robert, G., Macfarlane, F., Bate, P., & Kyriakidou, O. (2004). Diffusion of innovations in service organizations: Systematic review and recommendations. Milbank Quarterly, 82(4), 581–629. https://doi.org/10.1111/j.0887-378X.2004.00325.x.

Greenhalgh, T., Wherton, J., Papoutsi, C., Lynch, J., Allwood, D., et al. (2017). Beyond adoption: The NASSS framework for theorizing and evaluating non-adoption, abandonment, and challenges to the scale-up, spread, and sustainability of health and care technologies. Journal of Medical Internet Research, 19(11), e367. https://doi.org/10.2196/jmir.8775.

Griffin, T., et al. (2025). Strengthening health information systems and inherent program management: Lessons from Kenya's KHIS (DHIS2). Frontiers in Epidemiology, 2, 1591261.

https://doi.org/10.3389/fepid.2025.1591261.

Griffin, T., et al. (2025). Strengthening health information systems: Lessons from Kenya's KHIS (DHIS2). Frontiers in Epidemiology, 2, 1591261. https://doi.org/10.3389/fepid.2025.1591261.

Guadie, H. A., et al. (2025). Intention to adopt DHIS2 among health professionals: A cross-sectional study. Frontiers in Digital Health, 7, 1449510. https://doi.org/10.3389/fdgth.2025.1449510.

Ha, S. K., et al. (2025). Impact of a teleretinal screening program on diabetic retinopathy screening compliance in community health centers. NPJ Digital Medicine, 8, 67. https://doi.org/10.1038/s41746-025-01039-9.

Hailu et al. (2025) modified UTAUT model for telemedicine acceptance among healthcare professionals. Frontiers.

Hailu, D. T., et al. (2025). A modified UTAUT model for acceptance to use telemedicine services among healthcare professionals. Frontiers in Digital Health, 7, 1469365. https://doi.org/10.3389/fdgth.2025.1469365.

Hailu, D. T., et al. (2025). A modified UTAUT model for acceptance to use telemedicine services among healthcare professionals. Frontiers in Digital Health, 7, 1469365. https://doi.org/10.3389/fdgth.2025.1469365.

Heeks, R. (2003). Most eGovernment-for-Development projects fail: How can risks be reduced? SSRN Working Paper 3540052. https://doi.org/10.2139/ssrn.3540052.

Heeks, R. (2022). Digital inequality beyond the digital divide: Conceptualising adverse digital incorporation in the global South. Information Technology for Development, 28(1), 1–19. https://doi.org/10.1080/02681102.2022.2068492.

Hood, C. (1991). A public management for all seasons? Public Administration, 69(1), 3–19. https://doi.org/10.1111/j.1467-9299.1991.tb00779.x.

Hu, C., et al. (2025). Clinical and cost-effectiveness of telehealth-supported home oxygen therapy in COPD: Systematic review and meta-analysis. Journal of Medical Internet Research, 27, e73010. https://doi.org/10.2196/73010.

Hyldgaard, C., et al. (2025). Effect of telemonitoring on moderate and severe COPD exacerbations: Systematic review and meta-analysis. Respiratory Medicine, 236, 108234. https://doi.org/10.1016/j.rmed.2025.108234.

Iacopini, I., Milojević, M., & Latora, V. (2022). Group interactions modulate critical-mass dynamics in social convention formation. Communications Physics, 5, 265. https://doi.org/10.1038/s42005-022-00845-y.

Jackson, S. L. (2015). Research Methods and Statistics: A Critical Thinking Approach (5th ed.). Cengage Learning.

Jacobides, M. G., Cennamo, C., & Gawer, A. (2024). Externalities and complementarities in platforms and ecosystems. Research Policy, 53(10), 104093. https://doi.org/10.1016/j.respol.2023.104093.

Kachimanga, C., et al. (2024). Community health worker adoption of mHealth and maternal service use in sub-Saharan Africa: Systematic review. JMIR mHealth and uHealth, 12, e55819. https://doi.org/10.2196/55819.

Kachimanga, C., et al. (2024). Evaluating the adoption of mHealth technologies by community health workers in sub-Saharan Africa: Systematic review. JMIR mHealth and uHealth, 12, e55819.

https://doi.org/10.2196/55819.

Karan, A., Negandhi, H., Kabeer, M., Zapata, T., Mairembam, D., De Graeve, H., Buchan, J., & Zodpey, S. (2023). Achieving universal health coverage and sustainable development goals by 2030: investment estimates to increase production of health professionals in India. Human Resources for Health, 21(1), 17. https://doi.org/10.1186/s12960-023-00802-y

Krogh, A. H. (2024). Developing New Public Governance as a framework for intra-public collaboration. Public Management Review, 26(10), 1955–1979. https://doi.org/10.1080/14719037.2024.2313539.

Kuan, K. K. Y., & Chau, P. Y. K. (2001). A perception-based model for EDI adoption in small businesses using a technology-organization-environment framework. Information & Management, 38(8), 507-521.

Kumar, R., & Singh, A. (2024). Mobile health for remote monitoring: A systematic review of opportunities and challenges. Digital Health Research Journal, 10(3), 112–128.

Kumpulainen, H., & Juntunen, H. (2025). ICT acceptance in the social and healthcare context: A systematic review beyond TAM and UTAUT. International Journal of Medical Informatics, 190, 105626.

Lee, A. T., et al. (2025). A review of TAM and UTAUT frameworks in digital health contexts. Informatics in Medicine Unlocked, 47, 101503. https://doi.org/10.1016/j.imu.2025.101503.

Longhini, J., et al. (2022). Digital health competencies among health care professionals: Systematic review. Journal of Medical Internet Research, 24(8), e36414. https://doi.org/10.2196/36414.

Mensah, K., Oduor, P., & Alabi, J. (2023). Overcoming interoperability challenges in health information systems in LMICs. International Journal of Medical Informatics, 176, 105012.

Mergel, I., Edelmann, N., & Haug, N. (2019). Defining digital transformation: Results from expert interviews. Government Information Quarterly, 36(4), 101385. https://doi.org/10.1016/j.giq.2019.06.002.

Ministry of Health (Kenya). (2020). Kenya Community Health Strategy 2020–2025. Nairobi: MOH.

Ministry of Health (Kenya). (2023). Kenya Health Facility Census Report (September 2023). Nairobi: MOH.

Muriuki, A., et al. (2023). Experiences on the utility and barriers of telemedicine among doctors in Kenya. Advances in Public Health, 2023, 5520074. https://doi.org/10.1155/2023/5520074.

Mwangi, S. (2025). Organizational preparedness and digital health adoption in Kenyan hospitals. African Journal of Health Informatics, 9(1), 77–91.

Nanyonga, H., Tadesse, A., & Afolabi, K. (2025). Barriers to mHealth adoption in Africa: A systematic review. Health Policy and Technology, 14(2), 200–214.

Ngusie et al. (2024) UTAUT3 for EHR intention among health professionals. BioMed Central.

Ngusie, H. S., et al. (2024). Understanding the predictors of health professionals' intention to use electronic health record systems: Extend and apply UTAUT3. BMC Health Services Research, 24, 11378. https://doi.org/10.1186/s12913-024-11378-1.

OECD. (2020). The OECD Digital Government Policy Framework: Six Dimensions of a Digital

Government (Public Governance Policy Papers, No. 2). Paris: OECD Publishing. https://doi.org/10.1787/f64fed2a-en.

OECD. (2020). The OECD Digital Government Policy Framework: Six dimensions of a Digital Government. Paris: OECD Publishing. https://doi.org/10.1787/4b2f6b12-en.

OECD. (2023). OECD Digital Government Index (DGI). Paris: OECD Publishing.

Okeyo, J., Mutua, F., & Lwanga, S. (2025). Mobile health integration in Sub-Saharan Africa: A systematic review. BMC Public Health, 25, 178.

Okoroafor, S. C., et al. (2022). Investing in the health workforce in Kenya: Trends in size, composition and distribution (2015–2020). Human Resources for Health, 20, 89. https://doi.org/10.1186/s12960-022-00771-7.

Osborne, S. P. (2006). The (New) public governance? Public Management Review, 8(3), 377–387. https://doi.org/10.1080/14719030600853022.

Owoyemi, A., Chisale, S., & Banda, M. (2025). Digital health in Sub-Saharan Africa: Opportunities and constraints. npj Digital Medicine, 8(12), 55.

Plus: Wurster et al. (2024) and Rauner et al. (2025) applying Diffusion of Innovations to modern digital health contexts. PMCScienceDirect.

Pollitt, C., & Bouckaert, G. (2017). Public management reform: A comparative analysis—Into the age of austerity (4th ed.). Oxford University Press.

Polus, M., et al. (2024). Impact of digital interventions on treatment burden in chronic conditions: Systematic review. Journal of Personalized Medicine, 14, 512. https://doi.org/10.3390/jpm14050512.

Pong, C., et al. (2024). Digital health in chronic disease management: A scoping review of implementation and outcomes. Journal of Medical Internet Research, 26, e53576. https://doi.org/10.2196/53576.

Rauner, Y., et al. (2025). The socio-technical adoption and diffusion of digital health innovations: Integrating DOI and socio-technical systems theory. Digital Health, 11, 100030. https://doi.org/10.1016/j.dhjo.2025.100030.

Rocha, M. D. (2023). Telemedicine—Portugal. In IBA Telemedicine Survey (pp. 1–12). International Bar Association. https://www.ibanet.org/document?id=Healthcare-Telemedicine-Survey-Portugal.

Rogers, E. M. (2003). Diffusion of innovations (5th ed.). New York, NY: Free Press.

Sarkar, A., & Bello, Y. (2025). Health informatics in developing countries: Challenges and opportunities. Medical Research Archives, 13(1), 233–248.

Scholte, N. T. B., et al. (2023). Telemonitoring for heart failure: A meta-analysis. European Journal of Heart Failure, 25(7), 1203–1216. https://doi.org/10.1002/ejhf.2934.

Schüler, F., Übelhör, J., & Legner, C. (2023). Measuring network effects of digital industrial platforms. Information Systems Frontiers, 25, 401–422. https://doi.org/10.1007/s10257-023-00655-x.

Shin, H. D., et al. (2025). The NASSS framework in health and care: A scoping review of applications. BMC Medicine, 23, 345. https://doi.org/10.1186/s12916-025-0345-1.

Spann, B., Pizzolato, N., & Thorson, K. (2022). Applying diffusion of innovations theory to social networks. Online Social Networks and Media, 29, 100214.

https://doi.org/10.1016/j.osnem.2022.100214.

SPMS (Serviços Partilhados do Ministério da Saúde). (2019). Plano Estratégico Nacional para a Telessaúde (PENTS)2019–2022. https://www.spms.min-saude.pt/wp-content/uploads/2019/11/PENTS_Tradu%C3%A7%C3%A3o.pdf

Stergiopoulos, G. M., et al. (2024). Telemedicine employing telemonitoring: Effects on readmissions—a systematic review. Frontiers in Digital Health, 6, 1441334. https://doi.org/10.3389/fdgth.2024.1441334.

Tareh, C. T., et al. (2023). Information and communication technology in health care: A cross-sectional study in Kericho County, Kenya. BMC Health Services Research, 23, 1335. https://doi.org/10.1186/s12913-023-10067-6.

Teleanu, I. C., et al. (2025). Remote monitoring of patients with heart failure: Systematic review and meta-analysis. BMJ (in press).

Thakkar, A., et al. (2022). Network characteristics of a referral system for hypertension care in Kenya. BMC Health Services Research, 22, 7699. https://doi.org/10.1186/s12913-022-07699-3.

Thomas, V., et al. (2024). Factors influencing adoption of mHealth interventions in LMICs: A systematic review and qualitative evidence synthesis. Oxford Open Digital Health, 3, oqae046. https://doi.org/10.1093/oodh/oqae046.

United Nations, Department of Economic and Social Affairs. (2022). United Nations E-Government Survey 2022: The Future of Digital Government. New York: UN DESA.

United Nations, Department of Economic and Social Affairs. (2024). United Nations E-Government Survey 2024: Accelerating Digital Transformation for Sustainable Development. New York: UN DESA.

United Nations. (2003). World Public Sector Report 2003: E-Government at the Crossroads. New York: UN DESA.

Waiyaiya et al. (2024) Kenya Digital Health Convergence Workshop paper (HIE “Digital Health Superhighway”). PMC.

Waiyaiya, E., et al. (2024). Digital Health Convergence Workshop: The Kenyan experience. JAMIA Open, 7(3), ooae079. https://doi.org/10.1093/jamiaopen/ooae079.

Wang, M., et al. (2024). Acceptance and use of digital health technologies by health workers in low- and middle-income countries: A systematic review and meta-analysis. Globalization and Health, 20, 94. https://doi.org/10.1186/s12992-024-01109-1.

World Bank. (2023). GovTech Maturity Index, 2022 Update—Global and Regional Findings. Washington, DC: World Bank.

World Bank. (2024). Tracking SDG7: Energy Progress Report — Access to electricity (Chapter 1). https://trackingsdg7.esmap.org.

World Health Organization. (2019). WHO guideline: Recommendations on digital interventions for health system strengthening. Geneva: WHO. https://apps.who.int/iris/handle/10665/311941.

World Health Organization. (2019). WHO guideline: Recommendations on digital interventions for health system strengthening.

World Health Organization. (2021/2025). Global Strategy on Digital Health 2020–2025 (with WHA78

[2025] extension to 2027). Geneva: WHO.

World Health Organization. (2024). Database on electrification of health-care facilities. https://www.who.int/data/gho/data/themes/database-on-electrification-of-health-care-facilities.

World Health Organization. (2024). Global strategy on human resources for health: Workforce 2030—update to EB156/15. Geneva: WHO.

Wosny et al. (2023) qualitative systematic review on clinicians' experiences with digital tools. PMC.

Wosny, M., et al. (2023). Experience of health care professionals using digital tools in the hospital: Qualitative systematic review. JMIR Human Factors, 10, e50357. https://doi.org/10.2196/50357.

Wurster, F., et al. (2024). Rogers' diffusion of innovations theory and the adoption of a patient portal: A mixed-methods study. BMC Medical Informatics and Decision Making, 24, 45. https://doi.org/10.1186/s12911-024-02234-5.

Wurster, F., et al. (2024). Rogers' diffusion of innovations theory and the adoption of a patient portal: A mixed-methods study. BMC Medical Informatics and Decision Making, 24, 45. https://doi.org/10.1186/s12911-024-02234-5.

Yang, C., Wu, H., & Xu, M. (2024). Government in the digital age: Impacts of digital transformation across sectors. Technological Forecasting and Social Change, 205, 122954. https://doi.org/10.1016/j.techfore.2024.122954.

Yang, M., Wang, H., & Li, X. (2024). Predicting m-health acceptance from perceived technology accuracy and social influence. International Journal of Environmental Research and Public Health, 21(1), 123. https://doi.org/10.3390/ijerph21010123.

Yew, S. Q., et al. (2025). Facilitators and barriers to the implementation of digital health technologies in LMIC hospital settings post-COVID-19: A scoping review. Journal of Medical Internet Research, 27(1), e63482. https://doi.org/10.2196/63482.

Yusof, M. M., et al. (2024). Evaluating health information systems-related errors using the HOPT-fit framework. Health Informatics Journal, 30(x), 1–15. https://doi.org/10.1177/14604582241252763.

Zhai, Y., et al. (2022). Nurses' perceptions of a new nursing information system using the HOT-fit framework: A mixed-methods study. BMC Nursing, 21, 343. https://doi.org/10.1186/s12912-022-01007-2.

Zhang, Y., Zhang, Y., Yan, X., & Wang, M. (2024). Continuous adoption of online healthcare platforms: An ECM–network-externalities approach. BMC Public Health, 24, 20072. https://doi.org/10.1186/s12889-024-20072-0.

Zou, Q., et al. (2023). E-government, transparency and accountability: Evidence from cross-country panel data. Technological Forecasting and Social Change, 194, 122669. https://doi.org/10.1016/j.techfore.2023.122669