

ASSESSING TELEMEDICINE ADOPTION IN ZAMBIA: A NARRATIVE REVIEW OF ACCEPTABILITY AND UTILIZATION

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ABSTRACT

Introduction: Telemedicine is increasingly recognized as a solution to healthcare challenges in Zambia, particularly in addressing healthcare worker shortages, infrastructure gaps, and overcrowding. This narrative review synthesizes existing literature on the acceptability and utilization of telemedicine in Zambia, identifying key influencing factors, service providers, and areas of application. **Methods:** A narrative review approach was used, involving searches on PubMed, Google Scholar, and Scopus for literature published between 2014 - 2024. Boolean operators (AND/OR) were applied to keywords such as “telemedicine,” “acceptability,” “utilization.” Narrative review,” and “Zambia.” Grey literature from institutional reports and service provider websites was also reviewed. Nine studies met the inclusion criteria and were synthesized in this review. **Results:** The nine studies reviewed indicate growing acceptance and use of telemedicine in Zambia, particularly in neurology, mental health, HIV/TB care, and maternal health. Telemedicine support remote consultations, patient monitoring, and provider tele-mentoring. High patient and provider satisfaction was reported, especially during the COVID-19 pandemic, with users citing reduced travel and wait times. Consultation success rates were high for appropriately triaged cases, and tele-mentoring improved provider confidence and clinical outcomes. Private and donor-supported providers play a key role in expanding services. However, barriers like limited digital infrastructure, low digital literacy, and privacy concerns hinder broader adoption. **Conclusion:** Telemedicine is a promising tool for healthcare delivery in Zambia, particularly in underserved areas. However, to enhance utilization, infrastructure and policy gaps must be addressed. Strengthening digital literacy, improving connectivity, and integrating telemedicine into national healthcare systems will be critical for its expansion.

Keywords: Telemedicine, acceptability, utilization, narrative review, Zambia

INTRODUCTION

The outbreak of COVID-19 posed one of the most significant threats to the global public well-being in recent times (WHO, 2022). Despite the chaos, some services experienced notable growth. One of those services that thrived during the pandemic is telemedicine. This review examines telemedicine's acceptance, utilization, and influencing factors and maps service providers to understand their role in improving healthcare in low-resource settings with a focus on Zambia.

According to the World Health Organization Global Observatory for eHealth (2010), telemedicine is the utilization of digital communication and information technology to improve patient care and deliver clinical services remotely (WHO Global Observatory for eHealth, 2010). Using video conferencing, mobile health (mHealth) apps, and other digital health tools, telemedicine includes a variety of services such as diagnosis, consultation, treatment, and follow-up care (Asukile et al., 2022). By eliminating the need for physical travel and overcoming geographic barriers, telemedicine also seeks to increase access to healthcare, particularly for underprivileged groups, and consequently increase the effectiveness of healthcare delivery (Anawade et al., 2024).

Telemedicine is also transforming healthcare access in Zambia, addressing challenges like specialist shortages and overcrowded facilities.

METHODS

The study employed a narrative review approach to examine the acceptability and utilization of telemedicine services in Zambia. A narrative review was selected due to the emerging nature of telemedicine research in the Zambian context and the need to synthesize a broad range of literature, including peer-reviewed articles and grey literature; more rigid systematic review protocols may not capture that. Narrative reviews offer flexibility and are especially useful for mapping evolving research fields, though they are inherently less vigorous and not systematic compared to other types of reviews (Sukhera, 2022).

A literature search was conducted using PubMed, Google Scholar, and Scopus to identify relevant studies on telemedicine in Zambia. Boolean operators were applied to refine the search results. Examples of some of the search strings used in PubMed included; ("telemedicine Utilization" AND "Zambia"), ("telemedicine" AND ("acceptability" OR "utilization") AND "Zambia"), ("acceptability" AND "telemedicine" AND "Zambia"). Similar variations were applied across the other databases.

Grey literature was also reviewed to capture insights from non-indexed sources. Examples of grey literature sources included Ministry of Health Zambia reports, the Teledoctor Zambia website, the MyCare Zambia platform, the Virtual Doctors Zambia project overview, Care365 Zambia promotional and service documentation, and expert blogs. These were selected due to their relevance in documenting actual telemedicine service provision and user experiences in Zambia.

Inclusion criteria: Articles published in English between 2014 and 2024 focusing on telemedicine in Zambia, including research papers, implementation reports, program evaluations, and expert blogs. The 2014-2024 timeframe was chosen to reflect 10 years encompassing key technological advances in Zambia's health sector and the impact of the COVID-19 pandemic, which significantly influenced telemedicine uptake.

Although this review focuses specifically on telemedicine, related terms such as e-health and digital health occasionally appear in the reviewed literature. These terms are not used interchangeably but are referenced where appropriate to reflect the scope of each source. For instance, Gregory and Tembo (2017) examine the broader implementation of e-health systems in Zambia. Their study was included because telemedicine is considered a component of e-health, and their findings on infrastructure, policy gaps, and adoption barriers provide an important context for understanding the enabling environment for telemedicine.

As with any narrative evaluation, the likelihood of a selection bias cannot be eliminated. Efforts were made to minimize this by using multiple sources and clearly defined inclusion criteria.

RESULTS

Literature on telemedicine use in Zambia

Our search identified available literature pertinent to the acceptability and utilization of telemedicine in Zambia. As can be seen in Table 1, nine (9) articles were included for review. The identified literature highlights the extent to which telemedicine has been applied as an acceptable service and is being utilized in Zambia.

Table 1: Literature on telemedicine in Zambia published between 2014 and 2024

Name of Author	Year	Study focus	Methods	Sample	Communication Technology Used	How Telemedicine Was Used	Findings and Recommendations	Health Area	Country of Study
Schuster, Sindano, Theis, and Zue	2014	Documented a community health worker initiative utilizing mobile phones for referrals, follow-ups, and service outreach in rural Zambia	Pilot program, mobile health (m-health) application	33,304 household members, 6,197 household visits, 15,539 patient visits to the clinic, 1,173 follow-up appointments	Mobile phones	Used for real-time guidance, patient follow-ups, and data collection	74% of follow-up requests were completed, and 63% of cases had outcomes. Recommended scaling up mHealth for better patient tracking and follow-ups.	Malaria, Diarrhoea, Pneumonia	Zambia
Gregory and Tembo	2017	Investigated the application of e-health in developing countries, using a case study concentrating on Zambia.	Mixed-method research approach, self-administered questionnaires and interviews	302 respondents from various health facilities	E-health systems	Used to implement e-health systems in health facilities for care management; while not focused exclusively on telemedicine, the study provides insights into the foundational systems needed for its adoption.	Only 34% of facilities had adopted e-health systems. Recommendations include stronger policy implementation and structured training programs.	General Healthcare	Zambia
Khondowe and Mwila	2018	Case study with library and information science students at the University of Zambia to examine their awareness and use of	Descriptive-case study design, semi-structured questionnaires	100 students, 82 respondents achieved a response rate of 82%	Mobile phones	Used to raise awareness and deliver health information (cholera, sexual health)	63.4% of students were aware of telehealth, but only 21% actively used the services. Recommendations include better marketing and infrastructure	Cholera, Chronic Health Conditions, Sexual Health	Zambia

		telehealth services.					improvement .		
Asukile, Chishimba, and Chomba	2022	Examined the feasibility and application of teleneurology services in the context of the COVID-19 pandemic	Retrospective single-centre observational study, cross-sectional surveys	323 patients, 133 agreed to televisions, 60 completed satisfaction surveys	Telephone, WhatsApp, Zoom	Televisits conducted for neurology patients, follow-ups, and consultations	98% of patients and all the neurologists reported satisfaction with teleneurology services. Recommended teleneurology as a viable supplement, especially for follow-ups.	Neurology	Zambia
Munthali-Mulemba, Figge, and Metz.	2022	This paper examines insights and findings related to the telephone implementation of the common elements approach aimed at meeting the mental health requirements of young people in Zambia during the COVID-19 crisis.	Qualitative research method, semi-structured interviews	16 participants aged 15-29 from Lusaka	Telephone	Used to deliver mental health treatment via phone, addressing anxiety and social issues	Telehealth improved social and mental functioning but faced challenges with phone access and privacy. Recommendations include improving access to Technology and in-person follow-up.	Mental Health	Zambia
Mubanga, Fwoloshi, and Lwatula	2023	Explored the impact of a telemedicine program that links healthcare providers with specialists via virtual mentorship	Mixed-methods, retrospective program evaluation	88 health workers from 64 health facilities, 96 participants in focus group discussions	Videoconferencing	Used to link rural health providers with experts through videoconferencing for HIV/TB care	VL coverage improved by 13.24%, and TPT completions increased by 138%. Recommendations include addressing connectivity challenges	HIV, Tuberculosis	Zambia

		p and collaborative case discussions on HIV and TB services in selected health facilities in Zambia.					and providing better leadership support.		
Parham, Egemen, and Befano	2023	Implemented an assessment of a cervical screening approach in Zambia that incorporated HPV genotype and automated visual evaluation using artificial intelligence (AI).	Prospective cohort study	998 women, 35% HIV positive	Smartphone for cervical imaging	Smartphone imaging is used to collect cervical screening data and deliver AI-based evaluations.	Combining HPV genotyping with AVE improved the detection of high-risk cases. Recommendations include retraining the AVE algorithm for use with different imaging devices.	Cervical Cancer Screening	Zambia
Biemba, Chiluba, Yeboah-Antwi, Silavwe, Lunze, Mwale, Hamer, MacLeod	2020	A cluster randomized trial in Zambia's Eastern province to explore the impact of supervision and supply chain management done through mobile phones on the effective integrated community case management of common childhood illness in	Cluster randomized controlled trial (RCT)	40 health facilities, 80 CHWs, 40 staff members, 3,690 children	Mobile health (m-health) application.	Used for real-time supervision, referrals, and guidance in child healthcare	Increased supervision and mentorship coverage by 18%, but no significant impact on stockouts. Recommendations include extending the implementation period to see greater results.	Malaria, Diarrhoea, Pneumonia	Zambia

		children aged 2 to 59 months.							
Swanson, Plotner, Franklin, Swanson, Lokomba Bolamba, Lokangaka, Sayury Pineda, Figueroa, Garces, Muyodi, Esamai, Kanaiza, Mirza, Naqvi, Saleem, Mwenechanya, Chiwila, Hamsumonde, McClure Goldenberg, and Nathan..	2016	Examined if an online quality assurance method could improve obstetric ultrasound services in five developing countries in Africa and Asia. Though a multi-country study, it includes Zambia among its study sites. It demonstrates how a web-based telemedicine tool for remote quality assurance significantly improved obstetric ultrasound services, highlighting the applicability of telemedicine in enhancing maternal health	Pilot study using an online quality monitoring tool with remote oversight	41 newly trained sonographers and over 3,800 ultrasound exams	Web-based tool for image upload and email notifications	Remote quality assurance (QA) through image review and feedback by experts	Significant improvement in ultrasound quality; unsatisfactory exams reduced from 21.5% to 10%	Obstetrics and pregnancy outcomes	Democratic Republic of the Congo, Guatemala, Kenya, Pakistan, Zambia

		care and provider performance in the Zambian context.							
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In summary, out of the nine studies reviewed, six studies (67%) [Studies 1,4,5,7,8,9] involved actual service delivery through telemedicine (Asukile et al., 2022; Biemba et al., 2020; Mubanga et al., 2023; Munthali-Mulemba et al., 2022; Parham et al., 2023; Schuster et al., 2014), including consultations, treatment, and diagnostic support. Four studies out of nine (44%) [Studies 1,4,7,8] included client monitoring where patients and community members were tracked and followed up remotely (Asukile et al., 2022; Biemba et al., 2020; Parham et al., 2023; Schuster et al., 2014), while three studies out of nine (33%) [Studies 2,3,5] focused on client education where health information was provided to patients and communities (Gregory & Tembo, 2017; Khondowe & Mwila, 2018; Munthali-Mulemba et al., 2022). Finally, five studies out of nine (56%) [Studies 2,6,7,8,9] examined provider education (Biemba et al., 2020; Gregory & Tembo, 2017; Mubanga et al., 2023; Parham et al., 2023; Swanson et al., 2016) through the provision of training or mentorship aimed at enhancing the quality of services they offered. These findings indicate that most telemedicine applications in Zambia have concentrated on service delivery and provider education, with a few emphasizing client education and monitoring.

Selected telemedicine service providers in Zambia

Telemedicine services in Zambia have varied levels of acceptance and utilization across different platforms. Table 2 below analyses some telemedicine providers in Zambia, namely, Virtual Doctor Project (Phiri & Fundafunda, n.d), Teledoctor Zambia (Teledoctor Zambia, 2024), MyCare Zambia (MyCare Zambia, 2024), PruCare24 and Care365 Zambia (Care365 Zambia, 2024). The Morehouse School of Medicine/National Centre for Primary Care (MSM/NCPC) operates in Zambia through a telemedicine hub-and-spoke model focused on HIV care. It is a project-based initiative implemented in collaboration with local partners since 2021 rather than a long-standing standalone provider (Morehouse School of Medicine, n.d.)

Table 2 Analysis of some telemedicine service providers in Zambia

Objective	Provider					
	Teledoctor Zambia	Care365 Zambia	Morehouse School of Medicine/National Centre for Primary Care (MSM/NCPC)	MyCare Zambia	Virtual Doctors	PruCare24
Acceptability and utilization	Virtual consultations with over 500 licensed professionals. Users can book appointments and access healthcare via video or chat.	Online consultations, primary care, and mental health services are available. The ability to book appointments and message care teams enhances the platform's accessibility.	NCPC's hub-and-spoke telemedicine program in Zambia has shown high acceptability with a 96% appointment adherence rate, serving over 5,000 HIV patients since 2021.	Offers an easy-to-use mobile platform for virtual consultations and appointments.	Connects rural health centers in Zambia with UK-based volunteer doctors through a mobile app.	Provides 24/7 access to telemedicine services via telephone, improving convenience for Prudential clients
Adoption Factors	Offers mobile payment options (e.g., mobile money), though connectivity and digital literacy may limit usage in rural areas.	The app supports easy access through mobile devices, though infrastructure limitations (connectivity) could affect rural adoption.	Real-time video consultations, though broader infrastructure and policy integration, are key challenges.	Integrates pharmacies, labs, and hospitals into a unified system.	Mobile vans fitted with satellite communication system, app-based	It leverages telephone communication, which is widely accessible, but phone network reliability may affect rural utilization. Partnership with iVitals strengthens its adoption potential.
Service providers and Technology	App-based, enabling remote consultations, prescriptions, and referrals	App-based, offering chat and video consultations.	Employs video telemedicine, linking multiple sites and specialists to improve HIV care delivery across hospitals and community facilities.	Mobile app-based, connects patients with doctors.	Mobile app-based, real-time medical consultations	Telephone-based consultations, supported by ProMed Smart Cards, allow clients to access specialists at any time.

Service range	General healthcare, chronic conditions, and mental health. Including follow-up care, management of chronic illnesses, and support for mental health	Mental health and therapy services, in addition to primary care	HIV management and treatment adherence support incorporates mental health support.	By integrating various healthcare services, MyCare can improve outcomes in primary care and chronic disease management.	Diagnosis, management, and treatment.	Remote diagnosis, treatment, and management of chronic patients, reducing healthcare.
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Utilization, Satisfaction, and Clinical Outcomes of Telemedicine in Zambia

Statistical data extracted from the reviewed studies (Table 3) show promising utilization, satisfaction, and treatment outcomes associated with telemedicine services in Zambia. In the teleneurology study, 60% of scheduled patients were successfully reached by phone, of whom 92% were confirmed alive, and 74% consented to virtual consultations. Satisfaction levels were notably high, with 98% of patients and 100% of providers expressing satisfaction. Furthermore, 81% of these virtual consultations were successfully managed remotely, while only 19% required follow-up, indicating strong clinical efficacy (Asukile et al., 2022). In the integrated community case management (iCCM) study by Biemba et al. (2020), the appropriate treatment of illnesses among children under five was slightly higher in the intervention group (66%) compared to the control group (63%). Similarly, the ECHO tele-mentoring program (Mubanga et al., 2023) demonstrated improvements in provider knowledge (66%) and clinical practice (67%) related to HIV and TB care. Collectively, these findings suggest that telemedicine in Zambia is both feasible and acceptable, yielding positive outcomes in patient engagement, provider performance, and clinical care delivery.

Table 3: Summary Utilization, Satisfaction, and Treatment Metrics from Selected Telemedicine Studies in Zambia

Indicator	Group	Sample size	Number (n)	Proportion (%)	Source
Patients reached by telephone	All scheduled patients	323	195	60	Asukile, Chishimba, and Chomba (2022)
Patients alive among reachable	Reachable patients	195	179	92	Asukile, Chishimba, and Chomba (2022)
Patients who agreed to television	Alive patients	179	133	74	Asukile, Chishimba, and Chomba (2022)
Patient satisfaction with teleneurology services	Teleneurology patients (surveyed)	60	59	98	Asukile, Chishimba, and Chomba (2022)
Provider satisfaction with teleneurology services	Neurologists (surveyed)	7	7	100	Asukile, Chishimba, and Chomba (2022)
Consultations successfully managed remotely	Teleneurology patients	133	108	81	Asukile, Chishimba, and Chomba (2022)
Consultations requiring in-person follow-up	Teleneurology patients	133	25	19	Asukile, Chishimba, and Chomba (2022)
Appropriate treatment of U5 illness (iCCM)	Intervention	1899	1252	66	Biemba, Chiluba, Yeboah-Antwi, Silavwe, Lunze, Mwale, Hamer, M. (2020)
	Control	1791	1134	63	
Improved HIV/TB clinical practice (proxy for quality)	ECHO participants	70	47	67	Mubanga, Fwoloshi, and Lwatula (2023)
Improved HIV/TB provider knowledge (proxy for quality)	ECHO participants	70	46	66	

DISCUSSION

Telemedicine acceptance and usage trends in Zambia

Available literature has shown that telemedicine is increasingly accepted and used in Zambia, especially in settings where access to in-person care is restricted. The study on the teleneurology clinic showed high acceptance levels of telemedicine in both service users (98%) and service providers (100%) (Asukile et al., 2022). The utilization of telemedicine is also demonstrated in the provision of health services to address common childhood illnesses through the application of mobile health technologies (Schuttner et al., 2014). Growing acceptability as well as utilization of telemedicine services is further corroborated by service providers like Teledoctor Zambia and Virtual Doctors who have shown that telemedicine is a practical method to provide healthcare by highlighting the convenience and accessibility of their services. This suggests that more Zambians are embracing telemedicine due to benefits such as shorter travel times and

reduced costs (TechTrends, 2023), as one can consult with a health specialist from the comfort of their home. This is especially impactful in Zambia, where patients often face long travel distances, costly transportation, and long wait times, barriers that telemedicine effectively addresses.

There are many studies conducted elsewhere that align with findings from the Zambian studies on patient and provider satisfaction with telemedicine services. In Rwanda, a telemedicine initiative resulted in positive health results for patients with elevated blood sugar levels compared to conventional care (Onsongo et al., 2024). In addition, a recent systematic review (Pandey & Malik, 2024) highlighted the growing adoption of telemedicine in the treatment of chronic conditions. Similar findings were reported in Ethiopia, where patients demonstrated a high willingness to use telemedicine for chronic disease management (Belachew et al., 2023). Telemedicine has also been found to reduce travel costs and improve access to healthcare specialists (Onsongo et al., 2024). All these studies emphasize the promise that telemedicine holds for improving healthcare outcomes in resource-limited settings like Zambia, especially when deployed for follow-up care and chronic disease management.

Further, telemedicine has been accepted as an effective strategy for linking health experts dispersed in different locations with healthcare providers working in underserved rural facilities using videoconferencing for tele-mentoring, ultimately resulting in better health outcomes such as improvements in viral load coverage in people on HIV treatment and enhanced compliance with tuberculosis preventive therapy (Mubanga et al., 2023). Global literature on the impacts of the ECHO model corroborates the Zambian study. For instance, one study (Arora et al., 2017) also illustrated how ECHO connects rural providers with specialists, leading to improved healthcare capacity and, hence, a reduction in the need for referrals for specialist care in distant health centers and ultimately improved services delivery outcomes (Olawade et al., 2024; Phan et al., 2022; Smith & Badowski, 2021). All these research efforts emphasize some of the key elements driving the increasing use of telemedicine in resource-constrained countries like Zambia.

Studies support Mubanga et al.'s (Mubanga et al. 2023) findings on telemedicine's role in linking rural providers with specialists, particularly through Project ECHO. A Georgian initiative improved HIV care through tele-mentoring (Arora et al., 2017). Rural areas still lack access due to poor infrastructure, highlighting the need for targeted solutions.

Medical Fields Adopting Telemedicine in Zambia

Literature consulted indicates that telemedicine has witnessed an increase in utilization across various medical fields in Zambia, especially in areas such as mental health, neurology, sexual health, HIV care, tuberculosis prevention, malaria, diarrhoea and pneumonia (Asukile et al., 2022; Biemba et al., 2020; Gregory & Tembo, 2017; Khondowe & Mwila, 2018; Mubanga et al., 2023; Munthali-Mulemba et al., 2022; Parham et al., 2023; Schuster et al., 2014; Swanson et al., 2016). This expansion may be fuelled by

the emphasis on these health issues in national policies and funding priorities (Ministry of Health, 2022). Remote consultations find particular success in specialties such as mental health and neurology, as evident from the teleneurology clinic launched during the COVID-19 pandemic (Asukile et al., 2022).

In Zambia's resource-constrained environments, telemedicine improves healthcare delivery by allowing specialists to oversee treatments for conditions like HIV and tuberculosis from a distance, minimizing the need for patient travel. Initiatives like Project ECHO also promote the use of telemedicine by providing virtual training and mentorship. Furthermore, telemedicine is a good fit with Zambia's digital health strategy, facilitating its incorporation into the healthcare framework (Ministry of Health, 2022).

Telemedicine has strengthened access to specialized medical services in remote regions, overcoming geographical obstacles through mobile Technology and videoconferencing (Dodoo et al., 2022). The ECHO initiative has effectively broadened healthcare availability in sub-Saharan Africa (Arora et al., 2017; Mubanga et al., 2023). In addition, the COVID-19 pandemic highlighted the importance of telemedicine, demonstrated by the successful rollout of teleneurology (Asukile et al., 2022; Monaghesh & Hajizadeh, 2020).

Factors Influencing Adoption and Utilization of Telemedicine in Zambia

The review of the literature reveals that several factors influence the adoption and utilization of telemedicine in Zambia. In this section, we discuss some of the main ones;

Infrastructure Barriers

Infrastructure limitation, especially rural Zambia, continue hinder telemedicine effectiveness and adoption (Biemba et al., 2020; Mubanga et al., 2023; Munthali-Mulemba et al., 2022; Schuttner et al., 2014). The lack of reliable electricity and telecommunications infrastructure further restricts digital health solutions (Kala, 2023). Addressing these challenges is important to expanding telemedicine services in Zambia (Kala, 2023; Muyunda & Mpundu, 2023).

Technology and Digital Literacy

Low digital literacy among both patients and providers also hampers telemedicine uptake (Gregory & Tembo, 2017; Khondowe & Mwila, 2018). While WhatsApp and Zoom are accessible, their effective use requires technical skills. Training and education on telemedicine tools are necessary, similar to findings from Malaysian studies where perceived ease of use influenced adoption (Tan et al., 2024).

Trust and privacy Concerns

Patients often hesitate to use telemedicine due to concerns about data privacy (Munthali-Mulemba et al., 2022; Paul et al., 2023). The lack of clear data protection policies increases these fears. Finding private spaces for virtual consultations is another challenge, particularly in shared living environments (Paul et al.,

2023). These issues mirror challenges faced in other African regions (Ansarian & Baharlouei, 2023; Breton et al., 2021; Houser & Foster, 2022), highlighting the need for stronger infrastructure and privacy safeguards.

Policy Support and Institutional Backing

Telemedicine's growth in Zambia is constrained by weak institutional frameworks and inadequate policy enforcement (Gregory & Tembo, 2017; Mubanga et al., 2023; Swanson et al., 2016). While Zambia has taken initial steps towards regulating telemedicine, most notably through the Health Professions Council of Zambia (HPCZ) Telemedicine Practice Guidelines, gaps in enforceable policy frameworks and institutional capacity persist. According to Gregory and Tembo (2017), only 34% of health facilities had implemented e-health systems, a critical foundation for telemedicine. Muyunda and Mpundu (2023), in their content analysis, acknowledged the value of HPCZ guidelines in outlining standards for provider conduct, consent, confidentiality, and digital record-keeping. However, they note that these guidelines are not yet supported by binding legislation and lack integration with broader digital health, financing, and ICT policy. Zambia still requires a cohesive regulatory framework (VillageReach, 2023) that governs licensing, reimbursement, cross-border service provision, and data governance. Without such alignment, telemedicine adoption risks remaining piecemeal and uneven across the health system.

Public Awareness

Despite the high awareness of telemedicine, its usage remains low. Khondowe and Mwila found that while 63.4% of university students were aware of telehealth, only 21% used it (Khondowe & Mwila, 2018). Barriers such as internet connectivity, high data costs (Chipps et al., 2012), and concerns over privacy (Chipps et al., 2012) deter users. Additionally, cultural preferences for in-person healthcare contribute to low adoption (Mars, 2013).

Demographic Disparities

Urban populations are more likely to use telemedicine due to better technological access, while rural communities face significant challenges, exacerbating existing healthcare inequalities (Kala, 2023; Khondowe & Mwila, 2018). Research by Haimi (2023) confirms that limited broadband and digital literacy widen the gap in telemedicine accessibility between rural and urban areas (Haimi, 2023).

Therefore, it's important to address these barriers through infrastructure development, digital literacy programs, strong policies, and public awareness campaigns to scale up telemedicine accessibility and utilization in Zambia.

Common technologies used to deliver telemedicine services in Zambia

Based on the literature reviewed and the analysis of the content from the various providers' websites, a range of ICTs are used to deliver telemedicine services in Zambia. Common tools include mobile applications, WhatsApp, and videoconferencing platforms like Zoom. During the COVID pandemic,

telephone services played an important role in mental health interventions (Munthali-Mulemba et al., 2022). Mobile phones have been widely utilized for real-time patient monitoring, follow-ups, and data collection in rural healthcare settings, assisting in the management of malaria, Diarrhea, and pneumonia (Biemba et al., 2020). Similarly, Khondowe and Mwila used mobile phones to disseminate telehealth information on cholera and sexual health (Khondowe & Mwila, 2018).

Smartphones have also been used for cervical screening (Parham et al., 2023) and teledermatology consultations (Okita et al., 2016). Additionally, web-based tools such as electronic health record portals and teleconsultation software support real-time consultations and patient monitoring (Houser & Foster, 2022). Videoconferencing has been instrumental in the ECHO tele-mentoring initiative for HIV and TB treatment (Mubanga et al., 2023). However, limited smartphone (36%) and internet (31.2%) penetration (Statista, 2024) hinder widespread adoption, necessitating both phone-based telemedicine and digital literacy investments.

Comparative analysis of Telemedicine in Zambia vs Other African countries

This narrative review confirms that Zambia is experiencing growing acceptance and use of telemedicine, particularly in specialties such as neurology, mental health, HIV/TB care, and maternal health. The high satisfaction rates reported in Zambia, 98% among patients in telenuerology services, and significant improvements in treatment linkage and follow-up rates in rural mobile health interventions reflect similar findings across sub-Saharan Africa, where telemedicine is increasingly seen as a viable solution to healthcare access challenges in resource-constrained settings (Asukile et al., 2022; Schuster et al., 2014; Onsongo et al., 2024).

When compared with other African countries, Zambia's telemedicine experience aligns with broader continental trends in terms of determinants of acceptability and utilization. Healthcare provider attitudes, particularly perceptions of usefulness and workload relief, are critical to adoption, as demonstrated in Zambia's Project ECHO tele-mentoring model for HIV/TB services (Mubanga et al., 2023). This mirrors similar findings from South Africa and Central Africa, where provider willingness is influenced by ease of use and the clinical relevance of teleconsultation platforms (Phorah & Motsi, 2025; Rodríguez-Ortega et al., 2025). Likewise, patient acceptance in Zambia has been high, particularly where telemedicine mitigates transportation barriers, and long wait times, factors also cited in Ethiopian and Rwandan studies as motivating patient willingness to adopt remote care (Belachew et al., 2023; Onsongo et al., 2024).

In terms of utilization patterns, Zambia has witnessed growth in both provider-to-patient (e.g., telenuerology, telepsychiatry) and provider-to-provider (e.g., Project ECHO) models, with common technologies including mobile phones, WhatsApp, Zoom, and telephone-based services. This technological mix is comparable to models observed across the continent, where most countries rely on mobile telephony and basic telehealth platforms due to infrastructure constraints (Mars, 2013; Doodoo et al., 2022). Zambia, however, distinguishes itself through the early integration of artificial intelligence (AI) in cervical cancer

screening (Parham et al., 2023) and a structured, high-adherence virtual mentorship program in HIV care, features not yet widely institutionalized in other sub-Saharan contexts.

Despite these advances, Zambia shares many of the same systemic barriers found elsewhere in Africa. Poor internet connectivity, inconsistent electricity supply, and weak policy enforcement significantly constrain the scaling of telemedicine services (Gregory & Tembo, 2017; Matrix Science Pharma, 2023). As in other African countries, legal and regulatory gaps, particularly concerning data privacy and security, deter patient engagement, while low digital literacy among both providers and users hampers technology uptake (Paul et al., 2023; Ansarian & Baharlouei, 2023). Although Zambia's Ministry of Health has published a digital health strategy (2022-2026), its implementation remains partial and fragmented.

Furthermore, disparities in telemedicine access persist along urban-rural lines. Urban populations in Zambia are more likely to engage with app-based and video consultation platforms due to better smartphone and internet access. In contrast, rural areas remain reliant on voice calls and community health worker-mediated services (Khondowe & Mwila, 2018). This rural-urban divide is consistent with findings across sub-Saharan Africa, where broadband access and infrastructure continue to shape usage patterns and deepen health equity gaps (Haimi, 2023).

Zambia's experiences underscore several critical insights for future telemedicine scale-up in Africa. First, integrated telermentoring models, such as Project ECHO, offer a practical and scalable solution to improving rural healthcare provider capacity. Second, given the infrastructural constraints, mobile-friendly, low-bandwidth platforms should be prioritized. Third, policy frameworks must be translated into enforceable standards supported by investment in connectivity, digital literacy, and community engagement.

In summary, while Zambia mirrors the broader African telemedicine landscape in many respects, it offers notable innovations and satisfaction outcomes that can inform regional best practices. However, without deliberate investment in infrastructure, regulation, and public awareness, telemedicine's potential to transform healthcare delivery in Zambia and Africa more broadly may remain unrealized.

CONCLUSION

This narrative review sought to synthesize available literature on the acceptability and utilization of telemedicine services in Zambia, covering the period 2014 to 2024. The review identified nine relevant studies that indicate the growing acceptance and utilization of telemedicine in the country, particularly in neurology, HIV/TB care, mental health, and chronic disease management. High levels of patient satisfaction, such as the 98% approval rate reported in teleneurology services, alongside improved treatment adherence and clinical outcomes in initiatives like Project ECHO and mobile health-enhanced supervision models, point to telemedicine's strong potential to transform healthcare delivery. The country's evolving telemedicine landscape includes providers such as Teledoctor Zambia, Virtual Doctors, MyCare Zambia, and the ECHO tele-mentoring program, employing technologies like mobile phones, WhatsApp, Zoom, and AI-enabled diagnostic tools for services such as cervical cancer screening. Despite these advances,

adoption remains limited in rural areas due to infrastructure challenges, low digital literacy, and privacy concerns.

Furthermore, while mobile phone penetration is relatively high (78.7%), the expansion of more sophisticated telemedicine platforms is hampered by low smartphone (36%) and internet penetration (31.2%) (Statista, 2024)%. To fully realize the potential of telemedicine in Zambia, strategic investment in digital infrastructure, provider training, regulatory harmonization, and public engagement is necessary. These efforts will not only enhance service delivery but also position Zambia as a leader in leveraging telemedicine for equitable healthcare access in resource-limited settings.

RECOMMENDATIONS

Drawing from the findings of this review, the following is recommended to broaden the available literature and to facilitate the scale-up of telemedicine in the country;

- Undertake future research that reviews telemedicine studies beyond the 2014 to 2024 period covered in this review in order to capture earlier initiatives and recent developments that may not have been documented in the selected window.
- Conduct a systematic review of telemedicine studies in Zambia to better understand the evolution, trends, and long-term outcomes of telemedicine interventions over time.
- Integrate telemedicine into routine public health services through national health policy frameworks.
- Provide training for healthcare providers and community health workers in digital literacy
- Reduce internet and mobile data costs through regulatory reforms and subsidies.
- Promote access to smartphones and basic digital tools through public-private partnerships.
- Expand partnerships between government and private platforms to deliver telemedicine to underserved areas.

To conclude, future research should assess not only the affordability and sustainability of telemedicine platforms but also the effectiveness of interventions aimed at improving digital literacy and connectivity in underserved areas, alongside the development of comprehensive policy frameworks to guide equitable scale-up.

Conflicts of Interest

The authors declare no conflicts of interest.

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