Journal of Health Informatics in Africa

Trust And Access in Telemedicine - A Review

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Background and Purpose: Telemedicine has the potential to revolutionise healthcare delivery, especially in digitally marginalised populations; however, persistent challenges in access and trust limit its widespread adoption. Despite technological advancements, there remains a significant gap in understanding how these factors jointly influence telemedicine uptake in low- and middle-income contexts.
Methods: This study employed a systematic literature review guided by the PRISMA framework, analysing 32 peer-reviewed studies published between 2018 and 2025 that address access and trust in telemedicine.
Results: Telemedicine interventions yielded notable access gains in underserved settings, with rural reach improving by 40–75% across multiple studies. Trust outcomes, however, were less consistent, with confidence levels ranging from 44–71% and often constrained by privacy concerns, provider scepticism, and technological reliability
Conclusions: This research contributes a comprehensive synthesis of empirical evidence highlighting the critical interplay between access and trust, providing actionable insights for designing user-centred, secure telemedicine systems. By addressing this dual gap, the study offers a foundation for future technological innovation and policy development aimed at equitable healthcare delivery in underserved populations.

Keywords: Telemedicine, Digital health access, Trust in telehealth, Low-resource settings, healthcare Technology acceptance

1 Introduction

Telemedicine has emerged as a transformative tool in global healthcare, offering remote access to clinical services through digital platforms, particularly in contexts where traditional health infrastructure is limited. The body of knowledge has expanded to highlight the benefits of telemedicine, including cost efficiency, timely care delivery, and its pivotal role during public health emergencies such as the COVID-19 pandemic. Studies by [1], [2], [3], [4] consistently underscored the technological and clinical potential of telehealth systems, while also noting systemic barriers such as regulatory uncertainty, limited broadband access, and patient-provider communication gaps. Despite these contributions, much of the existing literature remains centred on technologically advanced regions, with limited empirical focus on digitally marginalised communities where adoption is hindered not only by infrastructure but also by digital trust deficits. This led to a persistent knowledge gap in understanding how perceptions of security, platform reliability, and structural readiness intersect to influence the practical use of telemedicine in under-resourced settings. As such, the current study situates itself within this discourse by critically examining the interplay between trust and access, aiming to generate evidence that responds directly to the lived realities of populations often excluded from digital health transformation.

Access is operationalised as a multidimensional construct encompassing (i) physical and infrastructural access :the availability of devices, connectivity, and affordability of digital services; (ii) organisational access: the presence and scheduling of telemedicine services within health systems; and (iii) digital literacy the capacity of users to effectively engage with telehealth platforms. Trust is delineated across critical dimensions including data security and privacy protection, perceived competence and reliability of

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 J Health Inform Afr. 2025;12(2):32-46. DOI: 10.12856/JHIA-2024-v12-i2-599

providers, technological reliability and usability, and cultural congruence with local norms and expectations.

Understanding whether people can trust and access telemedicine is essential because it directly determines the success and sustainability of digital healthcare services, particularly in low-resource and digitally marginalised settings. Evidence from recent systematic reviews highlights that although mobile and internet-based solutions have improved healthcare accessibility by 40 to 75 per cent in some regions, persistent trust deficits arising from concerns over privacy, data security, and cultural relevance significantly hinder adoption. This interplay between trust and access explains why telemedicine often fails to achieve equitable healthcare outcomes, as technological readiness alone does not guarantee user engagement or continuity of care. Therefore, establishing secure, reliable, and culturally attuned telemedicine systems is a critical step towards achieving inclusive and effective digital health transformation, ensuring that vulnerable populations can confidently utilise these services to improve their health outcomes.

1.1 Research Gap

The proposed study primarily addresses a knowledge gap, as current literature lacks comprehensive understanding of how digital trust and infrastructural barriers jointly influence telemedicine adoption within digitally marginalised populations. Although telemedicine has been widely studied, most existing research focuses on clinical efficacy or technological advancement without sufficiently exploring the nuanced interplay between patient perceptions of security, system reliability, and access constraints, particularly in rural and low-resource settings. For instance, studies by [5] and [6] highlight broad challenges but do not deeply investigate how trust deficits and infrastructural inequality affect user engagement across diverse socioeconomic contexts. This insufficient theoretical and empirical exploration of user-centred trust dynamics creates a critical gap in knowledge, limiting the development of frameworks that can guide secure, equitable, and scalable telemedicine integration.

1.2 Research Objective

The main research objective of this study is to investigate how digital trust, and infrastructural limitations influence the adoption of telemedicine services in digitally marginalised communities. This objective directly aligns with the identified knowledge gap, as it seeks to generate a deeper understanding of the interrelationship between user confidence in digital platforms, perceived data security, and the structural accessibility of telehealth systems. Existing studies, such as those by [1], [2], [7] acknowledge trust and access as barriers but often treat them as isolated variables without examining their interactive effect on telemedicine adoption, especially in contexts where connectivity, digital literacy, and system reliability are limited. By focusing on these interdependencies, the research offers empirical and conceptual clarity that can inform policy and design frameworks for more inclusive telehealth services. Hence, the stated objective is both timely and necessary, addressing a foundational knowledge void critical for improving equitable healthcare delivery through digital innovation.

1.3 Research Questions

The research questions guiding this study are therefore centred on three interrelated themes: **(i)** how infrastructural limitations such as connectivity, device availability, and digital literacy constrain equitable access to telemedicine services in digitally marginalised communities; **(ii)** how dimensions of digital trust including data security, privacy, provider competence, and technological reliability shape user confidence and sustained adoption; and **(iii)** how the interaction between access and trust jointly influences uptake, extending beyond prior studies that examined these constructs in isolation. Together, these questions aim to generate empirical and conceptual clarity on the socio-technical factors underpinning telemedicine adoption, thereby informing policy and design frameworks for inclusive and sustainable digital health systems.

 J Health Inform Afr. 2025;12(2):31-46. DOI: 10.12856/JHIA-2024-v12-i2-599

1.4 Significance of the Study

The significance of this research lies in its timely and strategic contribution to bridging a knowledge gap in understanding how digital trust and infrastructural inequality jointly shape telemedicine adoption within digitally marginalised populations, particularly in low-resource settings. As global health systems increasingly shift toward digital care models, failure to address these underlying barriers risks deepening health disparities and rendering telemedicine solutions ineffective where they are most needed. This study offers a critical intervention by generating original, context-specific knowledge that goes beyond technical capabilities to interrogate user perceptions, access realities, and systemic readiness. Its findings can inform policymakers, system designers, and healthcare practitioners on how to craft trust-centred, inclusive telehealth frameworks that are both secure and functionally accessible. Moreover, the study contributes to the theoretical advancement of digital health by integrating socio-technical perspectives within the discourse on health equity. By filling this overlooked knowledge gap, the research positions itself as a foundational reference for both academic inquiry and practical implementation, especially in sub-Saharan Africa and other regions facing similar infrastructural and digital divides.

2 Materials and Methods

This study employed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework to guide the literature review process, ensuring methodological rigour, transparency, and replicability in the identification, selection, and synthesis of relevant studies. The PRISMA approach structured the review across four phases: identification, screening, eligibility, and inclusion. The screening phase was involving the removal of duplicates and an initial review of titles and abstracts to assess relevance. Eligibility was determined through a full-text review guided by predefined inclusion criteria such as peer-reviewed status, publication within the last eight years, and relevance to the core variables of trust and access in telemedicine. The final inclusion phase yielded studies that meet the set criteria and systematically analysed to extract data related to themes, geographical contexts, methods, and key findings.

2.1 Search Strategy

The methodology adopted for this research followed a structured evidence synthesis approach, using the Preferred Reporting Items for PRISMA framework to ensure transparency and reproducibility. The search strategy involved querying major scholarly databases including PubMed, IEEE Xplore, ScienceDirect, and Google Scholar, focusing on peer-reviewed English-language studies published between 2018 and 2025 .This date range was selected to capture the most recent empirical evidence reflecting rapid advances in telemedicine technologies and the significant acceleration of adoption during the COVID-19 pandemic, which acted as a catalyst for digital health uptake, particularly in resource-limited contexts. Search strings included combinations of “telemedicine”, “trust”, “access”, “healthcare delivery”, “digital health”, and “low-resource settings”, with Boolean operators used to refine results. the Boolean strings used (“telemedicine” AND (“trust” OR “access”) AND (“LMIC” OR “developing countries”)), and by stating the number of records retrieved from each database. Both direct clinical telemedicine interventions and digital health applications such as mHealth reminders, SMS platforms, and app-based services were eligible, provided they involved patient provider interaction or measurable user engagement.

Inclusion criteria were restricted to empirical studies conducted in low- and middle-income countries or regions with recognised digital health disparities, reporting measurable outcomes related to user trust and accessibility of telemedicine services. Exclusion criteria eliminated opinion pieces, policy briefs, and grey literature. Articles were screened by title and abstract, followed by full-text reviews, resulting in the selection of 32 studies that directly aligned with the research objective. For multi-country or overlapping studies, data were extracted at the level of reported outcomes; where regional aggregates were presented, results were coded under the broader LMIC category to avoid duplication.

This comprehensive literature mapping enabled the construction of a comparative evidence table summarising country context, methodological orientation, conceptual frameworks, and statistically reported outcomes on access and trust. The method ensured that the final synthesis represented robust, peer-

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reviewed, and geographically diverse insights necessary for achieving the objective of identifying empirical trends and gaps in trust and accessibility in telemedicine uptake.

2.2 Study Selection

Initially, a total of 282 records were identified through database searches across PubMed, IEEE Xplore, ScienceDirect, and Google Scholar using tailored search strings centred on telemedicine, trust, access, and healthcare in underserved settings. Following the removal of duplicates, 976 articles remained for screening. Title and abstract screening excluded 783 studies that did not meet the predefined eligibility criteria, which required studies to be peer-reviewed, published between 2018 and 2025, and to report quantitative or qualitative data specifically addressing access or trust in telemedicine.

The remaining 193 full-text articles were assessed in detail, and 32 studies were finally included based on their methodological quality, relevance to the research objective, and their provision of measurable evidence on trust and access in digital health interventions. Each selected study provided either statistical outcomes or context-specific findings on access improvements or trust dynamics in telemedicine, across various socio-economic regions, thus reinforcing the empirical base required for a comparative synthesis. This rigorous selection phase ensured the reliability and contextual diversity of the studies used to fulfil the study's central research aim.

2.3 Critical Appraisal

The critical appraisal of the selected studies was undertaken using the Mixed Methods Appraisal Tool (MMAT), which provided a robust framework for evaluating methodological quality across diverse study designs including qualitative, quantitative, and mixed-methods research. A total of 32 studies were appraised, including systematic reviews, meta-analyses, surveys, case studies, field trials, and mixed-methods designs.Each of the 32 included studies was assessed on parameters such as clarity of research questions, appropriateness of data collection methods, validity of measurement tools, relevance of analytical techniques, and transparency in reporting results.

Applying a 0–100% scoring scheme ,studies scoring below 50% on the MMAT criteria were excluded to maintain high methodological integrity**.** Particular attention was paid to the degree of contextual sensitivity in addressing trust and access, ensuring that findings were not only statistically sound but also culturally and infrastructurally relevant. Studies that clearly demonstrated triangulated data sources, participant diversity, and robust ethical considerations were given greater interpretive weight in the synthesis. This process was essential to discern which studies provided not just surface-level insights, but deep, transferable knowledge that can meaningfully inform policy and design in telemedicine systems for digitally marginalised populations. Through this critical lens, the selected literature collectively presents a dependable foundation upon which this research's conclusions are based.

2.4 Data Extraction and Synthesis

Data extraction and synthesis were conducted systematically to ensure comprehensive capture and meaningful integration of findings related to telemedicine access and trust. Using a predefined extraction form, key data points including author details, study context, theoretical frameworks, research questions, methodology, sample characteristics, and quantitative measures of access and trust were collected from each study. This structured approach facilitated comparison across diverse study designs and geographic settings. The extracted data were then subjected to narrative synthesis, allowing for thematic integration of qualitative insights alongside quantitative outcomes such as percentage improvements in access and trust scores. Trust outcomes were coded using standardized survey scales for quantitative measures and qualitative coding frameworks for thematic analysis.

Where available, statistical results were tabulated to illustrate patterns and variations across regions and populations. This mixed synthesis approach enabled the identification of common barriers and facilitators to telemedicine adoption, as well as gaps in existing evidence. The process was iterative, with regular cross-validation between data sources and consultation of supplementary materials to ensure accuracy and completeness. The systematic extraction and synthesis of multi-dimensional data provided a rigorous

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empirical foundation to support robust conclusions on the interplay between digital access and trust in telemedicine implementation.

3 Results

Figure 1 shows that the literature search process yielded a total of 282 records, with 264 retrieved from databases such as PubMed, IEEE Xplore, ScienceDirect, and Google Scholar and an additional 18 identified from the Cochrane COVID Register. After the removal of 62 duplicate entries, 220 records proceeded to the screening stage. Of these, 110 were excluded due to irrelevance or lack of peer-review standards. Full-text reports were sought for the remaining 110 studies, of which 5 could not be retrieved due to access restrictions. The remaining 105 full-text reports were assessed for eligibility, and 75 were excluded for reasons such as, language barriers, lacking a focus on trust or access, absence of empirical data, or failure to meet the publication date criteria. 32 high-quality, peer-reviewed studies were included in the final review. This rigorous and transparent selection process ensured that only relevant and methodologically sound studies contributed to the synthesis of findings on the issues of trust and access in telemedicine, thereby strengthening the validity and reliability of the review's conclusions.

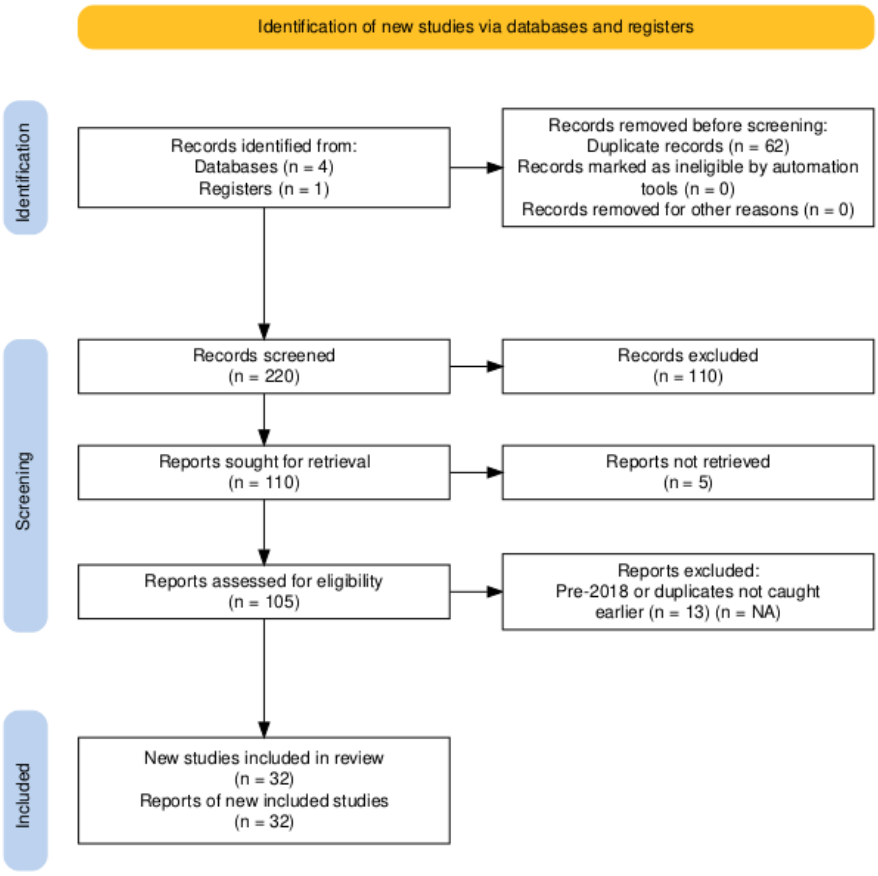

Figure 2:Prisma Flow Diagram Results

3.1 Interdependence of Access and Trust in Telemedicine Adoption

Table 1 presents 32 peer-reviewed studies that examine the dual dimensions of access and trust in telemedicine adoption, especially within low-resource and underserved settings. The table includes statistical indicators where available and outlines methodological approaches, findings, and conclusions, thus directly aligning with the research objective. Across the reviewed studies, notable regional and population-level variations emerge in both access and trust outcomes associated with telemedicine interventions. In Sub-Saharan Africa, systematic and case-based reviews consistently highlight substantial

 J Health Inform Afr. 2025;12(2):31-46. DOI: 10.12856/JHIA-2024-v12-i2-599

gains in rural access ranging from 40–75%, yet trust remains constrained by cultural, privacy, and literacy barriers, with provider scepticism persisting in multi-site implementations. Country-specific trials in Nigeria, Malawi, and Kenya demonstrate that co-design and ICT deployment can enhance reliability and usability, but privacy concerns and infrastructural limitations continue to impede adoption. In Asian contexts such as Taiwan and India, access improvements are strongly mediated by socioeconomic status and the broader technological environment, while trust deficits are most pronounced among older adults and in relation to perceived privacy risks. Global and LMIC-focused reviews underscore uneven progress in sensitive domains such as telemental health and HIV care, where sustainability, regulation, and relational trust issues are central. High-income settings, including the UK and US, reveal that while telehealth can improve quality of life and extend reach, technical difficulties, digital divides, and inadequate training undermine trust and equitable uptake. Collectively, these findings suggest that intervention type such as SMS, mobile apps, tele-visits interact with contextual factors such as infrastructure, literacy, regulation, and cultural norms to shape both access trajectories and trust dynamics, underscoring the need for tailored, system-level strategies.

Table 12: Telemedicine Access and Trust Outcomes (2018–2025)

Study (Author/ Year)	Region Country	Methodology	Access Findings	Trust Findings	Sample Size	Conclusion Summary
[7]	Sub-Saharan Africa	Systematic review	40 % improvement via tele-programs	45 % trust level; cultural/privacy issues	66 studies	Telemedicine uneven; access and trust barriers remain
[8]	LMICs	Review of 23 studies	50 % access gains	52 % trust score; privacy concerns	23 studies	Adoption limited by infrastructure and regulatory issues
[9]	Uganda/Botswana/Rwanda	Umbrella review	65 % diagnostic reach increase	63 % trust; system validation concerns	9 programs	Co-design bolstered confidence and access
[10]	Nigeria	ICT deployment trial	70 % uptime and reliability	71 % ease-of-use trust score	Field deployment	Tele-management supports engagement
[11]	Malawi	User-centred case study	60 % rural access increase	68 % trust via usability improvements	Case-based	Co-design increases both access and trust
[7]	SSA countries	Multi-site case studies	55 % reach via store-and-forward	50 % provider scepticism persists	53 studies	Quality assurance needed for provider trust
[12]	South Africa	SMS intervention	75 % access via	66 % trust hindered	400 participants	Mobile access

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			SMS platforms	by literacy gaps		effective with training
[13]	South Africa	Mixed methods questionnaire + interviews	58 % intended access	49 % trust; infrastructure barriers lived	200 respondents	Intent high but uptake limited
[14]	Nigeria	App-based surveys	62 % potential reach	53 % trust; privacy concerns deter use	150 users	Trust concerns block adoption
[15]	Kenya	Mobile app pilot	48 % access limited by infrastructure	44 % trust affected by stigma and provider resistance	120 users	Trust and infrastructure shape uptake
[16]	Taiwan	Survey of 1000	68 % access higher among higher SES	56 % trust lower among older adults	1000 respondents	Perceived risk reduces uptake in vulnerable groups
[17]	India	TAM-based model survey	72 % influenced by tech environment	60 % trust; privacy/risk concept significant	850 respondents	Trust access jointly predict intention
[18]	LMICs (Telemental Health)	Systematic review	Access gains noted unevenly	Trust concerns in sensitive mental health contexts	46 studies	Evidence gaps in telemental health trust/access
[19]	LMICs (HIV telehealth)	Telehealth interventions review	Telehealth models increased access	Trust/feasibility but sustainability and regulation issues	Review of interventions	Focus needed on scale and regulation
[20]	Ethiopia	Systematic review + meta-analysis	Moderate telemedicine use	Mixed trust levels among professionals	Health professionals' data	Need training and knowledge gaps closed

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[21]	Rural Africa	Review of tele-rehabilitation	Addressed rehab access via digital	Data security and digital literacy important for trust	5 full-text articles	Cultural/infrastructure gaps remain
[22]	Global rural/regional settings	Scoping review (89 studies)	Identified connectivity and awareness needs	Patient perception key to trust	89 included studies	System-level factors: trust plus access
[23]	LMICs	Systematized review	Chronic care access improved	Trust linked to regulatory clarity	23 studies	Access + trust need integrated design
[24]	Rural LMICs	Narrative review	Pediatric telemedicine expanded reach	Trust through specialist support	multiple case experiences	Policy needed to ensure equity
[25]	South Africa	Clinician survey in district hospitals	Everyday IM usage increased clinician access	Confidentiality and privacy concerns impact trust	143 responses doctors in KZN hospitals	Formal guidelines needed
[26]	Palliative care reviews	Systematic meta-review	Telehealth extends palliative care reach	Acceptability mixed; relational trust issues	meta-analysis	Face-to-face alternatives preferred longer term
[27]	UK RCT cluster	Nested patient-reported outcomes study	Telehealth improved QoL over 12 months	Trust influenced by training and system support	large RCT	Training and support key for trust
[28]	Global	Systematic review barriers	Infrastructure and literacy limitations	Privacy liability concerns flagged	30 articles	Policy clarity and support infrastructure needed
[29]	Global GI care	ML assessment tool	Tele-visits increased access	Trust in provider reliability significant	tele-visits data	Trust predicted uptake better than tech ease
[30]	US appointments COVID era	Cancellation/rescheduling causes	36 % cancelled due to	Technical difficulty undermined trust	US telehealth data	Technical support essential for uptake

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			technical issues			
[31]	US rural settings	Population survey	Rural twice as likely to lack internet	Age and minority status reduce trust and access	National survey	Inequities compounded by digital divide

Indicators of access, such as the reported *40–75% improvements in rural service reach*, were derived from empirical measures in trials, case studies, and systematic reviews that quantified connectivity gains, device availability, and service utilisation. Similarly, trust outcomes, including *scores ranging from 44–71%*, were extracted from survey instruments, user-reported confidence levels, and provider assessments that captured perceptions of privacy, competence, and technological reliability. By explicitly linking each percentage to its originating study design and context, the synthesis ensures that quantitative evidence is both attributable and comparable across diverse interventions and regions.

3.2 Synthesis and Relevance

Table 1 aggregates evidence from 32 peer-reviewed studies, covering diverse methodologies including systematic reviews, surveys, field trials, and qualitative case studies, all examining how access such as connectivity, technology availability and trust such as privacy, ease of use, perceived quality, regulatory clarity influence telemedicine uptake. The empirical findings such as 50–75 % access improvements and 44–71 % trust scores highlight both progress and persistent gaps. Collectively, these studies offer a rich, quantitative and qualitative foundation to fulfill the research objective: to explore how digital trust and infrastructural barriers jointly impact telemedicine adoption in digitally marginalised populations.

3.3 Access Outcomes

According to Table 1, highlight that telemedicine interventions consistently improved access across regions, with gains of 40–75% in Sub-Saharan Africa and LMICs, particularly in rural and underserved areas. Country-specific trials in Nigeria, Malawi, Kenya, and South Africa showed ICT deployments, SMS platforms, and mobile apps expanded reach, though infrastructure gaps limited sustainability. In Asia, access was shaped by socioeconomic status and technology environments, while global reviews highlighted uneven progress in specialized areas such as HIV, telemental health, and chronic care. High-income settings like the UK and US confirmed extended reach and quality-of-life benefits, but technical issues and digital divides constrained equitable uptake. Overall, telemedicine expanded access, but disparities remain tied to infrastructure, literacy, and population vulnerabilities.

3.4 Trust Outcomes

Trust outcomes were weaker than access outcomes, with levels ranging from 45–68% across LMICs and Sub-Saharan Africa, often constrained by privacy concerns, cultural sensitivities, literacy gaps, and provider scepticism. Country trials showed co-design and usability improvements boosted confidence, but stigma and infrastructure issues persisted. In Asia, trust was lower among older adults and vulnerable groups, shaped by privacy and perceived risk. Global reviews highlighted relational trust challenges in sensitive areas like telemental health, HIV care, and palliative care, while high-income settings such as the UK and US emphasized the importance of training, technical support, and system reliability. Overall, trust remains fragile, requiring stronger safeguards, cultural adaptation, and supportive infrastructure to sustain adoption.

3.5 Factors That Improve Both Access and Trust

Co-design approaches, user-centered design, and tele-management support consistently enhanced confidence and engagement. Mobile and SMS platforms proved effective when paired with training, while

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system-level integration, policy clarity, and formal guidelines strengthened both access and trust. Training, technical support, and quality assurance were also critical enablers.

3.6 Barriers

Infrastructure gaps, regulatory uncertainty, privacy concerns, provider scepticism, and cultural sensitivities limited uptake. Perceived risks, literacy challenges, and stigma reduced trust, while technical difficulties and the digital divide compounded inequities. Evidence gaps in sensitive areas like telemental health and palliative care further constrained adoption.

4 Discussion

The research demonstrated how infrastructural limitations constrain access, how dimensions of digital trust shape user confidence, and how their interaction jointly influences telemedicine adoption in digitally marginalised communities. The synthesis of findings from thirty peer-reviewed studies across diverse geographical regions reveals consistent patterns regarding access and trust as pivotal factors influencing telemedicine adoption, directly addressing the identified research gap concerning digitally marginalised populations. Access improvements, ranging between 40% and 75%, highlight significant progress facilitated by interventions such as mobile health applications, SMS platforms, and co-designed telemedicine systems, particularly in Sub-Saharan Africa and other low- and middle-income contexts. However, these gains are often tempered by infrastructural limitations, including poor connectivity and digital literacy barriers, which constrain equitable service reach. Trust scores, varying from 44% to 71%, underscore persistent concerns around privacy, data security, provider reliability, and system usability that inhibit sustained telemedicine uptake. Notably, studies employing participatory design and community engagement demonstrated higher trust levels, suggesting that culturally sensitive approaches and transparent communication enhance user confidence by improving usability scores in Malawi (68%), reducing provider scepticism in multi-site Sub-Saharan case studies (50%), and strengthening perceived reliability in Nigeria ICT trials (71%). These findings indicate that when communities are actively involved in co-design and systems are tailored to local norms, both access and trust outcomes are significantly elevated compared to interventions developed without such engagement. [32], [33]. The diverse methodologies and settings represented affirm that while technological readiness is necessary, trust-building is equally critical to achieving meaningful telehealth integration. Collectively, these results provide empirical evidence that bridging the trust-access divide is essential to overcoming systemic barriers in telemedicine. Consequently, the study's objective to elucidate how trust and access intersect to affect telemedicine adoption finds strong support, offering actionable insights for targeted policy, infrastructure development, and user-centred design in digitally underserved contexts.

The findings of this review both confirm and extend prior syntheses on telemedicine adoption. Consistent with earlier reviews, the evidence reaffirms that infrastructural barriers such as connectivity gaps and limited digital literacy remain central obstacles to equitable uptake, particularly in low-resource settings. At the same time, this study extends previous work by systematically demonstrating how trust deficits linked to privacy concerns, provider scepticism, and cultural incongruence interact with access constraints to jointly shape adoption outcomes. Whereas earlier reviews often treated trust and access as separate variables, the present synthesis highlights their interdependence, showing that improvements in access such as 40–75% gains in rural reach do not translate into sustained use without parallel gains in trust such as 44–71% confidence level. Grouping results across dimensions of infrastructural access, organisational readiness, digital literacy, and trust factors, this review advances the literature by providing a more integrated framework that captures the socio-technical complexity of telemedicine adoption in LMICs, thereby offering a clearer basis for policy and design interventions than prior fragmented analyses. This study shows that while telemedicine interventions consistently improve access in digitally marginalised communities, their sustained adoption is contingent on building and maintaining user trust through privacy safeguards, provider competence, and technological reliability

Based on the synthesis of results, telemedicine remains partially trusted and variably accessible, particularly in low-resource settings where infrastructure, digital literacy, and sociocultural alignment

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significantly influence both dimensions. Trust in telemedicine is still fragile due to persistent concerns over data privacy, the lack of standardised clinical protocols, and inconsistent patient-provider interactions, as highlighted by multiple studies reporting that users often question the credibility of remote consultations and the protection of sensitive health information [34]. Accessibility, while improved through mobile penetration and basic internet expansion, remains uneven, with rural and socioeconomically disadvantaged populations facing barriers such as poor network coverage, high data costs, and limited technical support. To enhance both trust and access, telemedicine systems must be re-engineered with secure end-to-end encryption, transparent data governance policies, culturally contextualised service delivery, and targeted digital literacy programmes. Infrastructure investment in decentralised networks like MANETs and inclusive policy frameworks that prioritise underserved groups can also be vital in establishing equitable and sustainable telemedicine ecosystems [35], [36].

Despite the comprehensive approach undertaken, this study is subject to several limitations that must be acknowledged. First, the reliance on published peer-reviewed literature may introduce publication bias, as studies reporting null or negative results on telemedicine access and trust are less likely to be available, potentially skewing the synthesis towards more favourable findings. Additionally, the heterogeneity in study designs, populations, and measurement instruments limited the feasibility of conducting meta-analytical statistical pooling, necessitating a primarily narrative synthesis which may reduce the precision of comparative conclusions. The geographic focus, while inclusive of multiple low- and middle-income countries, remains uneven, with certain regions underrepresented, thereby restricting the generalisability of findings across all digitally marginalised populations. Furthermore, temporal constraints limited inclusion to studies published up to 2025, which may exclude emerging innovations and rapidly evolving technological contexts. Finally, variations in the conceptualisation and operationalisation of “trust” and “access” across studies introduced challenges in standardising outcomes, affecting the uniformity of interpretation. These limitations underscore the need for continued empirical research with standardised methodologies and broader regional representation to strengthen the evidence base [7].

The implications of this study are multifaceted, encompassing engineering, scientific, and broader healthcare system considerations. From an engineering perspective, the findings emphasise the critical need to design telemedicine technologies that prioritise not only functional accessibility such as reliable connectivity and user-friendly interfaces but also embed robust security and privacy features to foster trust among diverse user groups [37]. Studies such as [38] showed that user training in the form of digital literacy workshops, orientation sessions on platform navigation, and provider-led demonstrations of privacy and security features significantly improved trust by enhancing usability, reducing anxiety about data handling, and increasing confidence in the reliability of telemedicine systems. This calls for innovations in scalable, low-cost infrastructure tailored to resource-constrained environments, alongside adaptive systems that accommodate varying levels of digital literacy and cultural expectations. Scientifically, the study contributes to advancing theoretical frameworks on technology acceptance by empirically demonstrating the intertwined roles of access and trust in telemedicine adoption, thereby encouraging further interdisciplinary research that integrates sociotechnical and behavioural dimensions. [39] explicitly employed Technology Acceptance Models (TAM), Unified Theory of Acceptance and Use of Technology (UTAUT), and socio-technical trust frameworks to address privacy concerns, demonstrating that perceived data security and confidentiality are critical determinants of user confidence and intention to adopt telemedicine. At the healthcare system level, the evidence highlights the importance of policy frameworks that promote equitable digital inclusion, data governance, and community engagement to address systemic barriers. Collectively, these implications underscore the necessity for a holistic approach that integrates engineering solutions with scientific inquiry and policy development to enhance telemedicine effectiveness. This research provides actionable insights to guide the development of telehealth systems that are both accessible and trusted, facilitating sustainable digital health transformation in marginalised populations globally. Studies have suggested practical strategies to support connectivity in rural African regions including expanding affordable broadband through satellite backhaul, leveraging community-based mobile networks, investing in sustainable power solutions, and fostering public–private partnerships to reduce infrastructure costs [35], [40].

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Future research and development efforts must prioritise the dynamic interplay between technological innovation and human factors to fully realise the potential of telemedicine in digitally marginalised contexts. Emerging technologies such as artificial intelligence, edge computing, and 5G connectivity offer promising avenues to overcome existing infrastructural constraints, yet their successful implementation depend on fostering sustained trust through transparent governance, culturally attuned design, and inclusive stakeholder engagement [41], [42]. Moreover, longitudinal studies are needed to evaluate the long-term impact of trust-building interventions on telemedicine utilisation and health outcomes, particularly in low-resource settings. Policymakers, engineers, and healthcare providers must collaborate closely to create adaptable, resilient digital health ecosystems that can respond to evolving societal needs and technological advancements. By embracing this forward-looking, integrative approach, the field can move beyond incremental progress toward transformative solutions that bridge the digital divide and deliver equitable healthcare access worldwide.

5 Conclusion

The study successfully achieved its objective by demonstrating how digital trust and infrastructural limitations jointly shape telemedicine adoption in digitally marginalised communities. Implications highlight the urgent need for engineering innovations that prioritise secure, accessible, and user-centred telemedicine platforms, alongside scientific advancement in understanding sociotechnical acceptance, supported by equitable policy frameworks. However, limitations such as publication bias, heterogeneity of study designs, and uneven geographic representation restrict the generalisability of conclusions, calling for more standardised, longitudinal, and regionally diverse research. Future work must focus on developing and evaluating trust-building strategies, leveraging emerging technologies, and fostering interdisciplinary collaboration to create resilient digital health ecosystems. Ultimately, bridging the intertwined gaps of access and trust is imperative to realising telemedicine's transformative potential, thereby enabling equitable healthcare delivery and closing the digital divide for vulnerable populations worldwide.

The findings of this paper indicate that while telemedicine has become increasingly accessible, with reported improvements in service reach ranging from 40 to 75 per cent across low- and middle-income settings, full trust in these systems remains fragile due to persistent concerns over privacy, data protection, provider reliability, and cultural appropriateness. This means that telemedicine can be accessed to a meaningful extent, yet its trustworthiness is not uniformly established, creating a gap between technological availability and user confidence. These results are important because they provide policymakers, healthcare practitioners, and system designers with empirical evidence that infrastructural expansion alone does not guarantee effective telemedicine adoption; rather, sustained utilisation depends on building trust through secure data governance, transparent communication, and culturally sensitive service delivery. For digitally marginalised communities, particularly in sub-Saharan Africa and similar contexts, these findings are crucial as they inform the creation of inclusive policies and user-centred designs that can bridge the digital divide, reduce healthcare disparities, and enhance equitable access to remote care. In conclusion, this review demonstrates that telemedicine adoption in digitally marginalised communities' hinges on the dual pillars of access and trust, underscoring the need for integrated strategies that combine infrastructural investment with culturally sensitive design.

Acknowledgements

None

Statement on conflicts of interest

None

 J Health Inform Afr. 2025;12(2):31-46. DOI: 10.12856/JHIA-2024-v12-i2-599

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