



A Systematic Review: The Effectiveness of Telemedicine Services in Improving
Healthcare Access in Rural Regions in the US

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1. Introduction

1.1. Background

In rural areas, access to healthcare is a long-standing problem in the United States. Every 1 in 5 people in the US lives in rural and remote areas. The mortality rates from chronic illnesses are higher among rural residents. People in rural areas face a lot of difficulties in accessing services to prevent, diagnose, or treat their illnesses (Golembiewski et al., 2022). Across the US, rural residents are mostly vulnerable populations comprising low socioeconomic status, children, aged, Indigenous communities, and disabled people. They face social and economic burdens from the healthcare system due to limited access to healthcare. However, telehealth extends the reach of health services to alleviate care barriers in the US rural regions (Butzner and Cuffee, 2021; Kolluri et al., 2022).

Telehealth is an alternative healthcare service delivery model. It offers opportunities to expand access to treatment and alleviate barriers to care in rural and remote areas. It has been utilised in underserved areas to promote healthy behaviour and enhance patient satisfaction. In the US, it has the potential to improve health outcomes for rural residents (Butzner and Cuffee, 2021). The literature available implies that implementing telemedicine has been a challenge in rural settings (Gurupur and Miao, 2022). According to Butzner and Cuffee (2021), the literature remains ambiguous and indefinite in assessing the effectiveness of telehealth practices. There are gaps in delineating the effectiveness of technology-based interventions in rural communities.

Addressing the identified gap in the existing literature is requisite. For this reason, this dissertation intends to conduct a systematic review to explore the effectiveness of telemedicine services in improving healthcare access in rural regions in the US. By combining different articles' results, this study assesses the effectiveness of telemedicine services.

1.2. Research Question

The research question is "What is the effectiveness of telemedicine services in improving healthcare access in rural regions in the US?"

1.3. Research Aim and Objectives

The research aim of this dissertation is to explore the effectiveness of telemedicine services in improving healthcare access in rural regions in the US.

The research objectives to attain the aim of this dissertation are the following:

- To inspect the barriers to healthcare access and the role or impact of implementing telemedicine in rural regions.
- To evaluate the role of telemedicine services in improving patients' healthcare access in rural locations.
- To ascertain the impact of telemedicine services on patient outcomes and satisfaction in rural regions.

1.4. Rationale

Limited healthcare access in rural communities is detrimental to residents' health outcomes. As telemedicine has gained attention to address this problem, assessing its effectiveness in improving healthcare access is essential. This study's findings will have great implications for people living in rural communities in supporting and achieving optimal health and well-being.

2. Literature Review

2.1. Healthcare Access Disparities in Rural Regions

Rural populations make up nearly 20% of the US population. In comparison with the urban population, rural people have increased mortality rates. The causes of rural health outcome disparities are complex and multiple. Limited access to healthcare professionals is one of the main barriers to utilising healthcare services (Nuako et al., 2022). Access to healthcare is a vital aspect of a healthy civilisation. Living in a rural area is key barrier to accessing healthcare, leading to reduced quality of life. Certain socioeconomic and financial restrictions impede rural peoples' access to optimal healthcare. (Natarajan et al., 2023; Kolluri et al., 2022).

2.2. Benefits of Telemedicine in Rural Regions

Healthcare is continually becoming a technology-driven environment. Telehealth allows for real-time communication between healthcare professionals and patients. It is a beneficial remote healthcare service delivery method. It expands opportunities for treatment access to mitigate care barriers in rural and underserved regions. Decreased indirect and direct costs are linked with telemedicine implementation (Butzner and Cuffee, 2021). Telehealth visits in geographically dispersed rural settings are allied to enhanced convenience for patients and clinicians. Telehealth implementation and adoption lead to improved clinical outcomes and higher patient satisfaction (Klee et al., 2023).

2.3. Barriers/Challenges to Adoption of Telemedicine

The adoption of telehealth in rural regions is likely to be affected by certain challenges. The dearth of organisational effectiveness, health staff motivation, and patient satisfaction are barriers to telemedicine adoption. The lack of information and communication technology infrastructure and inadequate resource allocation affect the successful adoption of telemedicine in rural locations (Zobair, Sanzogni, and Sandhu, 2020; Coombs, Campbell, and Caringi, 2022). Some form of stigma or lack of efficacy towards telehealth use reduces accessibility to services in rural areas. The lack of efficient delivery models for telehealth services may endanger its acceptance (Gurupur and Miao, 2022).

3. Methodology

3.1. Research Design

A qualitative systematic review design was opted for to explore the effectiveness of telemedicine services in improving healthcare access in rural regions in the US. Qualitative research is focused on subjective phenomena and quantitative research is objective and numeric. Qualitative data is descriptive and interpretation-based, as a result, it is opt for this dissertation (Mbanaso, Abrahams, and Okafor, 2023). According to Newman and Gough (2020), a literature review with a systematic and robust approach is referred to as systematic review. It offers a more transparent research procedure to be ensured.

3.2. Research Approach

The inductive approach was employed to conduct the systematic review for this dissertation. Mbanaso, Abrahams, and Okafor (2023) put forth that induction begins with a set of empirical observations to develop a theory or hypothesis, whereas, deduction begins with a theory and data collection to test it. Since the inductive research approach uses a bottom-up method, it is best suited to perform this research investigation. By collecting data on the effectiveness of telemedicine services through an inductive approach, a conclusion is drawn.

3.3. Research Philosophy

The interpretivism philosophy was considered in this dissertation to explore the effectiveness of telemedicine services. Mbanaso, Abrahams, and Okafor (2023) underline that the interpretivist stance is based on understanding the interpretations and meanings from experiences. Besides, positivism relies on quantifiable observation of an activity. Thus, the impact of telemedicine on healthcare access is to be measured qualitatively, interpretivism well aligns with this dissertation.

3.4. Search Strategy

3.4.1. Databases

Online databases were used to begin with the data collection and analysis processes. PubMed Central, Science Direct, and EBSCOhost were explored to find relatable articles. Scholarly materials were searched for through these databases.

3.4.2. Keywords

Keywords used in this dissertation were 'Telemedicine', 'Telehealth', 'Virtual Visits', 'Healthcare Access', 'Rural Regions', 'Rural and Remote Locations', 'United States', and 'US'. The keywords were applied to the databases to search for valid articles.

3.4.3. Selection Criteria

The inclusion criteria to conduct this systematic review were the following:

- English research articles.
- Peer-reviewed research articles.
- Research articles published in the last ten years.
- Primary research articles (qualitative and randomized controlled trials).
- Research articles based on the US.

The exclusion criteria to conduct this systematic review were the following:

- Non-English research articles.
- Non-peer-reviewed research articles.
- Research articles published before the last ten years.
- Secondary research articles.
- Research articles based on nations other than the US.

3.5. Data Collection and Analysis

Data was collected and evaluated from different articles selected to answer the research question. The characteristics of each article were delineated in the data extraction table (Table 2). After collection, the data was analysed and interpreted to draw conclusions by adopting a thematic analysis approach. According to Lochmiller (2021), thematic analysis best suits the qualitative research method. Researchers identify, analyse, and interpret patterns in data by the involved steps of developing themes.

3.6. PRISMA

Figure 1 presented the "PRISMA - Preferred Reporting Items for Systematic Reviews and Meta-Analyses" flow diagram to document and report the stages of this review's search strategy and selection process.

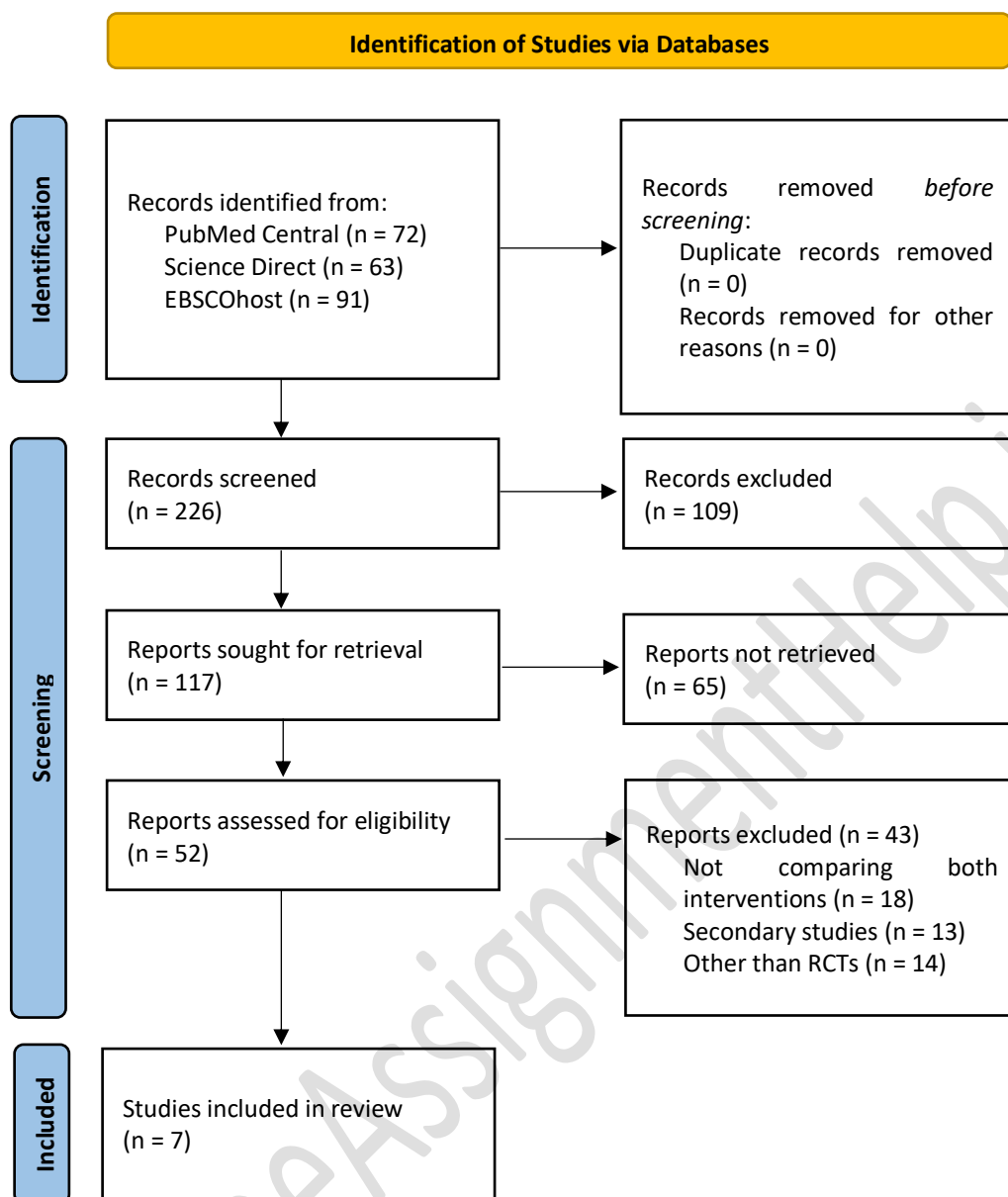


Figure 1: PRISMA-2020 Flow Diagram (Self-developed)

3.7. Quality Appraisal

Health-related evidence can be appraised for quality using the most common CASP (Critical Appraisal Skills Programme) tool. It is recommended by researchers for its high usability and suitability. Higher-quality articles are opted for to surge reliability (Long, French, and Brooks, 2020). The quality appraisal scores using the CASP checklists are elucidated in Table 1.

Research Study	Study Design	CASP Score	CASP Quality
<i>Davis et al. (2016)</i>	Randomized Controlled Trial	08 out of 11	Moderate
<i>Bonsignore et al. (2018)</i>	Qualitative Study	09 out of 10	High
<i>Sinha et al. (2019)</i>	Qualitative Study	09 out of 10	High
<i>Demirci et al. (2019)</i>	Qualitative Study	10 out of 10	High
<i>Uscher-Pines et al. (2020)</i>	Randomized Controlled Trial	11 out of 11	High
<i>Emmett et al. (2022)</i>	Randomized Controlled Trial	09 out of 11	Moderate

<i>Coombs, Campbell, and Caringi (2022)</i>	Qualitative Study	10 out of 10	High
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Table 1: CASP - Quality Appraisal

4. Results

4.1. Data Extraction Table

Research Study	Study Design	Research Aim	Participants	Results/Finding
<i>Davis et al. (2016)</i>	Randomized Controlled Trial	To assess the feasibility of telemedicine in treating rural paediatric obesity.	103 children in elementary schools from the rural state of Kansas.	The authors reveal that telemedicine intervention seems to be an acceptable and feasible method of delivering obesity treatment to rural children with no access to these services.
<i>Bonsignore et al. (2018)</i>	Qualitative Study	To investigate the feasibility and acceptability of telehealth in rural US palliative care.	101 patients, 61 women and 40 men from rural Western North Carolina.	The authors underline the high acceptability, usability, and feasibility of telehealth programs in palliative care in rural regions. Access to clinicians and quality of care has improved with the program.
<i>Sinha et al. (2019)</i>	Qualitative Study	To examine patient satisfaction with telemedicine delivery of paediatric fracture care.	167 patients aged over 18 years of age from rural central Pennsylvania.	The authors put forth that telemedicine use has resulted in higher patient satisfaction. Patient access to orthopaedic healthcare is increased with telemedicine visits.
<i>Demirci et al. (2019)</i>	Qualitative Study	To assess the feasibility and acceptability of telactation (direct-to-consumer) service among rural mothers.	17 breastfeeding women from rural Pennsylvania.	The authors claim that telactation was accepted in rural areas lacking breastfeeding support services. It was considered a suitable and competent delivery model, increasing women's access to lactation assistance.
<i>Uscher-Pines et al. (2020)</i>	Randomized Controlled Trial	To study the impact and feasibility of telactation delivered via	203 breastfeeding women from rural Pennsylvania.	The authors point out that telactation remains a promising approach to serving women of rural underserved communities.

		personal e-devices among rural mothers.	Access to exclusive support for breastfeeding is ensured by telelactation services.
<i>Emmett et al. (2022)</i>	Randomized Controlled Trial	To investigate mobile health screening and telemedicine's impact on access to speciality care in rural US.	Children aged between 4 to 21 years from 15 communities in rural Alaska. The authors unveil that telemedicine referrals have the potential to improve speciality care access for rural children. They can be applied to preventive school-based services for better access in rural areas.
<i>Coombs, Campbell, and Caring (2022)</i>	Qualitative Study	To assess social, cultural, and programmatic barriers to healthcare access in rural America.	12 healthcare professionals from the rural state of Montana. The authors disclose that rural areas in the US face the issue of inadequate healthcare access. However, telemedicine or virtual visits potentially improve the quality of healthcare delivery by addressing the challenges.

Table 2: Data Extraction Table

4.2. Thematic Analysis

In total, three key themes emerged from the analysis of the results drawn from the seven included articles in this dissertation. The themes and their related articles are the following:

4.2.1. Barriers to Healthcare Access and Telemedicine Implementation

Among rural breastfeeding women, barriers to accessing telelactation support services are related to technical issues, preference for community resources, and reluctance to video call an unknown provider. In spite of numerous advantages, these barriers hinder telemedicine's apt implementation and adoption (Demirci et al., 2019). Access to healthcare is inadequate in the US rural areas. Facilitating access to acceptable delivery of healthcare services such as telemedicine is obstructed as a result of certain challenges. Time and resource constraints, fragmented communication, technical bugs, and prioritising profits over addressing barriers are the main challenging aspects (Coombs, Campbell, and Caring, 2022).

4.2.2. Telemedicine and Improved Healthcare Access and Outcomes

Obese children with no access to appropriate healthcare services benefit from telemedicine intervention. It is considered a feasible method of delivering paediatric treatment for obesity in the rural state of Kansas (Davis et al., 2016). For palliative care patients, the telemedicine program improves access to and care quality in rural Western North Carolina. Video conferencing has ensured palliative patients have 24/7 access to healthcare professionals (Bonsignore et al., 2018). The utilisation of video consultations increases patients' access to orthopaedic surgeons with reduced travel costs. Follow-up care for fracture patients living in rural central Pennsylvania is ensured with telemedicine visits (Sinha et al., 2019).

Breastfeeding women in rural Pennsylvania face disparities in lactation support. Inequitable access to qualified breastfeeding support is addressed with direct-to-consumer telelactation – telephone and video-based support. Telelactation allows breastfeeding women to connect to adequate and effective remote support services (Demirci et al., 2019; Uscher-Pines et al., 2020). Speciality care access in rural Alaska for children is enhanced with telemedicine referral. Mobile health school hearing screening aims to mitigate rural health disparities. Underserved children in rural areas are offered better access to preventive services and programs (Emmett et al., 2022).

4.2.3. Telemedicine and Patient Satisfaction and Acceptance

The use of telemedicine is linked with higher patient satisfaction in rural settings. The health and well-being of rural patients are enhanced with telemedicine services. It is an accepted model of healthcare delivery in rural United States regions, accompanying improved patient outcomes (Davis et al., 2016; Bonsignore et al., 2018; Sinha et al., 2019; Coombs, Campbell, and Caringi, 2022). In rural US settings, telelactation is considered a highly feasible and accepted care model. The positive attributes of telelactation are linked to its acceptability among rural mothers (Demirci et al., 2019; Uscher-Pines et al., 2020).

5. Discussion

5.1. Discussion

The seven selected articles delineated the barriers to healthcare access and telemedicine implementation; the efficacy of telemedicine in improving healthcare access and outcomes; and the effect of telemedicine on patient satisfaction and acceptance within the context of rural settings in the US.

In rural regions, breastfeeding women perceive technical issues such as limited WiFi access, preference for community resources, and hesitancy to video call an anonymous healthcare professional. These are the barriers to not completely utilising telelactation support services (Demirci et al., 2019). In support, Grubestic and Durbin (2020) reveal that limited internet connection or robust broadband inaccessibility hinders access to telelactation services in the rural state of Ohio. The authors found that many women prefer community-based support and not calling an unknown provider. Besides, Coombs, Campbell, and Caringi (2022) put forth barriers to accessing telemedicine services: time and resource restrictions, fragmented communication, and prioritising profits over addressing barriers. Similar results were pointed out by Haleem et al. (2021) and Gurupur and Miao (2022). Lack of enough time and resources, unavailability of required infrastructure, poor communication due to the lack of inexpensive internet amenities, and sub-standard reimbursements are barriers to implementing or adopting telehealth in rural settings (Haleem et al., 2021; Gurupur and Miao, 2022).

Improved healthcare access in different US rural regions is connected to putting telemedicine services into practice. Different care areas with accepted telemedicine delivery models are paediatric obesity, palliative care, orthopaedic care, lactation support, and speciality care (Davis et al., 2016; Bonsignore et al., 2018; Sinha et al., 2019; Demirci et al., 2019; Uscher-Pines et al., 2020; Emmett et al., 2022). Many research authors have published similar results in the same or different care areas in their articles. Talarico (2021) underlines that telemental health services increase the access of rural patients in northeast Florida to specialist mental healthcare. Kobe et al. (2022) put forth that implementing a telehealth intervention for managing diabetes in seven rural cities in the US improved patient's access to comprehensive

diabetes care. According to Nadakuditi and Agrawal (2022), telemedicine is proven to reduce healthcare access disparities for the population living in the rural states of the US.

Improved patient outcomes and higher patient satisfaction accompany the employment of telemedicine services in US rural regions (Davis et al., 2016; Bonsignore et al., 2018; Sinha et al., 2019; Coombs, Campbell, and Caringi, 2022). In support, the authors reveal that rehabilitation services delivered via telehealth in rural communities are linked with increased rates of patient satisfaction. The benefits of telehealth in terms of patient-related outcomes outweigh the allied barriers (Harkey et al., 2020; Butzner and Cuffee, 2021). Telemedicine is considered an accepted healthcare delivery model by the rural population in the United States (Demirci et al., 2019; Uscher-Pines et al., 2020). Similarly, Butzner and Cuffee (2021) point out that telehealth interventions across rural communities in the US seem moderately feasible and accepted healthcare delivery models. It is a convenient and efficient technology-based intervention to enhance patient health and well-being in rural areas.

5.2. Limitations

There are quite a few limitations to this systematic review. Only articles published between 2015 to 2024 and written in English were taken in. Limiting the search time frame to the last ten years may have excluded earlier publications and data on telemedicine in rural US areas. Publication bias is possible within this dissertation as only PubMed Central, ScienceDirect, and EBSCOhost were explored to search for peer-reviewed articles. Additional database searching may have provided more articles to be included. The review's results are only generalisable to the rural population in the US. A relatively small sample of seven articles may have limited the reliability of this review.

6. Conclusion

6.1. Conclusion

Telehealth is a potential solution to ensure greater access to healthcare for the rural population in the United States. It can address the need for rural communities to access equal health outcomes. It is an effective intervention for healthcare delivery in terms of access, patient outcomes, and satisfaction. It seems to be a feasible and acceptable model of healthcare delivery in the rural US. Yet, certain barriers impede its successful implementation and adoption. Limited time and resources, inadequate infrastructure, and technical difficulties are the major barriers. With serious efforts made by the policymakers and stakeholders, the barriers can be addressed for positive rural health outcomes. They are recommended to acknowledge the problem of healthcare access in rural regions and take action to address it. Researchers are recommended to conduct an investigation to ascertain the long-term effectiveness of telemedicine services in rural communities.

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