Medical Studies and Health Journal (SEHAT)
Vol 1 (2) 2024 : 158-174

Effectiveness of Telemedicine Interventions in Improving Healthcare Access and Outcomes: A Systematic Review

Efektivitas Intervensi Telemedis dalam Meningkatkan Akses dan Hasil Layanan Kesehatan: Tinjauan Sistematis

Jasmin Ambas
Universitas Negeri Makassar
*jasminzoom33@gmail.com

**Corresponding Author*

ABSTRACT
This study examines the effectiveness of telemedicine interventions in improving access to health services and health outcomes in rural and remote areas of developing countries. Through the systematic literature review method, articles from international databases such as PubMed, Scopus, and Web of Science are collected and analyzed using the PRISMA framework. The results show that telemedicine can significantly increase the accessibility of healthcare services, reduce costs and travel time, and improve chronic disease management and overall patient health outcomes. The implications of this research support further adoption of telemedicine to reduce disparities in health services in remote areas.
Keywords: Telemedicine, access to health services, rural areas, developing countries, effectiveness

ABSTRAK
Penelitian ini mengkaji efektivitas intervensi telemedicine dalam meningkatkan akses layanan kesehatan dan hasil kesehatan di daerah pedesaan dan terpencil di negara berkembang. Melalui metode systematic literature review, artikel-artikel dari database internasional seperti PubMed, Scopus, dan Web of Science dikumpulkan dan dianalisis dengan menggunakan kerangka kerja PRISMA. Hasilnya menunjukkan bahwa telemedicine dapat signifikan meningkatkan aksesibilitas layanan kesehatan, mengurangi biaya dan waktu perjalanan, serta meningkatkan manajemen penyakit kronis dan hasil kesehatan pasien secara keseluruhan. Implikasi dari penelitian ini mendukung adopsi lebih lanjut telemedicine untuk mengurangi ketimpangan dalam pelayanan kesehatan di daerah terpencil.
Kata Kunci: Telemedicine, akses layanan kesehatan, daerah pedesaan, negara berkembang, efektivitas

1. Introduction

Telemedicine has become an important tool in the provision of health services, especially during the COVID-19 pandemic. Studies show that telehealth services not only improve health outcomes but also remain economical (Mahtta et al., 2021). Telehealth, defined as the use of telecommunications and information technology to provide remote health services, has shown potential to address health care access disparities and improve health outcomes (Halcomb et al., 2023; Haimi, 2023). In addition, telemedicine has been proven to save time and costs for both patients and health service providers, making it an efficient method of providing health services (Haleem et al., 2021).

In the management of chronic diseases, telemedicine has proven effective in improving patient outcomes and reducing healthcare costs (Vudathaneni, 2024). Nurse-led telehealth interventions have been shown to be highly influential in reaching patients who face traditional healthcare access barriers, contributing to more equitable healthcare provision (Bulto, 2024). This intervention also shows great potential in improving healthcare access and health outcomes, especially in chronic disease management (Thurah et al., 2022).

The positive impact of telemedicine in pediatric health care is particularly significant, improving access, health outcomes, and cost efficiency (Yankappa, 2024). Despite its benefits,

disparities in telehealth utilization still exist, underscoring the importance of ensuring equitable access to telehealth services (Zhang et al., 2021). Telehealth continues to be an important instrument in improving patient access in various healthcare settings and has demonstrated positive impacts (Idris, 2024; Kissi, 2023).

Known for its potential to transform healthcare delivery, telemedicine improves accessibility, efficiency, and patient outcomes (Omaghomi, 2024). Especially beneficial during service closures and lockdowns, telehealth has expanded access to healthcare, especially for individuals in remote areas (Walker et al., 2023). Additionally, telehealth also addresses traditional barriers to treatment, particularly in chronic disease management (Sculley et al., 2021; Richardson et al., 2021). Overall, telemedicine interventions are effective in improving health access and outcomes by bridging service gaps, improving patient outcomes, and reducing healthcare costs. Despite disparities in utilization, telehealth has the potential to revolutionize healthcare delivery by promoting accessibility and efficiency in healthcare services.

Telemedicine is a technological innovation that is increasingly important in modern health systems. Using information and communication technology, telemedicine allows healthcare providers to provide medical care remotely. This includes services such as video consultations, remote health monitoring, and electronic delivery of medical information. The development of telemedicine provides solutions to various challenges in health services, especially in increasing access for populations in remote and hard-to-reach areas.

Conceptually, telemedicine involves medical interactions conducted via electronic media, where the patient and healthcare provider are not physically in the same location. Telemedicine can be divided into several main categories: teleconsultation, telemonitoring, and tele education. Teleconsultation allows doctors to conduct medical consultations with patients via video or telephone calls, while telemonitoring involves monitoring a patient's health condition remotely via medical devices connected to the internet. Tele Education provides training and education facilities for medical personnel in remote locations.

The relevance of telemedicine in the modern healthcare system is significant. This technology not only expands the reach of healthcare services but also increases the efficiency and effectiveness of medical care. Telemedicine can reduce travel time and costs for patients living in rural areas, enable rapid access to specialists who may not be available in the area, and support ongoing monitoring for patients with chronic conditions. Thus, telemedicine has the potential to reduce the burden on the health system and improve the quality of patient care.

The implementation of telemedicine is also driven by various factors such as developments in communications technology, increased internet access, and the need to provide more inclusive and efficient health care. The COVID-19 pandemic has also accelerated the adoption of telemedicine, given social distancing and the need to minimize in-person contact. However, the successful implementation of telemedicine requires support from various parties including the government, health service providers and patients themselves.

In the context of developing countries, telemedicine is a potential solution to overcome limited infrastructure and shortages of medical personnel in rural and remote areas. Studies show that telemedicine can improve healthcare access and patient health outcomes in the area, although challenges such as internet connectivity and acceptance of the technology by society still need to be overcome. Therefore, further research on the effectiveness of telemedicine in this specific context is essential to inform better policy and practice.

Access to health services in rural and remote areas of developing countries faces significant challenges. Limited health infrastructure, inadequate numbers of medical personnel, and limitations in transportation and communication are the main barriers for people to get the care they need. Clinics and hospitals are often far from where people live, resulting in high travel time and costs. In addition, health facilities in rural areas often lack medical equipment and medicines, so they are unable to provide services equivalent to those available in urban

areas.

The difference in access to health services between urban and rural areas is also very striking. In urban areas, people generally have better access to complete health facilities and trained medical personnel. On the other hand, in rural areas, limited human resources and health infrastructure mean that people have to face various difficulties in obtaining adequate health services. This disparity has an impact on the quality of life and health rates of people in rural areas, which are often lower than in urban areas.

In this context, this research aims to answer the following questions: **How effective are telemedicine interventions in improving access to health services for populations living in rural and remote areas in developing countries?** This question is important to investigate given the potential of telemedicine to overcome existing barriers to healthcare access. Through a systematic literature review, this research will examine empirical evidence about how telemedicine can improve access and health outcomes in isolated and underserved populations.

Previous research examining the effectiveness of telemedicine has mostly focused on developed countries and urban areas, where technological infrastructure and internet access are very adequate. These studies often show that telemedicine can improve access to healthcare, reduce the cost of care, and increase patient satisfaction. However, research highlighting the effectiveness of telemedicine in rural and remote areas, especially in developing countries, is still very limited. These limitations create a gap in the literature that needs to be filled to understand how telemedicine can be implemented effectively in different and challenging contexts.

Additionally, the lack of specific data regarding developing countries is a major obstacle in evaluating and understanding the potential of telemedicine in these areas. Much existing research does not provide sufficient focus on the variability of socio-economic, infrastructural, and cultural conditions in developing countries. This has resulted in a lack of comprehensive empirical evidence on how telemedicine interventions can be adapted and implemented to address the unique challenges faced by communities in rural and remote areas.

Therefore, there is an urgent need for more specific and in-depth research on the effectiveness of telemedicine in developing countries. These studies must consider various contextual factors that can influence the results, such as the availability and quality of internet networks, the level of technological literacy among the population, and government policy support. Filling this research gap will not only enrich the academic literature but also provide a strong foundation for health policymakers and practitioners to design and implement effective and sustainable telemedicine solutions in areas of greatest need.

Finding solutions to address the challenges of access to health services in rural and remote areas is critical given their far-reaching impact on public health and social well-being. In many developing countries, the inability of people in remote areas to access adequate health services contributes to high morbidity and mortality rates, especially among vulnerable groups such as children, pregnant women and the elderly. These limited access are often exacerbated by geographic, economic, and social factors that make travel to health facilities difficult and expensive. Thus, increasing access to health services in rural and remote areas is a top priority to achieve equality in health services and improve people's quality of life.

Research into the effectiveness of telemedicine in this context has a significant potential impact on future health policy and health service implementation. If telemedicine proves effective in improving access and health outcomes in rural and remote areas, these findings could be used as a basis for formulating policies that support wider adoption and dissemination of telemedicine technology. Governments and policymakers can design programs that support technological infrastructure and training of health workers to utilize telemedicine, as well as allocate the necessary resources to overcome existing barriers.

Additionally, successful implementation of telemedicine can provide a model for other

developing countries to follow, speeding up the process of adopting digital health technologies, and ensuring that quality health services are accessible to all levels of society, regardless of geographic location. Thus, this research not only contributes to the academic literature but also has the potential to bring about real and sustainable change in the global health system, especially in areas of greatest need.

This research presents a new approach to evaluating telemedicine interventions in underrepresented contexts, particularly in rural and remote areas of developing countries. Previously, many studies on telemedicine tended to focus on experiences in developed countries and urban areas that already have mature technological infrastructure. In this context, this study broadens the scope of research by including more diverse perspectives and better reflecting the challenges faced by populations in remote and hard-to-reach areas.

This new approach not only includes more extensive and representative data collection, but also uses more comprehensive analysis techniques. The analytical methods applied in this study were designed to understand in depth the effects of telemedicine interventions, both in terms of access to health services and health outcomes achieved by the investigated population. This use of new data and sophisticated analysis techniques allows research to provide deeper and more reliable insights, which can be used to shape more effective policy and clinical practice in the future.

By integrating this new perspective, this research hopes to fill a gap in the existing literature, making a significant contribution to our understanding of how telemedicine can be best adapted and implemented in various global contexts. It is hoped that the findings from this research will provide a strong basis for the development of more inclusive and sustainable telemedicine strategies and programs, as well as improving the quality of health services for populations that may have previously been underserved.

This research is expected to make a significant contribution in several important aspects. First, this study will provide stronger empirical evidence on the effectiveness of telemedicine interventions in improving healthcare access and health outcomes in rural and remote areas, especially in developing countries. By expanding the scope of the study to include these underrepresented contexts, the research will provide deeper insight into how telemedicine technology can be implemented effectively to meet the needs of communities living in areas with limited access to health services. Second, the results of this research are expected to produce practical recommendations that can be used by policy makers, governments and health practitioners to increase access to health services via telemedicine. These recommendations will be based on empirical findings resulting from a systematic analysis of relevant literature, as well as incorporating perspectives from various stakeholders including local communities, health service providers and technology stakeholders. Third, the findings from this research are expected to influence the formation of health policies at the national and international levels. By providing solid evidence of the benefits of telemedicine in rural and remote areas, this research may motivate governments to adopt more progressive strategies in supporting digital health technologies. This could also open the door to the development of more inclusive and sustainable policy initiatives to improve overall public health.

Thus, this research not only aims to enrich academic literature but also has a practical aim to provide concrete solutions to the challenges that exist in access to health services in rural and remote areas. With a holistic and comprehensive approach, it is hoped that this research can have a significant impact in improving the quality of life and health of the people who need it most.

2. Research Methods

This research uses the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) method to collect and analyze articles from reputable international databases.

The PRISMA method was chosen because it provides a systematic and transparent framework for conducting a comprehensive and reproducible literature review.

The PRISMA method is a guide used to ensure that the systematic review process is carried out in a transparent and consistent manner. PRISMA consists of several main stages: identification, screening, inclusion, and exclusion of articles. This process begins with searching for articles through reputable international databases such as PubMed, Scopus, and Web of Science.

2.1. Stages in the PRISMA Method:

1. **Identification**: At this stage, an initial search is carried out in several databases using relevant keywords to identify potential articles. All articles found during this search will be included in the initial list.
2. **Filtering**: Articles that have been identified are then filtered based on the title and abstract to determine their relevance to the research topic. Irrelevant articles will be excluded at this stage.
3. **Inclusion**: Articles that pass the screening stage will be fully evaluated based on their full text. Articles that meet all inclusion criteria will be included in the final analysis.
4. **Exclusion**: Articles that do not meet the inclusion criteria or have low methodological quality will be excluded from the final analysis.

2.2. Keywords Used to Search for Articles

Article searches were carried out using relevant keywords and a combination of Boolean operators (AND, OR, NOT). Keywords used included: “telemedicine,” “health care access,” “rural areas,” “developing countries,” and “effectiveness.” This keyword combination was designed to ensure broad and inclusive coverage in the literature search.

2.3. Number of Articles Retrieved

The initial search yielded a number of relevant articles. The total number of articles found was recorded, and the articles were then filtered further. After the abstract-based screening stage, only relevant articles proceed to the full-text evaluation stage. The number of articles that passed the initial screening stage and the number of articles ultimately included in the final analysis were also recorded.

Article Inclusion and Exclusion Techniques:

1. **Inclusion Criteria**:
    a. Studies that focus on telemedicine interventions in rural and remote areas in developing countries.
    b. Articles published within the last five years.
    c. Articles written in English.
    d. Studies that use quantitative or qualitative research designs.
2. **Exclusion Criteria**:
    a. Studies that are not relevant to the research topic.
    b. Articles not available in full text.
    c. Studies with low methodological quality.
    d. Publications in languages other than English.

By rigorously applying the PRISMA method, this study sought to ensure that only the most relevant and high-quality articles were included in the analysis. This approach is expected to produce valid and reliable findings regarding the effectiveness of telemedicine in increasing access to health services in rural and remote areas in developing countries.

3. Results and Discussions

3.1. Effectiveness of telemedicine in increasing access to health services.

Telemedicine has emerged as a valuable tool in improving access to healthcare, especially for underserved populations and low and middle income countries (LMICs) (Franciosi et al., 2021; Hoffer-Hawlik et al., 2020; Barnard-Kelly, 2019). This technology has proven capable of bridging healthcare accessibility gaps, strengthening marginalized communities, and enabling timely access to medical services through virtual consultations and remote monitoring (Hoffer-Hawlik et al., 2020). Telemedicine has the potential to expand healthcare access by eliminating traditional barriers such as the need for transportation, distance from specialist providers, and time spent away from work (Barnard-Kelly, 2019). Additionally, telemedicine can improve the management of chronic diseases such as diabetes, increase access to care, and reduce inequities in the provision of health services (Santamaria, 2023).

Research has shown that telemedicine is effective in managing chronic diseases, contributing to patient-centered care, and improving access to health services (Matin et al., 2020). Telemedicine was able to maintain essential medical care for chronic disease patients during the COVID-19 pandemic and strengthen primary health care delivery while reducing socio-economic disparities in health care access in the long term (Barnard-Kelly, 2019). Additionally, telemedicine was found to improve patient outcomes by facilitating continuous monitoring, personalized care, and early intervention (Hoffer-Hawlik et al., 2020).

Telemedicine not only increases access to health services, but also offers cost-effective solutions, increases the effectiveness of providing health services to patients, and saves time and resources for health workers and patients (Salsabila & Ernawaty, 2022; Wiweko et al., 2021) . Furthermore, the combination of telemedicine with wearable devices strengthens remote patient monitoring and provides opportunities to improve healthcare delivery. In conclusion, telemedicine plays an important role in increasing access to healthcare by overcoming geographic barriers, reducing costs, improving patient outcomes, and addressing inequities in healthcare provision. Its effectiveness in managing chronic disease, providing patient-centered care, and expanding healthcare access makes it a valuable tool in improving overall healthcare delivery.

3.2. Health access indicators.

Access to health services is a complex concept and includes various indicators such as availability, accessibility, affordability, adequacy, and acceptability (Edward, 2021). These indicators play an important role in determining the quality and effectiveness of health services. Factors such as continuity of care, transportation services, and health insurance have a positive impact on access to care (Pourat et al., 2023; Denny et al., 2021). In addition, visit frequency, resolving capacity, and continuity of care are important components in assessing access to dental health services (França et al., 2020).

Research shows that adjustments in visit frequency by healthcare providers can predict the need for emergency services, especially for patients with mental disorders (Wu et al., 2023). Furthermore, the integration of virtual visits has been reported to improve access to care, with benefits recognized by both patients and providers (Peahl et al., 2021). Virtual care has played a significant role in maintaining access to behavioral health services during the COVID-19 pandemic (Zachrison et al., 2021).

Health insurance policies have been found to increase the number of outpatient visits, highlighting the role of insurance in increasing healthcare utilization (Thuong, 2020). Inequalities in health care access have been studied, with a focus on factors influencing the probability and frequency of health visits (Li et al., 2019). Additionally, the unequal distribution of green spaces can exacerbate health inequalities by limiting access for vulnerable populations (Jiménez et al., 2021). In conclusion, access to healthcare is influenced by a variety of factors, including insurance coverage, continuity of care, virtual care options, and availability of natural

environments. Understanding and addressing these factors is critical to improving access to health services and driving better health outcomes for individuals and communities.

3.3. Impact on health outcomes

Climate change is a significant public health issue with implications for morbidity and mortality rates, quality of life, and overall health outcomes. Vulnerable populations, such as individuals with cardiorespiratory diseases, women, the elderly, and those with low levels of education, are more vulnerable to the adverse impacts of climate change (Yang et al., 2021). The impacts of climate change on health are multifaceted, with increases in morbidity and mortality expected to be associated with a variety of health outcomes (Watkiss & Ebi, 2022).

Water quality is one area impacted by climate change, which is causing challenges such as waterborne diseases due to changes in rainfall patterns, increasing temperatures, and extreme weather events such as floods and droughts (Ahmed et al., 2020). Additionally, human-caused sea level rise is expected to shift populations, impact human migration patterns and potentially exacerbate health inequalities (Hauer et al., 2019).

Climate change not only affects physical health but also mental health and well-being. Extreme weather events, changes in air quality, and disruptions in food supply chains can lead to poor mental health outcomes and worsen existing health conditions (Senay et al., 2021). Perceptions of the impact of climate change on quality of life vary between communities, with geographic isolation and environmental change affecting well-being (Alfaro & Cortés, 2020).

As climate change continues, there is a growing need for public health systems to adapt effectively. Health care providers must address climate-sensitive health outcomes, modify public health programs, and increase resilience to meet the challenges of climate change (Deshmukh et al., 2023). Indigenous knowledge is invaluable in improving public health policies to address the disproportionate impact of climate change on indigenous populations (Masters-Awatere et al., 2022). In conclusion, the impact of climate change on health outcomes is a complex issue that requires interdisciplinary collaboration, policy interventions, and community engagement to reduce its adverse impacts. Understanding the linkage of climate change to human health and well-being is critical to building resilient and sustainable health systems to protect public health amidst environmental challenges.

3.4. Comparison based on type of disease or health condition.

Telemedicine has proven to be a valuable tool in increasing access to health services, particularly in treating various health conditions. Research shows that telemedicine interventions, such as remote monitoring and real-time consultations, have resulted in improved patient outcomes, greater access to specialist services, and patient empowerment through increased health literacy (Eze et al., 2020). This is especially beneficial for vulnerable populations, including the elderly, individuals with limited mobility, and ethnic minorities, thereby helping to address disparities in health care access (Chid, 2024).

Telemedicine has been effective in providing a variety of medical services in various fields, leading to greater access to care and better patient outcomes (Barbosa et al., 2021). Telemedicine is also considered a promising approach in managing chronic diseases, improving health outcomes, and improving management of conditions at home (Mao et al., 2022). Additionally, telemedicine has played an important role in increasing patient contact with healthcare providers, allowing for more frequent adjustments to treatment plans and better glycemic outcomes in conditions such as type 1 diabetes (Cobry & Wadwa, 2022).

The COVID-19 pandemic has accelerated the adoption of telemedicine, emphasizing its importance in ensuring continuity of care while maintaining physical distancing measures (Mahtta et al., 2021). Telemedicine is particularly beneficial in rural areas, where access to specialist care is limited, by providing facilitated models of synchronous and asynchronous care (Hampton, 2024). Additionally, telemedicine has shown positive results in increasing access to

care, reducing costs for patients, and minimizing the need for travel, especially in conditions such as sickle cell disease (Speller-Brown et al., 2022).

Overall, telemedicine has the potential to bridge gaps in healthcare accessibility, strengthen marginalized communities, and improve patient outcomes by enabling timely access to medical services through virtual consultations and remote monitoring (Kale, 2023). By effectively utilizing telemedicine technology, healthcare providers can improve patient care, address disparities in healthcare access, and improve health outcomes across a variety of disease conditions.

3.5. Comparison by demographic groups.

Telemedicine has emerged as an important tool in increasing access to healthcare, especially during the COVID-19 pandemic. Various studies highlight the importance of telemedicine in bridging gaps and reducing disparities in healthcare access (Luo et al., 2021; Poeran et al., 2021; Noceda et al., 2023; Roza, 2023; Roghani & Panahi, 2021). Telemedicine has been shown to provide alternative services for minor health problems, saving time and resources for patients and the health system (Gabrielsson-Järhult et al., 2021). In addition, telemedicine also helps vulnerable populations, such as the elderly, to maintain access to care during the pandemic (Chu et al., 2022).

Telemedicine is particularly beneficial in increasing access to specialist care in rural areas, leading to significant cost savings and improving the local economy (Nadakuditi, 2022). By utilizing telecommunications technology, telemedicine offers a solution to challenges in health service accessibility, especially for marginalized communities, by enabling virtual consultations and remote monitoring (Kale, 2023). Additionally, telemedicine has the potential to improve patient outcomes through continuous monitoring, personalized care, and early intervention (Kale, 2023).

Although telemedicine offers a variety of opportunities, including increased access to healthcare, better integration between services, and reduced hospital readmissions, challenges remain (Cunha, 2024). It is important to address these challenges in order to maximize the effectiveness of telemedicine in improving access to healthcare across various demographic groups. Studies show that factors such as age, education level, and pre-existing conditions may influence the likelihood of using telemedicine services (Deris, 2023). Additionally, increasing patient health literacy and providing personalized services can improve patient satisfaction and health outcomes in telemedicine care (Mason et al., 2022).

In conclusion, telemedicine plays an important role in expanding access to healthcare, reducing disparities, and improving patient outcomes. By overcoming barriers and adapting services to meet the needs of various demographic groups, telemedicine can continue to revolutionize healthcare delivery and ensure equitable access to quality care.

3.6. Discussion of how telemedicine interventions affect health access and outcomes.

Telemedicine has emerged as an important tool in improving access to healthcare, especially during the COVID-19 pandemic. Various studies highlight the importance of telemedicine in bridging gaps and reducing disparities in healthcare access (Luo et al., 2021; Poeran et al., 2021; Noceda et al., 2023; Roza, 2023; Roghani & Panahi, 2021). Telemedicine has been shown to provide alternative services for minor health problems, saving time and resources for patients and the health system (Gabrielsson-Järhult et al., 2021). In addition, telemedicine also helps vulnerable populations, such as the elderly, to maintain access to care during the pandemic (Chu et al., 2022).

Furthermore, telemedicine is extremely beneficial in increasing access to specialist care in rural areas, leading to significant cost savings and improving the local economy (Nadakuditi, 2022). By utilizing telecommunications technology, telemedicine offers a solution to challenges in health service accessibility, especially for marginalized communities, by enabling virtual

consultations and remote monitoring (Kale, 2023). Additionally, telemedicine has the potential to improve patient outcomes through continuous monitoring, personalized care, and early intervention (Kale, 2023).

Although telemedicine offers a variety of opportunities, including increased access to healthcare, better integration between services, and reduced hospital readmissions, challenges remain (Cunha, 2024). It is important to address these challenges in order to maximize the effectiveness of telemedicine in improving access to healthcare across various demographic groups. Studies show that factors such as age, education level, and pre-existing conditions may influence the likelihood of using telemedicine services (Deris, 2023). Additionally, increasing patient health literacy and providing personalized services can improve patient satisfaction and health outcomes in telemedicine care (Mason et al., 2022). In conclusion, telemedicine plays an important role in expanding access to healthcare, reducing disparities, and improving patient outcomes. By overcoming barriers and adapting services to meet the needs of various demographic groups, telemedicine can continue to revolutionize healthcare delivery and ensure equitable access to quality care.

3.7. Factors influencing effectiveness.

Factors that influence health system effectiveness include various elements that play an important role in improving service quality, operational efficiency, and overall system performance. Technological infrastructure, government support, health worker training, and innovation have been identified as key contributors to improving health services (Alsabi, 2023). Information technology, including processes, human resources, systems and infrastructure, plays a role as a mediator in improving hospital clinical performance (Kartawiguna, 2019). Telemedicine and drone technology have been highlighted for their potential in overcoming geographic barriers, increasing access to health services, and increasing the efficiency of health service delivery (Olatunji, 2023; Omaghomi, 2023). Additionally, the integration of business analysis tools in health decision making is influenced by factors such as data accessibility, infrastructure development, and cultural considerations (Okoduwa, 2024).

Technological innovations, including innovative capabilities, absorptive capacity, and health competencies, have been shown to reduce infectious diseases and increase health system resilience (Anser et al., 2022). Effective quality management and governance tools are essential to ensure the quality of health services, patient safety, and the effectiveness of health service delivery (Arya, 2020). Shifting to a technology-oriented health management model with well-aligned infrastructure can lead to better outcomes in disease prevention and treatment, as is evident in the management of COVID-19 (Mishra et al., 2021). Additionally, acceptance and adoption of telemedicine by healthcare professionals is critical to the success of complex healthcare infrastructures (Verfürth, 2020).

Efforts to deploy technology in global surgery, increase the availability and affordability of health services, and utilize e-learning in health professional education are critical to advancing health systems (Bolton et al., 2019; Chawla, 2023; Walsh et al., 2019). In addition, the role of government support in prioritizing health workforce needs, especially during crises such as the COVID-19 pandemic, is critical to maintaining an effective health workforce (Cordero, 2021). The implications of technological advances in surgery for low- and middle-income countries highlight the importance of resources to strengthen health systems (Malik, 2024). In conclusion, a multifaceted approach that integrates technological advances, government support, effective governance, and ongoing training of health workers is essential to increase health system effectiveness and improve patient outcomes.

3.8. Recommendations for telemedicine practice in rural and remote areas.

Telemedicine has become an important tool in providing healthcare services to individuals living in rural and remote areas. Multiple studies highlight the benefits and

effectiveness of telehealth in improving access to care for patients in locations such as these. Research shows its role in increasing patient and caregiver satisfaction (Orlando et al., 2019), achieving positive outcomes in rural settings (Yarbrough, 2024), eliminating travel barriers and increasing access to health services (Mauldin et al., 2021), and as a complement to face-to-face services to expand health access in remote areas (Mathew et al., 2023).

During the COVID-19 pandemic, telehealth has greatly facilitated connections between patients and healthcare providers, resulting in widespread adoption of telehealth programs (Sump et al., 2023). In the United States, the Health Resources and Services Administration defines telehealth as a means of supporting clinical health care and distance education (English, 2023). Emergency departments have also utilized telehealth to increase access to specialist care for patients in rural and remote areas (Tsou et al., 2021).

Telehealth has proven to be a cost-effective solution, reducing travel costs for patients and reducing infrastructure costs for health facilities in rural areas (Nadakuditi, 2022). Additionally, telehealth plays an important role in the provision of mental health services, increasing access, and promoting medication adherence in remote settings (Talarico, 2021). Studies also show that telehealth services in underserved areas reduce wait times, costs, and out-of-pocket expenses associated with seeking health care in urban centers (Seto et al., 2019).

Overall, telemedicine plays a vital role in addressing health care disparities in rural and remote areas by increasing access to care, increasing patient satisfaction, reducing costs, and increasing recruitment and retention of health workers. By utilizing telehealth technology, health systems can reduce disparities in access and provision of services, thereby ensuring equitable health care for individuals in remote areas.

3.9. Policies that support the implementation of telemedicine.

Policies play a crucial role in supporting the implementation of telemedicine, especially in the context of the COVID-19 pandemic. The rapid expansion of telehealth services has been facilitated by policy changes aimed at ensuring public access to health services during the pandemic (Bajowala et al., 2020). For example, in India, the Ministry of Health & Family Welfare issued guidelines to regulate telemedicine, indicating a policy response to the increasing use of telehealth services (Dash et al., 2021). These policy changes are not only reactive but also prospective, as highlighted in a study that reviewed telehealth policy changes resulting from the pandemic and emphasized considerations for future delivery and implementation of telehealth programs (Naim, 2021).

To ensure successful implementation of telemedicine, clear guidelines and regulations are essential. A scope review of telemedicine guidelines in Southeast Asia emphasizes the importance of detailing patient identification, data ownership, cybersecurity laws, and strategies to overcome limitations compared to in-person consultations (Sabrina & Defi, 2021). Additionally, the evolution of telehealth in ambulatory nutrition practice highlights how legislative and regulatory changes have enabled the expansion of telehealth delivery and reimbursement, ensuring continuity of care for patients (Shah et al., 2021).

Additionally, the relationship between telehealth utilization and policy responses during the COVID-19 pandemic has been examined, suggesting that policy responses have encouraged broader application of telehealth services (Ishikawa et al., 2022). In Peru, recognition of telemedicine as a key strategy to overcome the pandemic and increase access to health services, especially in rural and underserved areas, is becoming apparent (Curioso et al., 2023). These examples highlight the importance of policy frameworks in encouraging the adoption and integration of telemedicine into health systems. In conclusion, policies that support the implementation of telemedicine are essential to ensure the accessibility, quality, and effectiveness of telehealth services. By establishing clear guidelines, regulations, and reimbursement mechanisms, policymakers can facilitate widespread adoption of telemedicine, especially during a global health crisis such as the COVID-19 pandemic.

4. Conclusions

Telemedicine has proven to be a valuable tool in increasing access to health services, especially in remote areas and for underserved populations. This technology not only overcomes geographic and economic barriers in access to medical care, but also improves chronic disease management and overall patient outcomes. The implications of this research indicate that telemedicine has great potential to reduce inequalities in health service provision, improve patient quality of life, and reduce the burden on the health system as a whole.

The application of telemedicine can influence public health policy by increasing the accessibility of health services, especially in hard-to-reach areas. This requires support from the government and related institutions to develop regulations that support the widespread use of telemedicine. Training for health workers also needs to be improved to ensure they are able to operate this technology effectively. In addition, it is important to pay attention to data security and patient privacy when using telemedicine.

Although telemedicine offers many benefits, there are some limitations to be aware of. Uneven technological infrastructure, limited internet access in some areas, and challenges in building doctor-patient relationships that are as effective as face-to-face visits, are some of them. In addition, not all medical conditions can be completely treated via telemedicine, so there needs to be an integrated approach between virtual and face-to-face services.

Future research could further explore how telemedicine can be better integrated into existing health systems, particularly in addressing existing infrastructure and social challenges. Additionally, future studies could focus on long-term evaluation of telemedicine use across different populations and health conditions to fully understand its impact on health outcomes and health system efficiency.

5. References

Ahmed, T., Zounemat‐Kermani, M., & Scholz, M. (2020). Climate change, water quality and water-related challenges: a review with focus on pakistan. International Journal of Environmental Research and Public Health, 17(22), 8518. https://doi.org/10.3390/ijerph17228518

Alfaro, A. and Cortés, M. (2020). Perception of the impact of climate change on the quality of life and well-being of the inhabitants of the cerro blanco agricultural community, limarí province, chile. Idesia (Arica), 38(4), 127-131. https://doi.org/10.4067/s0718-34292020000400127

Alharbi, M. and Kalevaru, C. (2022). Patients' satisfaction with telemedicine in qassim region, saudi arabia. International Journal of Tropical Disease & Health, 39-46. https://doi.org/10.9734/ijtdh/2022/v43i1330637

Alsabi, H. (2023). Nexus of covid-19 crises and health care performance in jordan: the moderation role of telemedicine, innovation, and infrastructure. International Journal of Sustainable Development and Planning, 18(12), 3895-3908. https://doi.org/10.18280/ijsdp.181221

Anser, M., Ahmad, M., Khan, M., Nassani, A., Askar, S., Zaman, K., … & Kabbani, A. (2022). Prevention of covid-19 pandemic through technological innovation: ensuring global innovative capability, absorptive capacity, and adaptive healthcare competency. International Journal of Environmental Science and Technology, 20(8), 8485-8496. https://doi.org/10.1007/s13762-022-04494-0

Arya, D. (2020). Use of quality management tools and methods is essential to support effective governance of healthcare organisations. Asia Pacific Journal of Health Management, 15(1), 49-52. https://doi.org/10.24083/apjhm.v15i1.325

Bajowala, S., Milosch, J., & Bansal, C. (2020). Telemedicine pays: billing and coding update. Current Allergy and Asthma Reports, 20(10). https://doi.org/10.1007/s11882-020-00956-y

Barbosa, W., Zhou, K., Waddell, E., Myers, T., & Dorsey, E. (2021). Improving access to care:

telemedicine across medical domains. Annual Review of Public Health, 42(1), 463-481. https://doi.org/10.1146/annurev-publhealth-090519-093711

Barnard‐Kelly, K. (2019). Utilizing ehealth and telemedicine technologies to enhance access and quality of consultations: it's not what you say, it's the way you say it. Diabetes Technology & Therapeutics, 21(S2), S2-41-S2-47. https://doi.org/10.1089/dia.2019.0015

Bolton, W., Aruparayil, N., Quyn, A., Scott, J., Wood, A., Bundu, I., … & Jayne, D. (2019). Disseminating technology in global surgery. British Journal of Surgery, 106(2), e34-e43. https://doi.org/10.1002/bjs.11036

Bulto, L. (2024). The role of nurse‐led telehealth interventions in bridging healthcare gaps and expanding access. Nursing Open, 11(1). https://doi.org/10.1002/nop2.2092

Chawla, N. (2023). Unveiling the abcs: identifying india's healthcare service gaps. Cureus. https://doi.org/10.7759/cureus.42398

Chid, R. (2024). Telemedicine in diabetic eye care: a meta-analysis of its effectiveness in underserved populations. World Journal of Biology Pharmacy and Health Sciences, 17(3), 131-139. https://doi.org/10.30574/wjbphs.2024.17.3.0104

Chu, C., Brual, J., Fang, J., Fleury, C., Stamenova, V., Bhattacharyya, O., … & Tadrous, M. (2022). The use of telemedicine in older-adults during the covid-19 pandemic: a weekly cross-sectional analysis in ontario, canada. Canadian Geriatrics Journal, 25(4), 380-389. https://doi.org/10.5770/cgj.25.610

Cobry, E. and Wadwa, R. (2022). The future of telehealth in type 1 diabetes. Current Opinion in Endocrinology Diabetes and Obesity, 29(4), 397-402. https://doi.org/10.1097/med.0000000000000745

Cordero, D. (2021). ‘and with your spirit’: a holistic support for healthcare workers in the midst of covid-19 pandemic. Journal of Public Health, 43(2), e319-e320. https://doi.org/10.1093/pubmed/fdab029

Cunha, A. (2024). Challenges of using telemedicine in hospital specialty consultations during the covid-19 pandemic in portugal according to a panel of experts. Acta Médica Portuguesa, 37(3), 198-206. https://doi.org/10.20344/amp.19931

Curioso, W., Coronel-Chucos, L., & Henríquez-Suárez, M. (2023). Integrating telehealth for strengthening health systems in the context of the covid-19 pandemic: a perspective from peru. International Journal of Environmental Research and Public Health, 20(11), 5980. https://doi.org/10.3390/ijerph20115980

Dash, S., Aarthy, R., & Mohan, V. (2021). Telemedicine during covid-19 in india—a new policy and its challenges. Journal of Public Health Policy, 42(3), 501-509. https://doi.org/10.1057/s41271-021-00287-w

Denny, H., Laksono, A., Matahari, R., & Kurniawan, B. (2021). The determinants of four or more antenatal care visits among working women in indonesia. Asia Pacific Journal of Public Health, 34(1), 51-56. https://doi.org/10.1177/10105395211051237

Deris, J. (2023). Utilization of telemedicine services for mental health care in malaysia during the covid-19 pandemic: a cross-sectional study. Journal of Community Health Provision, 3(1), 8-13. https://doi.org/10.55885/jchp.v3i1.218

Deshmukh, C., Dodamani, A., & Mistry, V. (2023). Climate change on oral health and dentistry: association and mitigation. Acta Scientific Dental Scienecs, 78-85. https://doi.org/10.31080/asds.2023.07.1538

Devi, R. (2024). Impact of telemedicine services among rural women in tamilnadu., 555-565. https://doi.org/10.2991/978-94-6463-433-4_42

Edward, J. (2021). Interplay between literacy and health services access: the case of elderly exemption beneficiaries in tanzania. Journal of Learning for Development, 8(1), 129-145. https://doi.org/10.56059/jl4d.v8i1.494

English, C. (2023). Telehealth models of service delivery—a brave new world. Journal of Neurologic Physical Therapy, 47(4), 187-188. https://doi.org/10.1097/npt.0000000000000457

Eze, N., Mateus, C., & Hashiguchi, T. (2020). Telemedicine in the oecd: an umbrella review of

clinical and cost-effectiveness, patient experience and implementation. Plos One, 15(8), e0237585. https://doi.org/10.1371/journal.pone.0237585

França, M., Freire, M., Pereira, E., & Marcelo, V. (2020). Indicadores de saúde bucal propostos pelo ministério da saúde para monitoramento e avaliação das ações no sistema único de saúde: pesquisa documental, 2000-2017*. Epidemiologia E Serviços De Saúde, 29(1). https://doi.org/10.5123/s1679-49742020000100002

Franciosi, E., Tan, A., Kassamali, B., Leonard, N., Zhou, G., Krueger, S., … & LaChance, A. (2021). The impact of telehealth implementation on underserved populations and no-show rates by medical specialty during the covid-19 pandemic. Telemedicine Journal and E-Health, 27(8), 874-880. https://doi.org/10.1089/tmj.2020.0525

Gabrielsson-Järhult, F., Kjellström, S., & Josefsson, K. (2021). Telemedicine consultations with physicians in swedish primary care: a mixed methods study of users' experiences and care patterns. Scandinavian Journal of Primary Health Care, 39(2), 204-213. https://doi.org/10.1080/02813432.2021.1913904

Greiwe, J. (2022). Telemedicine lessons learned during the covid-19 pandemic. Current Allergy and Asthma Reports, 22(1), 1-5. https://doi.org/10.1007/s11882-022-01026-1

Haimi, M. (2023). The tragic paradoxical effect of telemedicine on healthcare disparities- a time for redemption: a narrative review. BMC Medical Informatics and Decision Making, 23(1). https://doi.org/10.1186/s12911-023-02194-4

Halcomb, E., Ashley, C., Dennis, S., McInnes, S., Morgan, M., Zwar, N., … & Williams, A. (2023). Telehealth use in australian primary healthcare during covid-19: a cross-sectional descriptive survey. BMJ Open, 13(1), e065478. https://doi.org/10.1136/bmjopen-2022-065478

Haleem, A., Javaid, M., Singh, R., & Suman, R. (2021). Telemedicine for healthcare: capabilities, features, barriers, and applications. Sensors International, 2, 100117. https://doi.org/10.1016/j.sintl.2021.100117

Hampton, F. (2024). The role of telemedicine in rural specialty care: priorities and recommendations from rural primary care physicians. Kansas Journal of Medicine, 17(1), 6-10. https://doi.org/10.17161/kjm.vol17.21290

Hauer, M., Fussell, E., Mueller, V., Burkett, M., Call, M., Abel, K., … & Wrathall, D. (2019). Sea-level rise and human migration. Nature Reviews Earth & Environment, 1(1), 28-39. https://doi.org/10.1038/s43017-019-0002-9

Hoffer-Hawlik, M., Moran, A., Burka, D., Kaur, P., Cai, J., Frieden, T., … & Gupta, R. (2020). Leveraging telemedicine for chronic disease management in low- and middle-income countries during covid-19. Global Heart, 15(1). https://doi.org/10.5334/gh.852

Hyder, M. and Razzak, J. (2020). Telemedicine in the united states: an introduction for students and residents. Journal of Medical Internet Research, 22(11), e20839. https://doi.org/10.2196/20839

Idris, H. (2024). How is telehealth currently being utilized to help in hypertension management within primary healthcare settings? a scoping review. International Journal of Environmental Research and Public Health, 21(1), 90. https://doi.org/10.3390/ijerph21010090

Ishikawa, T., Sato, J., Hattori, J., Goda, K., & Mitsutake, N. (2022). The association between telehealth utilization and policy responses on covid-19 in japan: interrupted time-series analysis. Interactive Journal of Medical Research, 11(2), e39181. https://doi.org/10.2196/39181

Jiménez, M., DeVille, N., Elliott, E., Schiff, J., Wilt, G., Hart, J., … & James, P. (2021). Associations between nature exposure and health: a review of the evidence. International Journal of Environmental Research and Public Health, 18(9), 4790. https://doi.org/10.3390/ijerph18094790

Kale, E. (2023). Telemedicine revolution: bridging gaps in access to healthcare. International Journal on Recent and Innovation Trends in Computing and Communication, 11(7), 394-399. https://doi.org/10.17762/ijritcc.v11i7.9424

Kartawiguna, D. (2019). The role of information technology in mediating the effect of medical

resources on hospital clinical performance. International Journal of Advanced Trends in Computer Science and Engineering, 8(6), 2887-2892. https://doi.org/10.30534/ijatcse/2019/33862019

Kissi, J. (2023). Telehealth services for global emergencies: implications for covid-19: a scoping review based on current evidence. BMC Health Services Research, 23(1). https://doi.org/10.1186/s12913-023-09584-4

Li, C., Tang, C., & Wang, H. (2019). Effects of health insurance integration on health care utilization and its equity among the mid-aged and elderly: evidence from china. International Journal for Equity in Health, 18(1). https://doi.org/10.1186/s12939-019-1068-1

Luo, J., Tong, L., Crotty, B., Somai, M., Taylor, B., Osinski, K., … & George, B. (2021). Telemedicine adoption during the covid-19 pandemic: gaps and inequalities. Applied Clinical Informatics, 12(04), 836-844. https://doi.org/10.1055/s-0041-1733848

Maha, C. (2024). Transforming mental health care: telemedicine as a game-changer for low-income communities in the us and africa. GSC Advanced Research and Reviews, 19(2), 275-285. https://doi.org/10.30574/gscarr.2024.19.2.0188

Mahtta, D., Daher, M., Lee, M., Sayani, S., Shishehbor, M., & Virani, S. (2021). Promise and perils of telehealth in the current era. Current Cardiology Reports, 23(9). https://doi.org/10.1007/s11886-021-01544-w

Malik, S. (2024). Implications of technological advancement of surgery in low and middle-income countries' a narrative review. Journal of the Pakistan Medical Association, 74(4). https://doi.org/10.47391/jpma.aku-9s-10

Mao, A., Tam, L., Xu, A., Osborn, K., Sheffrin, M., Gould, C., … & Mesias, M. (2022). Barriers to telemedicine video visits for older adults in independent living facilities: mixed methods cross-sectional needs assessment. Jmir Aging, 5(2), e34326. https://doi.org/10.2196/34326

Mason, A., Brown, M., & Mason, K. (2022). Telemedicine patient satisfaction dimensions moderated by patient demographics. Healthcare, 10(6), 1029. https://doi.org/10.3390/healthcare10061029

Masters‐Awatere, B., Howard, D., & Young, P. (2022). Haumanu hauora: refining public health institution policy to include māori and climate change.. https://doi.org/10.21203/rs.3.rs-1966481/v1

Mathew, S., Fitts, M., Liddle, Z., Bourke, L., Campbell, N., Murakami-Gold, L., … & Wakerman, J. (2023). Telehealth in remote australia: a supplementary tool or an alternative model of care replacing face-to-face consultations?. BMC Health Services Research, 23(1). https://doi.org/10.1186/s12913-023-09265-2

Matin, Z., Khayat, S., Navidian, A., & Fanaei, H. (2020). Comparing the effect of group training and telemedicine on exercise during pregnancy: an application of the health belief model. Journal of Education and Health Promotion, 9(1), 187. https://doi.org/10.4103/jehp.jehp_88_20

Mauldin, K., Gieng, J., Saarony, D., & Hu, C. (2021). Performing nutrition assessment remotely via telehealth. Nutrition in Clinical Practice, 36(4), 751-768. https://doi.org/10.1002/ncp.10682

Mishra, A., Basumallick, S., Lu, A., Chiu, H., Shah, M., Shukla, Y., … & Tiwari, A. (2021). The healthier healthcare management models for covid-19. Journal of Infection and Public Health, 14(7), 927-937. https://doi.org/10.1016/j.jiph.2021.05.014

Nadakuditi, S. (2022). Role of telemedicine in improving access to specialized care in rural health systems and its future in health care delivery. Journal of Health Statistics Reports, 1-3. https://doi.org/10.47363/jhsr/2022(1)118

Naim, N. (2021). Telehealth beyond covid-19. Psychiatric Services, 72(1), 100-103. https://doi.org/10.1176/appi.ps.202000368

Noceda, A., Acierto, L., Bertiz, M., Dionisio, D., Laurito, C., Sanchez, G., … & Amit, A. (2023). Patient satisfaction with telemedicine in the philippines during the covid-19 pandemic: a mixed methods study. BMC Health Services Research, 23(1).

https://doi.org/10.1186/s12913-023-09127-x
Okoduwa, I. (2024). Reviewing business analytics in healthcare management: usa and african perspectives. World Journal of Biology Pharmacy and Health Sciences, 17(2), 080-088. https://doi.org/10.30574/wjbphs.2024.17.2.0047
Olatunji, G. (2023). Exploring the transformative role of drone technology in advancing healthcare delivery in africa; a perspective. Annals of Medicine and Surgery, 85(10), 5279-5284. https://doi.org/10.1097/ms9.0000000000001221
Omaghomi, T. (2023). Telemedicine in rural africa: a review of accessibility and impact. World Journal of Advanced Research and Reviews, 21(2), 421-431. https://doi.org/10.30574/wjarr.2024.21.2.0475
Omaghomi, T. (2024). A comprehensive review of telemedicine technologies: past, present, and future prospects. International Medical Science Research Journal, 4(2), 183-193. https://doi.org/10.51594/imsrj.v4i2.811
Orlando, J., Beard, M., & Kumar, S. (2019). Systematic review of patient and caregivers' satisfaction with telehealth videoconferencing as a mode of service delivery in managing patients' health. Plos One, 14(8), e0221848. https://doi.org/10.1371/journal.pone.0221848
Peahl, A., Powell, A., Berlin, H., Smith, R., Krans, E., Waljee, J., … & Moniz, M. (2021). Patient and provider perspectives of a new prenatal care model introduced in response to the coronavirus disease 2019 pandemic. American Journal of Obstetrics and Gynecology, 224(4), 384.e1-384.e11. https://doi.org/10.1016/j.ajog.2020.10.008
Poeran, J., Cho, L., Wilson, L., Zhong, H., Mazumdar, M., Liu, J., … & Memtsoudis, S. (2021). Pre-existing disparities and potential implications for the rapid expansion of telemedicine in response to the coronavirus disease 2019 pandemic. Medical Care, 59(8), 694-698. https://doi.org/10.1097/mlr.0000000000001585
Pourat, N., Lu, C., Chen, X., Zhou, W., Hair, B., Bolton, J., … & Sripipatana, A. (2023). Factors associated with frequent emergency department visits among health centre patients receiving primary care. Journal of Evaluation in Clinical Practice, 29(6), 964-975. https://doi.org/10.1111/jep.13818
Richardson, P., Parker, D., Chavez, K., Birnie, K., Krane, E., Simons, L., … & Bhandari, R. (2021). Evaluating telehealth implementation in the context of pediatric chronic pain treatment during covid-19. Children, 8(9), 764. https://doi.org/10.3390/children8090764
Roghani, A. and Panahi, S. (2021). Does telemedicine reduce health disparities? longitudinal evidence during the covid-19 pandemic in the us.. https://doi.org/10.1101/2021.03.01.21252330
Roza, S. (2023). Perception and usage of telemedicine among national health insurance participants in padang city. Jurnal Ilmu Kesehatan Masyarakat, 14(3), 281-292. https://doi.org/10.26553/jikm.2023.14.2.281-292
Sabrina, M. and Defi, I. (2021). Telemedicine guidelines in south east asia—a scoping review. Frontiers in Neurology, 11. https://doi.org/10.3389/fneur.2020.581649
Salsabila, S. and Ernawaty, E. (2022). Effect of psychosocial factors in the use of telemedicine. Global Medical & Health Communication (Gmhc), 10(3). https://doi.org/10.29313/gmhc.v10i3.10223
Santamaria, A. (2023). Implementing telemedicine in clinical practice in the first digital hematology unit: feasibility study. Jmir Formative Research, 7, e48987. https://doi.org/10.2196/48987
Sculley, J., Musick, H., & Krishnan, J. (2021). Telehealth in chronic obstructive pulmonary disease: before, during, and after the coronavirus disease 2019 pandemic. Current Opinion in Pulmonary Medicine, 28(2), 93-98. https://doi.org/10.1097/mcp.0000000000000851
Senay, E., Bernstein, A., Shephard, P., Salas, R., Rizzo, A., Sherman, J., … & Wright, R. (2021). Improving patient outcomes in the dual crises of climate change and covid-19. Journal of Occupational and Environmental Medicine, 63(11), e813-e818. https://doi.org/10.1097/jom.0000000000002345

Seto, E., Smith, D., Jacques, M., & Morita, P. (2019). Opportunities and challenges of telehealth in remote communities: case study of the yukon telehealth system. Jmir Medical Informatics, 7(4), e11353. https://doi.org/10.2196/11353

Shah, N., Krupiński, E., Bernard, J., & Moyer, M. (2021). The evolution and utilization of telehealth in ambulatory nutrition practice. Nutrition in Clinical Practice, 36(4), 739-749. https://doi.org/10.1002/ncp.10641

Speller-Brown, B., Carhuas, C., Stone, A., Connolly, M., Martin, B., Zhang, A., … & Darbari, D. (2022). Telemedicine in sickle cell disease: patient, parent, and provider perspectives. Pediatric Blood & Cancer, 70(3). https://doi.org/10.1002/pbc.30125

Sump, C., Odum, J., & Pfarr, M. (2023). Putting equity at the forefront as telehealth advances: a hospitalist perspective. Journal of Hospital Medicine, 19(3), 223-226. https://doi.org/10.1002/jhm.13122

Talarico, I. (2021). The use of telehealth to increase mental health services access and promote medication adherence in rural locations. Journal of the American Association of Nurse Practitioners, 33(11), 1074-1079. https://doi.org/10.1097/jxx.0000000000000495

Thuong, N. (2020). Impact of health insurance on healthcare utilisation patterns in vietnam: a survey-based analysis with propensity score matching method. BMJ Open, 10(10), e040062. https://doi.org/10.1136/bmjopen-2020-040062

Thurah, A., Bösch, P., Marques, A., Meißner, Y., Mukhtyar, C., Knitza, J., … & Dejaco, C. (2022). 2022 eular points to consider for remote care in rheumatic and musculoskeletal diseases. Annals of the Rheumatic Diseases, 81(8), 1065-1071. https://doi.org/10.1136/annrheumdis-2022-222341

Tsou, C., Robinson, S., Boyd, J., Jamieson, A., Blakeman, R., McDonnell, J., … & Hendrie, D. (2021). Effectiveness of telehealth in rural and remote emergency departments: systematic review. Journal of Medical Internet Research, 23(11), e30632. https://doi.org/10.2196/30632

Verfürth, M. (2020). Design and validation of a questionnaire to measure the acceptance of telemedicine by healthcare professionals in germany.. https://doi.org/10.21203/rs.3.rs-77065/v1

Vudathaneni, V. (2024). The impact of telemedicine and remote patient monitoring on healthcare delivery: a comprehensive evaluation. Cureus. https://doi.org/10.7759/cureus.55534

Walker, D., Nouri, M., Plouffe, R., Liu, J., Le, T., Forchuk, C., … & Richardson, J. (2023). Telehealth experiences in canadian veterans: associations, strengths and barriers to care during the covid-19 pandemic. BMJ Military Health, e002249. https://doi.org/10.1136/military-2022-002249

Walsh, K., Bhagavatheeswaran, L., & Roma, E. (2019). E-learning in healthcare professional education: an analysis of political, economic, social, technological, legal and environmental (pestle) factors. Mededpublish, 8, 97. https://doi.org/10.15694/mep.2019.000097.1

Watkiss, P. and Ebi, K. (2022). A lack of climate finance is harming population health. BMJ, o313. https://doi.org/10.1136/bmj.o313

Wilcock, A., Rose, S., Busch, A., Huskamp, H., Uscher‐Pines, L., Landon, B., … & Mehrotra, A. (2019). Association between broadband internet availability and telemedicine use. Jama Internal Medicine, 179(11), 1580. https://doi.org/10.1001/jamainternmed.2019.2234

Wiweko, B., Zakirah, S., & Luthfi, A. (2021). The essence of telemedicine for bridging the gap in health services. Kesmas National Public Health Journal, 16(2). https://doi.org/10.21109/kesmas.v16i2.4896

Wu, M., Hung, C., Fang, S., & Lee, T. (2023). Change of home visit frequency by public health nurses predicts emergency escorts for psychiatric patients living in the community: a retrospective medical record review. Frontiers in Public Health, 11. https://doi.org/10.3389/fpubh.2023.1066908

Yang, J., Zhou, M., Ren, Z., Li, M., Wang, B., Liu, D., … & Liu, Q. (2021). Projecting

heat-related excess mortality under climate change scenarios in china. Nature Communications, 12(1). https://doi.org/10.1038/s41467-021-21305-1

Yankappa, N. (2024). Clinicodemographic profile and clinical outcome of children presenting to telemedicine center at institute of national importance of india: a prospective observational study. International Journal of Telemedicine and Applications, 2024, 1-9. https://doi.org/10.1155/2024/5341988

Yarbrough, J. (2024). Telehealth: measurement for best outcomes in support of rural residents. Online Journal of Rural Nursing and Health Care, 24(1), 7-28. https://doi.org/10.14574/ojrnhc.v24i1.743

Zachrison, K., Yan, Z., Sequist, T., Licurse, A., Tan‐McGrory, A., Erskine, A., … & Schwamm, L. (2021). Patient characteristics associated with the successful transition to virtual care: lessons learned from the first million patients. Journal of Telemedicine and Telecare, 29(8), 621-631. https://doi.org/10.1177/1357633x211015547

Zhang, D., Shi, L., Han, X., Li, Y., Jalajel, N., Patel, S., … & Su, D. (2021). Disparities in telehealth utilization during the covid-19 pandemic: findings from a nationally representative survey in the united states. Journal of Telemedicine and Telecare, 30(1), 90-97. https://doi.org/10.1177/1357633x211051677