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Bridging Gaps in Health Access Through Telehealth in Indonesia: A Literature Review Focused on Primary Care

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Abstract

Indonesia, the world's largest archipelagic nation, faces significant challenges in equitable access to healthcare services, particularly in remote areas. Telehealth presents a potential solution to bridge this gap, particularly in primary healthcare. This study aims to examine the effectiveness, accessibility, and readiness of Indonesia's primary healthcare system to adopt telehealth, based on a review of international and national scientific literature. The study results indicate that telehealth can improve service effectiveness by accelerating diagnosis, improving referral mechanisms, and interprofessional collaboration. Healthcare worker satisfaction also increases, particularly when supported by adequate digital infrastructure. However, telehealth adoption remains unequal, with users concentrated in urban areas and groups with high digital literacy. Other challenges identified include uneven digital infrastructure, inadequate healthcare worker training, and the absence of regulations guaranteeing data security and electronic medical record (EHR) interoperability. While there is potential for leveraging technologies such as artificial intelligence to improve service efficiency, the success of this transformation depends on inclusive regulations and cross-sectoral leadership. Therefore, telehealth must be viewed not merely as a technological innovation, but as a tool for systemic transformation that requires readiness in infrastructure, regulations, human resources, and community participation.

Keywords: Telehealth, primary health care, accessibility, digital transformation, Indonesia

1. Introduction

Indonesia, as the world's largest archipelagic nation, faces complex geographic challenges in healthcare provision. Inequality of access between urban and rural areas remains a major issue in the national healthcare system. In many remote areas, people struggle to access basic healthcare due to limited infrastructure, medical personnel, and health facilities. This situation widens the gap in health quality and exacerbates morbidity and mortality rates in geographically isolated areas (Leosari et al., 2023; Mangoma & Sulistiadi, 2024).

To address these challenges, telehealth, including telemedicine and e-health, has emerged as an innovative approach capable of reaching populations previously unreachable by conventional services. Telehealth allows patients to receive medical consultations, diagnoses, and even follow-up therapy virtually without having to physically travel to a healthcare facility (Reed et al., 2021; Suresh et al., 2021). This innovation is particularly important in a country like Indonesia, where referral systems are often hampered by geography and transportation limitations.

The use of telehealth has grown rapidly since the outbreak of the COVID-19 pandemic, which required restrictions on mobility and physical contact. During the pandemic, various hospitals and community health centers (Puskesmas) in Indonesia began utilizing online services to provide medical care, particularly for patients with chronic diseases and minor complaints (Wulandari et al., 2023). The government also encouraged the use of digital platforms such as Alodokter, Halodoc, and BPJS telemedicine services as part of an adaptive strategy to ensure the continuity of basic healthcare services (Futri & Naruetharadho, 2025).

Despite its potential, the implementation of telehealth in Indonesia is not free from various structural challenges. One of these is the digital infrastructure gap between western and eastern Indonesia. In many remote areas, weak internet connectivity and uneven electricity distribution are major barriers to successful teleconsultation. This is exacerbated by low levels of digital literacy among both medical personnel and service users (Hariyati et al., 2024).

Furthermore, the readiness of healthcare institutions to adopt telehealth systems also varies. Some healthcare facilities, particularly private hospitals in urban areas, demonstrate high readiness in terms of technology and human resources. Conversely, many community health centers (Puskesmas) in underserved areas lack adequate equipment and training to support sustainable telemedicine services. Regulatory aspects are also a significant concern, as Indonesia still lacks comprehensive regulations regarding patient data protection, digital security, and standardization of remote service practices (Drury & Lazuardi, 2021).

From a user perspective, telehealth offers convenience and efficiency. Patients in remote areas can avoid expensive travel costs and long waiting times. However, several studies indicate that public trust in the quality of digital services still varies, especially when compared to in-person interactions with doctors. Perceptions of service effectiveness are also influenced by users' initial experiences accessing the system, which can sometimes be unfriendly or unstable.

In terms of service equity, telehealth can be a crucial instrument for improving health equity, provided it is supported by an inclusive approach. The government needs to ensure that the development of digital health technology is not solely focused on large cities but also reaches indigenous communities, coastal communities, and border areas. Community-based approaches, digital training for local health workers, and incentives for service providers can be effective empowerment strategies (Owoyemi et al., 2022).

Previous literature reviews have focused primarily on the use of telehealth in referral hospitals or private clinics, while aspects of primary care, such as community health centers (Puskesmas), have received relatively little discussion. Yet, primary care is the foundation of the Indonesian health system, tasked with implementing promotive, preventive, curative, and rehabilitative efforts at the community level. Therefore, it is crucial to systematically review how telehealth has been implemented in the context of primary care and its effectiveness in expanding equitable access.

Through this literature review, this article aims to present a mapping of scientific findings covering the effectiveness, accessibility, and equity dimensions of telehealth implementation in primary care in Indonesia. The primary focus is on user experience, provider readiness, policy support, and structural challenges faced. It is hoped that the results of this study can provide a conceptual and practical basis for the development of more adaptive and sustainable telehealth to support the transformation of the Indonesian health system.

2. Research Methods

This study used a systematic literature review approach to examine the implementation of telehealth in primary care services in Indonesia, focusing on three main dimensions: effectiveness, accessibility, and equity of service. This method was chosen because it allows for comprehensive collection, sorting, and analysis of various scientific findings from reliable and relevant sources over a specific period of time. The following research flow is shown in Figure 1.

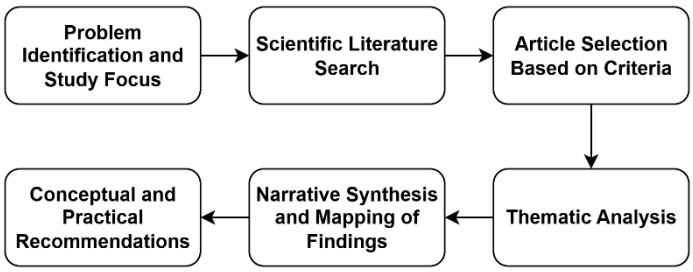

Figure 1: research flow

The initial step of the research began with problem identification through an examination of Indonesia's geographical context as an archipelagic nation, as well as the disparity in access to healthcare services between urban and rural areas. This issue was reinforced by the findings of several previous studies that highlighted the limitations of healthcare infrastructure in the 3T (underdeveloped, frontier, and outermost) areas. The study focused on how telehealth, as a digital innovation in healthcare, can address access challenges at the primary care level, such as community health centers (Puskesmas) and primary clinics.

Once the study focus was determined, the next step was to conduct a systematic literature search through various scientific databases, both national and international. The databases used included PubMed, Scopus, ScienceDirect, Google Scholar, and national platforms such as Garuda and Neliti. Articles were searched for articles published between 2019 and 2025, to reflect the dynamics before and after the COVID-19 pandemic, which is considered a starting point for accelerating the use of digital healthcare services.

The literature found was then screened using inclusion and exclusion criteria. Articles included in the review must discuss the implementation of telehealth in Indonesia, particularly in the context of primary care services. Articles

must be written in Indonesian or English and published in reputable journals. Articles that solely discuss referral hospital services (secondary or tertiary care), or that are not relevant to the study topic, were excluded from the analysis. The selection process involved carefully reading the title, abstract, and content of the articles to ensure their relevance.

Articles that passed the selection process were then analyzed using a thematic approach, beginning with an open coding stage to identify key issues related to the dimensions of effectiveness, accessibility, institutional readiness, and regulatory challenges. Axial coding was then performed to group these issues into larger thematic categories. The analysis was conducted manually using reference software such as Mendeley for literature management and Microsoft Excel or NVivo to tabulate findings and emerging thematic patterns.

Findings from the thematic analysis were then compiled into a narrative synthesis to provide a coherent understanding of telehealth implementation in primary care. This synthesis not only summarizes the content of the articles but also maps the relationships between factors influencing the success or failure of telehealth implementation. Mapping of the findings was also conducted to illustrate the spatial and institutional distribution of telehealth implementation and identify gaps in policy and practice in the field.

Based on the results of the synthesis, conceptual and practical recommendations are developed that aim to contribute to the development of a more inclusive, equitable, and sustainable telehealth strategy. These recommendations include strengthening digital infrastructure, training healthcare workers in the regions, developing patient data protection regulations, and integrating a community approach into the design and implementation of digital services. The results of this study are expected to provide evidence-based policy direction that will benefit stakeholders in the digital health sector.

3. Results and Discussion

3.1. Key Findings Map Digital Transformation of Primary Care Through Telehealth

The literature review indicates that the implementation of telehealth in primary care in Indonesia has significant potential to address healthcare disparities. Numerous studies, both in urban and remote areas, demonstrate that telehealth can accelerate diagnosis, expand access to specialists, and improve communication efficiency between facilities. Figure 2 illustrates the systemic relationship between key factors contributing to the successful transformation of primary care through digital technology.

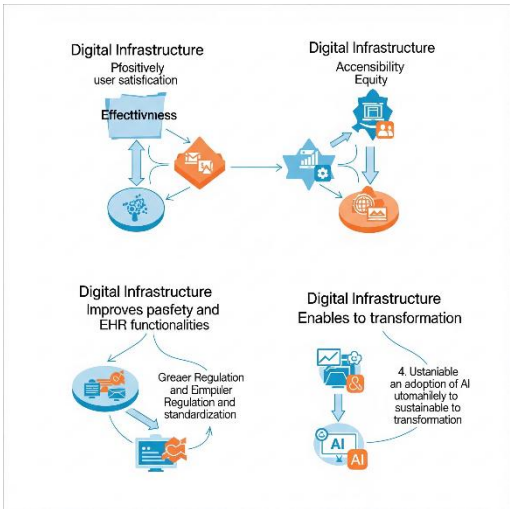

Figure 2: integrative framework of the impact of telehealth on primary care in indonesia

This framework demonstrates that digital infrastructure is a prerequisite that influences service effectiveness and accessibility. High effectiveness increases user satisfaction (both patients and healthcare workers), while improved accessibility directly impacts equity or the distribution of services.

3.2. Effectiveness of Telehealth in Primary Care: Between Hope and Reality

Telehealth has demonstrated significant effectiveness in strengthening primary care in Indonesia, particularly in accelerating diagnosis, reducing referral delays, and increasing the efficiency of clinical interactions. One notable study was conducted in Makassar, which implemented tele-ECG to detect heart disease in primary care facilities. As a result, diagnoses were made more quickly and patients could be promptly referred to secondary care facilities, shortening emergency management times (BMC Primary Care, 2020).

Effectiveness is also reflected in the perceptions of healthcare workers. A survey by BMC Medical Informatics & Decision Making noted that 78% of healthcare workers were satisfied with telehealth services, and 69% acknowledged the acceleration in the diagnostic process. This suggests that digital technology not only improves clinical outcomes but also increases provider satisfaction.

However, the effectiveness of telehealth is highly dependent on infrastructure readiness. Studies in various 3T (Disadvantaged, Frontier, and Outermost) regions revealed that telemedicine services are often disrupted by unstable internet connectivity, limited electricity, and a lack of human resource training. A case study at the Lopok Community Health Center (Sumbawa) found that 62.5% of healthcare workers did not fully understand the concept of telehealth, and 65% were not yet ready to implement it in their daily practice.

Table 1: Effectiveness of Telehealth in Primary Care

Topic	Key Findings	Studies and Sources
Tele ECG in Makassar	Supports rapid diagnosis of heart disease; processed at the referral center from the primary clinic	Makassar Tele ECG: a BMC Primary Care cohort population study
Primary Clinic Perceptions	78% of clinicians are satisfied; 69% stated faster diagnosis; internet connectivity was the main obstacle (47%)	Makassar clinician study, BMC Medical Informatics & Decision Making
Emergency Teleconsultation	Improves interprofessional collaboration, accelerates decision-making, and minimizes referral delays	Journal of Public Health and Nutrition (2023)
Review of Telemedicine in Rural Areas	Telemedicine implementation is affected by infrastructure readiness, policies, human resources, and EHR documentation, particularly incomplete informed consent.	IHPA Review & International Publication (2022)

3.3. Accessibility: The Potential of Digitalization and Structural Inequality

In terms of accessibility, telehealth offers a practical solution for reaching communities in remote areas. The use of applications such as Alodokter, Halodoc, and BPJS Kesehatan Digital services allows patients to consult without the need for long travel. Research by Omboni et al. (2022) indicates that since the COVID-19 pandemic, teleconsultation usage has increased from 4 million to over 15 million sessions, indicating a surge in demand for digital services.

However, upon closer examination, telehealth penetration remains low nationally, with only around 5.6% of the total Indonesian population actually accessing these services consistently (IHPA, 2023). This confirms that digital transformation remains elitist and concentrated in urban areas.

Factors influencing accessibility include public digital literacy, internet network availability, and trust in the security of digital services. Surveys indicate that social influence, ease of use, and perceived benefits are key determinants of people's intention to use telehealth services.

3.4. Institutional Readiness: Gap in Human Resource and Infrastructure Capacity

The success of telehealth implementation is inextricably linked to institutional readiness, both in terms of healthcare facilities and regulations. In urban areas, private hospitals are highly prepared, supported by technology, human resources, and a robust service platform. Conversely, at the Community Health Center (Puskesmas) level, limited equipment, inadequate training, and limited budgets for digital infrastructure are still common.

One of the most fundamental challenges is the low quality of electronic medical records (EHRs). Many services do not include informed consent, are not synchronized between services, and do not meet patient data interoperability standards. A literature review by Pool et al. (2024) shows that without strict regulations, poor EHR systems can actually compromise patient safety and service credibility.

3.5. Technological Innovation and the Implications of Advanced Digitalization

Several recent initiatives have introduced the use of artificial intelligence (AI) for clinical documentation. For example, research developing an AI-based doctor-patient conversation transcription system in primary care has reduced recording time by up to 40% and increased the completeness of medical documentation. This represents a concrete solution to the high administrative burden in Puskesmas. This integration of innovations is a strategic step to promote more adaptive, efficient, and data-driven telehealth. However, the government needs to play a role in ensuring that technology is not exclusive, but inclusive and equitable.

4. Conclusion

The integration of telehealth into Indonesia's primary healthcare system demonstrates considerable promise in addressing longstanding disparities in access, efficiency, and quality of services. Findings from this review underscore that telehealth significantly enhances clinical effectiveness particularly in accelerating diagnosis, improving referral mechanisms, and facilitating interprofessional collaboration. Furthermore, increased satisfaction among healthcare providers reflects the perceived value of telehealth when infrastructure is well prepared.

However, this promise is not without its challenges. Despite the rise in digital health services, actual population-level access remains limited—concentrated mostly in urban areas and among digitally literate populations. Telehealth adoption in rural and underserved regions is still hindered by fragile internet infrastructure, insufficient training of healthcare professionals, and lack of standardization in digital medical records. The uneven institutional readiness across Indonesia's primary care system underscores the need for strategic investments in both human and technological capacity.

Moreover, while innovations such as artificial intelligence have begun to ease administrative burdens and improve data quality, their benefits will only be fully realized when supported by inclusive and robust governance. The absence of interoperability standards, secure EHR systems, and digital consent protocols presents risks to patient safety and long-term sustainability.

In conclusion, telehealth should not be viewed solely as a technological upgrade but as a transformative tool that requires systemic alignment across infrastructure, regulation, human resources, and public engagement. To realize its full potential in advancing health equity, a multi-sectoral approach involving government leadership, capacity building at the community level, and a commitment to inclusive digital transformation is essential. Only then can telehealth be a sustainable vehicle for strengthening Indonesia's primary healthcare system.

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