Implementation, Regulation, and Implications of Telemedicine in Indonesia: A Comprehensive Literature Review

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ABSTRACT

Telemedicine in Indonesia has evolved significantly since 2015, from an undervalued application during pre-pandemic (2019) to an essential component and embedded into the Indonesia healthcare system. This integrative literature review synthesizes 45 studies published between 2015 and 2025. It assesses telemedicine technological infrastructure, regulatory frameworks, human resources, organizational integration, benefits, and challenges. The pandemic dramatically accelerated adoption of telemedicine. The pandemic forced users to deal with telemedicine causing the users exploded from approximately 4 million to 15 million during 2020-2021. Telemedicine platforms like Halodoc and Alodokter rose in a night and played major contribution since then. Despite its benefit, telemedicine also raises several concerns in infrastructure barriers, such as inadequate internet infrastructure, pronounced urban-rural divides, imbalance distribution of human resources and unreliable electricity, exacerbate the imbalances among regions. Benefit includes enhanced access for underserved populations, effective chronic disease management, reduced hospitalizations, and high satisfaction. Challenges in telemedicine persists encompassing digital literacy deficits, provider training gaps, and uncertain reimbursement. The review highlights the need for equity-focused policies, infrastructure investment, workforce development, and continuous improvement to develop a sustainable, integrated telemedicine ecosystem.

***Keywords**: Telemedicine, Telecommunication, Indonesia, Pandemic, Medical Technology*

INTRODUCTION

Telemedicine is defined as the provision of healthcare services and health information delivery through telecommunication technologies. It has emerged as a transformative and lucrative method to address healthcare disparities across regions globally, particularly in resource-limited settings (Sabrina & Defi, 2021). Indonesia, as the world's fourth most populous nation and Southeast Asia's largest country by population, faces substantial healthcare challenges starting from geographical constraints (as an archipelagic nation, (Nababan, 2024), uneven distribution of healthcare resources, and significant socioeconomic disparities (Mutiah, Sibuea & Chandra, 2025).

Before COVID-19 pandemic, telemedicine development in Indonesia was rudimentary, with limited regulatory frameworks and inconsistent implementation across health facilities. However, the pandemic seemed to be the turning point for accelerating telemedicine adoption from being a marginalized healthcare application into a highly demanding care (Aisyah et al., 2023). It has forced government and public to engage with it. The results are staggering. Between 2020 and 2021, telemedicine users in Indonesia have increased dramatically from approximately 4 million to 15 million users during the pandemic period (Sari & Santiago, 2022).

This rapid expansion, however, raises concerns in term of regulatory development, technological advancement, and health care system readiness. Since it is driven by the pandemic, most infrastructures are barely ready. As it is also faced by most counties, Indonesia has experienced a tough phase in term of infrastructure and human resource readiness, regulatory framework and emergency integration into conventional healthcare delivery systems (Chen & Keng, 2025).

Luckily, the regulatory framework for telemedicine in Indonesia has substantially transformed since then. With the enactment of Omnibus Law No. 17 of 2023 concerning Health, it explicitly and formally acknowledges telemedicine as a legitimate and legal healthcare service (Julita et al., 2024). Prior to this enactment, the establishment of Minister of Health Regulation No. 20 of 2019 give essential guidelines for telemedicine implementation between health service facilities (Nasution and Ibrahim, 2024). Most recently, Government Regulation No. 28 of 2024 synchronizes telemedicine regulations with broader public protection and digital governance frameworks (Harinawantara et al., 2025). Despite these progresses, significant regulatory gaps still persist. Bewildering regulation on medical practice, liability standards, and artificial intelligence applications in remote diagnostics are still undervalued (Mutiah, et al., 2025).

This comprehensive literature review synthesizes studies on telemedicine implementation in Indonesia across the period 2015 to 2025. It is conducted by examining technological, regulatory, human resource, as well as the arising institutional issues related to telemedicine. By incorporating perspectives from both international and Indonesian studies, this review critically examines the challenges, benefits, and regulatory implications of telemedicine for the Indonesian healthcare system as a whole. The review emphasizes research gaps and future directions necessary for establishing a sustainable, equitable, resilient and integrated telemedicine ecosystem that contributes meaningfully to universal health coverage objectives.

METHOD

Database Selection and Search Strategy

This literature review followed a systematic approach to comprehensively search studies on telemedicine in Indonesia. Electronic databases searched included PubMed, Scopus, Web of Science, Google Scholar, and the Indonesian Digital Repository to ensure inclusion of both internationally and locally published articles. Literature searches were conducted between October 2024 and February 2026, covering publications from January 2015 to December 2025 to capture the pre-pandemic, pandemic, and early post-pandemic periods. Search terms employed included combinations of: (“telemedicine” OR “telehealth” OR “digital health” OR “eHealth” OR “mHealth” OR “mobile health”) AND (“Indonesia” OR “Southeast Asia”) AND (“implementation” OR “adoption” OR “regulation” OR “barriers” OR “challenges” OR “benefits”). Both English and Indonesian articles were selected.

Inclusion and Exclusion Criteria

Inclusion criteria included: (1) primary research studies, reviews, or policy analyses specifically addressing telemedicine implementation, regulation, or outcomes in Indonesia; (2) empirical studies examining telemedicine implementation, barriers, or institutions or facilitators within the Indonesian context; (3) Indonesian government regulations, policies and guidelines on telemedicine; (4) comparative studies about telemedicine across Southeast Asian nations with specific reference to Indonesia; (5) studies examining digital health technologies, mobile health applications, or electronic health records in Indonesia. Exclusion criteria included: (1) studies

focusing exclusively on countries outside Indonesia without comparative relevance; (2) commentaries, editorials, or opinion pieces lacking empirical basis; (3) studies published before 2015 or addressing telemedicine in totally different institutional contexts (e.g., military or specialized private institutions); (4) duplicate publications or secondary analyses of the same dataset; (5) studies addressing only general eHealth implementation without specific reference to telemedicine modalities.

Study Selection Process

Initial searches resulted approximately 2,500 documents. Following application of inclusion/exclusion criteria and removal of duplicates, 98 unique studies were kept for full-text review. From these, 45 studies meeting complete inclusion criteria were selected for detailed analysis and synthesis. The selection process was initiated by reviewing their titles and abstracts, followed by full-text assessment. Studies were categorized into thematic groups: regulatory and legal analyses (18 studies), technological implementation and infrastructure assessments (12 studies), adoption and user acceptance studies (11 studies), clinical outcomes and benefits (8 studies), and organizational and health system integration analyses (9 studies).

Data Extraction and Quality Assessment

Data extraction employed a standardized form includes author information, publication year, study design, geographic focus within Indonesia, specific to telemedicine, key findings, regulatory aspects, technical infrastructure, barriers and facilitators, and outcomes measured. For empirical studies, particular assessment was paid to methodology, sample characteristics, and measurement instruments. Regulatory documents and policy analyses were assessed for comprehensiveness, consistency with international standards, and identified gaps. While formal quality assessment using tools such as CASP or STROBE was not systematically applied across all studies due to the heterogeneous nature of included evidence, studies were evaluated for internal validity, relevance to research questions, and completeness of information reported.

Synthesis Method

An integrative literature review approach was employed to synthesize findings across technological, regulatory, human resource, and organizational dimensions of telemedicine implementation. Key themes were identified iteratively through careful examination of findings across the evidence base according to the convergence and divergence of findings. Evidence was organized related to: regulatory framework, technological infrastructure, human resources and challenges.

RESULTS AND DISCUSSION

Regulatory and Legal Framework for Telemedicine in Indonesia

Indonesia’s telemedicine regulatory framework has transformed over the past decade. Prior to 2019, regulation on telemedicine was in dormant stage. Then, the Ministry of Health Regulation No. 20 of 2019 on the Implementation of Telemedicine Services Between Health Service Facilities became the first formal recognition of telemedicine within Indonesian health law (Nasution & Ibrahim, 2024). In spite of its foundational role, this regulation was limited in scope. It restricts telemedicine services to interact with the established health service facilities (Rahmadhani et al., 2023). The pandemic insisted the radical breakthrough on regulatory

adaptation. As a result, broader telemedicine implementation was permitted under Minister of Health Circular Letter No. 303 of 2020 (Hani, 2021). Although it is a solution, this letter created temporal inconsistency formed legal uncertainty for both providers and patients, due to its limited scope and duration (Budiyanti & Kusumastuti, 2023). The Indonesian Medical Council then issued Regulation No. 74 of 2020, allowing telemedicine consultations during the pandemic, yet providing detailed operational guidance (Budiyanti & Kusumastuti, 2023).

The enactment of Omnibus Law No. 17 of 2023 concerning Health was a breakpoint in Indonesia's telemedicine regulatory evolution. This comprehensive health law explicitly incorporates telemedicine as a recognized healthcare modality, defining it as "the provision and facilitation of health services, including public health and self-care through telecommunications and digital technology" (Anggayanti, et al., 2023). Subsequently, Government Regulation No. 28 of 2024 established implementing regulations for telemedicine, attempting to harmonize health law requirements with consumer protection principles and digital governance frameworks (Seliana & Anggriawan, 2025). This regulation represents the most comprehensive Indonesian telemedicine policy to date, addressing operational standards, professional licensing, patient rights, data protection, and cross-jurisdictional practice issues.

Despite the evolution of regulatory frameworks, critical gaps persist in Indonesia's telemedicine legal architecture. A key weakness is unclear liability standards when misdiagnosis or unintended outcomes occur during remote consultation (Mutiah, et al., 2025). Existing regulations inadequately examine the degree of responsibility allowed by telemedicine platforms, healthcare providers, and healthcare facilities. This unclear standards for telemedicine-specific become a potential issue and intrinsic limitations of remote diagnosis (Fakih, 2022).

Furthermore, data privacy and patient information security creates another concern. While the Personal Data Protection Law (Law No. 27 of 2022) provides general data protection principles, its application to telemedicine remains incomplete and unspecified (Raihan and Rosadi, 2024). The Electronic Information and Transactions Law (ITE Law) addresses digital transaction security and cybercrime, yet does not specifically address the unique characteristics of electronic health record protection and real-time patient monitoring data (Bonsapia & Jumiran, 2025). Consequently, telemedicine providers operate under uncertainty regarding mandatory security standards and appropriate penalties for data breaches.

Further, application of artificial intelligence and algorithmic decision-making in telemedicine is also raise another concern since lack of regulatory protection. The rapidly increasing integration of AI-assisted diagnostics in Indonesian telemedicine platforms occurs without clear regulatory frameworks governing algorithm validation, bias assessment, or transparency requirements (Arimbi, 2025). No current regulation mandates that AI-assisted diagnostic algorithms undergo independent validation or addresses liability when algorithmic recommendations contribute to adverse outcomes.

Another regulatory gap relates to cross-jurisdictional medical practice presents a jurisdictional challenge. A doctor licensed in one Indonesian province may provide telemedicine consultation to patients in any other province, yet licensing verification, patient complaint mechanisms, and disciplinary jurisdiction remain ambiguous (Susantiet al., 2025). This creates potential for inconsistent provider accountability standards and difficulty in patient protection enforcement across regional boundaries.

Technological Implementation

Internet infrastructure quality and availability represent fundamental prerequisites for telemedicine implementation, yet Indonesia faces substantial disparities in connectivity across regions. A comprehensive assessment of 10,378 public health centers (Puskesmas) nationwide revealed that 21% of the centers have inadequate internet access (7.18% having no internet access at all, and 14.33% having limited connectivity (Dike & Whyte, 2025). While Jakarta achieved 85 percent internet access as of 2022, eastern regions such as Papua recorded only 26 percent access (Nababan, 2024). Rural and remote areas consistently face connectivity challenges, with 70 percent of rural respondents reporting inconsistent network availability (Dike & Whyte, 2025). Indeed, these figures of connectivity has changed since the introduction of Starlink in 2025. Luckily, mobile phone penetration is higher than that of the broadband internet access (Nababan, 2024), which can be temporary solution for internet access scarcity in rural areas (Alfian, et al., (2025)). In fact, mobile health applications emerged as the primary telemedicine platform in Indonesia during and following the COVID-19 pandemic. It can be lucrative during the pandemic and has been supported by the government for health information dissemination, self-risk assessment, online forums, and direct teleconsultation (Sujarwoto et al., 2022).

Popular commercial platforms such as Halodoc, Alodokter, and Teladoc Indonesia provide synchronous consultation services, yet adoption rates remain below population potential (<10% of the population) (Khotimah et al., 2022). Whereas, web-based telemedicine platforms developed by hospitals and health systems show uneven geographic distribution, with concentration in metropolitan areas and provincial capitals and unintegrated with existing patient management systems (Shah et al., 2025). This lack of integration creates data fragmentation and prevents telemedicine from functioning as a seamless component of comprehensive patient care.

Integration of electronic health record (EHR) systems with telemedicine-integrated demonstrate various level of failures on its implementation across Indonesian healthcare facilities. Data completeness, accuracy, and interoperability challenges dominate the issues (Alfiyyah, et al., 2022). As a result, many rural health centers continue to utilize paper-based medical records, creating the integration of telemedicine consultations is more complicated in the long-run.

Furthermore, specialized telemedicine applications have been launched mostly by private sectors to support Indonesian healthcare. Teledentistry, for instances, represents a specialized platforms that provide remote oral health consultation and screening (Mathur, et al., 2025). A commercial teledentistry program from a private sector (Tanya Pepsodent) demonstrated effectiveness in increasing oral health awareness among Indonesian users. However, challenges including long waiting times, limited capability for diagnostic confirmation, and limited availability of practitioners constrain teledentistry popularity in community (Mathur, et al., 2025).

Telepharmacy, the provision of pharmaceutical care through remote consultation, has also expanded during the pandemic. In this scheme, pharmacists provide medication counseling and medication management review through digital platforms (Iswardani, et al., 2025). Although only 52 percent of surveyed telepharmacy providers have received formal training (Iswardani, Sudaryono & Kurniawati, 2025), this service has improved basic knowledge on pharmacy and drug-related issue.

Lastly, the integration of artificial intelligence into Indonesian telemedicine platforms represents an expanding border with substantial potential versus regulatory framework. AI applications in Indonesian telemedicine involves natural language processing for medical documentation, machine learning algorithms for diagnostic support, and predictive analytics for disease progression (Arimbi, 2025). A growing body of research describes AI-assisted telemedicine applications for conditions such as tuberculosis screening, diabetic retinopathy detection, and COVID-19 risk prediction (Aisyah et al., 2023). However, the regulatory framework governing AI validation, bias assessment, and clinical governance remains largely absent, creating risks for algorithmic discrimination and patient safety concerns without corresponding legal accountability mechanisms (Arimbi, 2025).

Human Power Development

Healthcare provider engagement with telemedicine in Indonesia has shown progressive evolution from skepticism and resistance during early adoption phases to cautious integration following regulatory formalization. A qualitative study of healthcare workers in Pakistan and Bangladesh, which shares substantial similarities with the Indonesian context, identified multiple layers of provider hesitation: concerns about depersonalization of care, anxiety regarding technological competence, workflow disruption, and insufficient training (Bernabe & Ebardo, 2025). Indonesian studies document similar provider concerns, with particular emphasis on the inability to conduct physical examination and resultant diagnostic uncertainty (Sari & Santiago, 2022).

Organizational readiness for telemedicine implementation varies substantially across Indonesian healthcare facilities, with lower-middle-class hospitals (Classes C and D) demonstrating particular challenges in digital capability development (Binsar et al., 2026). A cross-sectional assessment of such facilities revealed only weak positive correlation between external environmental pressures for digital adoption and internal digital capability (Binsar et al., 2026). The researchers concluded that external regulatory requirements and market pressures alone cannot drive digital transformation without corresponding investments in internal human and technological resources (Binsar et al., 2026).

Provider training remains a critical gap in telemedicine implementation. Among 250 community pharmacists surveyed regarding telepharmacy services, 52 percent reported never attending formal training or workshops on telepharmacy (Iswardani, et al., 2025). This training deficit is directly associated with inconsistent practice standards and suboptimal patient safety. Developing comprehensive provider education programs addressing technical skills, clinical protocols, patient communication approaches, and ethical-legal considerations represents a critical implementation priority.

Besides human power, digital literacy emerges as a fundamental facilitator or barrier to telemedicine adoption across Indonesian populations. The Ministry of Communication and Informatics assessment of digital literacy across Indonesia documented substantial geographic variation, with urban regions demonstrating higher literacy indices than rural areas (Nababan, 2024). Age represents another significant predictor of digital literacy, with older adults reporting substantially lower smartphone competence and internet navigation skills (Alfian, et al., 2025). A study of patients with chronic diseases in Bandung found that age 50 years or older was associated with more than three-fold increased odds of low willingness to use telepharmacy

services, with ability to use smartphones independently being critical differentiator (Alfian, et al., 2025).

Gender demonstrates complex associations with telemedicine adoption, with evidence showing both that women comprise the majority of telemedicine users in certain contexts and that gender-based digital divides persist in accessing certain telemedicine modalities (Khotimah et al., 2022). Education level consistently predicts both initial telemedicine adoption intention and sustained utilization, with tertiary education associated with higher adoption rates (Alviani et al., 2023).

Organization level also play essential role in shaping the successful telemedicine implementation. At such organization level, integration workflow, clinical governance, and performance measurement are taken place. Many Indonesian healthcare organizations treat telemedicine as a separate supplementary service rather than an integrated component of comprehensive patient care (Alfiyyah, et al., 2022). This perspective limits the potential for telemedicine to improve continuity of care and coordination across health system levels.

Challenges

Having said the potential application of telemedicine to be integrated and become a fundamental backbone of the Indonesian healthcare system, several challenges still persist. Telecommunication infrastructure, particularly limited internet access has not distributed equally across regions in Indonesia. The substantial proportion of Indonesian Puskesmas and rural health facilities lacking adequate internet connectivity constitutes a fundamental barrier to telemedicine scaling. The 21 percent of Puskesmas lacking sufficient internet access creates an unequivocal barrier to telemedicine implementation in these facilities, while 14.33 percent with limited access face substantial reliability and speed constraints, in addition to unreliable electricity supply (Aisyah et al., 2025). It is reported that up to 8.02 percent of facilities face this constrains (Aisyah et al., 2025).

The digital divide in internet access is not merely a technical matter but reflects and amplifies existing health inequities, with the most disadvantaged populations; rural residents, older adults, and those with lower education levels, simultaneously experiencing the greatest barriers to both underlying healthcare access and to telemedicine-enabled service use (Nababan, 2024). This paradoxical situation, wherein those with greatest healthcare needs face greatest telemedicine access barriers, raises substantial equity concerns regarding the potential for telemedicine to either reduce or exacerbate health disparities.

The next task is insufficient digital illiteracy, particularly among older adults and rural populations. For public age 50 years or older, inability to use the internet independently, and low daily smartphone usage are significantly associated with low tendency to use telemedicine services (Alfian, et al., 2025). This barrier extends beyond mere inability to navigate applications to the understanding of privacy implications of health data sharing. High costs of smartphones, data plans, and unreliable internet services exacerbate the reluctancy to engage with telemedicine application, more importantly in rural areas and low-income users (Adewojo & Olalere, 2026).

Besides technical issues, regulatory framework is still an issue for several applications. Despite improvements in telemedicine regulations through Law No. 17 of 2023 and Government Regulation No. 28 of 2024, substantive gaps in the regulatory framework persist. Bewildering definition of conditions suitable for telemedicine versus those requiring in-person assessment creates clinical and legal uncertainty (Nasution & Ibrahim, 2024), which may arise ethical

concerns regarding patient autonomy and understanding of remote consultation limitations (Fakih, 2022). Liability standards remain ambiguous, with uncertain allocation of responsibility when adverse outcomes result from telemedicine consultation among patients, providers, and platform operators (Susanti, et al., 2025).

Furthermore, data privacy and cybersecurity concerns constitute significant barriers to telemedicine adoption among both patients and healthcare providers. Personal Data Protection as defined by on the Law No. 27 of 2022 provides general frameworks for personal data protection yet lacks health-specific provisions addressing unique characteristics of health data sensitivity and electronic health record protection requirements (Raihan & Rosadi, 2024). Many telemedicine platforms demonstrate inadequate security measures and data protection mechanisms, with users expressing concerns about unauthorized access to personal health information (Sujarwoto et al., 2022). As a result, patients may be inconvenience to share personal data through digital platforms with privacy concerns (Alviani et al., 2023). This inconvenience is also reported for the healthcare providers due to lacking trust in platform cybersecurity measures (Bernabe & Ebardo, 2025).

Besides security concern, cultural and behavioral barriers also take a part to into the telemedicine adoption. Some patients and healthcare providers prefer in-person consultation rather than distanced communication. This preference emerges from cultural values emphasizing direct human contact and personal relationship in healthcare encounters (Siregar, 2021). This preference reflects broader cultural factors in Indonesia emphasizing interpersonal relationships and direct communication in healthcare contexts (Lukitawati & Novianto, 2023).

Healthcare providers express concerns about the depersonalization of care through telemedicine, with worries that remote consultation may compromise the therapeutic relationship and patient trust (Bernabe & Ebardo, 2025). Some providers hold the belief that physical examination is absolutely essential for accurate diagnosis, without recognition that telemedicine can successfully serve particular types of conditions and consultations (Nwankwo et al., 2024). Organizational inertia and existing workflows create resistance to adoption of telemedicine, particularly in facilities where leaders have not championed digital health transformation (Bernabe & Ebardo, 2025). These values exist not only in Asia but also across Africa.

Lastly, financial issue might be the most crucial issue. The financial sustainability of telemedicine services remains uncertain in the Indonesian context. Initial infrastructure investment required for telemedicine platform development, electronic health record integration, and provider training represents substantial capital expenditure, particularly challenging for lower-middle-class health facilities with constrained budgets (Susanti et al., 2025). Ongoing operational costs including platform maintenance, cybersecurity measures, and provider education create recurring financial burden (Susanti et al., 2025).

Reimbursement mechanisms for telemedicine services within Indonesia's Universal Health Coverage (UHC) financing system remain incompletely developed. The absence of clear telemedicine-specific reimbursement rates creates financial uncertainty for healthcare facilities and providers regarding whether telemedicine services will be adequately compensated (Fuad et al., 2018). Different telemedicine service modalities, from synchronous video consultation to asynchronous messaging to remote monitoring, may require different reimbursement structures, yet such differentiation is not fully articulated in current financing mechanisms (Fuad et al., 2018).

Government subsidy and dedicated financing mechanisms represent critical facilitators of telemedicine sustainability in resource-constrained contexts (Susanti et al., 2025). Several studies recommend that government subsidies support both technology infrastructure and patient access to telemedicine services to ensure equitable utilization (Fuad et al., 2018). Without such financial support, telemedicine threatens to become accessible primarily to higher-income populations, thereby exacerbating rather than reducing health inequities.

Policy Implications and Recommendations

The first and uttermost recommendation for a successful telemedicine application might be how to establish and strengthen the legal framework. Current evidence demonstrates the necessity for continued refinement of Indonesia's telemedicine regulatory framework to address identified gaps. Specific legal provisions are needed to: (1) clearly define medical conditions appropriate for telemedicine versus those requiring in-person assessment; (2) establish explicit standards for telemedicine-specific informed consent documenting patient understanding of remote consultation limitations; (3) define allocation of liability and accountability among patients, healthcare providers, telemedicine platforms, and healthcare facilities when adverse outcomes occur; (4) mandate algorithmic transparency and bias assessment for artificial intelligence applications in telemedicine; (5) specify minimum cybersecurity and data protection standards for telemedicine platforms; (6) establish clear cross-jurisdictional oversight mechanisms for healthcare providers practicing telemedicine across provincial borders.

The development of telemedicine regulatory sandboxes, as successfully employed in Singapore, would permit controlled testing and refinement of novel telemedicine models within defined parameters while generating evidence regarding optimal implementation approaches (Naimah, 2025). Indonesia would benefit from establishing designated regional pilot programs wherein telemedicine services operate under relaxed regulatory requirements while undergoing intensive data collection and evaluation to inform subsequent scaled implementation.

Next to address is the development the telecommunication infrastructure and digital environment, the essential keys of telemedicine success. Government collaboration with private telecommunications providers, as recommended in multiple studies, can expand broadband access to rural and remote areas through subsidy or incentive mechanisms (Aisyah et al., 2025). Renewable energy solutions offer particular promise for electricity generation in regions with limited grid connectivity (Hui, et al., 2022). Device subsidy programs targeting low-income populations and older adults could increase smartphone and technology access (Mutiah, et al., 2025).

Digital literacy represents an educational priority requiring integration into health worker training programs, community education initiatives, and school curricula. Target populations including older adults, rural residents, and those with limited educational attainment require tailored digital literacy interventions recognizing their specific learning needs and constraints (Chen et al., 2025). Healthcare worker training programs must comprehensively address not only technical skills for using telemedicine platforms but also clinical protocols for telemedicine consultation, patient communication approaches, and ethical-legal considerations (Iswardani, et al, 2025).

Additionally, systematization of telemedicine consultation documentation, coding, and interoperability with health information systems are required to successfully integrate telemedicine into the whole healthcare system. National standards addressing documentation

formats, clinical data elements to be captured, and integration points with electronic health records would enable telemedicine to function as a seamless component of longitudinal patient care rather than a separate ancillary service (Alfiyyah, et al., 2022). Hospital and clinic workflows must be revised to incorporate telemedicine into standard clinical pathways, with clear protocols regarding which conditions are appropriate for telemedicine triage and initial assessment, which require in-person follow-up, and how telemedicine fits within continuity of care processes (Binsar et al., 2026).

Clinical governance frameworks for telemedicine must be developed. It should address minimum quality standards, provider credentials, clinical protocol development for telemedicine-appropriate conditions, and quality assurance mechanisms (Pati et al., 2023). Specific guidance regarding telemedicine details would be useful information for practitioners to make decisions regarding service modality, diagnosis evidence and follow-up care.

Finally, service fairness should be addressed in telemedicine policy development. The mechanisms ensure implementation reduces or even eradicate rather than exacerbates existing health disparities. Targeted policies supporting telemedicine access in rural and remote areas, for disadvantaged populations including older adults and those with lower digital literacy, are essential to prevent telemedicine from becoming a service utilized primarily by advantaged populations (Nababan, 2024). Community engagement and co-design processes incorporating end-users in telemedicine implementation would ensure that systems are designed for actual user contexts and capabilities rather than idealized scenarios (LaMonica et al., 2025).

Policy regarding vulnerable populations, including those with language barriers, low health literacy, and disability, requires explicit attention to ensure telemedicine does not inadvertently exclude or disadvantage these groups (Lukitawati & Novianto, 2023). Implementation of accessible design principles, multilingual interface options, and alternative input mechanisms for individuals with disabilities would ensure inclusive te access. Behavioral nudging and community health worker engagement could support digital literacy development and platform utilization among disadvantaged populations (Putra, 2025).

Future Directions

Health equity impacts of telemedicine expansion require more explicit examination. While qualitative evidence suggests telemedicine can reduce geographic barriers to care, empirical data examining whether telemedicine implementation actually reduces or widens existing health disparities across socioeconomic, geographic, and demographic groups remain limited (Singh et al., 2025). Studies specifically examining telemedicine outcomes and access patterns among marginalized populations including rural residents, older adults, individuals with disabilities, and lower-income groups would provide crucial evidence for equity-centered policy development.

The organizational and implementation science dimensions of Indonesian telemedicine require substantially greater research attention (Gudi et al., 2024). Few studies have examined the organizational change management processes necessary for successful telemedicine integration, facilitating conditions for provider adoption, or strategies for overcoming institutional resistance to digital health transformation. Implementation research employing rigorous qualitative methods to understand contextual factors enabling or hindering successful telemedicine implementation in diverse Indonesian healthcare settings would advance implementation science knowledge.

Another important point is that, future research must examine how telemedicine can be optimally integrated with Indonesia's tiered health system, wherein patients ideally receive primary care from community health centers (Puskesmas) with appropriate referral to district, provincial, and national-level facilities as needed (Azah & Rahman, 2025). Telemedicine's role in strengthening primary care capacity, improving referral processes, and enabling consultation between levels of care requires investigation. The relationship between telemedicine implementation and achievement of universal health coverage goals, particularly regarding financial protection and service quality dimensions, remains understudied (Balakhrisnan et al., 2025).

Furthermore, emerging technologies including artificial intelligence, wearable health devices, and blockchain applications in health data security warrant investigation within the Indonesian context (Yustinus, 2025). Research examining the feasibility, effectiveness, and ethical implications of AI-assisted telemedicine diagnostics for Indonesian populations would inform responsible integration of these technologies. Studies evaluating optimal telemedicine modalities, synchronous versus asynchronous consultation, remote monitoring technologies, hybrid in-person and virtual care models, for specific conditions within Indonesian healthcare contexts would advance clinical implementation science.

Finally, comparative analyses examining how Indonesia's telemedicine regulatory approaches compare to international standards and other Southeast Asian nations would identify opportunities for regulatory learning and harmonization (Pati et al., 2023). Research evaluating the implementation and impact of the 2023 Health Law and 2024 Government Regulation would provide evidence for regulatory refinement. Cost-effectiveness and health economic analyses specific to the Indonesian context, examining financial impacts of various telemedicine implementation strategies and financing mechanisms, remain critically needed to support policy decisions regarding resource allocation (Gudi et al., 2024)

CONCLUSION

Telemedicine in Indonesia has transformed from an undervalued healthcare modality before the pandemic to a popular component of the national health system by 2025. It is progressively established under regulatory frameworks including Law No. 17 of 2023 and Government Regulation No. 28 of 2024. The period examined in this review demonstrates both substantial progress in regulatory formalization and technological infrastructure development. The study findings in this review indicates that telemedicine has promising benefit to improve healthcare accessibility, particularly for rural and geographically isolated or underserved populations (Mehmood, 2025). Benefits including improved access to specialist consultation, improve patient convenience, reduced mobility cost and effort, and reduce risk for disease-specific outcomes. However, these lucrative outcomes remain unevenly distributed, with urban, higher-income, and more digitally literate populations demonstrating substantially greater telemedicine access than rural, lower-income, and older populations (Nababan, 2024). Critical barriers constraining equitable telemedicine implementation in Indonesia include inadequate digital infrastructure in 21 percent of health facilities, marked geographic digital divides, insufficient provider training, regulatory gaps particularly regarding liability and artificial intelligence governance, and uncertain financial sustainability (Dike and Whyte, 2025). For these potential benefits, telemedicine should contribute meaningfully to Indonesia's healthcare coverage objectives. Persistent regulatory refinement addressing identified legal gaps,

coordinated infrastructure investment particularly in rural and remote areas, comprehensive health worker training programs, explicit equity-focused policy design, and sustained financial commitment through government subsidies and innovative financing mechanisms are all necessary components of an integrated implementation strategy. Indonesia's decentralized health system governance structure creates both opportunities for locally-tailored implementation and risks of fragmented, inconsistent standards; policy approaches supporting standardization while permitting regional adaptation could help balance these considerations. Research priorities for the coming years should emphasize rigorous evaluation of telemedicine's equity impacts, longitudinal study of implementation sustainability, organizational improvement, implementation of modern management processes, and health economic analysis specific to Indonesian contexts. Improvement on infrastructure readiness, human resources, paramedic capacity building, and consistent evaluation would significantly uplift the role of telemedicine from the underestimated service to most feasible and essential healthcare modality in Indonesia's healthcare system.

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