

SYSTEMATIC LITERATURE REVIEW OF THE ROLE OF DIGITAL TECHNOLOGY IN IMPROVING MATERNAL AND CHILD HEALTH SERVICES IN INDONESIA

Febriana Muzdhalifah¹, Jayanti Dian Eka Sari², Moh. Haris Sofyan³

^{1,2} Universitas Airlangga, Banyuwangi, Indonesia

³ Sekolah Tinggi Ilmu Komputer PGRI, Banyuwangi, Indonesia

Corresponding E-mail: febrianamuzdhalifah@gmail.com

Copyright © 2026 The Author



This is an open access article

Under the Creative Commons Attribution Share Alike 4.0 International License

DOI: [10.53866/ajirss.v5i2.1544](https://doi.org/10.53866/ajirss.v5i2.1544)

Abstract

Digital technology has reshaped maternal and child health services in Indonesia by expanding access, improving efficiency, and strengthening the quality of care. This review identifies, analyzes, and synthesizes evidence on the contribution of digital technology to maternal and child health services in Indonesia. A systematic literature review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Google Scholar, PubMed, ScienceDirect, and Scopus were searched for publications issued between 2021 and 2026. Following a structured screening process, eight studies were included. The evidence shows that mobile health applications, web-based information systems, and SMS-based communication can improve health monitoring, health literacy, access to information, and service efficiency. These tools may also support earlier detection of pregnancy-related risks and encourage users to participate more actively in managing their health. Implementation nevertheless remains constrained by limited digital infrastructure, uneven digital literacy, and disparities in access across regions. Digital technology therefore offers substantial potential to improve maternal and child health services, but its impact depends on the readiness of health systems, users, and local implementation environments.

Keywords: Digital Technology, Digital Health, Maternal and Child Health Services, Health Information Systems

1. Introduction

Advances in digital technology have transformed health care through innovations that support diagnosis, treatment, and health management. Telemedicine enables remote consultations between patients and health professionals, thereby reducing geographical and time-related barriers to care (El-Tallawy et al., 2024). Digital systems can also support clinical decision-making, real-time monitoring, and greater patient participation. Evidence from modern health systems suggests that telehealth can improve access and service efficiency (Papalamprakopoulou et al., 2024). Together, these developments are making health services more integrated, efficient, and accessible (Rossi & Rehman, 2025).

Maternal and child health services are fundamental to population well-being. Yet maternal and neonatal mortality remain major global health concerns, particularly in low- and middle-income countries. Approximately 260,000 women are estimated to die each year from complications of pregnancy and childbirth, many of which are preventable (World Health Organization, 2025). The leading causes include hemorrhage, hypertensive disorders of pregnancy, infection, and other childbirth-related complications (Cresswell et al., 2025). Unequal access to care, variation in the quality of maternal services, and socioeconomic conditions also contribute to persistently high maternal and infant mortality in developing settings (Wei et al., 2025).

A health system's ability to reduce maternal and infant mortality is a key indicator of health development. Despite continuing interventions, maternal and child health services still face substantial barriers to equitable, high-quality care. Uneven access, shortages of health workers, and weaknesses in service delivery contribute to poor outcomes in many regions (Elci et al., 2025). Health-system capacity, education, socioeconomic circumstances, and environmental conditions are likewise closely associated with maternal

morbidity and mortality (Wei et al., 2025). Sustainable progress therefore requires a comprehensive strategy that improves service quality, strengthens health systems, and makes appropriate use of health technology (World Health Organization, 2025).

Although many studies discuss digital technology in health care generally, relatively little literature has systematically examined its role in maternal and child health services in Indonesia. Digital transformation is advancing rapidly, but research on its implementation in maternal and neonatal care remains uneven across developing countries (World Health Organization, 2021). Many studies focus on a single intervention, such as pregnancy applications or remote consultation, without connecting it to broader outcomes such as maternal and infant mortality (Lupton, 2021). Evidence mapping of technologies implemented in practice and assessments of their effectiveness also remain limited (Sondaal et al., 2021). Local conditions—including unequal access to care, weak digital infrastructure in remote areas, and the social and cultural contexts of mothers and families—strongly influence implementation success (Labrique et al., 2022). Systematic reviews further indicate that mobile health, artificial intelligence, and health information systems need stronger integration into maternal and neonatal services (World Health Organization, 2021).

Digital technology is particularly relevant to maternal and child health because it can improve both access and quality. Mobile health applications can strengthen monitoring during pregnancy and communication between pregnant women and health professionals (Lee et al., 2022). Real-time digital monitoring may also support earlier detection of complications and improve adherence to antenatal care (Chen et al., 2023). In addition, digital health tools can support clinical decisions and accelerate responses to maternal and infant health risks (Kumar et al., 2023). This systematic review therefore aims to identify, analyze, and synthesize the role of digital technology in improving maternal and child health services in Indonesia.

2. Methods

This study used a systematic literature review to analyze scientific articles on the application of digital technology to maternal and child health services in Indonesia. The review was conducted in 2026 using secondary data from Google Scholar, PubMed, ScienceDirect, and Scopus. Eligible publications were written in Indonesian or English and published from 2021 through 2026.

2.1 Data Collection

The review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Four databases—Google Scholar, PubMed, ScienceDirect, and Scopus—were searched using the following combination of terms: ("digital health" OR "digital technology") AND ("maternal health" OR "child health") AND "Indonesia".

Inclusion and exclusion criteria were established to ensure that the selected studies were relevant to the research objective and met an acceptable quality threshold. These criteria guided the selection process so that only evidence directly related to digital technology in maternal and child health services was analyzed. Table 1 summarizes the criteria.

Table 1. Inclusion and Exclusion Criteria

No	Inclusion criteria	Exclusion criteria
1	Published between 2021 and 2026	Published before 2021
2	Published in a reputable or indexed scientific journal accessible through Google Scholar, PubMed, ScienceDirect, or Scopus	Published in a non-reputable, non-indexed, or predatory journal
3	Examines the use of digital technology in maternal and child health services	Does not address digital technology or maternal and child health
4	Reports empirical research using quantitative, qualitative, or mixed methods	Opinion, editorial, non-peer-reviewed proceedings paper, or review article
5	Evaluates the effectiveness, implementation, or impact of digital technology on health services	Does not report outcomes, impacts, or implementation
6	Full text is available	Full text is unavailable
7	Written in Indonesian or English	Written in another language
8	Participants include mothers, children, or health professionals involved in maternal and child health services	Participants are unrelated to maternal and child health services

2.2 Study Selection

Study selection followed the PRISMA stages of identification, screening, and eligibility assessment. The

database searches identified 620 records: Google Scholar (n = 250), PubMed (n = 120), ScienceDirect (n = 150), and Scopus (n = 100). Before screening, 80 duplicate records were removed, 40 records were excluded by automated tools, and 50 records were removed for other reasons. This left 450 records for title-and-abstract screening.

During screening, 300 records were excluded because they were not relevant to the topic. Full texts were sought for 150 records, of which 70 could not be retrieved. Eighty full-text reports were assessed for eligibility. Seventy-two were excluded because they were not relevant (n = 25), were not empirical studies (n = 20), had incomplete data (n = 15), or were review articles (n = 12). Eight studies ultimately met all inclusion criteria and were included in the synthesis.

2.3 Quality Assessment

All studies that met the inclusion criteria were assessed for methodological quality. The assessment considered the clarity of the research objective, appropriateness of the methods, quality of the data, and relevance of the findings to the review question. Studies were then classified as being of high or moderate quality to support a more reliable synthesis.

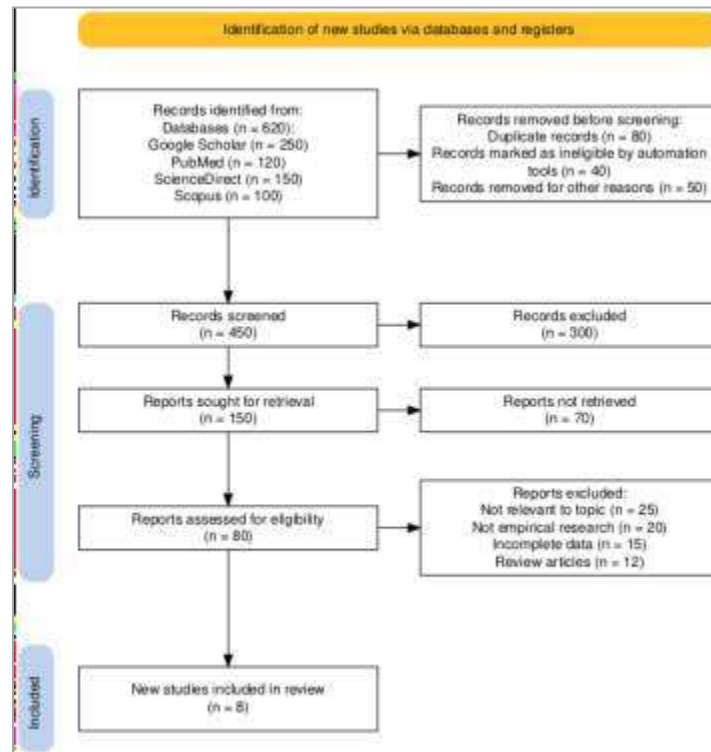


Figure 1. PRISMA Flow Diagram

3. Results and Discussion

The eight included studies show that digital technologies used in maternal and child health services in Indonesia include mobile health (mHealth) applications, web-based information systems, and SMS-based communication. These technologies have improved health monitoring, access to information, and service efficiency. Table 2 summarizes the characteristics and findings of the reviewed studies.

Table 2. Characteristics of the Reviewed Studies

No	Author (s)/Year	Study title	Method	Effectiveness	Challenges	Impact
1	Sulaksono et al. (2025)	Use of the SEHATI maternal and child health application through	Participatory training using demonstrations and hands-on	Digital literacy scores increased by an average of 78%; service efficiency	Initial records were still manual; digital literacy was low; devices and technology	Improved administrative efficiency and maternal-child health records,

		immunization to improve service quality in Surabaya	practice	improved; data-search time fell by approximately 60%; users operated the application independently.	were limited; intensive support was needed during early implementation.	access to information, digital literacy, and primary-care transformation.
²	Delmaifanis et al. (2025)	Digital Transformation in Antenatal Care in Indonesia: The Effectiveness of the Bundaqusehat Application	Quasi-experimental pretest-posttest study with a control group	Significant gains in knowledge ($p = 0.001$), satisfaction ($p = 0.002$), attitudes ($p = 0.002$), behavior ($p = 0.001$), iron-tablet adherence ($p = 0.030$), and fetal-movement monitoring ($p = 0.041$).	Limited infrastructure and digital literacy in some areas; small sample; relatively short intervention.	Improved antenatal-care quality and adherence while supporting digital transformation in maternal health services.
³	Desmawati and Ismail (2024)	Optimizing Antenatal Care: The Effects of a Holistic Nursing Android Application for Pregnant Women	Experimental intervention-control design with repeated-measures ANOVA	The antenatal-care optimization score increased from 45.79 to 59.16 ($p < 0.001$).	Limited use for high-risk pregnancies; dependence on technology access; limited direct monitoring by health professionals.	Improved antenatal care, enabled access from home, reduced the need for in-person visits, and increased service convenience.
⁴	Kumalasari et al. (2023)	Development of the DELIMA Application for Early Detection of High-Risk Pregnancy	Research and development using the ADDIE model	Media validation reached 75%, content validation 100%, and user understanding improved by 83%; the application was considered suitable for wider use.	Implemented in only two community health centers and not yet adopted systematically by local government.	Shows potential as a national digital education tool for early detection of pregnancy problems.
⁵	Excel et al. (2024)	Development of a Web-Based Nutrition Monitoring	Waterfall model and UML	Enabled independent nutrition recording, integration of	Required adequate digital literacy and access to computers or	Supported family nutrition monitoring and greater

		Information System for Pregnant Women and Children		child-development histories, and long-term access to data.	smartphones in each household.	family participation in preventive health interventions.
⁶	Kamisutara and Artaya (2022)	Training on an Early-Warning Application for Maternal Health	Community-service-based training	Achievement of monitoring indicators exceeded 85%, and local health workers showed improved understanding.	Implementation was limited to one community health center; intensive training was needed for new staff.	Could be replicated as a training model in areas with limited access to monitoring systems.
⁷	Nurhaeni et al. (2021)	Using a Mobile Application (PrimaKu) to Promote Childhood Immunization in Indonesia	Cross-sectional study with logistic regression	Application use increased the likelihood of complete immunization 3.23-fold ($p = 0.034$) and favorable maternal attitudes toward immunization 3.58-fold ($p = 0.003$).	Immunization coverage and maternal awareness remained low, and application use was uneven.	Improved child immunization coverage and maternal attitudes and supported digital technology in child health services.
⁸	Hamzah et al. (2024)	Mobile Application Model for Monitoring the Health of Pregnant Women	Focus-group discussions and alpha/beta testing	Provided automated notifications, supported daily records, and made pregnancy monitoring more systematic.	Evaluation was limited to early users; implementation at scale was not measured.	Received positive user responses and encouraged pregnant women to participate actively in their care.

The evidence suggests that digital technology has developed rapidly in Indonesian maternal and child health services over the past five years. Mobile health applications produced the most consistent improvements. Sulaksono et al. (2025), Delmaifanis et al. (2025), and Desmawati and Ismail (2024) reported gains in health literacy, adherence to antenatal care, or service quality. Applications may be particularly useful because they can be personalized, are readily accessible to users, and can deliver interventions directly. These findings are consistent with international evidence that mHealth can strengthen maternal and child health services in low- and middle-income settings (Lee et al., 2022; Sondaal et al., 2021). The World Health Organization (2021) likewise emphasizes the importance of integrating digital technology into health systems to sustain improvements in care.

Differences across studies indicate that effectiveness is shaped by both study design and implementation context. Experimental studies generated more readily quantifiable outcomes than training or system-development studies. Delmaifanis et al. (2025), for example, reported statistically significant changes, whereas Kamisutara and Artaya (2022) focused mainly on improved understanding. The web-based system developed by Excel et al. (2024) supported data management, but its direct effect on end users was not extensively measured. The strength of the available conclusions therefore varies with the methods used.

Implementation remains limited in scale and is affected by non-technical conditions. Sulaksono et al.

(2025) and Kamisutara and Artaya (2022) highlight the importance of digital literacy and the readiness of health workers. Differences in infrastructure also influence whether digital interventions can be implemented successfully across locations.

Overall, digital technology has considerable potential to improve maternal and child health services in Indonesia, but the magnitude of benefit is not uniform. Outcomes depend on study design, the type of technology, and local implementation conditions. A more comprehensive approach is needed if digital interventions are to produce broad and lasting improvements.

Digital health also contributes to Sustainable Development Goal 3, which promotes good health and well-being. Better access to information, earlier detection of pregnancy risks, and stronger primary-care services may help reduce maternal and infant deaths. Integrating digital technology into the health system could therefore support sustainable health development. However, few studies have evaluated long-term outcomes or large-scale implementation, underscoring the need for further research.

4. Conclusion

Digital technology has made a positive contribution to maternal and child health services in Indonesia by expanding access, improving health monitoring, and increasing the efficiency of data management. Mobile health applications show the most consistent potential to strengthen health literacy and adherence to antenatal care, although their effectiveness varies according to the research design, technology, and implementation context. The benefits of digital health are most likely to be sustained when implementation is supported by adequate infrastructure and capable human resources. This review is limited by the small number of included studies and the restricted scale of most implementations, so its findings may not fully represent conditions across Indonesia. Future research should assess long-term outcomes and implementation at a larger scale to provide a more comprehensive evidence base.

Bibliography

- Chen, Y., Li, X., & Zhang, L. (2023). Digital health interventions for improving maternal health monitoring during pregnancy. *BMC Pregnancy and Childbirth*, 23(1), 1–10.
- Cresswell, J. A., Say, L., & Souza, J. P. (2025). Global causes of maternal mortality and strategies for prevention. *The Lancet Global Health*, 13(2), e210–e220.
- Delmaifanis, D., Antarsih, N. R., & Siregar, K. N. (2025). Digital transformation in antenatal care in Indonesia: The effectiveness of the Bundaqusehat application. *Jurnal Promkes: The Indonesian Journal of Health Promotion and Health Education*, 13(2), 230–238.
- Desmawati, D., & Ismail, R. (2024). Optimizing antenatal care: The effects of a holistic nursing Android application for pregnant women. *Nurse Media Journal of Nursing*, 14(2), 246–255.
- Elci, O. C., Huda, T., & Ahmed, S. (2025). Health system challenges in reducing maternal and neonatal mortality in developing countries. *Global Health Research and Policy*, 10(1), 1–9.
- El-Tallawy, S. N., Pergolizzi, J. V., Vasiliu-Feltes, I., Ahmed, R. S., LeQuang, J. A., Alzahrani, T., Varrassi, G., Awaleh, F. I., Alsubaie, A. T., & Nagiub, M. S. (2024). Innovative applications of telemedicine and other digital health solutions in pain management: A literature review. *Pain and Therapy*, 13(4), 791–812. <https://doi.org/10.1007/s40122-024-00605-6>
- Excel, J. J., Teguh, R., & Sylviana, F. (2024). Rancang bangun sistem informasi monitoring gizi ibu hamil dan anak berbasis website [Development of a web-based nutrition monitoring information system for pregnant women and children]. *JOINTECOMS (Journal of Information Technology and Computer Science)*, 4(2), 122–134.
- Hamzah, R. R., Zahra, N. A., Najwa, H., Ananda, F. C., Azzahrani, N., Dahlan, M. R., Manapa, E. A., Sirinti, Y., & Sanda, E. (2024). Model aplikasi mobile pemantauan kesehatan pada ibu hamil [Mobile application model for monitoring the health of pregnant women].
- Kamisutara, M., & Artaya, I. P. (2022). Pelatihan aplikasi peringatan dini kesehatan ibu hamil di Puskesmas Kepanjen Malang dan Akademi Kebidanan Griya Husada Surabaya [Training on an early-warning application for maternal health]. *Madaniya*, 3(4), 709–721.
- Kumar, S., Nilsen, W., Abernethy, A., et al. (2023). Mobile health technology evaluation: The mHealth evidence workshop. *American Journal of Preventive Medicine*, 54(5), 734–742.
- Kumalasari, I., Maksuk, M., Yuniati, F., Ranga, A. D., Fathurrahman, M. D., & Aulia, E. (2023). Pengembangan aplikasi DELIMA sebagai upaya deteksi dini kehamilan bermasalah [Development of the DELIMA application for early detection of high-risk pregnancy]. *Jurnal Kesehatan*, 12(1), 124–

132.

- Labrique, A., Vasudevan, L., Kochi, E., Fabricant, R., & Mehl, G. (2022). mHealth innovations as health system strengthening tools: 12 common applications and a visual framework. *Global Health: Science and Practice*, 10(1), 160–171. <https://doi.org/10.9745/GHSP-D-21-00552>
- Lee, S. H., Nurmatov, U. B., Nwaru, B. I., Mukherjee, M., Grant, L., & Pagliari, C. (2022). Effectiveness of mHealth interventions for maternal, newborn and child health in low- and middle-income countries. *Journal of Global Health*, 12, 04033. <https://doi.org/10.7189/jogh.12.04033>
- Lupton, D. (2021). Digital health now and in the future: Findings from a participatory design stakeholder workshop. *Digital Health*, 7, 1–12. <https://doi.org/10.1177/20552076211001726>
- Nurhaeni, N., Chodidjah, S., Adawiyah, R., & Astuti. (2021). Using a mobile application (PrimaKu) to promote childhood immunization in Indonesia: A cross-sectional study. *Belitung Nursing Journal*, 7(4), 329–335. <https://doi.org/10.33546/bnj.1500>
- Papalamprakopoulou, M., Apostolakis, I., & Papathanasiou, J. (2024). Telehealth services and digital transformation in healthcare systems. *Healthcare Informatics Research*, 30(2), 120–129.
- Rossi, M., & Rehman, A. (2025). Digital transformation in healthcare systems: Opportunities and implementation challenges. *Health Policy and Technology*, 14(1), 100–110.
- Sondaal, S. F. V., Browne, J. L., Amoakoh-Coleman, M., Borgstein, A., Miltenburg, A. S., Verwijs, M., & Klipstein-Grobusch, K. (2021). Assessing the effect of mHealth interventions in improving maternal and neonatal care in low- and middle-income countries. *PLOS ONE*, 16(5), e0251236. <https://doi.org/10.1371/journal.pone.0251236>
- Sulaksono, D. H., Prabiantissa, C. N., Yuliasuti, G. E., & Hapsari, D. P. (2025). Pemanfaatan aplikasi sehat ibu dan anak melalui imunisasi (SEHATI) untuk peningkatan mutu layanan kesehatan ibu dan anak di Surabaya [Using the SEHATI application to improve maternal and child health services through immunization in Surabaya]. *PARTA: Jurnal Pengabdian Kepada Masyarakat*, 6(2), 145–152.
- Wei, Y., Zhang, L., & Chen, H. (2025). Determinants of maternal mortality in developing countries: A global health perspective. *International Journal of Public Health*, 70, 1–10.
- World Health Organization. (2021). *Global strategy on digital health 2020–2025*. World Health Organization.
- World Health Organization. (2025). *Trends in maternal mortality 2000–2025*. World Health Organization.