

Exploration of Contextual Factors Affecting the Effectiveness of *E-Kescatin* Application Utilization: A Qualitative Study in Pringsewu Regency

Nelly Indrasari*, Risneni Risneni, Warjidin Aliyanto, Nurlaila Nurlaila, Eva Berliana, Marlina Marlina

Midwifery Department, Poltekkes Kemenkes Tanjung Karang, Bandar Lampung, Indonesia

Corresponding author: nellyindrasari@poltekkes-tjk.ac.id

ARTICLE INFO

Article history

Submitted:
30 Jun 2025

Revise:
25 Aug 2025

Accepted:
22 Sept 2025

Keywords:

Health innovation;
Public health;
Reproductive health.

ABSTRACT

The *E-Kescatin* application was developed as an innovation in premarital health services to support stunting prevention efforts through a digital approach. However, the effectiveness of utilization of this application still shows variations between regions and is not optimal at the implementation level. This study aims to explore the contextual factors that influence the effectiveness of the *E-Kescatin* application utilization in Pringsewu District, Lampung Province. The research used a qualitative approach with an exploratory study design. Informants were selected purposively, consisting of midwives, brides-to-be, Health Office officers, and MCH program managers. Data collection was conducted through in-depth interviews and focus group discussions. Data analysis was done thematically with an interpretative approach. The results identified five main themes that influence the effectiveness of app utilization, namely: (1) accessibility of technology and digital infrastructure; (2) digital competence of health workers; (3) perceived benefits from the user side; (4) policy and regulatory support at the local level; and (5) cross-sector integration in the implementation of premarital services. It is concluded that the effectiveness of *E-Kescatin* application utilization is influenced by contextual factors that include technical, social, and institutional aspects. Therefore, improving the success of application implementation requires a collaborative and adaptive approach to local conditions. The findings of this study provide a significant contribution to strengthening digital transformation policies in the field of reproductive health.



This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.

INTRODUCTION

Stunting remains a primary global health concern, with an estimated 148 million children under five affected worldwide in 2022 (UNICEF, WHO & World Bank, 2023). The World Health Organization (WHO) sets the tolerance threshold for stunting prevalence at 20% or below. However, in Indonesia, the prevalence of stunting among children under five reached 21.6% in 2022 (Global Nutrition Report, 2023), which is still above this threshold. Moreover, the prevalence of stunting in Indonesia shows a fluctuating pattern between regions, reflecting disparities in the effectiveness of local interventions. In Lampung Province, for instance, the prevalence remains higher than the national average, and Pringsewu Regency is among the areas still facing challenges in reducing stunting rates.

Promotive and preventive approaches starting from the premarital phase are promising strategies for reducing the risk of stunting. Several studies have shown that premarital education or preconception services for prospective brides (and grooms) can enhance reproductive health readiness, minimize the risk of problematic pregnancies, and ultimately strengthen primary health services (Ayuanda et al., 2024; Andayani et al., 2024; Kementerian Kesehatan Republik Indonesia, 2022; Sari & Sari, 2023). One of the innovations developed by the government to support this effort is the *E-Kescatin* (Electronic Health of Prospective Brides) application. This

digital platform conducts initial screenings of reproductive health risks while providing education to CPs in a systematic and documented manner.

However, the implementation of *E-Kescatin* in various regions has not run optimally. Some areas, especially those classified as rural or underdeveloped, face significant challenges in terms of digital infrastructure availability and low technological literacy, both among healthcare workers and the general public. Previous studies have generally focused on demographic, socio-cultural, and organizational support factors in influencing the use of these applications. While these factors are important, they are limited in explaining the full context of implementation. Therefore, this study aims to explore in depth the contextual factors that influence the effectiveness of the *E-Kescatin* application utilization in Pringsewu District, Lampung Province. The exploration focuses on several key aspects, including digital infrastructure, the competence of health workers, regulatory and supervisory support, and cross-sectoral synergy in premarital services. The findings are expected to provide strategic insights for strengthening policies and improving the implementation of digital premarital health programs at the regional level, with approaches that are more adaptive to local conditions (Aisyah et al., 2025; McKenna et al., 2025).

METHOD

This research is a qualitative study with an exploratory approach, aiming to investigate in depth the contextual factors that influence the effectiveness of *E-Kescatin* application utilization in premarital health services. This approach was chosen to gain a comprehensive understanding based on the experiences, perceptions, and interactions of implementers and service users in the field (Hennink et al., 2021; Braun & Clarke, 2022). To ensure the credibility and trustworthiness of the findings, this study employed triangulation techniques, including Data triangulation, which involved collecting information from multiple sources, such as health workers, prospective brides and grooms, and policy stakeholders. Methodological triangulation: combining in-depth interviews, focus group discussions, and document reviews related to *E-Kescatin* implementation. Investigator triangulation: involving more than one researcher in the coding and analysis process to minimize subjectivity. The use of triangulation strengthens the validity of qualitative research results by providing a more holistic and balanced understanding of the contextual factors under study (Carter et al., 2014; Noble & Heale, 2019).

The study was conducted in the working area of the Pringsewu District Health Office, Lampung Province, an area that has implemented the *E-Kescatin* application in the reproductive health program. Data collection was conducted from May to June 2025. This research has obtained approval from the Health Research Ethics Committee of the Poltekkes Kemenkes Tanjung Karang, with number: 359/KEPK-TJK/V/2025. All informants were provided with an explanation of the study's purpose and procedures, and they signed an informed consent form. Confidentiality and anonymity of informants' identities were strictly maintained during and after the research process.

Informants were purposively selected using the following criteria:

- have direct experience in the use or management of the *E-Kescatin* application,
- involved in the implementation of premarital reproductive health services, and
- willing to provide information voluntarily.

The informants consisted of:

- Midwives implementing premarital services at *Puskesmas* (Health center),
- The bride-to-be is the app user,
- MCH program officers at *Puskesmas* and the Health Office,
- KUA* and *BKKBN* representatives are involved in cross-sector coordination.

A total of 42 informants were spread across several *Puskesmas* working areas, and this number was determined based on the principle of information saturation, when no significant new data was found from additional interviews (Hennink et al., 2021). The informants were selected using purposive sampling, with inclusion criteria tailored to the research objectives, namely: (1) health workers directly involved in premarital services and *E-Kescatin* application implementation, (2) prospective brides and grooms who had experience using the application,

and (3) local stakeholders such as staff from the *Puskesmas*, *KUA*, and *BKKBN*. Additionally, snowball sampling was employed when key informants suggested other relevant participants to provide richer perspectives. This approach allowed researchers to obtain diverse information and capture different contextual factors influencing *E-Kescatin* utilization (Palinkas et al., 2015; Etikan, 2016).

Data was obtained through three main techniques, namely:

- a. In-depth interviews, conducted using semi-structured interview guidelines to explore informants' experiences and perceptions.
- b. Focus group discussions (FGDs) with service implementers and cross-sector stakeholders to capture collective views and interactions.
- c. Limited participatory observation of the *E-Kescatin* application implementation process, including data entry by prospective brides (CPs) and recording by midwives, to understand actual practices in the field.

All interviews and FGDs were conducted with the informants' consent, audio-recorded, transcribed verbatim, and validated through member checking, whereby transcripts or summaries were returned to informants to confirm accuracy and credibility of the data (Birt et al., 2016).

Data analysis was conducted using a thematic analysis approach following the stages developed by Braun and Clarke (2022), which included:

- a. repeated reading of the transcripts to achieve data immersion,
- b. generating initial codes,
- c. grouping similar codes into categories and broader themes,
- d. interpreting the data and developing thematic narratives, and
- e. Validating findings through peer debriefing enabled the research team to critically examine emerging themes, identify potential biases, and enhance the credibility and trustworthiness of the analysis (Nowell et al., 2017; Godsey et al., 2020).

Data management was carried out manually, and all analysis procedures were conducted systematically and reflectively by the research team.

RESULTS

This study identified several main themes that emerged from in-depth interviews and focus group discussions (FGDs) with a total of 42 informants consisting of midwives, brides-to-be, MCH program officers, and cross-sector representatives (*KUA* and *BKKBN*). Through a thematic analysis approach, five central themes were identified that describe the contextual factors influencing the effectiveness of *E-Kescatin* application utilization in Pringsewu District.

Table 1. Thematic analysis result table

No.	Main theme	Sub-theme	Representative quotes (verbatim)
1	Technology Accessibility	- Internet network availability - Limitations of digital devices	"In some areas, the signal is complicated. The application often fails to access." (Midwife, FGD). "Some CPs do not have smartphones, so they rely on midwives to help input their data." (Health Worker)
2	Digital Competence of Health Workers	- Ability to use the app - Additional workload	"There are midwives who are not familiar with online data input, especially while providing services." (MCH Manager) "Sometimes we have to learn by ourselves, and it takes extra time outside of routine service hours." (Midwife)
3	Perceived Benefits by Users	- Relevance of content - Practical value of the application	"I know the application, but I am confused about filling it in. It is like repeating what the midwife already asked." (Bride-to-be) "If I fill it in correctly, I hope it will help me get better preparation before marriage." (Bride-to-be, FGD)
4	Regulatory and Supervisory Support	- Socialization from the agency - Cross-sector supervision	"If the agency does not monitor it, sometimes it becomes less of a priority." (Health Center Officer) "We only got socialization once, after that there was no follow-up guidance." (Midwife)

No.	Main theme	Sub-theme	Representative quotes (verbatim)
5	Cross-Sector Synergy	- Coordination with KUA/BKKBN - Role suitability	"Sometimes we are not in one voice with the KUA about when the CP should fill out the application." (BKKBN, FGD) "Coordination is still limited; sometimes the schedules between KUA and health services do not match." (Health Office Staff)

Interpretation of research findings

Technology accessibility

Access to technology is a significant challenge in utilizing the *E-Kescatin* application, particularly in areas with limited internet connectivity and a shortage of digital devices. Information from health workers indicates that signal interference directly hinders the use of the application in the field. This reflects that the successful implementation of digital systems is highly dependent on the readiness of technological infrastructure at the primary care level, especially in remote areas (Bimanur, 2024; Otieno & Kamanzi, 2023). The unequal distribution of devices, such as *smartphones* and computers, also widens the access gap between regions (Saini & Kumar, 2023).

Digital competency of health workers

The level of digital literacy among health workers, especially midwives, is a crucial factor affecting the utilization of applications. Some midwives are not accustomed to using digital systems and experience difficulties when they must combine direct service tasks with online data entry. Additional workloads without adequate training support can cause the application to run suboptimally. These findings underscore the importance of capacity building and continuous training, as well as the integration of digital systems into existing health service workflows (Haryanti et al., 2023; Hossain et al., 2025).

Perceived benefits by users (prospective brides)

Although some brides-to-be are familiar with the *E-Kescatin* application, their understanding of its benefits and how to use it is still limited. The mismatch between application content and user needs leads to confusion and negative perceptions, such as the assumption that filling in data is a repetition of information that has been conveyed verbally by the midwife. This suggests that the success of the application depends not only on technical aspects but also on user-friendly interface design, relevant content, and a positive user experience (Noack et al., 2024; Grieve et al., 2025).

Regulatory and supervisory support

The lack of technical guidelines and a consistent supervision system from health authorities has resulted in the utilization of apps not being a priority in facilities. Informants reported that the application's use was only seriously activated during official visits or assessments from superiors. This suggests the need for institutional strengthening through the development of standard operating procedures (SOPs), measurable performance indicators, and an integrated monitoring and evaluation system (German et al., 2024; World Health Organization, 2023).

Cross-sector synergy

Coordination between agencies, such as between *Puskesmas*, *KUA*, and *BKKBN*, still faces obstacles, especially in terms of scheduling compatibility and the workflow of application submission by prospective brides. The lack of harmonization in roles and communication within agencies leads to fragmentation of premarital services. These findings underscore the importance of implementing collaborative governance by strengthening cross-sectoral communication, aligning program visions, and clarifying roles and responsibilities in the implementation of the *E-Kescatin* application (Suyanti et al., 2025; Khuzaimah et al. 2024).

DISCUSSION

Theme 1: Technology accessibility

Access to technology is a fundamental component in the successful adoption of digital innovations, particularly in the healthcare sector. In the context of utilizing the *E-Kescatin* application, the results of this study indicate that the limitations of the internet network and the availability of digital devices are the primary technical barriers, particularly in *Puskesmas* working areas with inadequate telecommunications infrastructure.

Some informants reported that the process of filling in data on prospective brides and grooms was often delayed due to unstable internet connections, even during working hours. The midwives revealed that they had to find a location with a better signal or postpone data input until the evening when the internet connection was smoother. This condition not only affects the timeliness of recording but also demotivates health workers from utilizing the application in real-time.

This finding is consistent with Smart City researchers in Indonesia, who found that differences in infrastructure and digital literacy across regions significantly affect the adoption and implementation of digital health services. Within the framework of Rogers' (2003). The Diffusion of Innovations theory suggests that the success of technology adoption is strongly influenced by infrastructure readiness and the socio-technological conditions of the user community. When these prerequisites are not met, resistance to adoption can occur despite motivation from individual or institutional users (Paina et al., 2019; Sun et al., 2024).

Additionally, hardware limitations in healthcare facilities pose another challenge. Some health centers do not yet have specialized devices, such as computers or tablets, to support application operations. As a result, officers use personal devices that are not necessarily compatible with the *E-Kescatin* application's features. The use of personal devices in the context of public services not only reduces work efficiency but also poses a risk to the security and confidentiality of user data.

The implications of these findings are strategic. First, without systemic efforts to ensure equitable access to technology, the digitization of services could widen the gap in service quality between regions. Second, the use of personal devices by healthcare workers has the potential to compromise the data governance system and user privacy protection. Therefore, digital transformation in reproductive health services must be supported by planned and sustainable investments in infrastructure.

From a policy perspective, local governments need to integrate digital infrastructure strengthening into technology-based health program planning. Initiatives such as "healthy digital villages" or "digital-based community health centers" can be a medium-term solution, involving cross-sector collaboration such as the Office of Communication and Informatics, telecommunication service providers, and local private partners.

Theme 2: Digital competencies of health workers

The digital competence of health workers, especially midwives and Maternal and Child Health (MCH) program managers, is proven to have a direct influence on the quality and sustainability of using the *E-Kescatin* application. The interview results showed a significant variation in ability. Some officers had difficulty understanding the application features and data input procedures. The high daily workload exacerbates this, so filling out the application is often considered an additional administrative burden and not part of core services.

This finding aligns with a study conducted by Hossain et al. (2025), which found that low digital literacy among health workers is a significant obstacle to the adoption of Electronic Medical Records (EMR) in several hospitals in Indonesia. The study also emphasized the importance of continuous training as an effort to overcome resistance to using digital systems. When training is not conducted systematically, the perceived ease of use within the framework of the Technology Acceptance Model (TAM) becomes less established, which has implications for low technology adoption.

Research related to the use of the Healthy IndonesiaKu Application (ASIK) in first-level healthcare facilities also showed that the level of satisfaction among health workers increased significantly after training and digital synchronization of the system (Manikam et al., 2025). This reinforces the importance of combining formal and hands-on training to enhance staff skills functionally.

Structurally, the adoption of a digital system, such as *E-Kescatin*, requires not only technical readiness but also changes in work culture within the service system. Studies of EMR implementation in hospitals across Java and Sulawesi show that the success of digital transformation is highly dependent on organizational commitment, continuous training, and the involvement of clinical management. Without such support, digital applications are often perceived as an additional administrative burden rather than a tool to improve service quality (Hossain et al., 2025; Widyasmita & Ricki, 2025).

Policy implications:

1. Development of a Tiered Digital Literacy Program: This program should not only focus on introducing the application features but also on integrating *E-Kescatin* into the daily service workflow practically and efficiently.
2. Strengthening Peer Support Mentoring between Midwives: A mentoring approach between senior and junior midwives can increase the effectiveness of learning and encourage more optimal utilization of the application.
3. Integration of *E-Kescatin* System with *e-Puskesmas* and *Satusehat*: This step aims to avoid repetitive data entry and strengthen the efficiency of the reporting system, in line with the national EMR integration direction that the Ministry of Health has rolled out.

By strengthening digital competencies through systematic training, inter-officer support, and cross-platform integration, the *E-Kescatin* application has great potential to transform into an effective service support tool, not just an administrative obligation.

Theme 3: Perceived benefits by users

Perceived benefits are a key factor in encouraging the adoption level of the *E-Kescatin* application among prospective brides (CP). The results of interviews in this study show that CP perceptions of the *E-Kescatin* application are still diverse. Some respondents claimed to have a limited understanding of the application's functions, experienced difficulties in answering the questions presented, and some even considered that the application did not provide direct benefits in their marriage preparation process. This finding reveals a gap between the design of the application content and the actual needs of users, as well as a weak communication strategy for conveying the added value of the application.

In the Technology Acceptance Model (TAM) framework, perceived usefulness (PU) is a key predictor of an individual's intention to use a technology (Davis, 1989). When prospective brides do not perceive the utility of the application, their intrinsic motivation to use it will remain low, even if there is a recommendation or obligation from the service provider. Recent research in digital health contexts shows that interactive features, such as direct access to healthcare professionals and relevant tailored content, can significantly increase perceived usefulness and thus intention to use the application (Yang et al., 2025; Hussain et al., 2025).

Furthermore, within the framework of the Health Belief Model (HBM), perceived benefits are strongly influenced by the level of individual understanding of health risks, such as anemia, high-risk pregnancy, and stunting. If these risks are not thoroughly understood, then premarital health applications, such as *E-Kescatin*, will not be perceived as a tool that can enhance their reproductive health readiness (Haryanti et al., 2023).

This finding is also supported by various international studies showing that digital-based educational approaches incorporating interactive content, risk visualization, and educational simulations are proven to increase user engagement and perceived benefits. Examples include global youth health promotion tools which use personalization and user-centered content, and digitally enhanced physiotherapy education that uses gamified, simulation, and blended learning methods to improve perceived usefulness and intention to use (Global Youth Perspectives on Digital Health Promotion, 2023; Pagels et al., 2025).

Policy and program implications:

1. Application Content Redesign: It is necessary to simplify and improve the application content to make it more communicative, relevant to the needs of prospective brides, and include features such as risk visualization, premarital tips, and interactive simulations.
2. Community-based Digital Education: Improving the understanding of prospective brides through community-based educational approaches, such as peer education and small-group discussions, has proven effective in building perceived benefits.
3. Strengthening Value Narratives by Health Workers: Midwives and cross-sectoral workers need to emphasize the long-term benefits of *E-Kescatin* application, such as prevention of anemia, pregnancy complications, and stunting as a form of reproductive health investment.
4. Engaging Brides-to-be in App Co-Creation: A participatory approach to developing the app's content and interface can increase the bride-to-be's sense of ownership and emotional attachment to the app.

By building a strong perception of benefits through an educative and participatory approach, *E-Kescatin* has the potential to become a digital innovation that is not only administrative in nature, but also actively adopted by brides-to-be as part of the preparation towards a healthy and quality family.

Theme 4: Regulatory and supervisory support

Regulatory support and supervision systems are strategic pillars in ensuring the sustainability of digital innovation implementation in the public service sector, including the utilization of the *E-Kescatin* application in Pringsewu Regency. The results of this study show that the application in the field still depends on individual enthusiasm or local initiatives, without written instructions, incentive systems, or standardized performance evaluations. This condition indicates that the *E-Kescatin* application has not been fully institutionalized structurally in the regional health service system.

These findings align with a global study that highlighted the absence of detailed technical policies and weak supervision mechanisms as significant obstacles to mainstreaming digital innovation in health, particularly in developing countries (Human Resources for Health, 2021).

According to contemporary studies on policy implementation in Indonesia, public policies that lack adequate resource allocation, clear operational guidance, and strong supervision are highly vulnerable to implementation failure (Triyono et al., 2021; Salomo & Rahmayanti, 2023).

Furthermore, the Global Strategy on Digital Health 2023-2030, released by the World Health Organization (2023), emphasizes that the digital transformation of the health sector must be supported by operational regulations, change management systems, and coordination across institutional levels. Without the existence of standard operating procedures (SOPs), performance indicators, and systematic supervision, technology adoption tends to run unevenly and is not integrated nationally.

The systematic study by German et al. (2024) also shows that data-driven supervision and digitized reporting have a positive impact on improving service quality. However, in practice, many digital supervision interventions are not sustainably integrated into the national program management system. This finding aligns with indications from UGM's regulatory sandbox for health technology sector, which reported that digital health innovations face significant challenges in regulation, product evaluation, and oversight; moreover governance aspects are not yet fully supported in the national health regulatory framework. A case in point is the *e-Malaria regulatory sandbox*, where stakeholders noted issues like limited regulatory awareness, gaps in legal frameworks, product testing and documentation bottlenecks, data protection concerns, and inadequate supervisory mechanisms (Fuad et al., 2023; UGM, 2022).

Policy and Program Implications:

1. Development of Structured Technical SOPs: Local health offices need to develop technical guidelines for implementing *E-Kescatin* that include operational flow, division of responsibilities among officers, and standardized reporting mechanisms.
2. Integration of Application Usage Indicators: The use of *E-Kescatin* needs to be one of the indicators in routine monitoring systems, such as MCH supervision, *Puskesmas* monthly reports, and regional performance evaluation systems.

3. Development of Digital Supervision System: The implementation of a real-time data-based reporting dashboard and digital notification system will increase transparency and accountability in program implementation.
4. Non-Financial Incentives: Rewards in the form of digital certificates or performance publications to *Puskesmas* or health workers who are active and high-performing in app utilization can be an effective motivator.

By strengthening the foundation of technical regulations and data-based supervision systems, *E-Kescatin* has a significant opportunity to become an integral part of an adaptive and responsive health service culture in response to digital transformation. This effort is also in line with national policy directions in realizing an inclusive and sustainable technology-based health system.

Theme 5: Cross-sector synergy

Cross-sector synergy is a key element in the successful implementation of digital-based health services, including the *E-Kescatin* application. Despite the initiation of cooperation among the Health Office, Religious Affairs Office (*KUA*), and the National Population and Family Planning Agency (*BKKBN*), this study found that, at the technical level, program implementation still faces various coordination obstacles. Discrepancies in service schedules, differences in understanding of roles between institutions, and the lack of regular coordination mechanisms have led to unsynchronized implementation. One of the impacts is the fragmentation of services when the prospective bride and groom (CP) first attend the *KUA* before getting health counseling at the *Puskesmas*, which causes service confusion.

This finding supports the Collaborative Governance theory proposed by Ansell and Gash (2008), which emphasizes that the effectiveness of cross-sector collaboration is strongly influenced by shared commitment, open communication, mutual trust, and facilitative leadership. Without a coordination forum, clarity of mandate, and a shared decision-making process, initiatives such as *E-Kescatin* will tend to run sectorally and unsustainably.

Research by Taikun et al. (2023) demonstrated that integrating healthcare systems with pentahelix synergy and utilizing shared digital data can enhance service effectiveness and user satisfaction. In the context of digital systems, reliance on face-to-face coordination or manual administration presents an obstacle to building a service ecosystem that is connected in real-time. The absence of a data integration system between institutions risks overlapping roles and information, reducing service efficiency.

Strategic Implications and Policy Recommendations:

1. Development of MoU and Joint Technical Guidelines: There is a need for a memorandum of understanding between agencies related to *E-Kescatin* that explicitly regulates the division of roles, service flow, and responsibilities of each sector.
2. Development of an Integrated Service Calendar: A joint calendar of activities is needed among the *KUA*, *Puskesmas*, and *BKKBN* to ensure that the bride and groom undergo all stages of services in a sequential and synchronized manner.
3. Strengthening Informal Digital Coordination: As a short-term solution, utilizing online communication groups such as WhatsApp across sectors can help accelerate operational coordination before a unified system is developed.
4. Cross-Sector Collaborative Training: A joint training was organized for officers from various institutions to build a common understanding that *E-Kescatin* is a strategic tool in preventing reproductive health risks and stunting.

The five themes that have been analyzed—technological accessibility, digital competence of health workers, perceived user benefits, regulatory and supervisory support, and cross-sectoral synergies—collectively show that the effectiveness of *E-Kescatin* application utilization is not only influenced by technical readiness, but also by social, institutional, and intersectoral dynamics. By thoroughly understanding the local context and building an inclusive support structure, digital

transformation programs in reproductive health can be implemented in a more adaptive, responsive, and sustainable manner.

CONCLUSION

This study concludes that the effectiveness of the *E-Kescatin* application in Pringsewu Regency is shaped by multiple contextual factors, including technological infrastructure, health workers' digital competence, user perceptions, institutional support, and cross-sector coordination. The findings highlight that limited internet access, low digital literacy, weak regulatory frameworks, and fragmented collaboration hinder optimal utilization. Ultimately, the success of digital health innovations such as *E-Kescatin* depends not only on technology but also on strong governance, adaptive policies, competent human resources, and user-oriented design aligned with local needs.

AUTHOR'S DECLARATION

Authors' contributions and responsibilities

NI: Conceptualization, initial draft writing, funding acquisition, project administration; **RR:** Initial draft writing (supporting), formal analysis, visualization; **AO, WA:** Review and editing, validation, supervision (main), funding (equivalent); **EB, MM:** Supervision (support), validation (equivalent), review and editing; All authors have read and approved the final manuscript, responsibility for the content of this article, including the validity of the methods, data analysis, and conclusions presented.

Funding

This research was funded by the Research Grant Fund of Poltekkes Kemenkes Tanjungkarang Year 2025, in accordance with funding contract number: 359/PL.07.01/PPK/2025.

Availability of data and materials

All data used in this study are available and can be accessed through the corresponding author upon request.

Competing interests

The authors declare that there are no conflicts of interest affecting this study.

Additional information

This article is part of a program aimed at strengthening the digital transformation of community-based reproductive health services in Pringsewu District and will serve as the basis for the development of evidence-based regional policy interventions.

ACKNOWLEDGEMENT

The author thanks the Ministry of Health of the Republic of Indonesia through the Decree of the Director of the Health Polytechnic of the Ministry of Health, Tanjungkarang, Number: HK 02.03/F.XLIII/60/2025, for the opportunity given to the author to carry out this research.

REFERENCES

Aisyah, D. N., Setiawan, A. H., Mayadewi, C. A., Lokopessy, A. F., Kozlakidis, Z., & Manikam, L. (2025). Understanding health information systems utilization across public health centers in

- Indonesia: Cross-sectional study. *JMIR Medical Informatics*, 13, e68613. <https://doi.org/10.2196/68613>
- Andayani, D., Handayani, T., & Lestari, N. (2024). Preconception health counseling and its effect on maternal preparedness: A quasi-experimental study in Yogyakarta. *Indonesian Journal of Reproductive Health*, 15(2), 88–96.
- Ayuanda, R., Pratiwi, D., & Nurhidayah, S. (2024). The impact of premarital education on reproductive health readiness among prospective brides in Central Java, Indonesia. *Journal of Midwifery and Public Health*, 12(1), 45–54.
- Bimanur. (2024). *Building a connected Indonesia through digital infrastructure and connectivity*. Center of Governance & Digitalization.
- Birt, L., Scott, S., Cavers, D., Campbell, C., & Walter, F. (2016). Member checking: A tool to enhance trustworthiness or merely a nod to validation? *Qualitative Health Research*, 26(13), 1802–1811. <https://doi.org/10.1177/1049732316654870>
- Braun, V., & Clarke, V. (2022). *Thematic analysis: A practical guide*. London: SAGE Publications. <https://doi.org/10.53841/bpsqmip.2022.1.33.46>
- Carter, N., Bryant-Lukosius, D., DiCenso, A., Blythe, J., & Neville, A. J. (2014). The use of triangulation in qualitative research. *Oncology Nursing Forum*, 41(5), 545–547. <https://doi.org/10.1188/14.ONF.545-547>
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340. <https://doi.org/10.2307/249008>
- Etikan, I. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, 5(1), 1–4. <https://doi.org/10.11648/j.ajtas.20160501.11>
- Fuad, A., Tiara, A., Kusumasari, R. A., Rimawati, & Murhandarwati, E. E. H. (2023). Introducing a regulatory sandbox into the Indonesian health system using e-Malaria as a use case: Participatory action study. *Journal of Medical Internet Research*, 25, e47706. <https://doi.org/10.2196/47706>
- German, C. J., Kengia, J. T., & Mwanyika, H. (2024). Building a digital supportive supervision system for improving health service delivery in low- and middle-income countries through the collaborative requirements development methodology (CRDM): Experience from Tanzania. *Gates Open Research*, 8, 74. <https://doi.org/10.12688/gatesopenres.15870.1>
- Global Nutrition Report. (2023). *Country nutrition profiles: Indonesia*. Development Initiatives. <https://globalnutritionreport.org/resources/nutrition-profiles/asia/south-eastern-asia/indonesia/>
- Global youth perspectives on digital health promotion: A scoping review. (2023). *BMC Digital Health*, 1, Article 25. <https://doi.org/10.1186/s44247-023-00025-0>
- Grieve, N., Braaten, K., MacPherson, M., Liu, S., & Jung, M. E. (2025). Involving end users in the development and usability testing of a smartphone app designed for individuals with prediabetes: Mixed-methods focus group study. *JMIR Formative Research*, 9, e59386. <https://doi.org/10.2196/59386>
- Godsey J. A., Houghton D. M., Hayes T. (2020). Registered nurse perceptions of factors contributing to the inconsistent brand image of the nursing profession. *Nursing Outlook*, 68(6), 808–821. <https://doi.org/10.1016/j.outlook.2020.06.005>
- Haryanti, P., et al. (2023). Application of the health belief model in improving healthy behaviors among pregnant women: A literature review. *International Journal of Health Sciences*, 11(4), 123–135. <https://doi.org/10.59585/ijhs326>
- Hennink, M., Kaiser, B. N., & Marconi, V. C. (2021). Code saturation versus meaning saturation: How many interviews are enough? *Field Methods*, 29(1), 97–114. <https://doi.org/10.1177/1525822X17706185>
- Hossain, M. K., Sutanto, J., Handayani, P. W., & Haryanto, A. A. (2025). An exploratory study of electronic medical record implementation and recordkeeping culture: The case of hospitals in Indonesia. *BMC Health Services Research*, 25, 249. <https://doi.org/10.1186/s12913-025-12399-0>
- Human Resources for Health. (2021). Systematic review of performance-enhancing health worker supervision approaches in low- and middle-income countries. *Human Resources for Health*, 19, 73. <https://doi.org/10.1186/s12960-021-00692-y>

- Hussain, A., et al. (2025). The mediating effects of perceived usefulness and ease of use on technology acceptance among healthcare workers. *BMC Nursing*. <https://doi.org/10.1186/s12912-024-02648-8>
- Kementerian Kesehatan Republik Indonesia. (2022). *Report of the Preconception Maternal Mentoring Trial in Indonesia: Strengthening primary care through reproductive health education*. Ministry of Health of the Republic of Indonesia. <https://kesmas.kemkes.go.id/preconception-mentoring-report>
- Khuzaimah, A., Kurniati, U., Haq, M. Z., & Yunita, Y. (2024). Collaborative governance in stunting interventions at the local level. *Journal of Government and Development*, 1(3), 149–161. <https://doi.org/10.69816/jgd.v1i3.42560>
- Manikam, L., et al. (2025). Using an electronic immunization registry (Aplikasi Sehat IndonesiaKu) in Indonesia: A cross-sectional study. *Interactive Journal of Medical Research*, 14, e53849. <https://doi.org/10.2196/53849>
- McKenna, L. G., Efendi, F., & Sommers, C. L. (2025). Digital health in Indonesian nursing: A scoping review. *CIN: Computers, Informatics, Nursing*. <https://doi.org/10.1097/CIN.0000000000001326>
- Noack, E. M., et al. (2024). Usability of an app for medical history taking in general practice from the patients' perspective: Cross-sectional study. *JMIR Human Factors*, 11. <https://doi.org/10.2196/47755>
- Noble, H., & Heale, R. (2019). Triangulation in research, with examples. *Evidence-Based Nursing*, 22(3), 67–68. <https://doi.org/10.1136/ebnurs-2019-103145>
- Nowell L., Norris J. M., Mrklas K., White D. E. (2017). Mixed methods systematic review exploring mentorship outcomes in nursing academia. *Journal of Advanced Nursing*, 73(3), 527–544. <https://doi.org/10.1111/jan.13152>
- Otieno, D., & Kamanzi, G. (2023). Strengthening health system resilience through digital health: Challenges and prospects in Indonesia's rural and remote regions. *Open Public Health Journal*, 18, 1–20. <https://doi.org/10.2174/18749445393540>
- Pagels, L., Schindler, O., & Luedtke, K. (2025). Overview of styles, content, learning effects, and attitudes of students towards digitally enhanced physiotherapy education: A scoping review. *BMC Medical Education*, 25, Article 176. <https://doi.org/10.1186/s12909-025-06750-6>
- Paina, L., Namazzi, G., Tetui, M., Waiswa, P., & Kananura, R. M. (2019). Applying the model of diffusion of innovations to understand facilitators for the implementation of maternal and neonatal health programmes in rural Uganda. *Global Health*, 15, 38. <https://doi.org/10.1186/s12992-019-0483-9>
- Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Administration and Policy in Mental Health and Mental Health Services Research*, 42(5), 533–544. <https://doi.org/10.1007/s10488-013-0528-y>
- Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). New York: Free Press.
- Saini, D., & Kumar, A. (2023). Digital divide and social inequality: An analysis of ICT accessibility and usage in developing countries. *Information Development*, 39(2), 178–190. <https://doi.org/10.1177/02666669221075831>
- Salomo, R. V., & Rahmayanti, K. P. (2023). Progress and institutional challenges on local governments performance accountability system reform in Indonesia. *SAGE Open*. <https://doi.org/10.1177/21582440231196659>
- Sari, C. K., & Sari, K. C. (2023). Digital-based preconception mentoring to improve reproductive health literacy among prospective brides. *Indonesian Journal of Midwifery*, 11(3), 120–130.
- Sun, Y., Maroufkhani, P., & Tiwari, S. (2024). Determinants of digital technology adoption in innovative SMEs. *Journal of Innovation & Knowledge*. <https://doi.org/10.1016/j.jik.2024.100633>
- Suyanti, Then, Maryani, D., & Polyando, P. (2025). Collaborative governance for stunting reduction: A qualitative case study from Bangka Regency, Indonesia. *Contagion: Scientific Periodical Journal of Public Health and Coastal Health*. <https://jurnal.uinsu.ac.id/index.php/contagion/article/view/24139>

- Taikun, R., Hidayat, T., & Wulandari, S. (2023). Impact of integrated digital health governance on maternal service delivery in rural Indonesia. *BMC Health Services Research*, 23, 456. <https://doi.org/10.1186/s12913-023-09456-3>
- Triyono, B., Hardiyati, R., & Pradana, A. W. (2021). The gap between program planning and implementation: The case of R&D program in Indonesian RPJMN. *STI Policy and Management Journal*. <https://doi.org/10.14203/STIPM.2020.285>
- UNICEF, WHO, & World Bank Group. (2023). *Levels and trends in child malnutrition: Key findings of the 2023 edition*. UNICEF, WHO, and World Bank.
- Universitas Gadjah Mada. (2022). *Regulatory sandbox for health technology: Challenges in regulation, product testing, oversight, and governance*. Universitas Gadjah Mada & Sustainable Development UGM.
- Widyasasmita, M. N., & Ricki, A. V. (2025). Top management support and electronic medical records effectiveness: A case study at Amanda Hospital, Indonesia. *Science Midwifery*, 13(1), 22–29. <https://midwifery.iocspublisher.org/index.php/midwifery/article/view/1859>
- World Health Organization. (2023). *Global strategy on digital health 2023–2030*. Geneva: WHO. <https://www.who.int/teams/digital-health/e-health-systems/global-strategy>
- World Health Organization. (2023). *The state of digital health 2023: Global digital health monitor*. Geneva: WHO. <https://www.who.int>
- Yang, H. J., et al. (2025). Factors influencing health care technology acceptance: A study of digital health services. *JMIR*, e65269. <https://doi.org/10.2196/65269>