Original Article

Village Midwives' Experiences with Maternal Emergency Management and Digital Health Systems: A Phenomenological Study in Rural Indonesia

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ABSTRACT

Background: Maternal and neonatal mortality remain significant challenges in low- and middle-income countries, particularly in rural Indonesia, where village midwives serve as the first responders to obstetric emergencies. Despite numerous digital health initiatives, fragmented systems and poor usability often hinder timely emergency management. This study aimed to explore the lived experiences, challenges, and expectations of community midwives in designing an effective maternal–neonatal emergency digital application in Tanah Laut District, South Kalimantan, Indonesia.

Methods: This qualitative study employed a Husserlian descriptive phenomenological approach. Ten active village midwives were recruited through purposive sampling; inclusion required at least one year of experience, while those unable to attend or refusing participation were excluded. Data were collected in August 2024 through a focus group discussion (FGD) lasting 120 minutes. Data were analyzed using Colaizzi's phenomenological analysis method, and reporting followed the COREQ guideline.

Results: Five interrelated themes emerged: (1) Maternal emergencies as multidimensional crises, (2) Informal communication as the real emergency network, (3) Fragmented and burdensome reporting systems, (4) Digital and infrastructural barriers in rural practice, and (5) Expectations for an integrated, user-friendly digital solution. These themes progress conceptually from the initial crisis experience, through the mobilization of informal networks due to systemic barriers, culminating in user-driven expectations for digital design.

Conclusion: The study highlights midwives' resilience amid digital fragmentation. Policymakers and developers should adopt participatory co-design approaches involving midwives to ensure the usability and sustainability of maternal emergency digital systems

Keywords: Maternal Health Services; Midwives; Emergency Medical Services; Digital Health; Qualitative Research

Implications for Practice:

- Strengthening clinical practice requires the integration of informal communication pathways into formal maternal emergency systems to enhance rapid coordination, decision-making, and continuity of care in time-critical situations.
- Advancing health policy should prioritize the development of interoperable, user-centered digital platforms co-designed with midwives to reduce administrative burden and improve the efficiency and quality of maternal health service delivery.
- Reforming midwifery education is essential to equip practitioners with competencies in digital health, emergency management, and adaptive problem-solving, particularly in Low- and Middle-Income Countries where resource constraints and infrastructural limitations shape clinical realities.

Introduction

Maternal mortality remains one of the most persistent global health challenges, reflecting inequities in access, quality, and responsiveness of healthcare systems. Most of the maternal mortality result from delayed recognition and management of emergencies such as postpartum hemorrhage, eclampsia, and sepsis. Indonesia continues to face a high maternal mortality ratio (MMR), reported at 189 deaths per 100,000 live births in 2020, far from the Sustainable Development Goal (SDG) target of 70 per 100,000 (Kementerian Kesehatan Republik Indonesia, 2022). These figures underscore the urgent need to improve the speed, coordination, and accuracy of emergency response particularly in rural and geographically isolated regions like Tanah Laut District, South Kalimantan.

In Indonesia, midwives (bidan) are the backbone of maternal and neonatal care, especially in rural areas where health facilities are limited. They often serve as the first responders to maternal emergencies, performing critical stabilization procedures and coordinating referrals under significant resource constraints (Hazfiarini et al., 2022; Herwansyah et al., 2023). However, midwives face systemic barriers such as fragmented reporting systems, limited digital infrastructure, and administrative overload, which impede effective emergency management (Puspitasari et al., 2022; Susanti et al., 2022; Tamrat et al., 2022). Although the Ministry of Health has introduced multiple digital health applications to improve maternal data integration, many of these systems are top-down, overlapping, and disconnected from field realities. Consequently, rather than facilitating care, they frequently increase the administrative burden on midwives, diverting valuable time from clinical service delivery (Susanti et al., 2022; Tamrat et al., 2022).

Existing research on digital health interventions in maternal care has primarily focused on technical feasibility and health outcomes, with limited attention to the user experiences and contextual factors shaping implementation success (Ameyaw et al., 2025; Danquah & Morgan, 2025; Moise et al., 2023). While some studies highlight the promise of mHealth for improving maternal surveillance and reporting, others note that poor usability, low connectivity, and insufficient training often undermine adoption (Ameyaw et al., 2025; Danquah & Morgan, 2025). This contradiction points to a critical research gap: the lack of qualitative evidence capturing midwives' voices and lived experiences in shaping digital solutions for maternal emergencies. Without understanding these perspectives, digital health initiatives risk perpetuating the same structural and operational challenges they aim to solve.

This study is grounded in the human-centered design (HCD) and sociotechnical

systems theory, which emphasize that technology adoption and effectiveness depend on the interaction between human behavior, workflow, and technological environments. In this framework, midwives are not merely end-users but co-creators of innovation, whose experiential knowledge and adaptive strategies are essential to designing functional and sustainable solutions (Adidharma et al., 2024; Chamberlain et al., 2022; Göttgens & Oertelt-Prigione, 2021; Landeiro et al., 2025). The study assumes that understanding the lived experiences (phenomenological perspective) of midwives can illuminate the relational, technical, and systemic dynamics that influence how emergency response and digital reporting are carried out in practice. The interplay among these elements clinical care, communication systems, and digital readiness forms the conceptual foundation for exploring how a maternal emergency application should be designed to align with frontline realities.

Therefore, the aim of this study was to explore the experiences, challenges, and expectations of village midwives in managing maternal emergencies and using digital systems in Tanah Laut District, South Kalimantan, Indonesia. Specifically, it sought to (1) understand the contextual barriers and enablers in maternal emergency documentation and communication, and (2) identify user-driven design requirements for developing a practical and integrated digital recording application. By listening to the voices of frontline midwives, this study contributes empirical and conceptual insights for building contextually relevant, human-centered digital health solutions that can enhance maternal emergency response and support national efforts to reduce maternal mortality.

Methods

Study Design

This study employed a qualitative method with a Husserlian descriptive phenomenology approach. This approach was selected over other qualitative methods as it focuses on capturing the universal essence of the midwives lived experiences without superimposing prior theoretical constructs. The study reporting adheres strictly to the Consolidated Criteria for Reporting Qualitative Research (COREQ) guidelines

The study was conducted in Tanah Laut District, South Kalimantan, Indonesia, a geographically dispersed rural area with limited internet access, challenging transportation, and decentralized maternal health services. These contextual conditions directly influenced how participants experienced emergency response and documentation in their daily practice.

Research Team and Reflexivity

The research team consisted of multidisciplinary members with expertise in nursing and health promotion and behavioral science, and information technology. The research team had extensive experience in community-based health research and digital health intervention design. The broader team included two researchers with backgrounds in public health and qualitative research methods.

The Focus Group Discussion (FGD) was facilitated by a female principal investigator with extensive training in qualitative research methods and behavioral science. Prior to the study, the research team acknowledged their assumption that existing digital health systems were burdensome; this was consciously bracketed using reflexivity journals to prevent biasing participant responses.

Before the study began, the principal investigator had no hierarchical or supervisory relationship with the participating midwives, although familiarity existed through professional interactions during previous health promotion programs in the district. This professional familiarity facilitated open communication during data collection.

To minimize researcher bias, reflexive practices were applied throughout the research process. The principal investigator maintained a reflexivity journal documenting assumptions, reflections, and emerging interpretations. Peer debriefing sessions with colleagues experienced in qualitative research were conducted to enhance analytical rigor and reduce subjective bias.

Participants

A total of 12 village midwives were approached, of which 10 met the inclusion criteria and participated, while the remaining two were unable to participate due to scheduling conflicts, and no financial compensation was provided. Participants were active village midwives (bidan desa) working in Tanah Laut District, South Kalimantan, Indonesia, and were selected through purposive sampling to ensure adequate field experience and representation across urban, semi-urban, and remote subdistricts. Inclusion criteria comprised active village midwives with at least one year of experience in their current position and willingness to participate voluntarily in the focus group discussion, whereas exclusion criteria included inability to attend the scheduled session, refusal to participate, or personal or professional constraints preventing participation. Ultimately, all 10 eligible midwives agreed to participate, none declined, and all provided written informed consent after receiving a full explanation of the study's purpose and procedures.

Data Collection

Data were collected through a face-to-face FGD in a private, quiet room at the Tanah Laut District Health Office to ensure participant privacy and comfort. The semi-structured interview guide was pilot-tested with two non-participating midwives prior to data collection. During the session, the note-taker maintained detailed field notes on non-verbal cues and group dynamics. The audio was transcribed verbatim in Bahasa Indonesia and translated into English for analysis, with back-translation performed to ensure semantic equivalence.

A semi-structured discussion guide was used, covering four broad domains:

1. Experiences and challenges in managing maternal–neonatal emergencies;
2. Current documentation and reporting practices;
3. Barriers to using existing digital health systems; and
4. Expectations for features, usability, and functions of a new digital application.

Sample guiding questions included:

1. "Can you describe a recent maternal emergency case you handled?"
2. "How do you currently record and report such cases?"
3. "What obstacles do you encounter when using existing applications?"
4. "If a new system were developed, what features would be most useful for you?"

The session was audio-recorded with participants' consent and transcribed verbatim in Bahasa Indonesia. Transcripts were reviewed and verified for accuracy by both the moderator and note-taker.

Participants were invited to review summary points at the end of the discussion (member checking) to validate the interpretation of their views. Data

saturation was reached as no new themes or insights emerged toward the end of the session.

Data Analysis

Data were analyzed using Colaizzi's seven-step phenomenological method (Colaizzi, 1978): (1) Familiarization with the data by reading transcripts multiple times; (2) Extracting significant statements pertaining to the phenomenon; (3) Formulating meanings from these statements; (4) Clustering themes into categories; (5) Developing an exhaustive description of the phenomenon; (6) Identifying the fundamental structure; and (7) Validating findings with participants

Coding and analysis were performed manually using Microsoft Word and Excel to ensure close engagement with the text. Two researchers independently coded the transcript, followed by joint discussion to reconcile differences and reach consensus on final themes.

Peer review by an external qualitative expert further enhanced the credibility and confirmability of the findings. The final thematic framework reflected the multidimensional realities of midwives' work: clinical, social, technological, and organizational.

Trustworthiness and Rigor

Credibility was established through methodological triangulation (combining transcript data with observational field notes) and investigator triangulation (involving multiple coders). Thick descriptions were utilized to provide rich, contextual evidence of the midwives' experiences.

Ethical Consideration

Ethical approval was obtained from the Ethics Committee of the Universitas Noor Huda Mustofa (Approval No. 2903/KEPK/UNIV-NHM/EC/XI/2025). Permission to conduct the study was also granted by the Tanah Laut District Health Office, South Kalimantan. All participants received both verbal and written explanations about the research purpose, procedures, risks, and confidentiality safeguards before providing written informed consent. Confidentiality was maintained by anonymizing all identifiable information in the transcripts. Audio files and transcripts were securely stored on password-protected devices accessible only to the research team.

Results

Participant characteristics

A total of 10 active village midwives (bidan desa) participated in the focus group discussion. All participants were female, aged between 27 and 48 years, with a range of 5 to 22 years of professional experience as midwives and an average of 9 years serving in their respective villages. Most midwives worked in rural and geographically challenging areas within Tanah Laut District, South Kalimantan, where transportation barriers, long distances to referral hospitals, and some of the area have unstable internet connectivity frequently impeded emergency response and data reporting. All participants had experience handling maternal emergencies such as postpartum hemorrhage, eclampsia, and premature labor, and routinely performed emergency stabilization before referral. They were familiar with basic digital communication tools (e.g., WhatsApp) but had varying levels of digital literacy regarding government health applications (**Table 1**).

Table 1. Characteristics of The Participants

Participant Code	Profession Role	Gender	Age (Years)	Years of Experience	Years in Current Village
P1	Village Midwife	Female	27	5	4
P2	Village Midwife	Female	30	7	5
P3	Village Midwife	Female	32	9	7
P4	Village Midwife	Female	35	10	8
P5	Village Midwife	Female	36	12	9
P6	Village Midwife	Female	39	14	9
P7	Village Midwife	Female	41	15	10
P8	Village Midwife	Female	43	17	11
P9	Village Midwife	Female	46	20	13
P10	Village Midwife	Female	48	22	14

Overview of emergent themes

Five main themes emerged through thematic analysis, representing midwives' lived experiences, challenges, and aspirations related to maternal–neonatal emergency management and digital documentation (**Table 2**):

1. Maternal emergencies as multidimensional crises
2. Informal communication as the real emergency network
3. Fragmented and burdensome reporting systems
4. Digital and infrastructural barriers in rural practice
5. Expectations for an integrated, user-friendly digital solution

These themes collectively illustrate how midwives navigate emergency care through social connections, professional commitment, and adaptive use of technology in resource-limited settings.

The five themes are deeply interconnected, forming a comprehensive understanding of midwives' realities in rural emergency care (**Figure 1**). The maternal emergency experience (Theme 1), which activates rapid response through informal communication networks (Theme 2). However, these efforts are constrained by administrative burdens (Theme 3) and technological barriers (Theme 4). From these challenges arises a shared vision, the expectation of a practical, integrated, and empowering digital solution (Theme 5). Together, these interconnected themes portray a system where technology, human relationships, and resource limitations converge. For digital transformation in maternal health to succeed, it must build upon the existing informal systems of trust and communication already sustaining emergency responses in rural Indonesia.

Table 2. Thematic Analysis Matrix

Theme	Category	Codes
1. Maternal emergencies as multidimensional crises	Medical realities	Postpartum hemorrhage, eclampsia, retained placenta, preterm labor
	Social and cultural barriers	Delayed care-seeking, family indecision, hiding pregnancy, shame/stigma
	First responder burden	Acting alone, immediate stabilization, working under high pressure
2. Informal communication as the real emergency network	Grassroots digital coordination	WhatsApp groups, rapid response, connecting with doctors/drivers

Theme	Category	Codes
	Alternative community networks	Mobilizing cadres, utilizing family members as physical messengers
3. Fragmented and burdensome reporting systems	Redundant documentation	Manual registers, Google forms, multiple government apps
	Technical frustrations	System crashes, data loss, unresponsive platforms
	Administrative overload	Diverted attention from clinical care, time-consuming data entry
4. Digital and infrastructural barriers in rural practice	Poor connectivity	Unstable internet, seeking signal in higher areas
	Limited digital readiness	Insufficient brief training, inability to troubleshoot errors
	Financial constraints	High cost of internet data
5. Expectations for an integrated, user-friendly digital solution	Essential functionalities	Risk alerts, emergency directories, GPS-location, automated sync
	Usability requirements	Simple, intuitive, online/offline capability
	Expected outcomes	Data privacy, faster workflows, no added administrative burden

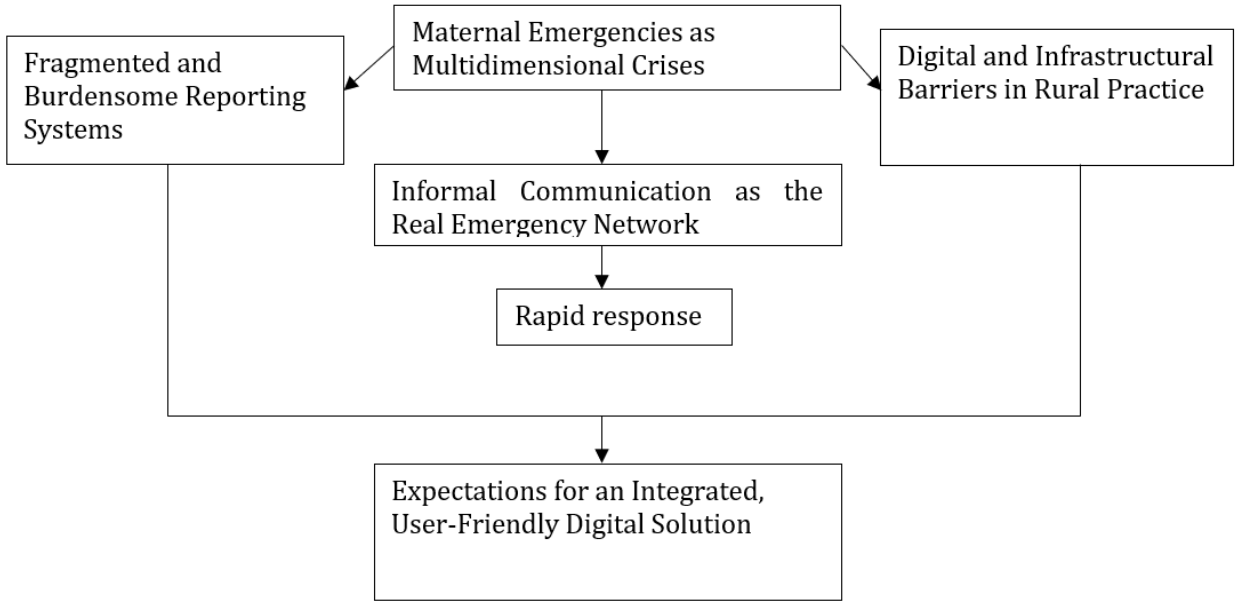

Figure 1. Tree Code of Midwives' Lived Experiences

Theme 1: Maternal Emergencies as Multidimensional Crises

Midwives described maternal and neonatal emergencies not only as medical conditions but also as social, emotional, and cultural events. Common emergencies included postpartum hemorrhage, eclampsia, retained placenta, and preterm labor. However, the severity of outcomes often stemmed from delays in care-seeking, family indecision, or social stigma around pregnancy.

> *"Sometimes the mother hides her pregnancy out of shame. By the time she comes, she's already in a critical condition." (P1)*

Midwives often acted as the first and only responders in remote areas, performing initial management while coordinating referrals under pressure.

> *"We are the first to handle everything helping the mother, calling the ambulance, contacting the hospital. There's no one else." (P4)*

This theme underscores that emergency response in rural maternal care extends beyond clinical skills, it involves emotional resilience, cultural sensitivity, and social trust.

Theme 2: Informal Communication as the Real Emergency Network

Participants highlighted that informal digital communication, particularly via WhatsApp groups, served as their most reliable and rapid coordination tool for maternal emergencies. Through WhatsApp, midwives communicated with other midwives, doctors, district officers, and ambulance drivers, creating a grassroots referral network that filled the gaps of formal systems.

> *"When something urgent happens, I don't open the official app I send a message to the WhatsApp group. The response is much faster." (P7)*

In areas without cell service, community health cadres or family members were mobilized to deliver urgent messages directly to midwives.

> *"If there's no signal, the husband or cadre comes to my house on a motorbike to inform me." (P5)*

This theme reflects how social capital and informal communication function as a life-saving infrastructure in rural health care.

Theme 3: Fragmented and Burdensome Reporting Systems

Midwives expressed significant frustration toward existing documentation and reporting requirements. They were obligated to record data multiple times across manual registers, Google forms, and various government applications.

> *"Each program has its own form, but we input the same data again and again. It takes too much time." (P1)*

Technical issues such as poor connectivity, data loss, and unresponsive systems compounded the burden. Midwives reported that excessive administrative work diverted their attention from clinical care.

> *"Sometimes I lose the report because the system crashes, and I have to re-enter everything." (P10)*

They consistently voiced the need for a single, integrated application that could simplify data entry and automatically synchronize across platforms.

Theme 4: Digital and Infrastructural Barriers in Rural Practice

Digital literacy and infrastructure emerged as major obstacles to implementing any digital solution. Midwives in remote subdistricts struggled with poor connectivity and limited access to digital devices.

> *"If I need to send data, I go up the hill or to the school area to get a signal." (P8)*

Training sessions for new systems were often brief and insufficient, leaving many midwives unsure about how to operate applications effectively.

> *"Usually, we're trained quickly, just shown how to log in, but not how to fix errors." (P6)*

The cost of internet data and the unreliability of existing apps also discouraged consistent use. This theme highlights the unequal readiness for digital transformation within rural health systems.

Theme 5: Expectations for an Integrated, User-Friendly Digital Solution

Despite the challenges, participants expressed optimism toward the development of a new maternal–neonatal emergency application.

They envisioned a platform that is simple, intuitive, and functional both online and offline, emphasizing practicality over aesthetics.

Desired features included risk alerts, emergency contact directories, GPS-based location sharing, automated notifications, and compatibility across programs.

> *"We don't need something complicated just one app that can record and alert us, even if there's no signal." (P1)*

Midwives also stressed the importance of data privacy and workload reduction, preferring a system that supports their practice rather than adding new reporting layers.

> *"If it can make our work faster and not heavier, we'll use it." (P3)*

This theme represents the co-creation mindset among midwives willingness to adopt digital innovation if it aligns with their operational realities.

Discussion

This study provides an in-depth understanding of the experiences, challenges, and aspirations of village midwives in managing maternal–neonatal emergencies in rural Indonesia. The findings align with previous studies emphasizing that maternal emergencies in low-resource settings are not solely clinical but are influenced by social, cultural, and infrastructural factors (Erjino et al., 2022; Khan et al., 2025; Rudiyanti & Utomo, 2024). Similar to the "three delays" framework, this study found that delayed decision-making and limited access to care remain critical determinants of maternal outcomes(Mohammed et al., 2020; Vidler et al., 2023). However, our results expand this understanding by highlighting how midwives' relational networks and informal communication systems particularly via WhatsApp have become vital adaptive mechanisms that sustain emergency responses in the absence of formal infrastructure.

The findings reveal why informal communication networks dominate emergency coordination: they bypass the

rigid, top-down structures of official applications, offering the immediate, bidirectional communication required during life-threatening crises. Furthermore, cultural elements such as family decision-making delays and social stigma significantly exacerbate clinical emergencies, forcing midwives to act not only as clinicians but as social negotiators.

Compared to other qualitative studies in Low- and Middle-Income Countries (LMICs), our findings uniquely demonstrate how Human-Centered Design (HCD) must integrate these pre-existing cultural workflows rather than replacing them. The study contributes significantly to rural health system design by proving that a maternal-neonatal emergency digital application will only be adopted if it mimics the simplicity and speed of informal networks like WhatsApp.

In relation to the literature on digital health implementation in low- and middle-income countries (LMICs), particularly regarding fragmented systems, limited connectivity, and digital burden among frontline health workers. However, unlike prior studies that often focus on user resistance, our participants demonstrated digital adaptability and openness, provided that technologies are designed to fit their realities(Labrique et al., 2018; Owoyemi et al., 2022; Xiong et al., 2023). This supports principles of human-centered design and implementation science, emphasizing that technological interventions must evolve from the lived experiences of end-users rather than top-down programmatic directives(Alonge et al., 2019; Black et al., 2023; Burka et al., 2023; Waddell et al., 2024).

The study also contributes new insights into how informal communication channels act as de facto emergency health systems in rural contexts. While previous research has documented the use of mHealth tools for reporting and monitoring, few have examined how community-driven digital practices already function as critical components of maternal care ecosystems. The findings reveal that midwives use social trust and communication networks as compensatory systems, bridging the gap left by fragmented digital infrastructures. In several rural contexts, midwives and community health workers leverage familiar platforms (e.g., WhatsApp) and social trust to coordinate emergency referrals, share information, and bridge gaps in care delivery. These practices have improved prehospital transfer, health worker attentiveness, and patient outcomes, demonstrating high usability and sustainability (Dada et al., 2025; Reynolds et al., 2023).

This recognition challenges conventional approaches that view informal systems as secondary, instead, they should be seen as foundations for designing sustainable digital health innovations (Coleman et al., 2023; Till et al., 2023)

Overall, this study extends existing theory by integrating social and technological dimensions of maternal emergency management into a context-specific digital health framework. It underscores that successful digital transformation in maternal care requires attention to human relationships, workflow simplification, and infrastructural readiness. These findings have practical implications for policymakers and developers aiming to design maternal–neonatal emergency applications: systems must be lightweight, integrated, offline-capable, and supportive rather than burdensome. Future research should explore participatory co-design approaches involving midwives, community actors, and system developers to ensure contextual fit, usability, and long-term adoption of digital solutions in rural health systems.

Implications and limitations

The findings of this study offer significant implications for theoretical and scientific advancement in digital health and maternal care research. Conceptually, the study reinforces and extends the understanding of how human-centered and context-driven design is essential for digital innovation in low-resource settings. By illustrating that informal communication networks already operate as functional emergency systems, this research contributes to the growing body of work advocating for sociotechnical approaches in health system design—where technology, human interaction, and infrastructure are viewed as interdependent components. Theoretically, these insights enrich models of digital health readiness and implementation frameworks by emphasizing local adaptability and relational trust as determinants of success. For future research, this study highlights the importance of exploring participatory co-design and iterative evaluation to ensure that digital interventions are not only usable but also culturally and contextually embedded within frontline health practices.

For policy implementation, health ministries must shift from mandating fragmented recording tools to investing in integrated, interoperable platforms that auto-populate data across national health databases, thereby drastically reducing the reporting burden on frontline workers.

Despite its contributions, this study has limitations. As a single-site qualitative study, the results primarily reflect the contextual realities of Tanah Laut District and may differ in areas with different resource levels or health system organization. Nonetheless, the richness and consistency of the narratives provided robust insight into shared experiences across participants. Future studies should consider incorporating multiple FGDs or longitudinal participatory designs across diverse settings to validate and expand upon these findings, thereby strengthening their theoretical and practical contributions to digital maternal health research.

Relevance to Practice

The findings of this study provide practical guidance for midwives, healthcare managers, and policymakers seeking to strengthen maternal–neonatal emergency systems in rural areas. For practitioners, the results emphasize the need to integrate existing informal communication networks, such as WhatsApp groups, into formal emergency response and reporting workflows, recognizing their proven effectiveness in rapid coordination. Health institutions and program managers should prioritize developing a single, user-friendly, and offline-capable digital application that minimizes redundant data entry while supporting real-time case alerts and referrals. Training programs for midwives should combine digital literacy enhancement with emergency management skills, ensuring that technology directly supports clinical decision-making rather than adding administrative burden. At the policy level, the findings suggest that digital health initiatives must be grounded in human-centered design principles, involving end users—particularly midwives from the earliest stages of system development. By aligning technological innovation with local realities and frontline experiences, healthcare systems can improve responsiveness, data accuracy, and ultimately reduce maternal and neonatal mortality in underserved communities.

Conclusion

This study reveals that maternal–neonatal emergency management in rural Indonesia is shaped by a complex interplay of clinical, social, and technological factors, where village midwives serve as the central actors bridging gaps in care through informal communication networks and

adaptive problem-solving. Fragmented reporting systems and infrastructural limitations continue to challenge digital implementation, yet midwives demonstrate strong readiness to adopt innovations that are simple, integrated, and responsive to their working realities. To achieve successful digital transformation in maternal health, it is imperative that policymakers and developers adopt participatory co-design approaches involving frontline midwives. Grounding digital innovation in the lived experiences of these health workers—such as integrating informal communication workflows and ensuring offline capabilities—will ensure the usability and sustainability of maternal emergency digital systems, ultimately offering a pathway toward more effective and equitable maternal healthcare in resource-limited settings.

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CrediT Authorship Contributions Statement

Sumarti Endah Purnamaningsih Maria Margaretha: Conceptualization, Methodology, Supervision, Funding Acquisition, Writing - Original Draft

Dhiya Urrahman & Y Yohakim Marwanta: Software, Validation, Formal Analysis, Writing - Review & Editing

Chrisnawati: Investigation, Resources, Data Curation, Project Administration

Fahmi Baiquni: Conceptualization, Writing - Original Draft, Review & Editing, Visualization

Conflicts of Interest

There is no conflict of interest.

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