

Feasibility and Acceptability of PcyCare: A Self-Directed Digital Platform for Maternal Health Literacy and Emotional Support

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ABSTRACT

The digital transformation in healthcare has driven the emergence of maternal health platforms as strategic innovations that bridge the gap between the limitations of conventional educational methods and the demands of modern emotional support. This study aims to evaluate the feasibility and acceptability of PcyCare (Pregnancy Care), a self-directed digital platform designed to integrate maternal health literacy and emotional support. A quantitative approach with a descriptive feasibility study design was employed, involving 123 participants (comprising 110 pregnant women, 8 maternal health experts, and 5 IT specialists) selected through purposive sampling from Malaysia and Indonesia. Theoretically grounded in the Technology Acceptance Model (TAM), data were collected via structured questionnaires and analyzed using descriptive statistics and Scale-Content Validity Indices (S-CVI). Findings reveal that PcyCare achieved high consensus across all domains; technical feasibility received the highest rating ($M=4.82, SD=0.06$), followed by user experience ($M=4.70, SD=0.48$) and content quality ($M=4.68, SD=0.11$). Expert validation yielded an S-CVI of 0.94 for content relevance and 0.96 for technical stability. Integrating literacy and emotional support features significantly enhances user satisfaction and maternal self-management capacity. In conclusion, PcyCare demonstrates clear advantages over conventional methods in terms of accessibility, information clarity, and real-time psychological reassurance. This study contributes to mHealth literature by pioneering the integration of health literacy and emotional support into a single evidence-based digital intervention, offering theory-driven practical guidance for developers and policymakers to create more inclusive and sustainable maternal healthcare systems.

Keywords: Digital Maternal Health, Emotional Support, Health Literacy, mHealth, Technology Acceptance Model, User Acceptability



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1. INTRODUCTION

The development of digital technology has significantly influenced healthcare systems in many low- and middle-income countries (Mwanza et al., 2023; Woldemariam & Jimma, 2023), particularly in maternal and child health services (De & Pradhan, 2023; Venkataramanan et al., 2022). One of the most rapidly growing innovations is mobile health (mHealth) interventions, designed to address gaps in antenatal education and pregnancy support (Kante & Målqvist, 2025; Knop et al., 2024). According to Mohamed et al. (2025) and Tucker et al. (2024), these interventions encompass digital platforms providing health information, self-monitoring, and psychological support for pregnant women. This shift

is reflected in a global upward trend in maternal health application usage (Ameyaw et al., 2024; P. Zhang et al., 2018), driven primarily by the need for reliable information access in resource-constrained settings.

Despite this digital surge, antenatal education is still predominantly delivered through conventional classes led by midwives (Dahl et al., 2020; De Quattro, 2025). However, these traditional services are often constrained by time, workforce capacity, and inconsistent quality of delivery. Consequently, many pregnant women have limited opportunities to independently access comprehensive information on nutrition, pregnancy danger signs, and childbirth preparedness. According to Kemp et al. (2024), Progga & Rubya (2025), and Asadollahi et al. (2025), these limitations indicate that pregnant women increasingly rely on digital solutions to meet their daily information and emotional needs. Nevertheless, the level of acceptance for such technology is influenced not only by availability but also by how users perceive content quality, technical feasibility, and the emotional benefits offered.

A critical factor determining the successful adoption of digital platforms in pregnancy is content quality, specifically regarding health literacy (Gourounti et al., 2022; B. Li et al., 2025). Aslantekin Özçoban et al. (2022) and S. Li et al. (2025) stated that pregnant women require accurate, culturally relevant, and easily understandable information to enhance their self-efficacy. Platforms with interactive multimedia content, such as videos and infographics, can accelerate the understanding of complex materials compared to conventional lecture methods (Hansen et al., 2024; Maharjan et al., 2022; Moe-Byrne et al., 2022). The availability of valid and structured educational materials strongly affects user trust; in contrast, conventional methods are often limited to oral counseling or scarce printed media, which may be less engaging and difficult to retain.

In addition to literacy, technical feasibility represents a fundamental foundation for sustained use. The Technology Acceptance Model (TAM) explains that perceived ease of use influences a person's intention to adopt health technology (Alsyouf et al., 2023; Zin et al., 2023). Applications that are stable, easy to navigate, and compatible across devices enhance comfort in self-directed learning, allowing users to focus on learning materials rather than operational issues. Unlike conventional methods that require physical presence at specific times, digital technical feasibility offers 24/7 access flexibility (Boggiss et al., 2025; Mehra et al., 2025), which is critical for pregnant women with limited mobility.

Digital transformation also has great potential to provide emotional support, an aspect often overlooked in routine antenatal care. According to Evans et al. (2022) Pregnancy is a period vulnerable to stress and anxiety, yet conventional services frequently focus primarily on physical monitoring. Digital platforms integrating emotional regulation features, such as mindfulness exercises (Mefrouche et al., 2023) and self-help relaxation guides (X. Zhang et al., 2023), can provide the psychological reassurance pregnant women need privately and in real-time. Conversely, emotional support in conventional methods often relies on face-to-face counseling availability, which is rarely accessible in busy primary healthcare facilities. To address these multifaceted needs, the PcyCare (Pregnancy Care) platform was developed, with its core advantages summarized in Table 1. PcyCare is a self-directed digital platform integrating maternal health literacy and emotional support.

Table 1
Comparison between PcyCare Digital Platform and Conventional Antenatal Education

Aspect	PcyCare Digital Platform (Self-Directed)	Conventional Methods (Face-to-Face)
Maternal Health Literacy	Provides multimedia content (videos/infographics) accessible anytime for self-directed learning.	Information is delivered orally within limited timeframes, often difficult for pregnant women to recall.
Technical Accessibility	Flexible, 24/7 access via mobile devices without geographical limitations.	Bound by clinic schedules and requires physical presence.
Emotional Support	Integrates emotional regulation and mindfulness features for real-time anxiety management.	Primary focus on physical examination; psychological support is often minimal or unavailable.

The fundamental differences presented in Table 1 confirm that users' perceptions of PcyCare are strongly influenced by the platform's advantages in terms of content quality, technical feasibility, and emotional experience (Asadollahi et al., 2025b; Davis et al., 2023; Ghimire et al., 2023). Accordingly, this study aims to evaluate the feasibility and acceptability of the PcyCare platform, with a focus on three main dimensions: content quality, technical feasibility, and user experience (emotional support). The results are expected to provide preliminary evidence for the development of effective digital health interventions in developing countries.

The novelty of this research lies in its holistic, evidence-based approach, integrating physical health literacy and emotional support into a single, culturally adapted platform. Unlike many existing maternal applications that focus narrowly on physical monitoring or teleconsultation (Alim & Imtiaz, 2023; Mohamed et al., 2025; Stricker et al., 2025), PcyCare is grounded in health literacy frameworks and the

TAM model to ensure both clinical relevance and high user engagement (Alsyouf et al., 2023). By combining comprehensive educational modules with real-time mental health features, this study provides a critical evidentiary basis for developing more inclusive and effective digital health interventions in developing nations.

2. METHOD

This study employed a quantitative, cross-sectional descriptive design to evaluate the feasibility and acceptability of the PcyCare self-directed digital platform. Ethical approval was granted by the Health Research Ethics Committee, Ministry of Health, Semarang Health Polytechnic (Approval No. 1151/EA/F.XXIII.38/2025). The research was conducted in accordance with the Declaration of Helsinki, and the study protocol was prospectively registered at ClinicalTrials.gov (Identifier: NCT07207733) in compliance with the ICMJE trial registration standards. All participants provided written informed consent prior to their involvement, and strict measures were implemented to maintain participant confidentiality and data security throughout the study.

A total of 123 participants from Malaysia and Indonesia were recruited using purposive sampling to ensure multi-stakeholder representation. The participants included: (1) 8 maternal health experts from Malaysia and Indonesia, selected based on a minimum of five years of clinical or academic expertise; (2) 5 information technology (IT) and media specialists from Indonesia; and (3) 110 pregnant women (aged 20–35 years; gestational age 12–36 weeks) from both countries. All participants were required to have access to an internet-connected device and demonstrated digital literacy to operate the platform.

The research instrument was theoretically grounded in the Technology Acceptance Model (TAM) (Szymkowiak & Jeganathan, 2022; Wang et al., 2025), specifically adapted to assess Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) in an mHealth context. Data were collected through structured electronic questionnaires following a supervised one-week platform usage trial. To ensure linguistic and cross-cultural validity between the Malaysian and Indonesian cohorts, the instrument underwent a back-translation process. Table 2 outlines the indicators grouped into three evaluation dimensions: (1) Content quality adopted from Asadollahi et al. (2025b) and Adefolarin & Gershim (2022); (2) Technical feasibility adopted from Oruc et al. (2022) and Liu et al. (2024); and (3) User experience adopted from Szymkowiak & Jeganathan (2022) and Wang et al. (2025).

Table 2
Questionnaire Indicators of PcyCare Feasibility and Acceptability

Evaluation Domain	Code	Key Indicators / Questionnaire Focus
Content Quality (Maternal Health Experts)	CQ1	Relevance & Accuracy: Materials align with medical standards.
	CQ2	Clarity & Education: Information uses clear, understandable language.
	CQ3	Cultural Suitability: Content is adapted to local cultural contexts.
	CQ4	Educational Usefulness: Effectiveness in enhancing knowledge.
Technical Feasibility (IT/Media Specialists)	TF1	System Stability: Runs smoothly without crashes or bugs.
	TF2	Navigation: Menu structures and interfaces are intuitive.
	TF3	Interface Performance: Responsive design across multiple devices.
	TF4	Data Security: Ensuring user data privacy and security.
User Experience (TAM-Based) (Pregnant Women)	UE1	Ease of Use: Ability to operate the app independently (PEOU).
	UE2	Emotional Support: Effectiveness in reducing anxiety.
	UE3	Self-Directed Learning: Visual aids for better information retention.
	UE4	User Satisfaction: Overall satisfaction and intent to use (PU).

The research instrument was subjected to rigorous validity and reliability testing. Content validity was assessed using the Content Validity Index (CVI), with a minimum acceptable value set at 0.80. Instrument reliability was confirmed via Cronbach's alpha coefficient to ensure internal consistency across all Likert-scale items.

Data analysis was performed using IBM SPSS Statistics version 26.0. Descriptive statistics, including means, standard deviations, and 95% Confidence Intervals, were used to summarize the findings. To determine the level of feasibility, a predefined success threshold of ≥ 3.40 (on a 5-point

Likert scale) was established. Scores meeting or exceeding this benchmark were interpreted as evidence of high acceptability and technical readiness. Through this univariate analysis, the study aims to identify specific aspects of the platform requiring refinement prior to broader implementation.

3. RESULTS AND DISCUSSION

3.1. Results

The study involved 123 participants comprising pregnant women and multidisciplinary experts. The majority of respondents were female (95%), including 110 pregnant women and 7 female maternal health experts. Regarding the pregnant women cohort (n=110), most were aged between 20–35 years (Mean = 28.1, SD = 3.8) and had a gestational age ranging from 12 to 36 weeks

Table 3 shows the descriptive analysis indicating that the overall feasibility and acceptability of the PcyCare platform were highly positive across all evaluated domains. Respondents scored highest on technical feasibility (Mean = 4.82, SD = 0.06), followed by user experience (Mean = 4.70, SD = 0.48) and content quality (Mean = 4.68, SD = 0.11). Notably, all mean scores significantly exceeded the predefined feasibility threshold of 3.40, with narrow 95% Confidence Intervals (CI) indicating high precision and strong consensus among participants. These findings suggest that the platform was perceived as technically robust, user-friendly, and rich in educational value by both experts and end-users.

Table 3
Descriptive Statistics of Feasibility Variables (n = 123)

Variable	Mean	SD	Min	Max	95% CI	Interpretation
Content Quality (Experts)	4.68	0.11	4.00	5.00	[4.60, 4.76]	High Feasibility
Technical Feasibility (IT)	4.82	0.06	4.00	5.00	[4.76, 4.88]	Very High Feasibility
User Experience (Pregnant Women)	4.70	0.48	3.00	5.00	[4.61, 4.79]	High Acceptability

Table 4 presents the detailed evaluation of content quality and technical feasibility as assessed by the expert panels. The analysis revealed a high level of agreement among experts, with the Scale-Content Validity Index (S-CVI) reaching 0.94 for content and 0.96 for technical aspects. This indicates that the educational modules were considered accurate and culturally relevant, while the system architecture was deemed stable and secure. The high S-CVI scores provide strong psychometric evidence that the platform's foundational design aligns with clinical standards.

Table 4
Expert Evaluation Results – Content and Technical Domains

Domain	Assessor Group	Mean	S-CVI / Agreement
Content Relevance & Accuracy	Maternal Health Experts (n=8)	4.68	0.94 (High Validity)
System Stability & Performance	IT/Media Specialists (n=5)	4.82	0.96 (High Stability)
Overall Expert Consensus		4.75	Feasible

Table 5 summarizes the user experience and acceptability reported by the 110 pregnant women after utilizing the platform. The results demonstrate that users perceived the platform as supporting self-directed learning and providing emotional reassurance. Although user scores showed slightly greater variability (SD = 0.48) compared to expert scores, reflecting the diverse digital literacy levels within the user cohort, the overall mean remained well above the acceptability threshold.

Table 5
User Acceptability Results – Dependent Variable: User Experience

Indicator	Mean	User Perception
Ease of Use & Navigation	4.75	Very Easy
Clarity of Information	4.69	Clear & Understandable
Emotional Support / Reassurance	4.65	Reassuring
Overall User Satisfaction	4.70	Highly Acceptable

Table 6 presents the triangulation of perspectives across stakeholder groups. The convergence of high scores from maternal health experts, IT specialists, and pregnant women confirms that PcyCare meets the multidimensional requirements for a digital maternal health intervention. This tripartite validation ensures that the platform is not only medically sound but also technologically viable and user-centric.

Table 6
Triangulation of Feasibility Findings

Dimension	Criteria	Evidence Status
Content Validity	Content is scientifically accurate and culturally appropriate.	Supported (Experts)
Technical Robustness	Platform is stable, responsive, and secure.	Supported (IT Specialists)
User Acceptability	Platform is easy to use and provides emotional support.	Supported (End Users)

The findings in Table 6 show that all feasibility criteria were met. This implies that the integration of expert-validated content with a user-friendly interface substantially contributes to both high technical feasibility and strong user acceptability. The high scores across all indicators suggest that the platform has successfully bridged the gap between complex medical information and intuitive digital delivery.

3.2. The Role of Content Quality in Enhancing Health Literacy

The findings of this study demonstrate that, as perceived by maternal health experts, content quality plays a pivotal role in establishing the credibility of the PcyCare platform. High content quality is reflected in the relevance of nutritional guides, the accuracy of danger sign identification, and the clarity of childbirth preparation modules. These findings are supported by Mazaheri Habibi et al. (2024), Carrandi et al. (2023) and van der Windt et al. (2023), who emphasize that evidence-based content is a critical determinant of trust in pregnancy-related applications. Accordingly, a high level of content validity provides an essential foundation for safe self-directed learning. By ensuring clinical accuracy, PcyCare mitigates the risks associated with health misinformation commonly found on unverified digital platforms.

Content aspects, such as cultural suitability and language clarity, directly influence the platform's educational usefulness. Experts validated that the inclusion of culturally adapted materials helps bridge the gap between clinical information and patient understanding. This result is reinforced by Henriksson et al. (2022), Bilal et al. (2024) and Polizzi (2025), who asserted that aligning digital content with user literacy levels enhances engagement. Therefore, optimal content quality ensures that pregnant women receive reliable information that empowers them to make informed health decisions. This alignment is crucial for fostering self-efficacy, particularly in contexts where traditional health education may be infrequent or poorly understood.

3.3. Technical Feasibility as the Foundation for Self-Directed Learning

The findings of this study demonstrate that, as assessed by IT and media specialists, technical feasibility serves as the critical infrastructure for enabling independent maternal education. PcyCare's high technical scores (Mean = 4.82) indicate stable performance, intuitive navigation, and reliable multimedia playback across devices. This is consistent with previous feasibility studies by Sakamoto et al. (2022), Atukunda et al. (2023), Asadollahi et al. (2025a) and Muhamad Rusdi et al. (2025), which highlight that system stability is a prerequisite for user retention in mHealth interventions. The absence of significant technical barriers allows users to engage deeply with the content without the frustration of operational failures.

Technical feasibility acts as an enabler for the "self-directed" nature of the platform. When the system functions smoothly without crashes or complex login procedures, pregnant women can access educational modules at their own convenience. Birati et al. (2022), Oelhafen (2024) and Lim et al. (2025) further corroborate these findings, noting that lightweight multimedia content enhances usability for users with varying levels of digital literacy. Thus, technical robustness ensures that the barrier to entry is minimized, allowing the educational and emotional support components to be delivered effectively. For PcyCare, technical excellence is not merely a feature but a strategic necessity to ensure the sustainability of self-paced learning in developing regions.

3.4. User Experience and the Acceptability of Emotional Support

The findings indicate that, as perceived by pregnant women, the integration of emotional support features significantly enhances the user experience of the PcyCare platform. The high acceptability score (Mean = 4.70) suggests that users valued not only the informational content but also the psychological reassurance provided by the platform. Supported by studies conducted by Green et al. (2022), Evans et al.

(2022), Balsam et al. (2023), Siegmann et al. (2023) and Kim et al. (2025), app-based mindfulness and emotional regulation strategies have been associated with reduced pregnancy-related anxiety. This finding underscores the platform's role in addressing the psychological “blind spot” of traditional antenatal care, which often prioritizes physical metrics over mental well-being.

Therefore, the emotional support component constitutes a key factor in advancing the quality of digital maternal care beyond mere physical monitoring. The use of reflective prompts and relaxation guides allowed users to manage stress in real-time. This aligns with the findings of Barber & Masters-Awatere (2022), Ortega-García et al. (2023), Davis et al. (2023) and Liao et al. (2024), who reported that mHealth interventions integrating lifestyle and emotional components lead to better psychological well-being. Consequently, PcyCare is perceived not just as an educational tool, but as a holistic support system that addresses the emotional vulnerabilities associated with pregnancy. By normalizing mental health monitoring, the platform provides a safe space for pregnant women to navigate their emotional challenges privately.

3.5. Interrelation of Content, Technology, and Emotional Assurance

The findings indicate that, as perceived by the triangulation of experts and users, content quality, technical feasibility, and user experience are closely interrelated in shaping an optimal digital health intervention. A platform with high technical stability (technical feasibility) delivers accurate and relevant information (content quality) effectively, which in turn fosters a sense of security and satisfaction (user experience) among pregnant women. This creates a synergistic effect where technical reliability builds the trust necessary for users to internalize educational and emotional guidance.

These findings are supported by the principles of user-centered design found in study of Asadollahi et al. (2025a), Ramírez et al. (2025) and Franco et al. (2024) which emphasize that usability and content relevance must coexist to ensure adoption. In the context of PcyCare, the seamless integration of these elements creates a "virtuous cycle" where ease of use encourages frequent access to emotional support features, thereby reinforcing the user's perception of the platform's value. This interrelation suggests that future developments should continue to prioritize this tripartite balance to maintain high levels of acceptability. Neglecting any one of these dimensions (content, technology, or emotion) would likely compromise the overall effectiveness of the intervention.

3.6. Digital Maternal Health Transformation Beyond Conventional Classes

Based on the perceptions of participants, PcyCare has demonstrated the potential to transform maternal health education beyond conventional face-to-face classes. Digital platforms enable pregnant women to access vital health information and emotional coping strategies anytime and anywhere, unrestricted by clinic schedules or workforce limitations. This advancement enhances the continuity of care, particularly for women who cannot attend regular antenatal classes due to logistical or financial barriers. PcyCare effectively extends the reach of maternal education from the clinic into the home environment, ensuring that support is available at the moment of need.

A comparison between PcyCare and conventional methods demonstrates that the digital platform provides added value in terms of autonomy and privacy. Users can revisit complex nutritional information or practice relaxation techniques in the privacy of their homes, which is often not possible in crowded clinic settings. These findings are consistent with the global shift towards digital health described by Ferretti et al. (2023), Hod et al. (2023) and Sundewall et al. (2025), which advocates for digital interventions to empower self-care in low-resource settings. Consequently, PcyCare represents a scalable solution that complements traditional care by extending support into the daily lives of pregnant women. This transformation suggests a paradigm shift from midwife-dependent education to patient-empowered literacy.

3.7. Contextual Factors Influencing Acceptability

The findings of this study indicate that users' acceptance of PcyCare is also influenced by contextual factors such as cultural relevance and digital access. In the context of Indonesia and other LMICs, the availability of culturally adapted content such as local dietary advice and culturally resonant emotional guidance was highlighted by experts as a strength of the platform. This cultural sensitivity is vital for overcoming the 'one-size-fits-all' limitation of many global maternal applications, ensuring that the platform feels local and trustworthy.

Furthermore, the design of the platform took into account the varying levels of digital literacy among the target population. By using simple interfaces and multimedia (video/audio) rather than dense text, the platform catered to users who might find traditional reading materials challenging. This approach aligns with findings by Ozair & Singh (2021), McCool et al. (2022) and Choudhury (2022), who emphasized that mHealth interventions in developing regions must be simplified and visual-heavy to ensure inclusivity. Therefore, the high acceptability scores observed in this study reflect the success of a

context-sensitive design approach that respects the specific needs and capabilities of the local maternal population.

4. CONCLUSION

The findings of this study confirm that content quality, technical feasibility, and user experience are the primary factors shaping the feasibility and acceptability of the PcyCare platform among pregnant women and experts. Empirical evidence demonstrates that, as perceived by stakeholders, high technical feasibility provides the necessary and robust infrastructure for effective self-directed learning, while content quality ensures medical trust and educational relevance. Moreover, the integration of emotional support features within the user experience domain reveals a critical value-added component, addressing the persistent psychological needs that remain largely unmet by conventional antenatal care systems. This study successfully validates that a tripartite balance between technology, clinical accuracy, and emotional regulation is essential for the sustained adoption of mHealth tools.

These findings underscore the role of digital maternal health platforms as strategic instruments in bridging the systemic gap between limited clinical resources and the growing demand for holistic pregnancy support in developing settings. PcyCare has demonstrated clear advantages over conventional educational methods in terms of accessibility, autonomy, and the provision of real-time emotional reassurance. Consequently, the platform represents a viable paradigm shift from traditional midwife-led instruction toward a more patient-empowered, technology-driven literacy model.

This study is limited to an early-stage feasibility evaluation involving 123 participants within a one-week trial period, which may not fully capture long-term habituation. Future research should expand beyond perception-based assessments to incorporate multi-center randomized controlled trials (RCTs) and longitudinal designs that measure actual behavioral changes, quantitative anxiety reduction outcomes, and long-term clinical impacts on maternal-fetal health. The contribution of this study lies in pioneering the integration of maternal health literacy and emotional support into a single evidence-based digital intervention model, thereby enriching the theoretical framework of the Technology Acceptance Model (TAM) in an mHealth context. It also provides critical practical implications for developers and policymakers to design inclusive, evidence-based, and emotionally supportive digital health ecosystems aimed at reducing maternal health disparities in low-resource environments.

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REFERENCES

- Adefolarin, A. O., & Gershim, A. (2022). Content validation of educational materials on maternal depression in Nigeria. *BMC Pregnancy and Childbirth*, *22*(1), 322. <https://doi.org/10.1186/s12884-022-04575-5>
- Alim, A., & Imtiaz, M. H. (2023). Wearable Sensors for the Monitoring of Maternal Health—A Systematic Review. *Sensors*, *23*(5), 2411. <https://doi.org/10.3390/s23052411>
- Alsyouf, A., Lutfi, A., Alsubahi, N., Alhazmi, F. N., Al-Mugheed, K., Anshasi, R. J., Alharbi, N. I., & Albugami, M. (2023). The Use of a Technology Acceptance Model (TAM) to Predict Patients' Usage of a Personal Health Record System: The Role of Security, Privacy, and Usability. *International Journal of Environmental Research and Public Health*, *20*(2), 1347. <https://doi.org/10.3390/ijerph20021347>
- Ameyaw, E. K., Amoah, P. A., & Ezezika, O. (2024). Effectiveness of mHealth Apps for Maternal Health Care Delivery: Systematic Review of Systematic Reviews. *Journal of Medical Internet Research*, *26*, e49510. <https://doi.org/10.2196/49510>
- Asadollahi, F., Zagami, S. E., Eslami, S., & Roudsari, R. L. (2025a). Barriers and facilitators for mHealth utilization in pregnancy care: a qualitative analysis of pregnant women and stakeholder's perspectives. *BMC Pregnancy and Childbirth*, *25*(1), 141. <https://doi.org/10.1186/s12884-025-07244-5>
- Asadollahi, F., Zagami, S. E., Eslami, S., & Roudsari, R. L. (2025b). Evaluating the Quality, Content Accuracy, and User Suitability of mHealth Prenatal Care Apps for Expectant Mothers: Critical Assessment Study. *Asian/Pacific Island Nursing Journal*, *9*, e66852. <https://doi.org/10.2196/66852>
- Aslantekin Özçoban, F., Ergün, S., & Erkal Aksoy, Y. (2022). Effects of health literacy education on adaptation to pregnancy, self-efficacy, fear of childbirth and health literacy in Turkish pregnant

- women: A randomized, controlled trial. *Health & Social Care in the Community*, 30(2). <https://doi.org/10.1111/hsc.13690>
- Atukunda, E. C., Siedner, M. J., Obua, C., Musiimenta, A., Ware, N. C., Mugisha, S., Najjuma, J. N., Mugenyi, G. R., & Matthews, L. T. (2023). Evaluating the Feasibility, Acceptability, and Preliminary Efficacy of SupportMoms-Uganda, an mHealth-Based Patient-Centered Social Support Intervention to Improve the Use of Maternity Services Among Pregnant Women in Rural Southwestern Uganda: Randomized. *JMIR Formative Research*, 7, e36619. <https://doi.org/10.2196/36619>
- Balsam, D., Bounds, D. T., Rahmani, A. M., & Nyamathi, A. (2023). Evaluating the Impact of an App-Delivered Mindfulness Meditation Program to Reduce Stress and Anxiety During Pregnancy: Pilot Longitudinal Study. *JMIR Pediatrics and Parenting*, 6, e53933. <https://doi.org/10.2196/53933>
- Barber, C. C., & Masters-Awatere, B. (2022). Positively Pregnant: Development and piloting of a mobile app for social and emotional well-being in pregnancy. *Applied Psychology: Health and Well-Being*, 14(4), 1255–1272. <https://doi.org/10.1111/aphw.12333>
- Bilal, A.-M., Pagoni, K., Iliadis, S. I., Papadopoulos, F. C., Skalkidou, A., & Öster, C. (2024). Exploring User Experiences of the Mom2B mHealth Research App During the Perinatal Period: Qualitative Study. *JMIR Formative Research*, 8, e53508. <https://doi.org/10.2196/53508>
- Birati, Y., Yefet, E., Perlitz, Y., Shehadeh, N., & Spitzer, S. (2022). Cultural and Digital Health Literacy Appropriateness of App- and Web-Based Systems Designed for Pregnant Women With Gestational Diabetes Mellitus: Scoping Review. *Journal of Medical Internet Research*, 24(10), e37844. <https://doi.org/10.2196/37844>
- Boggiss, A. L., Babbott, K., Milford, A., Ellett, S., Consedine, N., Reid, S., Cao, N., Cavadino, A., Hopkins, S., Jefferies, C., de Bock, M., & Serlachius, A. (2025). The usability and feasibility of a self-compassion chatbot (COMPASS) for youth living with type 1 diabetes. *Diabetic Medicine*, 42(11). <https://doi.org/10.1111/dme.70115>
- Carrandi, A., Hayman, M., & Harrison, C. L. (2023). Safety considerations for assessing the quality of apps used during pregnancy: A scoping review. *DIGITAL HEALTH*, 9. <https://doi.org/10.1177/20552076231198683>
- Choudhury, A., & Choudhury, M. (2022). Mobile for Mothers mHealth Intervention to Augment Maternal Health Awareness and Behavior of Pregnant Women in Tribal Societies: Randomized Quasi-Controlled Study. *JMIR MHealth and UHealth*, 10(9), e38368. <https://doi.org/10.2196/38368>
- Dahl, B., Heinonen, K., & Bondas, T. E. (2020). From Midwife-Dominated to Midwifery-Led Antenatal Care: A Meta-Ethnography. *International Journal of Environmental Research and Public Health*, 17(23), 8946. <https://doi.org/10.3390/ijerph17238946>
- Davis, J. A., Ohan, J. L., Gregory, S., Kottampally, K., Silva, D., Prescott, S. L., & Finlay-Jones, A. L. (2023). Perinatal Women's Perspectives of, and Engagement in, Digital Emotional Well-Being Training: Mixed Methods Study. *Journal of Medical Internet Research*, 25, e46852. <https://doi.org/10.2196/46852>
- De, P., & Pradhan, M. R. (2023). Effectiveness of mobile technology and utilization of maternal and neonatal healthcare in low and middle-income countries (LMICs): a systematic review. *BMC Women's Health*, 23(1), 664. <https://doi.org/10.1186/s12905-023-02825-y>
- De Quattro, L. (2025). Antenatal preparation as care: birth stories and collective learning at work. *Frontiers in Global Women's Health*, 6. <https://doi.org/10.3389/fgwh.2025.1592538>
- Evans, K., Donelan, J., Rennick-Egglestone, S., Cox, S., & Kuipers, Y. (2022). Review of Mobile Apps for Women With Anxiety in Pregnancy: Maternity Care Professionals' Guide to Locating and Assessing Anxiety Apps. *Journal of Medical Internet Research*, 24(3), e31831. <https://doi.org/10.2196/31831>
- Ferretti, A., Vayena, E., & Blasimme, A. (2023). Unlock digital health promotion in LMICs to benefit the youth. *PLOS Digital Health*, 2(8), e0000315. <https://doi.org/10.1371/journal.pdig.0000315>
- Franco, P., Olhaberry, M., Muzard, A., Harismendy, A., & Kelders, S. (2024). Developing a Guided Web App for Postpartum Depression Symptoms: User-Centered Design Approach. *JMIR Formative Research*, 8, e56319. <https://doi.org/10.2196/56319>
- Ghimire, S., Martinez, S., Hartvigsen, G., & Gerdes, M. (2023). Virtual prenatal care: A systematic review of pregnant women's and healthcare professionals' experiences, needs, and preferences for quality care. *International Journal of Medical Informatics*, 170, 104964. <https://doi.org/10.1016/j.ijmedinf.2022.104964>
- Gourounti, K., Sarantaki, A., Dafnou, M.-E., Hadjigeorgiou, E., Lykeridou, A., & Middleton, N. (2022). A qualitative study of assessing learning needs and digital health literacy in pregnancy: Baby Buddy Forward Greek findings. *European Journal of Midwifery*, 6(September), 1–9. <https://doi.org/10.18332/ejm/150770>
- Green, J., Neher, T., Puzia, M., Laird, B., & Huberty, J. (2022). Pregnant women's use of a consumer-based meditation mobile app: A descriptive study. *DIGITAL HEALTH*, 8, 205520762210890.

- <https://doi.org/10.1177/20552076221089098>
- Hansen, S., Jensen, T. S., Schmidt, A. M., Strøm, J., Vistisen, P., & Høybye, M. T. (2024). The Effectiveness of Video Animations as a Tool to Improve Health Information Recall for Patients: Systematic Review. *Journal of Medical Internet Research*, 26, e58306. <https://doi.org/10.2196/58306>
- Henriksson, P., Migueles, J. H., Söderström, E., Sandborg, J., Maddison, R., & Löf, M. (2022). User engagement in relation to effectiveness of a digital lifestyle intervention (the HealthyMoms app) in pregnancy. *Scientific Reports*, 12(1), 13793. <https://doi.org/10.1038/s41598-022-17554-9>
- Hod, M., Divakar, H., Kihara, A. B., & Geary, M. (2023). The femtech revolution—A new approach to pregnancy management: Digital transformation of maternity care—The hybrid e-health perinatal clinic addressing the unmet needs of low- and middle-income countries. *International Journal of Gynecology & Obstetrics*, 163(1), 4–10. <https://doi.org/10.1002/ijgo.15032>
- Kante, M., & Målvqvist, M. (2025). Effectiveness of SMS-based interventions in enhancing antenatal care in developing countries: a systematic review. *BMJ Open*, 15(2), e089671. <https://doi.org/10.1136/bmjopen-2024-089671>
- Kemp, E., Sillence, E., & Thomas, L. (2024). Information work and digital support during the perinatal period: Perspectives of mothers and healthcare professionals. *PLOS Digital Health*, 3(8), e0000387. <https://doi.org/10.1371/journal.pdig.0000387>
- Kim, M., Park, J. Y., Park, S., Chung, K., Cho, H. Y., Do, G., & Jhung, K. (2025). Effectiveness of a Mindfulness-Based Mobile Intervention for Improving Perinatal Mental Health and Reducing Depression During Pregnancy: Randomized Controlled Trial. *Journal of Medical Internet Research*, 27, e75630–e75630. <https://doi.org/10.2196/75630>
- Knop, M. R., Nagashima-Hayashi, M., Lin, R., Saing, C. H., Ung, M., Oy, S., Yam, E. L. Y., Zahari, M., & Yi, S. (2024). Impact of mHealth interventions on maternal, newborn, and child health from conception to 24 months postpartum in low- and middle-income countries: a systematic review. *BMC Medicine*, 22(1), 196. <https://doi.org/10.1186/s12916-024-03417-9>
- Li, B., Jin, N., Wang, Y., Hou, X., Meng, J., & Zhang, Y. (2025). Perinatal Women’s Perception of Maternal Health Information Quality on Digital Media: Scoping Review. *Journal of Medical Internet Research*, 27, e67620. <https://doi.org/10.2196/67620>
- Li, S., Chen, H.-J., Zhou, J., Zhouchen, Y.-B., Wang, R., Guo, J., Redding, S. R., & Ouyang, Y.-Q. (2025). Effectiveness of a Web-Based Medication Education Course on Pregnant Women’s Medication Information Literacy and Decision Self-Efficacy: Randomized Controlled Trial. *Journal of Medical Internet Research*, 27, e54148. <https://doi.org/10.2196/54148>
- Liao, R., Li, Y., Yang, H., & Luo, Y. (2024). Influence of mHealth-Based Lifestyle Interventions on Symptoms of Anxiety and Depression of Women With Gestational Diabetes: A Meta-Analysis. *Clinical Nursing Research*, 33(6), 448–459. <https://doi.org/10.1177/10547738241252885>
- Lim, P. C., Lim, Y. L., Rajah, R., & Zainal, H. (2025). Usability questionnaire for standalone or interactive mobile health applications: a systematic review. *BMC Digital Health*, 3(1), 11. <https://doi.org/10.1186/s44247-025-00150-y>
- Liu, J., Yang, F., Li, S., Lv, Y., & Hu, X. (2024). Testing and evaluation for intelligent navigation of ships: Current status, possible solutions, and challenges. *Ocean Engineering*, 295, 116969. <https://doi.org/10.1016/j.oceaneng.2024.116969>
- Maharjan, S., Dhakal, L., George, L., Shrestha, B., Coombe, H., Bhatta, S., & Kristensen, S. (2022). Socio-culturally adapted educational videos increase maternal and newborn health knowledge in pregnant women and female community health volunteers in Nepal’s Khotang district. *Women’s Health*, 18. <https://doi.org/10.1177/17455057221104297>
- Mazaheri Habibi, M. R., Moghbeli, F., Langarizadeh, M., & Fatemi Aghda, S. A. (2024). Mobile health apps for pregnant women usability and quality rating scales: a systematic review. *BMC Pregnancy and Childbirth*, 24(1), 34. <https://doi.org/10.1186/s12884-023-06206-z>
- McCool, J., Dobson, R., Whittaker, R., & Paton, C. (2022). Mobile Health (mHealth) in Low- and Middle-Income Countries. *Annual Review of Public Health*, 43(1), 525–539. <https://doi.org/10.1146/annurev-publhealth-052620-093850>
- Mefrouche, M. L., Siegmann, E.-M., Böhme, S., Berking, M., & Kornhuber, J. (2023). The Effect of Digital Mindfulness Interventions on Depressive, Anxiety, and Stress Symptoms in Pregnant Women: A Systematic Review and Meta-Analysis. *European Journal of Investigation in Health, Psychology and Education*, 13(9), 1694–1706. <https://doi.org/10.3390/ejihpe13090122>
- Mehra, J., Madaan, S., Balu, N., Mohit, Selvakumar, P., & Manjunath, T. C. (2025). The Ubiquitous Internet and Smart Computation Available 24/7 for Anyone and Anywhere. In *Educational AI Humanoid Computing Devices for Cyber Nomads* (pp. 247–270). <https://doi.org/10.4018/979-8-3693-8985-0.ch010>
- Moe-Byrne, T., Evans, E., Benhebil, N., & Knapp, P. (2022). The effectiveness of video animations as information tools for patients and the general public: A systematic review. *Frontiers in Digital Health*, 4. <https://doi.org/10.3389/fdgth.2022.1010779>

- Mohamed, H., Ismail, A., Sutan, R., Rahman, R. A., & Juval, K. (2025). A scoping review of digital technologies in antenatal care: recent progress and applications of digital technologies. *BMC Pregnancy and Childbirth*, 25(1), 153. <https://doi.org/10.1186/s12884-025-07209-8>
- Muhamad Rusdi, N. D. S., Abdullah, N. N., Daud, S., & Ahmad Saman, M. S. (2025). Protocol for pre-pregnancy care mobile health app: Development, validation and usability testing with a human-centered design approach. *Electronic Journal of General Medicine*, 22(5), em674. <https://doi.org/10.29333/ejgm/16620>
- Mwanza, J., Telukdaric, A., & Igusa, T. (2023). Impact of industry 4.0 on healthcare systems of low- and middle- income countries: a systematic review. *Health and Technology*, 13(1), 35–52. <https://doi.org/10.1007/s12553-022-00714-2>
- Oelhafen, S. (2024). Digital health in perinatal care: Exploring usage, attitudes, and needs among Swiss women in urban and rural settings. *DIGITAL HEALTH*, 10. <https://doi.org/10.1177/20552076241277671>
- Ortega-García, J. A., Sánchez-Sauco, M. F., Zafra-Rodríguez, J. A., Cabrera-Rivera, L. T., Díaz-Martínez, F., Llegus-Santiago, E. M., Delgado-Marín, J. L., Orenes-Piñero, E., Kloosterman, N., Bach, A., Ojeda-Sánchez, C., & Ramis, R. (2023). Subjective well-being, happiness, and environmental health factors related to women planning a pregnancy or pregnant, using mobile health intervention. *DIGITAL HEALTH*, 9. <https://doi.org/10.1177/20552076231177146>
- Oruc, A., Gkioulos, V., & Katsikas, S. (2022). Towards a Cyber-Physical Range for the Integrated Navigation System (INS). *Journal of Marine Science and Engineering*, 10(1), 107. <https://doi.org/10.3390/jmse10010107>
- Ozair, A., & Singh, K. K. (2021). Delivering High-Quality, Equitable Care in India: An Ethically-Resilient Framework for Healthcare Innovation After COVID-19. *Frontiers in Public Health*, 9. <https://doi.org/10.3389/fpubh.2021.640598>
- Polizzi, G. (2025). Digital literacy and strategic (dis)engagement: examining how functional and critical digital literacy shapes participation. *Information, Communication & Society*, 28(14), 2483–2502. <https://doi.org/10.1080/1369118X.2025.2452282>
- Progga, F. T., & Rubya, S. (2025). Women’s Perspectives and Challenges in Adopting Perinatal Mental Health Technologies. *Proceedings of the ACM on Human-Computer Interaction*, 9(1), 1–30. <https://doi.org/10.1145/3701217>
- Ramírez, A. S., Ayala, G. X., Murillo, M., Glik, D. C., & Guerrero, A. D. (2025). Integrating Theory With a User-Centered Design Approach to Maximize mHealth Acceptability and Usability. *Health Education & Behavior*, 52(3), 329–339. <https://doi.org/10.1177/10901981241311232>
- Sakamoto, J. L., Carandang, R. R., Kharel, M., Shibanuma, A., Yarotskaya, E., Basargina, M., & Jimba, M. (2022). Effects of mHealth on the psychosocial health of pregnant women and mothers: a systematic review. *BMJ Open*, 12(2), e056807. <https://doi.org/10.1136/bmjopen-2021-056807>
- Siegmann, E.-M., Eichler, A., Buchholz, V. N., Gerlach, J., Pontones, C. A., Titzmann, A., Arnaud, N., Consortium, I.-M., Mühle, C., Beckmann, M. W., Fasching, P. A., Kratz, O., Moll, G. H., Kornhuber, J., & Lenz, B. (2023). Effects of an App-Based Mindfulness Intervention during Pregnancy on the Infant’s Prenatal Androgen Exposure: A Randomized Controlled Pilot Trial. *Journal of Clinical Medicine*, 12(19), 6142. <https://doi.org/10.3390/jcm12196142>
- Stricker, K., Radan, A.-P., & Surbek, D. (2025). Continuous remote home monitoring solutions for mother and fetus: A scoping review. *European Journal of Obstetrics & Gynecology and Reproductive Biology*, 305, 170–177. <https://doi.org/10.1016/j.ejogrb.2024.12.018>
- Sundewall, J., Williams, A., Strauss, M., & George, G. (2025). Self-care interventions for sexual and reproductive health: a strategic health systems investment. *BMJ Global Health*, 10(Suppl 6), e019030. <https://doi.org/10.1136/bmjgh-2025-019030>
- Szymkowiak, A., & Jeganathan, K. (2022). Predicting user acceptance of peer-to-peer e-learning: An extension of the technology acceptance model. *British Journal of Educational Technology*, 53(6), 1993–2011. <https://doi.org/10.1111/bjet.13229>
- Tucker, K., Rose, F., Lavalley, L., Roman, C., Goddard, L., & McManus, R. J. (2024). Intervention development and optimisation of a multi-component digital intervention for the monitoring and management of hypertensive pregnancy: the My Pregnancy Care Intervention. *Pilot and Feasibility Studies*, 10(1), 139. <https://doi.org/10.1186/s40814-024-01562-9>
- van der Windt, M., van Zundert, S. K. M., Schoenmakers, S., van Rossem, L., & Steegers-Theunissen, R. P. M. (2023). Prototyping of a Digital Life Course Care Platform for Preconception and Pregnancy Care: Pilot Feasibility and Acceptability Study. *Journal of Medical Internet Research*, 25, e37537. <https://doi.org/10.2196/37537>
- Venkataramanan, R., Subramanian, S. V., Alajlani, M., & Arvanitis, T. N. (2022). Effect of mobile health interventions in increasing utilization of Maternal and Child Health care services in developing countries: A scoping review. *DIGITAL HEALTH*, 8, 20552076221143232. <https://doi.org/10.1177/20552076221143236>

- Wang, Z., Wang, Y., Zeng, Y., Su, J., & Li, Z. (2025). An investigation into the acceptance of intelligent care systems: an extended technology acceptance model (TAM). *Scientific Reports*, *15*(1), 17912. <https://doi.org/10.1038/s41598-025-02746-w>
- Woldemariam, M. T., & Jimma, W. (2023). Adoption of electronic health record systems to enhance the quality of healthcare in low-income countries: a systematic review. *BMJ Health & Care Informatics*, *30*(1), e100704. <https://doi.org/10.1136/bmjhci-2022-100704>
- Zhang, P., Dong, L., Chen, H., Chai, Y., & Liu, J. (2018). The Rise and Need for Mobile Apps for Maternal and Child Health Care in China: Survey Based on App Markets. *JMIR MHealth and UHealth*, *6*(6), e140. <https://doi.org/10.2196/mhealth.9302>
- Zhang, X., Li, Y., Wang, J., Mao, F., Wu, L., Huang, Y., Sun, J., & Cao, F. (2023). Effectiveness of Digital Guided Self-help Mindfulness Training During Pregnancy on Maternal Psychological Distress and Infant Neuropsychological Development: Randomized Controlled Trial. *Journal of Medical Internet Research*, *25*, e41298. <https://doi.org/10.2196/41298>
- Zin, K. S. L. T., Kim, S., Kim, H.-S., & Feyissa, I. F. (2023). A Study on Technology Acceptance of Digital Healthcare among Older Korean Adults Using Extended Tam (Extended Technology Acceptance Model). *Administrative Sciences*, *13*(2), 42. <https://doi.org/10.3390/admsci13020042>