



Digital midwifery education development: a needs analysis approach toward health technopreneurship

Kunawati Tungga Dewi^{1*}, Novi Paramitasari MS¹, Rochmanita Sandya Afindaningrum¹,
Laksmitha Janasti²

¹Bachelor of Midwifery Program, STIKES Bhakti Husada Mulia Madiun, Madiun, Indonesia

²Midwife Profesion Program, STIKES Bhakti Husada Mulia Madiun, Madiun, Indonesia

*Corresponding Author: kunawatitunggade@gmail.com

ABSTRACT

Article history:

Submitted, 2026/04/16

Revised, 2026/04/25

Accepted, 2026/08/26

Published, 2026/10/19

Keywords:

Digital midwifery education;
technopreneurship; digital
literacy; maternal and child
health; mobile health application.

Cite This Article:

Dewi KT, Paramitasari NMS,
Afindaningrum RS, Janasti L.
Digital midwifery education
development: a needs analysis
approach toward health
technopreneurship. J Ilm
Kebidanan (The J Midwifery).
2026;14(2):143-150. DOI:
[10.33992/jik.v14i2.5106](https://doi.org/10.33992/jik.v14i2.5106)

The rapid advancement of digital technology opens new opportunities in health education, particularly in midwifery. Conventional education has limited reach and interactivity, necessitating digital alternatives that align with community needs. This study aimed to analyze community needs for digital midwifery education products, assess usage interest, and identify their potential as a form of health technopreneurship. A descriptive-analytic study with a cross-sectional approach was conducted among 120 respondents, selected using purposive sampling, with the questionnaire distributed through social media platforms during February–March 2026 using an online Google Form questionnaire. Descriptive and bivariate analyses were performed, including Chi-square tests and Pearson correlation. A statistically significant association was identified between digital literacy and interest in digital products ($p < 0.05$; $r = 0.62$). Preferred content formats included interactive videos (78%), infographics (70%), and mobile applications (65%). The high level of community need and interest in digital midwifery education confirms a substantial opportunity to develop such products as economically viable health technopreneurship that enhances maternal and child health literacy. This study confirms that digital competency is a key determinant of interest in adopting digital midwifery education products among adolescent girls and women of childbearing age in Indonesia.

INTRODUCTION

The global digital transformation in the healthcare sector has expanded massively over the past decade. More than 5.3 billion people worldwide now have internet access, and smartphone penetration continues to rise, particularly in developing countries, including Indonesia. Notably, despite this high and growing level of internet access, national health-promotion evaluations continue to report heavy reliance on printed leaflets and brochures for maternal-health counseling. This gap between digital access and digital utilisation for health education is a key indicator of the timeliness of the present study¹. Data from Indonesia's Central Bureau of Statistics (BPS) in 2023 indicate that 69.21% of the population aged five years and older actively use the internet, predominantly through mobile devices². This landscape creates a strategic opportunity for digital health service transformation, particularly in



midwifery, given that maternal and child health education is a cornerstone of promotive and preventive care within the national health system³.

Conventional midwifery education has long faced significant limitations. Face-to-face counseling methods, leaflets, and brochures, while still commonly employed, are demonstrably insufficient in reaching broad populations due to constraints of time, location, and healthcare human resources⁴. National data shows a significant increase in internet access in Indonesia, with penetration reaching 81.72% by 2026, while 95.8% of Indonesian internet users reportedly searched for drug and disease information online. This situation underscores the importance of developing digital-based health education media⁵. Notoatmodjo underscores that the effectiveness of health knowledge transfer is strongly influenced by the characteristics of the medium used, noting that one-directional and static media tend to produce poor information retention⁶. These challenges are further compounded by Indonesia's geographic complexity as an archipelagic nation, which has produced persistent disparities in health information access between urban and remote areas. As a result, awareness among pregnant women regarding warning signs of pregnancy, postpartum care, and birth preparedness remains uneven across regions⁷.

Empirical evidence increasingly indicates that digital educational media hold considerable potential to address these shortcomings. The World Health Organization (WHO), within its Digital Health Intervention (DHI) framework, classifies the use of mobile technology for patient education as a priority strategy in strengthening global health systems¹. A study by Dieteren *et al.* demonstrated that smartphone application-based interventions significantly improved maternal knowledge of maternal health compared to conventional educational approaches⁸. Consistent with this, research by Mirna *et al.* in Indonesia found that digital pocket book-based nutritional education effectively increased knowledge among pregnant women in the digital era, offering flexible, interactive, and repeatedly accessible learning content that holds strong potential for integration into national health education programs aimed at reaching pregnant women more broadly⁹.

Adolescent girls and women of childbearing age represent the most relevant priority segments for digital midwifery education. Data from the Indonesian Demographic and Health Survey (SDKI) indicate that the adolescent birth rate among girls aged 15–19 years remains at 36 per 1,000 live births, reflecting persistently low reproductive health literacy in this age¹⁰. Kristy *et al.* found that generations raised alongside technology, often termed 'digital natives', tend to respond more effectively to digital, interactive, and visual learning compared to conventional methods¹¹. These characteristics position digital educational media as a particularly relevant and strategic approach for improving maternal and child health literacy.

The emerging health technopreneurship ecosystem in Indonesia provides a conducive context for the sustainable development of digital midwifery education products. The Ministry of Health of the Republic of Indonesia, within its Health Transformation Framework toward a Healthy and Advanced Indonesian Society, positions digital innovation as a central pillar of national health service transformation¹². Technopreneurship, in this context, refers to technology-based entrepreneurship that integrates digital product innovation with sustainable business models in the health sector¹³. Girmay *et al.* highlight the opportunities for digital health startups in Indonesia to address gaps in primary healthcare services, including maternal and child education¹⁴.

Although prior studies have separately documented the effectiveness of digital interventions for general maternal health knowledge (e.g., smartphone applications and digital pocket books) and the technology-adoption tendencies of digital-native populations, none have specifically quantified community-level needs, format preferences, and adoption interest for digital midwifery education among adolescent girls and women of childbearing age in Indonesia, nor examined this evidence through a health-technopreneurship lens. This represents the specific gap the present study addresses. Based on the identified research gaps, this study aims to: (1) analyze community needs for digital midwifery education products; (2) assess the level of interest in and readiness to adopt such products; and (3) identify their potential for development as a form of sustainable health technopreneurship. The findings are expected to provide a robust scientific foundation for developing effective, user-centered, economically viable digital midwifery education products that meaningfully contribute to improving maternal and child health outcomes in Indonesia.

METHODS

This study employed a descriptive-analytic design with a cross-sectional approach. The study was conducted online, with the questionnaire distributed through social media platforms, from February to March 2026. The study population comprised adolescent girls and women of childbearing age with internet access and active use of smartphones or computers. Participants were recruited using purposive sampling based on the following inclusion criteria: (1) aged 15–35 years; (2) active internet access; and (3) willingness to complete the online questionnaire in full. The minimum required sample size was calculated using the Lemeshow formula for cross-sectional studies ($n = Z^2P(1-P)/d^2$), applying $Z = 1.96$ (95% confidence level), an estimated proportion of $P = 0.5$ (maximum variance, as no prior local estimate was available), and a margin of error $d = 0.09$, yielding a minimum requirement of approximately 119 respondents. Respondents who did not provide informed consent were excluded, and the final sample size was set at 120 respondents. Respondents were recruited consecutively using a snowball-assisted online strategy: the questionnaire link was first distributed by the research team through midwifery-related WhatsApp and Telegram community groups and social media pages, and members of these groups were invited to further share the link within their own networks until the target sample size was reached. The research instrument consisted of an online questionnaire developed using Google Forms, systematically covering four domains: (1) respondent characteristics (age, education level, and digital device usage); (2) digital literacy; (3) need for digital midwifery education; and (4) interest in digital educational products. The instrument was self-developed by the research team based on a review of relevant literature and comprised 28 items in total (6 items on respondent characteristics, 8 items on digital literacy, 6 items on educational need and format preference, and 8 items on interest/adoption), and was not adapted from a previously published, validated scale. All items used a five-point Likert scale (1 = strongly disagree; 5 = strongly agree). The questionnaire underwent validity testing (Pearson Product Moment, $r > 0.3$) and reliability testing (Cronbach's Alpha > 0.7) through a pilot test with 30 respondents prior to broader distribution via social media and community groups on WhatsApp and Telegram¹⁵.

Data were analyzed descriptively to characterize the frequency distribution and percentage of each variable. Bivariate analysis was conducted to examine the relationship between digital literacy and interest in digital educational products using Chi-square tests for categorical data and Pearson correlation for continuous data, with a significance threshold of $p < 0.05$. Digital literacy score and total interest score were treated as continuous variables for the Pearson correlation, while respondent characteristics, format preference, and each individual literacy/interest indicator were treated as categorical variables for the Chi-square analysis and descriptive frequency tabulation. All analyses were performed using SPSS version 25.0. Regarding ethical considerations, all respondents received a comprehensive online information sheet detailing the study's purpose, benefits, and data confidentiality provisions prior to completing the questionnaire. Informed consent was obtained electronically through a designated consent option, and data were collected anonymously and used exclusively for scientific purposes. This study has been approved by the Ethics Committee of STIKES Bhakti Husada Mulia Madiun with approval number 004/E-KEPK/STIKES/BHM/II/2026.

RESULT AND DISCUSSION

Respondent Characteristics

Table 1. Respondent characteristics

Variable	Frequency (n)	Percentage (%)
Age Group		
Adolescent girls (15–19 years)	50	41.7%
Women of childbearing age (20–35 years)	70	58.3%
Educational Attainment		
Junior secondary/equivalent	24	20.0%
Senior secondary (SMA/SMK)	54	45.0%
Diploma/Undergraduate	42	35.0%
Daily Smartphone Use		
Yes	114	95.0%
No	6	5.0%
Total	120	100.0%

A total of 120 respondents participated in this study. The adolescent group (15–19 years) comprised 50 individuals (41.7%), while the women of childbearing age group (20–35 years) comprised 70 individuals (58.3%). The educational distribution showed that the majority held a senior secondary education qualification (SMA/SMK; 45%), followed by diploma or undergraduate degree (35%), and junior secondary or equivalent (20%). Nearly all respondents (95%) reported daily active use of smartphones and adequate internet access, thereby meeting the study's inclusion criteria. Full characteristics are presented in Table 1.

This study found that the majority of respondents, both adolescent girls (15–19 years) and women of childbearing age (20–35 years), demonstrated good digital literacy and a high level of interest in digital midwifery education products. The high proportion of respondents with significant digital education needs (90%) and substantial willingness to try educational applications (85%) confirms that this target group is technically and psychologically prepared to adopt digital health innovations. The high prevalence of smartphone ownership and daily use (95%) corroborates this finding, consistent with the Ericsson Mobility Report, which projected that smartphone penetration in Southeast Asia would reach 90% by 2027¹⁶.

Digital Literacy Profile

Table 2. Respondent digital literacy profile

Digital Literacy Indicator	Percentage (%)
Ability to search health information online independently	88.0%
Ability to distinguish valid from invalid health information	82.0%
Comfort using health education applications	85.0%

Analysis of digital literacy revealed that the majority of respondents possessed good digital competencies. Specifically, 88% reported the ability to independently search for health information online, 82% demonstrated the capability to distinguish valid from invalid health information, and 85% expressed comfort using health education applications on smartphones. These high levels of digital literacy indicate the technical readiness of the target population to utilize digital midwifery education products. A detailed profile is provided in Table 2.

In this context, digital literacy enhancement programs should be integrated as a complementary component within the marketing strategy of digital midwifery education products, particularly to reach population segments with lower digital competencies. This association is plausible on conceptual grounds: respondents with stronger digital literacy are better able to evaluate the credibility of online health content and to operate application features independently, which is likely to lower the perceived effort and perceived risk associated with adopting a new digital product, two factors the Technology Acceptance Model identifies as central to adoption intention¹⁷.

Need for Digital Midwifery Education

Table 3. Need assessment for digital midwifery education media

Category	Frequency (n)	Percentage (%)
Overall Need for Digital Media		
Expressed a need for digital media	108	90.0%
Did not express a need / Unsure	12	10.0%
Adolescent Girls		
Find conventional materials difficult to understand	43	86.0%
Do not find conventional materials difficult	7	14.0%
Women of Childbearing Age		
Face limited access & low comprehension of materials	64	92.0%
Do not face significant access & comprehension barriers	6	8.0%

Based on responses to the need-assessment domain of the study questionnaire (table 3), a total of 90% of respondents (n = 108) expressed a need for digital midwifery education media. Among

adolescent girls, 86% reported difficulty understanding conventional educational materials, while among women of childbearing age, 92% acknowledged limited access to and comprehension of available materials.

The effectiveness of digital education in the midwifery context is supported by an expanding body of evidence. Dieteren *et al.* demonstrated that smartphone application-based interventions among pregnant women produced a 13.4% improvement in knowledge scores over 12 weeks ($p < 0.001$), with the most pronounced gains in content related to anemia, breastfeeding, and skin-to-skin contact, as well as significant improvements in dietary diversity intake compared to the conventional control group⁸. WHO further affirms that digital platforms serve as effective instruments for expanding the reach of health information and improving adherence to health guidelines, particularly among populations underserved by formal health services¹. Consequently, user-needs-driven digital midwifery education products hold considerable potential for systematically improving maternal and child health literacy in Indonesia. This is corroborated by a large retrospective real-world study of a mobile prenatal education program in China, which found that structured mobile-based education was associated with a reduced incidence of adverse pregnancy outcomes among enrolled participants¹⁸.

Table 3a. Preferred formats for digital midwifery education

Digital Education Format	Percentage (%)
Interactive video	78.0%
Infographics	70.0%
Mobile application	65.0%
Health podcast	45.0%
Digital text-based module	38.0%

Respondents expressed diverse format preferences: interactive video was the most favored format (78%), followed by infographics (70%) and mobile applications (65%). These findings indicate that content preferences are inherently multifunctional, suggesting that product developers should integrate a range of presentation modalities. The pronounced preference for interactive video over stand-alone mobile applications (78% vs 65%) may reflect that video content requires no installation, storage space, or app-navigation skill, making it accessible even to respondents with comparatively lower digital confidence; infographics (70%) plausibly occupy an intermediate position because they are easy to view and share but, unlike video, do not provide guided narration. Full format preference data are presented in Table 3a.

Interest in Digital Education Products

Table 4. Interest in digital midwifery education products

Interest Indicator	Percentage (%)
Willing to try a midwifery education application	85.0%
Interested in following educational content on social media	80.0%
Would recommend the product to family/peers	75.0%
Willing to subscribe to a digital education service	60.0%

Survey findings demonstrated high levels of interest in digital midwifery education products. Specifically, 85% of respondents were willing to try a midwifery education application, 80% expressed interest in following educational content on social media platforms, and 75% indicated they would recommend such digital products to family members or peers. Bivariate analysis using the Chi-square test revealed a statistically significant association between digital literacy and interest in digital education products ($p < 0.05$; $r = 0.62$), indicating that digital competency positively influences readiness and willingness to adopt digital midwifery education products. Detailed results are presented in Table 4.

Table 5. Relationship between digital literacy and interest in digital midwifery education products

Association	Pearson r	95% CI for r	<i>p</i> -value	Interpretation
Digital literacy × Interest in digital education products	0.62	0.50 – 0.72 ^a	< 0.001 ^b	Moderate–strong positive correlation

The full bivariate statistics (Pearson correlation and 95% confidence interval) are presented in Table 5. The significant positive association between digital literacy and interest in digital education products ($p < 0.05$; $r = 0.62$) represents an important finding with direct implications for product dissemination strategy design. This result is consistent with the recent systematic review conducted by Lee et al. (2025) on the application of the Technology Acceptance Model (TAM) in healthcare, which concluded that user acceptance of health technology is substantially influenced by behavioral and psychological factors, including perceived usefulness, trust, and readiness¹⁷.

From a health technopreneurship perspective, Setiawaty et al. (2025) affirm that health technology innovation and entrepreneurship in Indonesia demonstrate a positive growth trajectory, with widespread adoption of digital health technology supported by an enabling policy ecosystem and increasing digital literacy among users, particularly among the productive age group that constitutes the largest market segment¹⁹. The Ministry of Health of the Republic of Indonesia, within its Health Transformation Framework, has identified the development of a digital health ecosystem as a national priority, thereby providing indirect policy support for entrepreneurs operating in this sector¹². The development of sustainable and innovative business models is fundamental to the successful commercialization of digital health technology, given the sector's diverse stakeholder landscape and stringent regulatory environment. Viable business models may include freemium applications, subscription-based content delivery, and strategic partnerships with healthcare facilities and midwifery education institutions²⁰.

Several limitations should be acknowledged in interpreting the findings of this study. First, the use of purposive sampling and online questionnaire distribution introduced selection bias, as participants were limited to those actively using the internet and social media. Population segments with low digital literacy or without internet access, who may have the greatest educational needs, were not adequately represented. Second, the self-report nature of the data creates a risk of social desirability bias, whereby respondents may have provided more favorable answers than their actual experiences. Third, the cross-sectional design captures a single point in time and cannot reflect changes in needs or adoption behavior over time. Future research employing mixed-methods approaches with more representative population samples is strongly recommended to validate and extend the present findings.

These findings carry several practical implications. For midwifery education institutions, the results support integrating short-format interactive video and infographic content into existing curricula and community outreach programs rather than relying solely on printed leaflets. For health policymakers, the strong association between digital literacy and adoption interest suggests that digital health literacy programs should be positioned as a complementary, not optional, component of any digital midwifery education rollout, particularly for population segments with lower digital competency. For digital health product developers and technopreneurs, the clear format hierarchy identified here (interactive video > infographics > mobile application > podcast > text-based module) offers an evidence-based basis for prioritising content formats in a minimum viable product, while the high overall willingness to try (85%) and comparatively lower willingness to subscribe to a paid service (60%) indicate that a freemium model, rather than a subscription-only model, is more likely to achieve the initial user acquisition needed for a financially sustainable digital midwifery education venture.

CONCLUSION

This study confirms that digital competency is a key determinant of interest in adopting digital midwifery education products among adolescent girls and women of childbearing age in Indonesia, with interactive video, infographics, and mobile applications identified as the most acceptable content formats. The principal implication is that digital midwifery education products are most likely to

succeed when they are designed as multiformat, literacy-tiered offerings, pairing low-barrier video/infographic content for broader reach with app-based features for more digitally confident users, and when supported by parallel digital-literacy-building efforts for lower-competency segments.

From a health technopreneurship perspective, these findings indicate a viable and largely untapped market opportunity: strong community need combined with high adoption willingness supports a freemium, multiformat business model as the most promising commercialisation pathway, provided it is paired with partnerships between developers, midwifery education institutions, and health policymakers to ensure clinical credibility and sustained reach.

Future research should prioritise: (1) usability testing and iterative development of a digital midwifery education prototype informed by the format preferences identified here; (2) randomized controlled trials to establish the effectiveness of such products on maternal and child health literacy outcomes; (3) inclusion of population segments with lower digital literacy and residents of remote areas, who were underrepresented in this online sample; and (4) empirical evaluation of freemium versus subscription-based business models for the sustainable financing of digital midwifery education ventures in the Indonesian context. This need-driven approach is particularly important given that a recent international scoping review found that many existing maternal and infant health applications are developed without adequate grounding in end-users' actual needs and preferences²¹, a shortcoming the present needs-analysis approach is explicitly designed to avoid.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

FUNDING

This research received no specific grant or financial support from any funding agency in the public, commercial, or non-profit sectors.

DECLARATION OF ARTIFICIAL INTELLIGENCE USE

The authors used Gemini (Google, version 1.5 / as a collaborative AI tool) to assist in refining the language, grammar, and flow of the manuscript. The authors thoroughly reviewed and verified all generated content to ensure its accuracy, integrity, and originality.

AUTHOR CONTRIBUTIONS

KTD and NPMS conceptualized and designed the research. RSA and LJ performed the data collection and methodology implementation. KTD and RSA conducted the data analysis and visualization. KTD wrote the original draft of the manuscript. NPMS, RSA, and LJ critically reviewed and edited the manuscript. All authors read and approved the final version for submission and agree to be accountable for all aspects of the work.

REFERENCES

1. World Health Organization. WHO guideline: recommendations on digital interventions for health system strengthening. Geneva: World Health Organization; 2019.
2. Badan Pusat Statistik. Statistik telekomunikasi Indonesia 2023. Vol. 12. Jakarta: Badan Pusat Statistik; 2024.
3. Kementerian Kesehatan Republik Indonesia. Pedoman pelaksanaan promosi kesehatan puskesmas. Jakarta: Kementerian Kesehatan Republik Indonesia; 2020.
4. Tokan PK, Owa K, Robert D, et al. Media promosi kesehatan. Media Pustaka Indonesia; 2024.
5. Asosiasi Penyelenggara Jasa Internet Indonesia. Profil internet Indonesia 2026: survei peran internet pada sektor kesehatan. Jakarta: Asosiasi Penyelenggara Jasa Internet Indonesia; 2026.
6. Notoatmodjo S. Promosi kesehatan: teori dan aplikasi. Jakarta: PT Asdi Mahasatya; 2018.
7. Kementerian Kesehatan Republik Indonesia. Profil kesehatan Indonesia 2023. Jakarta: Kementerian Kesehatan Republik Indonesia; 2024.

8. Dieteren C, Sarkar S, Saharan S, Bonfrer I. Effects of a smartphone application on maternal health knowledge and dietary diversity among pregnant women in India: a randomized single center pilot study. *J Glob Health Rep.* 2022;6. doi:10.29392/001c.39604.
9. Mirna M, Prianti AT, Ohorella F. Penerapan buku saku digital sebagai media edukasi gizi untuk ibu hamil di era digital. *Madu J Kesehat.* 2024;13(2):111-5. doi:10.31314/mjk.13.2.111-115.2024.
10. Badan Kependudukan dan Keluarga Berencana Nasional. *Survei demografi dan kesehatan Indonesia 2017: buku remaja.* Jakarta: Badan Kependudukan dan Keluarga Berencana Nasional; 2018.
11. Kristy GT, Alviani AA, Kusuma ER, et al. Digital native characteristics: a phenomenological study focused on essential material in sociology courses. *J Pedagogi Pembelajaran.* 2024;7(3):438-46. doi:10.23887/jp2.v7i3.79978.
12. Kementerian Kesehatan Republik Indonesia. *Transformasi kesehatan mewujudkan masyarakat Indonesia sehat dan unggul.* Jakarta: Kementerian Kesehatan Republik Indonesia; 2024.
13. Yunus MuhY, Syukur M. Transformasi digital dalam kewirausahaan kesehatan: peluang dan tantangan bagi kesehatan masyarakat. *RIGGS J Artif Intell Digit Bus.* 2025;4(3):7639-48. doi:10.31004/riggs.v4i3.3164.
14. Girmay M. Digital health divide: opportunities for reducing health disparities and promoting equitable care for maternal and child health populations. *Int J Matern Child Health AIDS.* 2024;13:e026. doi:10.25259/ijma_41_2024.
15. Sugiyono. *Metode penelitian kuantitatif, kualitatif, dan R&D.* Bandung: Alfabeta; 2019.
16. Ericsson. *Ericsson mobility report.* Ericsson; 2023.
17. Lee AT, Ramasamy RK, Subbarao A. Understanding psychosocial barriers to healthcare technology adoption: a review of TAM technology acceptance model and unified theory of acceptance and use of technology and UTAUT frameworks. *Healthcare (Basel).* 2025;13(3):250. doi:10.3390/healthcare13030250.
18. Hao J, Yang L, Wang Y, et al. Mobile prenatal education and its impact on reducing adverse pregnancy outcomes: retrospective real-world study. *JMIR Mhealth Uhealth.* 2023;11. doi:10.2196/46910.
19. Setiawaty E, Hartoyo H, Nurmalina R, Yulianti LN. Entrepreneurship and innovation in telemedicine adoption among physicians in Indonesia. *APTISI Trans Technopreneurship.* 2025;7(3):927-41. doi:10.34306/att.v7i3.707.
20. Weimar SN, Martjan RS, Terzidis O. Business venturing in regulated markets-taxonomy and archetypes of digital health business models in the European Union: mixed methods descriptive and exploratory study. *J Med Internet Res.* 2025;27. doi:10.2196/65725.
21. Phillips JC, Alfano AR, Barfield LC, et al. Exploring maternal and infant health app development and effectiveness research: scoping review. *JMIR Pediatr Parent.* 2024;7(1). doi:10.2196/46973.