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Scrolling for safety: Digital health literacy and pregnancy danger sign recognition in primary care

Nadila Nefi Nur Alifah[1], Dedy Purwito[2]

[1,2]Community Nursing Department, Faculty of Health Sciences, Universitas Purwokerto Muhammadiyah, Banyumas, Indonesia

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ABSTRACT

Pregnancy carries the risk of complications such as hemorrhage, hypertension, and infection, key causes of maternal death, making early detection of danger signs essential. Digital media are increasingly used for health information, yet prior research remains largely quantitative and rarely triangulates pregnant women, husbands, and midwives within a single primary care setting, a gap this study addresses. Using a descriptive phenomenological design, in-depth interviews and focus group discussion were conducted wth 27 participants (16 key informants, 5 FGD participants, 2 husbands, 4 midwives) at Community Health Center Sokaraja 1, analyzed using Colaizzi's method. Four themes emerged: (1) passive, alogirthm-driven access to short-form videos, especially TikTok; (2) a conflict-triggered verification pattern, where online information was cross-checked with midwives mainly when it conflicted with prior belief; (3) adequate danger-sign knowledge anchored in the Maternal and Child Health Handbook and face-to-face education rather than digital media; and (4) formal education constrained by scheduling, quota, and referral barriers, pushing women toward informal digital sources. These findings offer novel, multi-informant qualitative evidence that digital health literacy functions as an adaptive complement to formal education, supporting social media-based education strategies and stronger digital integration in primary care services.

Corresponding Author:

Dedy Purwito
Faculty of Health Sciences,
Universitas Purwokerto Muhammadiyah,
Jl. Let. Jend. Suparjo Rustam Sokaraja Banyumas, 53181, Indonesia
Email: dedypurwito@ump.ac.id

1. Introduction

Pregnancy carries the risk of complications such as bleeding, hypertension, and infection that can threaten the safety of both mother and fetus if not detected early (Mayasari & Rochmaedah, 2024). These remain leading causes of maternal mortality mordwide, with hypertensive disorders such as preeclampsia and eclampsia continuing to rise globally (Vera-Ponce et al., 2025). Early recognition of danger signs s therefore critical to reducing maternal and infant morbidity and mortality (Mayasari & Rochmaedah, 2024).

Knowledge of danger signs shapes how pregnant women respond when problems arise: well-informed women seek help more promptly (Rianti et al., 2024), while poor knowledge is linked to delayed care and greater risk of severe complications (Mayasari & Rochmaedah, 2024). Awareness of obstetric danger signs in developing countries remains inconsistent (Yunitasari et al., 2023),

compounded by structural barriers to care in low-resource settings such as Indonesia (Rizkianti et al., 2021).

Health information is increasingly accessed through digital media the internet, health apps, and social media including platforms like TikTok, a prominent but now always reliable source of maternal health information (Kirkpatrick & Lawrie, 2024; Storm et al., 2026). The ability to search for, understand, evaluate, and apply such information, distinct from general health literacy, is termed digital health literacy or eHealth literacy (Putri & Lu, 2024). This distinction matters because navigating online content requires appraisal skills assessing credibility, cross-verifying conflicting claims, resisting misinformation that general literacy measures do not capture, particularly given the volume of unverified pregnancy content online (Al-Dahshan et al., 2022). Stronger eHealth literacy is linked to more informed shared decision making (Kim & Lee, 2025) and healthier pregnancy behavior (Sahin et al., 2021).

Most existing studies, however, examine digital or eHealth literacy quantitatively and cross-sectional, either in general pregnant populations in high-resource settings (Hussain et al., 2023; Vogels-Broeke et al., 2022) or for specific conditions such as gestational diabetes (Xu et al., 2024). Little qualitative research has explored how digital health literacy is actually enacted how pregnant women decide which sources to trust, resolve conflicting information, and connect this danger-sign knowledge within primary care in a low and middle-income country such as Indonesia. Few studies also triangulate pregnant women's accounts with those of husbands and midwives, despite both shapng how information is understood and acted upon (Nambile Cumber et al., 2024). This represents a clear gap: the mechanisms linking digital information behavior to danger-sign knowledge, as experienced by multiple actors within a single primary care settin, remain underexplored.

This study addresses that gap trhough a phenomenological design exploring digital media access behavior, digital health literacy, and danger-sign knowledge among Sokaraja 1, Banyumas Regency, Indonesia, triangulating accounts from pregnant women, husbands, and midwives. Its novelty lies in (1) examining digital health literacy spesifically, rather than general health literacy, as a distint explanatory factor for danger-sign knowledge in a primary care; (2) using an in-depth, multi informant approach that capture lived experience rather than cross-sectional surveys data; and (3) situating the analysis in a site with documented local gaps in community health outcomes (Nandani & Purwito, 2013), offering context-spesific insight rather than broad generalization, while informing understanding of the digital divide (Girmay, 2024).

This is particularly important in the Indonesian, where maternal mortality remains a public health priority, digital access is expanding faster than digital literacy, and primary health centers serve as the frontline of maternal care (Kim & Lee, 2025; Purwito et al., 2025). Findings are expected to inform maternal health policy and practice guiding how providers integrate digital literacy support into antenatal counseling and how pregnant women actually seek and evaluate information (AlDughaishi et al., 2023).

2. Methods

This study used a descriptive phenomenological approach, drawing on Husserl's tradition of bracketing (*epoché*) researcher assumptions to describe the phenomenon as directly experienced by participants rather than through a pre-existing theoretical lens (Tavakol & Sandars, 2025). This design was chosen over grounded theory or case study because the aim was to describe the lived experience and meaning pregnant women attach to digital health information and danger-sign knowledge, not to generate a new theoretical model or to examine a single bounded case. Phenomenology suits capturing the shared essence of an experience across a relatively homogeneous group, consistent with this study's focus on pregnant women within a single primary care cathment area (Putri & Lu, 2024).

Participants were selected using purposive sampling. Inclusion criteria: (a) pregnant women undergoing antenatal care at Puskesmas Sokaraja 1; (b) willing to participate; (c) able to communicate adequately. Exclusion criteria: (a) unwell at the time of data collection; (b) unwilling to complete the full research process. Midwives (community health center and village midwives) and acoompanying

husbands were included as supporting informants to allow comparison with key informants' accounts, strengthening data triangulation.

A total of 27 participants were involved: 16 pregnant women as key informant (in-depth interview), 5 pregnant women in prenatal class who participated in a focus group discussion (FGD), 2 accompanying husbands, 3 community health center midwives, and 1 village midwife as supportig informants. The number of key informants was determined by data saturation interview continued until no new themes emerged and the coding matrix generated no additional codes. Most key informants were recruited from Wiradadi Village, which has the second-highest number of registered pregnant women (31) in the Sokaraja 1 catchment area.

In-depth interview lasted approximately 10 minutes on average, conducted either at the health center or participants' homes dependng on preference. The FGD lasted approximately 15 minutes, held during a prenatal class (*kelas ibu hamil*) in Sokaraja Tengah Village. All sessions were audio-recorded with participants' consent and transcribe verbatim.

Data analysis followed Colaizzi's phenomenological method: (1) familiarization through repeated reading; (2) extraction of significant statements on digital health literacy and danger-sign knowledge; (3) formulation of meaning; (4) organization into theme clusters; (5) integration into an exhaustive description; (6) identification of the phenomenon's fundamental structure; and (7) validation with participants. Coding was performed by the first author using ATLAS.ti version 26, with transcripts organized into four document groups corresponding to the study's four main themes, under supervision of the second author.

Trustworthiness followed Lincoln and Guba's (1985) criteria. Credibility was addressed through triangulation across pregnant women, husband, and midwives, and member checking conducted both directly with participants and internally with supervising lecturer. Dependability and confirmability were supported through peer debriefing and an audit trail documented in ATLAS.ti. Transferability was supported through thick description of the study context and participant characteristics.

Reflexivity was maintained through a reflective journal completed by first author after each interview, and regular discussion with the supervising lecturer to examine emerging interpretations against the raw data. This process identified leading questions in several early interview, where response options were inadvertently suggested when asking about danger signs; this is acknowledge as a limitation of study.

All data were anonymized using participant initials, stored in encrypted digital form, and accessible only to the first author to maintain confidentiality. This study has been approved by the Health Research Ethics Committee (KEPK) of Universitas Muhammadiyah Purwokerto, approval number KEPK/UMP/156/IV/2026.

3. Results and Discussion

This study was conducted in the service area of the Sokaraja 1 Community Health Center, covering Wiradadi Village, Karangnanas Village, and Sokaraja Tengah Subdistrict. The characteristics of the participants involved in this study, including age and gestational age, are presented in Tables 1 and 2 below.

Table 1.
Characteristics of Key Respondents

No.	Initials	Age (years)	Gestational age (weeks)	Gender	Participant
1	Mrs. I	26	32	Female	Key_IDI
2	Mrs. B	24	21	Female	
3	Mrs. G	28	25	Female	
4	Mrs. J	31	34	Female	
5	Mrs. A	23	38	Female	
6	Mrs. A	26	26	Female	
7	Mrs. S	34	23	Female	
8	Mrs. W	29	18	Female	

No.	Initials	Age (years)	Gestational age (weeks)	Gender	Participant
9	Mrs. H	37	16	Female	
10	Mrs. S	27	34	Female	
11	Mrs. Y	21	31	Female	
12	Mrs. S	26	23	Female	Key_FGD
13	Mrs. L	25	25	Female	
14	Mrs. S	30	21	Female	
15	Mrs. A	22	35	Female	
16	Mrs. S	21	27	Female	

Table 2.
Characteristics of General Participants

No.	Initials	Age (years)	Gender	Participant
1	Mr. A	26	Male	Husband
2	Mr. M	36	Male	Husband
3	Mrs. M	31	Female	Midwife
4	Mrs. R	28	Female	Midwife
5	Mrs. R	29	Female	Midwife
6	Mrs. U	40	Female	Midwife

Notes:
IDI: In-depth interview
FGD: Focus Group Discussion
This study involved 27 participants: 16 pregnant women as key informants (in-depth interviews), 5 pregnant women in a prenatal class who participated in a focus group discussion (FGD), 2 accompanying husbands, 3 community health center midwives, and 1 village midwife as supporting informants, interviewed to enrich and triangulate findings from the pregnant women's perspective.

Result

Theme 1: Health Information Access Behavior on Digital Media. Thematic analysis of interviews with pregnant women (R1–R16), 2 husbands, 1 village midwife, 3 community health center midwives, and an FGD identified 7 sub-themes: Sub-theme 1: TikTok's Dominance Across Multiple Platforms. TikTok is the main source, though other platforms are still used. "Yes, from YouTube and Google too… There's also (TikTok/Facebook). But which app do you use most often? TikTok, actually." – R9. "I've never (searched on Google)… I mostly use TikTok." – R3.

Sub-theme 2: Passive Search Patterns via the Home Feed Algorithm. Information appears automatically without active searching. "Yeah, it just shows up on the home feed (FYP/For You Page)." – R3. "It shows up on the home feed if it's related to that. For example, if I follow accounts about pregnant women, related content will definitely show up on Facebook too." – R5.

Sub-theme 3: Preference for Video Format Over the KIA Book. The video format is considered more engaging and easier to understand than the text in the KIA Book. "I'm usually more interested in educational content in video format." - R4.

The husband's perspective further reinforces this preference: "Just like my wife, short videos on TikTok or Instagram Reels are the easiest to take in… If I asked to read that thick KIA Book, honestly, I'd be too lazy. All I know is the KIA Book is pink and my wife always brings it to checkups." – R16's Husband. Sub-theme 4: Pregnancy Apps as an Alternative Resource. Some use dedicated pregnancy apps. "Yes, I use a pregnancy app… it's been recommended by several doctors to track pregnancy stage and monitor health, and I use it once to three times a week." – R1.

Sub-theme 5: The Husband's Role as an Information Intermediary. Wives share info; some husbands prefer direct consultation. "Most of the time, it's actually my wife who shares links to videos from TikTok or Instagram on my WhatsApp, saying, 'Honey, check out this video.' Then, that's when I start watching and reading the information." – Husband R16. "When it comes to pregnancy, I usually ask the person directly my own sister is a midwife… I rarely use social media, sincel've deleted the apps. At most, I watch YouTube videos that pop up on my feed." – Husband R3

Sub-theme 6: Barriers to Access: Busy Schedules, Work Hours, and Limited Devices. Access depends on free time and device limitations. "Yeah, I just do it when I have free time. Because now that I have a small child, I'm also busy with household chores. So, I only make time to browse about pregnancy when I have free time." – R15 "To be honest, I don't actively search for information on my own very often, because during the day I'm focused on work. But at night or when I have a spare moment, I sometimes watch educational videos online." – R16's Husband.

The village midwife also highlighted technical barriers to using official health apps: "sometimes there are pregnant women whose phones aren't capable of downloading the app on their own, so they have to be helped by a health worker to register." – Village Midwife.

Sub-theme 7: Healthcare Workers' Perspectives: The Digital Divide and Limited Adoption of Official Programs. Limited use of official apps (Noora Health), influenced by age and education. "Actually, there's already this support program now… the Noora Health app… if a pregnant woman has a concern, she can ask directly through the app… But not everyone is using it yet. So far, it's mostly women who actively join prenatal classes." – Village Midwife. "Not all pregnant women have access to the internet. It usually comes down to education, Ma'am. If they've completed high school, and in terms of age, it's probably those under 40. The ones who aren't technologically illiterate, so to speak." – Community Health Center Midwife.

Theme 2: Digital Literacy: Trust, Verification, and Conflict Resolution. This theme explains how pregnant women evaluate, verify, and resolve digital health information: Sub-theme 1: Multi-Layered Verification: The Internet as an Initial Reference, Healthcare Professionals as the Final Confirmation. The most prominent pattern in Theme 2 is the use of digital information as a starting point, which is then triangulated with more authoritative sources. "Generally, the information is pretty much the same, though it's more detailed from the OB-GYN… There are many public TikTok accounts sharing pregnancy tips, so I'll watch it as an initial reference, then verify by comparing with official OB-GYNs or midwives accounts." – R12. "Yeah, I asked (the midwife)… just to make sure, 'Is this information correct or not?'" – R8.

Sub-theme 2: Trust Based on the Source's Identity. Credibility depends on who provides the information. "I check the account first—whose account posted the content. Usually, if it's from a midwife…" – R6. "From social media, too. I follow accounts on TikTok, like those of OB-GYNs or midwives." – R7.

Sub-theme 3: Information Conflicts and Resolution Patterns. Conflicts are common and resolved by confirming with midwives. "Well, for example, there was this time… I wanted to bleach my hair or skin, so I usually look it up on Google. It said the product was safe, but when I told my midwife, she said it would be better not to use it for now." – R4. "There was that time… on TikTok there was info about MMS being consumed by pregnant women, and it said it was dangerous… Since I was confused, I asked my midwife, and she said that supplement was perfectly safe. I'm still taking it." – R6. "I once saw a video about myths warnings against eating certain fruits during the third trimester… But when I asked my midwife, she said as long as I don't overdo it and the fruit is clean, it's perfectly safe." – R16.

Sub-theme 4: Hierarchy of Trust: Medical Authority Over Digital Information. Healthcare professionals are trusted more than the internet. "I probably trust my midwife more, because she has formal training. Information from the internet is more subjective." – R3. "Of course, I trust an OB-GYN more than the internet, because their medical understanding is much broader." – R12.

Sub-theme 5: Husbands' Preparedness: The Internet as an Initial Reference, the Midwife as the Final Authority. Husbands use the internet as a reference but rely on midwives for decisions. "My wife was worried after reading a post online about sleeping positions in late pregnancy that supposedly endanger the fetus… Since it was stressing her out, I told her to ask the midwife directly at our next checkup. For medical decisions, I still trust the midwife's explanation more than the internet." – Husband R16. "Even though there are doctors online who say it's okay to eat a little pineapple or durian, it's just that my wife herself is afraid to eat them… Well, so far, the information I've received is mostly the same as what I've heard. So, it aligns with what I've known all along." – Husband of R3.

Sub-theme 6: Healthcare Workers' Perspectives: Sources of Conflict from Families and Rarely Disclosed Verification. Conflicts often come from family; KIA Book is emphasized as the main guideline. "Actually, the main source of resistance comes from family members parents who… get advice from traditional birth attendants or in-laws. But once we explain things clearly, they don't really argue… They're still open to education." – Community Health Center Midwife. "It's rare for people to consult us, because from the start we educating them that the KIA Book is the official primary referenc. We also urge them not to fully trust what circulates on social media, since we don't know if the source is medical." – Community Health Center Midwife.

A different perspective was shared by a midwife who facilitates prenatal classes, who acknowledged some resistance from patients, though they were eventually able to be educated: "There are indeed some who are a bit stubborn 'but this is the information I have' but after we provide health education, we gradually guide them." – Community Health Center Midwife.

It is important to note that this verification process was not uniform across participants. While several respondents (e.g., R.12, R8, R6) described a consistent multi-step pattern of across-checking digital information with midwives, others appeared to rely more heavily on source credibility alone as a proxy for accuracy, without an explicit subsequent confirmation step. This heterogeneity suggests that digital health literacy in this population exists along a spectrum of verification depth rather than as a uniform competency.

Overall, the findings of Theme 2 indicate that digital health literacy among pregnant women at the Sokaraja 1 Community Health Center is characterized by a fairly adaptive multi-layered verification strategy, a source-identity-based crediblity assesment that is prone to bias, information conflicts that are consistently resolved through the authority of midwives, and the role of husbands as preparedness partners all of which ultimately lead to referrals to health care providers.

Theme 3: Mothers' Knowledge and Experiences Regarding Warning Signs of Pregnancy. This theme describes pregnant women's level of knowledge regarding warning signs of pregnancy, the sources of that knowledge, variations in personal experiences, the context of their obstetric history, and healthcare providers' perspectives on the most common cases and delays in treatment.

Sub-theme 1: Knowledge of Pregnancy Warning Signs According to Medical Criteria. The majority of respondents were able to identify pregnancy warning signs accurately and in line with clinical criteria. "Spotting, diarrhea. Bleeding can happen too, dizziness. Especially if your vision is blurry." – R1. Participants also recognized swollen feet as a sign of preeclampsia after clarification.

Sub-theme 2: Sources of Knowledge: the KIA Book as the Primary Reference, the Internet as a Supplement. Unlike general pregnancy information (Themes 1 and 2), knowledge of warning signs mainly comes from formal sources, especially the Maternal and Child Health (KIA) Book and prenatal classes. Mostly from the KIA Book. I also learned about it in prenatal classes… it was explained during the prenatal class I yesterday." – R13.

Sub-theme 3: Variations in Personal Experiences with Warning Signs. Experiences with warning signs vary widely among respondents. "Yes, there was that time… (I had) diarrhea (in) the late second trimester, around 20-something weeks," – R6. "Yes, I did. Early in my last pregnancy, I still had nausea and vomiting… during the first trimester, the nausea and vomiting were really severe." – R9

In contrast, several respondents reported never experiencing any warning signs: "Thank God, I haven't experienced any warning signs of pregnancy at all… I didn't have excessive nausea and vomiting, or any spotting." – R14.

Sub-theme 4: Obstetric History of Miscarriage as a Context for Vigilance. Previous adverse pregnancy outcomes, such as miscarriage, significantly increase vigilance in subsequent pregnancies. "Actually, this is my fourth pregnancy, but this will be my third child—I had a miscarriage in my last pregnancy… at 8 weeks' gestation in my last pregnancy." – R9. Such experiences shape how women interpret symptoms and respond to potential risks.

Sub-theme 5: Healthcare Workers' Perspectives on Preeclampsia as the Most Common Condition in High-Risk Pregnancies. Both community health center midwives interviewed consistently identified preeclampsia as the most frequently encountered warning sign in the field. "Yes, that's right.

The cases we frequently encounter usually involve signs pointing to preeclampsia… high blood pressure is the main example. There are also warning signs triggered by underlying medical conditions such as diabetes mellitus." – Community Health Center Midwife. "Here, it's mostly preeclampsia. High blood pressure." – Community Health Center Midwife.

Community Health Center midwives also explained the characteristics of high-risk pregnancies in their service areas: "Age—there are some high-risk pregnancies in women under 20, but not that many… and there are also many in women over 35." – Community Health Center Midwife.

Sub-theme 6: Cases of Delayed Care as a Consequence of Gaps in Awareness. Although education on warning signs is routinely provided, cases of delayed referral are still encountered in the field. "An example of a past case of delayed care involved premature rupture of membranes (PROM); the patient should have been referred to a health facility within 6 hours, but she didn't arrive at the community health center until 12 hours later." – Community Health Center Midwife. However, digital literacy appears to improve responsiveness: "For mothers who like to browse the internet, they're more knowledgeable. Their response can be much quicker than mothers who rarely go online or seek information like that." – Village Midwife. Theme 4: Effectiveness of Health Education Services and Programs for Pregnant Women. This theme describes the extent to which formal education programs (pregnancy classes, the KIA Book, WhatsApp groups, and "Bapakke Mamakke" classes) reach and are effective for pregnant women, as well as the structural barriers that limit their reach.

Sub-theme 1: The KIA Book as the Primary Educational Medium; Leaflets/Brochures Rarely Distributed. The KIA Book is consistently cited as the primary official educational medium, while supplementary printed materials such as leaflets are rarely distributed. "There's nothing to take home; we just use the KIA Book (Maternal and Child Health Book)." – R1. Confirmed by a community health center midwife: "We don't distribute brochures because here we strictly follow the mandatory guidelines to use the KIA Book." – Community Health Center Midwife.

Sub-theme 2: Barriers to Participation in Prenatal Classes: Work Schedules, Limited Quotas, and Uneven Distribution of Information. Despite their importance, prenatal classes face several participation barriers: "As for prenatal classes, I don't attend them. That's because prenatal classes are usually held early in the morning, and I happen to be working then." – R14. "I've never attended one at all. The village authorities rarely organize prenatal classes and the information isn't up to date, I only found out about it yesterday, already in my second trimester." – R12

The village midwife confirmed structural challenges on the organizers' side: "Participant quotas are also limited—especially since they're capped at just 10 people per class… the health center's snack allocation is budgeted for only 10 people." – Village Midwife.

Sub-theme 3: WhatsApp Groups Limited to Administrative Functions. Village WhatsApp groups function primarily as channels for administrative announcements, rather than for substantive medical education. "Actually, we were asked to join that group for coordination purposes. But within the group itself, the content is mostly just announcements—for example, notifications about upcoming free ultrasound screenings." – R13. An error in recording contact numbers was reported by R3's husband: "The information I gave Ms. Uji, the midwife, was my personal number, but she thought it belonged to my wife so my number was added to the 'Bumil Wiradadi' WhatsApp group." – R3 Husband.

Sub-theme 4: Preference for Direct Communication (Private Messages) Over Formal Groups. In areas without official WhatsApp groups, pregnant women prefer to communicate directly and personally with their midwives. "There aren't any (WhatsApp groups). If I want to ask about any concerns, I just do it during my checkup appointment… I send a direct message." – R8.

Sub-theme 5: Barriers to Husbands' Participation in the "Bapakke Mamakke" Classes. Participation of husbands in "*Bapakke Mamakke*" classes remains low due to: "There are 'Bapakke Mamakke' classes, but my husband rarely attends. He rarely attends because of work demands; he's often assigned to work out of town." – R9. "He's never attended. It just so happens that these sessions are usually held on regular weekdays, and they start at 8:00 or 9:00 a.m. I can't make it because I'm at work." – R3's Husband. The midwife facilitator confirmed this pattern based on her field observations:

"If we invite 10 couples, at most only 2 or 3 husbands show up… perhaps—in a sense—the fathers still view this as purely a matter for the mothers." – Community Health Center Midwife.

Sub-theme 6: BPJS System Barriers: Cumbersome Referral Procedures. The tiered referral system under BPJS (Indonesia's national health insurance) creates access challenges, especially for specialist care. "I use BPJS for my checkups, and it feels complicated… I'd prefer an ultrasound directly from an OB-GYN but that's not possible under the referral system, the first trimester ultrasound has to be done at a primary facility first… so I just pay out-of-pocket to avoid the procedures." – R15.

Sub-theme 7: Independent Practices Outside Formal Programs. Some pregnant women practice exercises or take educational classes on their own through digital platforms, outside of village programs. "They said the baby's position isn't breech yet, So I was told to do exercises like the prostration position. I watched the tutorial on YouTube… and I've been doing them at home." – R4. "As for classes like prenatal yoga, I've taken one before… I did that on my own, outside the village program." – R12.

Discussion

Theme 1: Health Information Access Behavior on Digital Media. Mothers' preference for diverse platforms, particularly TikTok, mirror the global trend of reproductive age women seeking health information through algorithm-driven short videos (Aftab, 2025). This passive, home-feed-algorithms-driven search surfacing information without active seeking and linking across platforms (e.g., Google to Facebook) reflects interest-based recommendation systems shaped by prior interactions (Storm et al., 2026). This has dual implications: it eases access to information but risks exposing to unverified content, since quality control rests with the algorithm rather than clinical needs (Kirkpatrick & Lawrie, 2024).

The preference for video over the KIA Book reflects a shift toward concise visual content; young women often choose short-form video for convenience despite credibility concerns (Kirkpatrick & Lawrie, 2024). Digital sources now blend edutainment with structured health tools, shaped by healthcare-provider recommendations. Two husband-involvement patterns receive relayed information from their wives, or consulting providers directly with minimal social media use reflect a heterogeneous but complementary role in the pregnant information ecosystem, consistent with findings that healthy pregnancy behaviors is strongly influenced by each individual's communication patterns and access to information within the household (van Lonkhuijzen et al., 2023).

Barriers such as limited free time amid household and work demands show that digital information-seeking depends on time availablility, not just preference. This is reinforced by midwives' reports of age- and education-based access gaps and device limitations hindering self-registration on official apps a second-level digital divide (a usage gap, not just ownership) that risks widening access to preventive health information (Girmay, 2024). Low uptake of formal programs like Noora Health, used mainly by women who already attend prenatal classes, aligns with known sociodemographic variation in eHealth literacy among pregnant population women (Xu et al., 2024).

Overall, Theme 1 shows that digital information-seeking at Sokaraja 1 is dominated by passive, across-platforms short-video consumption shapes by heterogeneous couple dynamic, partly supported by pregnancy apps, but constrained by time and digital device limitations.

Why TikTok as the Dominant Medium in This Context. Several factors explain TikTok's dominance here. Participants consistently encountering pregnancy content passively via the FYP algorithm rather than deliberate search, matching the wider pattern of algorithm-driven health content exposure among reproductive-age women (Aftab, 2025; Storm et al., 2026). Short-form video was explicitly preferred over the text-based KIA Book for convenience echoing young women's preference for short video despite acknowledge credibility concerns (Kirkpatrick & Lawrie, 2024). Most key respondents were under 35 and active social media users (Table 1), matching TikTok's core demographic. TikTok's dominance is further reinforced by gaps in formal digital programming (Theme 4): absent an credible official alternative, a commercial algorithm-driven platform filled the space by default.

Theme 2: Literasi Digital: Kepercayaan, Verifikasi, dan Resolusi Konflik. A multi-layered verification process using digital information as an initial reference, then cross-checked with medical

authorities (R12, R8) reflects a fairly mature navigation strategy, consistent with findings that professional sources remain the most trusted despite wide digital use (Vogels-Broeke et al., 2022). R12's pattern of treating TikTok as an initial reference before confirming with an official OB-GYN or midwife account reflects fairly good eHealth literacy, though final decision still rest on professionals explanation (Xu et al., 2024).

Trusting accounts with clearly identified names (R6, R7) reflects a common credibility-evaluation strategy, using creator identity as a proxy when direct content verification is difficult. This strategy risk, since professional identities online cannot always be verified consistent with concerns about online information reliability among pregnant women in Qatar despite continued high use (Al-Dahshan et al., 2022). Information conflicts over beauty products (R4), supplements (R6), and dietary restrictions (R16) consistently resolved through midwives confirmation, show that the information landscape here is multisourced but still centered on healthcare providers as mediators, consistent with Australian finding that digital media use is linked to cross-source discussion before health decisions (Hussain et al., 2023). Notably, R6's MMS case shows verification does not always change behavior she continued the supplement after confirmation, suggesting verification can reaffirm an existing decision rather than drive it. A consistent trust hierarchy emerged (R3, R5, R11, R12), with midwives or doctors ranked above digital information whenever conflicts arose indicating strong trust in formal authorities despite high digital exposure. Husbands raise awareness via the internet but defer final decisions to midwives (Husband R16, Husband R3), reinforcing partners' role as informational support that complements rather than replacing formal services (van Lonkhuijzen et al., 2023).

Healthcare worker's view that extended familiy as a more dominant source of conflicting information adds nuance: digital health literacy cannot be understood apart for a sociocultural context where family norms compete with biomedical and online authority (Insani & Purwito, 2020). The difference between midwives reporting no "stubborn cases" and other noting some resistance reflects varying practitioners experience with digitally literate patients reinforcing the value of multi-informant triangulation in this study. Notably, verification was not uniform across participants. While several (e.g., R12, R8, R6) described consistent multi-step cross-checking with midwives, others relied more on source credibility alone, without an explicit confirmation step. This heterogeneity suggests digital health literacy here exists along a spectrum of verification depth rather than as a uniform competency. Overall, Theme 2 shows digital health literacy at Sokaraja 1 as a fairly adaptive, multi-layered verification strategy, with source-identity-based credibility assessment prone to bias, conflicts consistently resolved through the authority, and husbands as preparedness partners ultimately leading back to healthcare-provider referral. Theme 3: Mothers' Knowledge and Experience Regarding Obstetric Danger Signs, Most respondents accurately identified obstetric danger signs (R1, FGD), indicating a fairly good knowledge among pregnant women at the Sokaraja 1 important given that low awareness of danger signs is key factor delaying emergency care in developing countries (Yunitasari et al., 2023).

That the KIA Handbook a non-digital medium remains the primary source of specific danger-signs knowledge (R13, FGD) adds nuance to Themes 1 -2: while digital media dominate general information-seeking, safety-critical knowledge still relies on formal, verified sources. This aligns with Yunitasari et al. (2023), who identified ANC education as key determinant of danger-signs knowledge, reinforcing formal services role over uncurated digital exposure.

Experiences ranged from excessive nausea and vomiting (R9) and diarrhea (R6) to recurrent spotting (R12), contrasted with respondents who never experienced warning signs (R13, R14) reflecting heterogeneous obstetric risk typical of pregnant populations. R9's prior miscarriage aligns with findings that women with adverse obstetric histories tend to have a greater danger-signs knowledge (Yunitasari et al., 2023), suggesting traumatic obstetric experiences heighten vigilance in later pregnancies.

Both midwives identifying preeclampsia as the most common warning sign matchies global data showing hypertensive disorders, including preeclampsia as the leading cause of maternal morbidity and mortality, affecting 2–8% of pregnancies (Vera-Ponce et al., 2025). High-risk age ranges (<20, >35 years) cited by midwives align with established preeclampsia risk factors, reinforcing the relevance of high-risk early-detection programs at the Puskesmas level.

Delayed PROM referral cases reported by midwives show that knowledge action gaps can persist despite routine education, consistent with findings that danger-sign knowledge alone does not guarantee timely care-seeking, since family support and service accessibility also matter (Shibeshi et al., 2024). Conversely, village midwives' observation that internet-active women respond faster to danger signs suggests digital health literacy (Theme 2), combined with KIA Handbook knowledge, can improve preparedness and response speed. Overall, Theme 3 show that danger-signs knowledge at Sokaraja 1 fairly good, derived mainly from the KIA Handbook and face-to-face education, shaped by varied personal experiences and obstetric history, with preeclampsia the most common condition per healthcare workers. Theme 4: Effectiveness of Health Education Services and Programs for Pregnant Women. The KIA Handbook dominance as the sole official medium, with limited leaflet distribution (R1, R15, Puskesmas Midwife), shows Sokaraja 1's formal education relies on a single print medium consistent with findings that ANC providers elsewhere often lack varied educational materials and infrastructure (AlDughaishi et al., 2023).

Barriers to class participation included work-schedule conflict (R14), limited quotas from budget constraints (Village Midwife), and uneven invitation distribution leaving some unaware classes existed (R5, R12) consistent with a review identifying financial, transport, and cultural barriers to ANC in developing countries with community programs and male involvement as facilitators (Abdalla Osman Mohamed et al., 2025; Purwito et al., 2025). The gap shows a well-designed program does not guarantee equitable reach. WhatsApp groups are limited to administrative announcements (R13, R14), plus member tracking issues (R12, Husband R3), show official digital channels remain underused for education a gap relevant to Themes 1 -2, where women instead rely on informal video platforms for visual learning. The preference for direct messages with midwives where no group exists (R6, R8) confirm personal provider relationships remain the most trusted channel, consistent with Themes 2 hierarchy. Low husband participation in *Bapakke Mamakke* classes due to work demands and norms framing pregnancy as woman's domain (R9, Husband R3, facilitating midwife), aligns with a review on fathers' involvement in Africa identifying services exlusion, gender norms, and economic pressures as barriers, despite many father's underlying motivation (Nambile Cumber et al., 2024). This low formal involvement reinforces the Themes 1 -2 pattern of husbands as information recipients rather than programs participants. BPJS's tiered referral process, seen as cumbersome (R15), reflects structural challenges in Indonesia's National Insurance (JKN) system, where procedural barriers persist despite its cost-relief deisgn associated with delayed access, particularly among women who bypass referral for practicality (Rizkianti et al., 2021). Independent practices YouTube-guided exercise (R4) or self-directed prenatal yoga (R12) show women adapting to fill gaps left by limited formal programs, reaffirming digital media (Theme 1) as a functional complement to the formal system's limitations. Overall, Theme 4 show that education-programs effectiveness at Sokaraja 1 remains limited by rigid schedule, limited quotas/budgets, underused digital channels, low husband involvement, and complex BPJS procedures collectively driving women toward of informal sources (digital media, self-directed practices).

Toward an Integrative Conceptual Model of Digital Health Literacy and Danger-Sign Preparedness. The four themes integrate into a conceptual pathway explaining how digital health literacy shapes danger-signs knowledge. Digital access behavior (Theme 1) reflects the access dimension of eHealth literacy largely passive, alogirthm-driven exposure rather than active seeking (Norman & Skinner, 2006). This exposure passes through a verification mechanism (Theme 2), the appraisal dimension, which appears to operate as conflict-triggered verification: women largely accept digital information passively until it conflicts with prior belief, family advice, or perceived risk, at which point they actively confirm with a midwife. This explains why internet trust stays high as an initial reference while midwife trust dominantes final decisions sequential steps in a one process, not competing source and why participants facing more conflicting or high-stakes information (R4, R6, R16) showed more elaborate verification than those facing low-risk, already-credible information.

This mechanism, in turn, shapes what is retained as danger-sign knowledge (Theme 3): information confirmed via the digital-to-midwife pathway is retained and acted upon, while unconfirmed information stays background awareness consistent with danger-sign knowledge tracing

mainly to the KIA Handbook and face-to-face education. Formal education effectiveness (Theme 4) moderates this: where formal education is constrained, the digital-verification pathway (Theme 1-2) is relied on more heavily, positioning digital health literacy as an adaptive complement to, not a replacement for, formal maternal education. This can be modeled with four components: (1) Digital Exposure (Theme 1, algorithm-driven, passive), (2) Conflict-Triggered Verification (Theme 2, digital-to-midwife confirmation), (3) Retained Danger-Sign Knowledge (Theme 3, anchored in offline/formal sources) with (4) Formal Education Adequancy (Theme 4) moderating reliance on the digital pathway.

This extends quantitative eHealth literacy research, which typically measures literacy as a static score (Kim & Lee, 2025; Xu et al., 2024), by revealing the process beneath that score: a single rating may mask real heterogeneity in how consistently women verify information(Theme 2). This study also contributes new evidence by triangulating pregnant women, husbands, and midwives within one Indonesian primary care area a design absent form prior Indonesian studies relying on cross-sectional barriers surveys (Rizkianti et al., 2021) or awareness without attention to the digital process itself (Yunitasari et al., 2023). Police Implications and Practical Benefits, there findings suggest digital health literacy should be a formal component of maternal health policy, not an incidental behavior to be correct. Since women already default to short-video platforms, policy should place credible content where women already are, rather than only directing them underused official channels (Theme 4). This includes supporting midwife-or Ministry of Health-affiliated short-video content optimized for algorithmic discovery, rather than relying solely on print materials like the KIA Book. Policy should also address structural barriers in Theme 4 rigid schedules, limited quotas, cumbersome BPJS referral procedures which push women toward unmediated digital sources.

For healthcare professionals, this suggests proactively asking about recently seen on social media content during antenatal visits, since disclosure is inconsistent (Theme 2); using common TikTok narratives (e.g., dietary myths, sleeping-position warnings) as a counselling entry point rather than dismissing them; involving husbands more explicitly, given their role as an information-relay and preparedness partner (Theme 1); and standardizing how midwives present the KIA Handbook as the authoritative reference relative to digital media, given observed variation between midwives (Theme 2).

For digital intervention design, effective tools should work with not against the passive-consumption pattern observed, e.g., by partnering with or emulting trusted short-video formats rather than low-uptake apps (Theme 4). Interventions should also target the conflict-triggered verification mechanism directly: a clear, low-friction pathway for women to confirm digital information with a real midwife (e.g., a simple chat-based channel) may be better than generic literacy content, since women already seek verification when uncertain the gap is in channel accessibility and consistency, not in motivation. Transferability of Findings, because this study was conducted within a single Puskesmas catchment area with a purposive, non-representative sample, findings describe this specific context rather than a national pattern. However, the underlying mechanism passive algorithm-driven exposure followed by conflict-triggered verification through a trusted local provider is plausibly transferable to other semi-urban or rural Indonesian primary care settings with comparable smartphone penetration and deference to midwife authority. Transferability is more limited where digital infrastructure or health-system trust dynamics differ markedly (e.g., low-connectivity areas, or urban settings relying more on private). Applicability elsewhere should be weighed against contextual similarity to Sokaraja 1.

4. Conclusion

This study identified four major themes describing how pregnant women in Puskesmas Sokaraja 1 working area access, verify, and use digital health information for danger sign preparedness. Information-seeking was dominated by passive short-form consumption, particularly on TikTok, yet digital health literacy was generally adaptive, with online information as an initial reference and midwives as the most trusted source for confirmation. Danger-sign knowledge came primarily from the KIA Handbook and face-to-face education rather than digital media. Formal education effectiveness, however, was constrained by scheduling, limited resources, underused digital platforms, low husband involvement, and complex BPJS procedures, pushing women toward combining formal and independent digital sources. Scientific Contribution and Novelty. This study makes two contribution.

Theoretically, it extends the eHealth literacy framework (Norman & Skinner, 2006) by identifying conflict-triggered verification as the mechanism linking passive digital exposure to retained danger-sign knowledge showing digital health literacy here as selectively activated process, not a fixed competency, nuancing prior statisc-score eHealth literacy research (Kim & Lee, 2025; Xu et al., 2024), which measures literacy as a static score without capturing this behavior variability. Empirically, this is among the first Indonesian primary care studies to triangulate pregnant women, husbands, and midwives simultaneously, offering a fuller picture of how digital and formal sources interact than prior cross-sectional or single-informant studies (Rizkianti et al., 2021; Yunitasari et al., 2023).

Practical and Policy Implications. These findings support a social media-based education model, delivering official maternal health content through the short-video formats women already use e.g., midwife or Puskesmas affiliated TikTok or Instagram Reels content on danger signs, paired with a low-friction verification channel (a dedicated WhatsApp or chat line to a midwife) mirroring participants' informal conflict-triggered verification pattern. For Puskesmas-level digitization, this means prioritizing actively maintained digital channels over administrative tools: WhatsApp groups and apps like Noora Health need dedicated content and follow-up to function as education channels, not just announcement boards. For the Ministry of Health, this implies formally recognizing short-video platforms as a primary maternal information channel through verified content partnerships, official provider credentialing, digital literacy content in midwife training, and addressing structural barriers pushing women toward unmediated digital sources. Limitations. This study has several limitations. It was conducted in a single Puskesmas area, limiting transferability to settings with different digital infrastructure or trust dynamics, and its qualitative design does not allow statictical assessment of the relationship between digital health literacy and danger-sign knowledge. Findings relied on self-reports, which may carry recall bias. Education level was not collected for pregnant participants, and the small purposive sample did not allow meaningful sub-group comparison by age or gestational age. Reflexive analysis also identified leading questions in several early interview, where response options were inadvertently suggested; this was addressed through ongoing supervision and reflexive but may have influenced the phrasing of some early responses. Directions for Future Research. Future research should test the conflict-triggered verification mechanism using larger, quantitative or mixed-methods designs modeling the relationship between digital exposure, verification, and danger-sign knowledge. Broader, more diverse samples varying in education, age, and gestational stage are needed to test whether the mechanism holds across groups. Future work should also evaluate real-world social media-based education interventions co-designed with midwives, and further explore husbands, extended family, and community health workers as intermediary stakeholders in maternal digital health literacy.

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