



Use of information and Communication Technologies to improve health literacy among pregnant women: A scoping review

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Abstract

Background: Health literacy is a key component of informed decision-making during pregnancy and is influenced by access to and interpretation of health information. This study aimed to map and analyze the available evidence on the use of Information and Communication Technologies (ICTs) during pregnancy and their implications for obstetric nursing.

Methods: A scoping review was conducted according to JBI guidance and reported in accordance with PRISMA-ScR. The initial searches were conducted in December 2023 and updated in May 2026, covering records indexed from database inception through May 2026 in MEDLINE, EMBASE, LILACS, Scopus, and ScienceDirect. Controlled and uncontrolled terms based on MeSH, DeCS, and Emtree were used. Primary and secondary studies employing quantitative, qualitative, or mixed-methods approaches were eligible, with no restrictions on language or publication period. The findings were synthesized descriptively and thematically.

Results: Twenty-five studies were included. The evidence indicates that ICTs, including mobile applications, websites, and digital platforms, facilitate access to health information, promote self-care, and improve adherence to prenatal care. However, their effectiveness depends on three factors: digital literacy, information reliability, and integration into professional care. Barriers include digital inequality, low health literacy, information overload, cultural and linguistic limitations, and a lack of content regulation. Despite these challenges, benefits such as increased knowledge of warning signs, greater self-efficacy, and support for decision-making were observed.

Conclusion: ICTs play an important role in supporting maternal care and strengthening health literacy during pregnancy. Their effective use depends on the interaction among digital literacy, information reliability, and professional mediation.

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Highlights

What is current knowledge?

Information and Communication Technologies (ICTs) can expand access to prenatal health information and support self-care, but their effects on maternal health literacy remain uneven because evidence is fragmented and digital access and information quality vary.

What is new here?

This review maps 25 studies and proposes a three-pillar model in which effective ICT use depends on digital literacy, information reliability, and integration with professional care, highlighting the mediating role of nursing.

Introduction

Pregnancy and childbirth are critical periods in a woman's life, requiring a comprehensive understanding of physiological processes and care-related information to support appropriate clinical practices and safer decision-making (1). In this context, health literacy plays a fundamental role and is understood as a multidimensional construct encompassing the knowledge, motivation, and competencies required to access, understand, appraise, and apply health information when making decisions and navigating health systems.

According to Sørensen et al. (2), health literacy comprises three interrelated domains: healthcare, disease prevention, and health promotion. More recent reviews have expanded this understanding by

emphasizing that health literacy is not limited to acquiring information but also includes the ability to translate it into concrete actions suited to individual contexts and healthcare system demands (3). In maternal health, Putri, Irawan, and Lu (4) highlight that this construct is essential for empowering pregnant women, thereby contributing to greater autonomy, improved self-care, and more informed decisions concerning their own health and that of their babies.

Digital health is a broad term encompassing the application of digital technologies to health, including telemedicine, Information and Communication Technologies (ICTs), and emerging fields such as artificial intelligence, genomics, and big data. In this context, ICTs refer to resources used to produce, store, process, transmit, and share information, including computers, smartphones, laptops, emails, cameras, webcams, mobile applications, websites, social networks, text messaging, and digital health platforms (5,6).

In obstetric care, these technologies have considerable potential to enhance health literacy among pregnant women by facilitating access to reliable information and real-time support resources (7,8). However, despite the growing number of such interventions, the literature remains fragmented regarding the types of technologies used, their effects on health literacy, and the barriers to their effectiveness, underscoring a gap in the synthesis of the available evidence (8).

In addition, the use of ICTs in maternal health presents important challenges, including inequalities in internet access, limited digital literacy, cultural and linguistic barriers, and concerns about privacy and data security, particularly among pregnant women in socially vulnerable contexts (9,10). These factors may compromise equitable access to these technologies and adversely affect health outcomes.

Given the diversity of approaches, technologies, and contexts described in the literature, a scoping review is an appropriate method for broadly mapping existing evidence, identifying knowledge gaps, and informing future research and interventions (11). Specifically, there is no consolidated synthesis of how ICTs are used to strengthen health literacy during pregnancy or of their limitations, effectiveness, and implications for obstetric nursing practice. Therefore, this study aimed to map and analyze the available evidence on the use of Information and Communication Technologies during pregnancy and their implications for obstetric nursing.

Methods

Study design

This descriptive and exploratory scoping review was conducted in accordance with the methodological guidelines of the Joanna Briggs Institute (JBI) (12) and reported following the PRISMA-ScR extension (13), ensuring rigor and transparency throughout the identification, screening, eligibility, and study-synthesis stages. To ensure reproducibility and methodological traceability, the review protocol was registered in advance on the Open Science Framework (OSF) under DOI 10.17605/OSF.IO/XJP53, before data collection and evidence analysis began.

Research question identification

The review used the PCC mnemonic to formulate the research question, considering the following elements: population - pregnant women; concept - Information and Communication Technologies (ICTs) applied to health literacy; and context - pregnancy and childbirth. The guiding question was: What are the possibilities and challenges of using ICTs during pregnancy to enhance health literacy in the context of pregnancy and childbirth?

Search strategy

The search strategy was developed using controlled and uncontrolled descriptors identified in the Medical Subject Headings (MeSH), EMBASE Subject Headings (Emtree), and Descritores em Ciências da Saúde (DeCS) vocabularies, together with free-text terms related to the topic.

The strategies were individually adapted to each database to account for differences in syntax, indexing, search fields, and Boolean operators, thereby ensuring greater sensitivity and specificity. The following terms were used: pregnant women, pregnancy, antenatal care, prenatal care, health literacy, eHealth literacy, digital health literacy, and information technology.

An initial search was conducted in December 2023, and the search strategies were updated in May 2026. The searches covered publications indexed from the inception of each database through May 2026, with no restrictions on language, country, or study design. The databases searched were MEDLINE (PubMed), EMBASE, LILACS, Scopus, and ScienceDirect, accessed through the CAPES Journal Portal, as shown in Table 1.

Table 1. Search strategies used in the selected databases and information sources

BASE	SEARCH STRATEGY
MEDLINE (PubMed)	(Pregnant Women OR Pregnancy OR Prenatal OR Antenatal) AND (Health Literacy OR eHealth Literacy OR Digital Health Literacy) AND (Information Technology)
EMBASE	('pregnant woman'/exp OR pregnant women OR pregnancy OR antenatal care OR prenatal care) AND ('health literacy'/exp OR health literacy OR ehealth literacy OR digital health literacy) AND ('information technology'/exp OR information technology)
LILACS	(Gestantes OR gravidez OR pré-natal) AND (letramento em saúde OR letramento digital em saúde) AND (tecnologias da informação)
Scopus	TITLE-ABS-KEY (pregnant women OR pregnancy OR antenatal OR prenatal) AND TITLE-ABS-KEY (health literacy OR eHealth literacy OR digital health literacy) AND TITLE-ABS-KEY (information technology)
ScienceDirect	("pregnant women" OR pregnancy OR antenatal OR prenatal) AND ("health literacy" OR "eHealth literacy" OR "digital health literacy") AND ("information technology")

Source: Prepared by the authors (2026)

Inclusion criteria

Primary and secondary studies employing quantitative, qualitative, or mixed-methods designs were included if they addressed pregnant women or populations receiving prenatal/perinatal care; the use of Information and Communication Technologies; and the relationship of these technologies with health literacy, digital literacy, health education, self-care, decision-making, or access to health information. Studies published in any language and available in full text were included, with no restriction on publication period.

Exclusion criteria

The following were excluded: editorials, letters to the editor, commentaries, study protocols without results, conference abstracts, duplicate records, studies unrelated to pregnancy, and studies that did not address the intersection of ICTs and health literacy. Technical studies with no application to clinical, educational, or care settings in maternal health were also excluded.

Study selection

References were exported to EndNote, where duplicate records were removed. The remaining records were then imported into Rayyan QCRI for screening. The selection process comprised two stages: (1) title and abstract screening; and (2) full-text review. Two reviewers conducted the process independently. Disagreements were resolved by consensus, and a third reviewer was consulted when necessary.

Data charting and extraction

Data were extracted independently by two reviewers using a standardized spreadsheet that had been pilot-tested. The following data were extracted: authors and year, country, study design, study objective, number of participants, ICT-related opportunities, and challenges. To minimize errors, a double-checking procedure was applied, including comparison of the extraction sheets and resolution of discrepancies by consensus or consultation with a third reviewer.

Data analysis and presentation

Data were analyzed using descriptive synthesis and thematic analysis. Initially, the studies were grouped by year, country, and study design. The findings were then organized into two main themes: (1) opportunities for using ICTs to enhance health literacy among pregnant women; and (2) barriers and challenges to implementation. The results were presented in a summary table and discussed in relation to the scientific literature.

Results

As shown in Figure 1, a total of 293 records were identified through the databases: MEDLINE/PubMed (n = 51), LILACS (n = 2), EMBASE (n = 57), Scopus (n = 2), and ScienceDirect (n = 181). Before screening, 118 duplicate records were removed, leaving 175 records for title and abstract screening.

After the initial screening, 89 studies were excluded because they did not address the research question, resulting in 86 articles being assessed in full text. At this stage, 62 studies were excluded because they did not meet the predefined eligibility criteria, leaving 24 studies.

In addition to the database searches, a complementary snowballing strategy was applied by reviewing the reference lists of the included studies. This strategy identified 11 additional records, of which 4 were duplicates. Thus, 7 studies were assessed for eligibility, and 6 were excluded because they did not address the research question, resulting in 1 additional included study.

At the end of the identification, screening, eligibility, and inclusion process, the final sample of this scoping review comprised 25 studies, of which 24 were identified through database searching and 1 through snowballing.

Table 2 presents the characteristics of the included studies in terms of authors/year, country of origin, methodological design, and the reported opportunities and challenges associated with the use of Information and Communication Technologies to promote health literacy among pregnant women.

The studies were published between 2007 and 2026, with a higher concentration from 2023 onward, highlighting the recent growth of research on digital health, eHealth literacy, and mHealth technologies in maternal health.

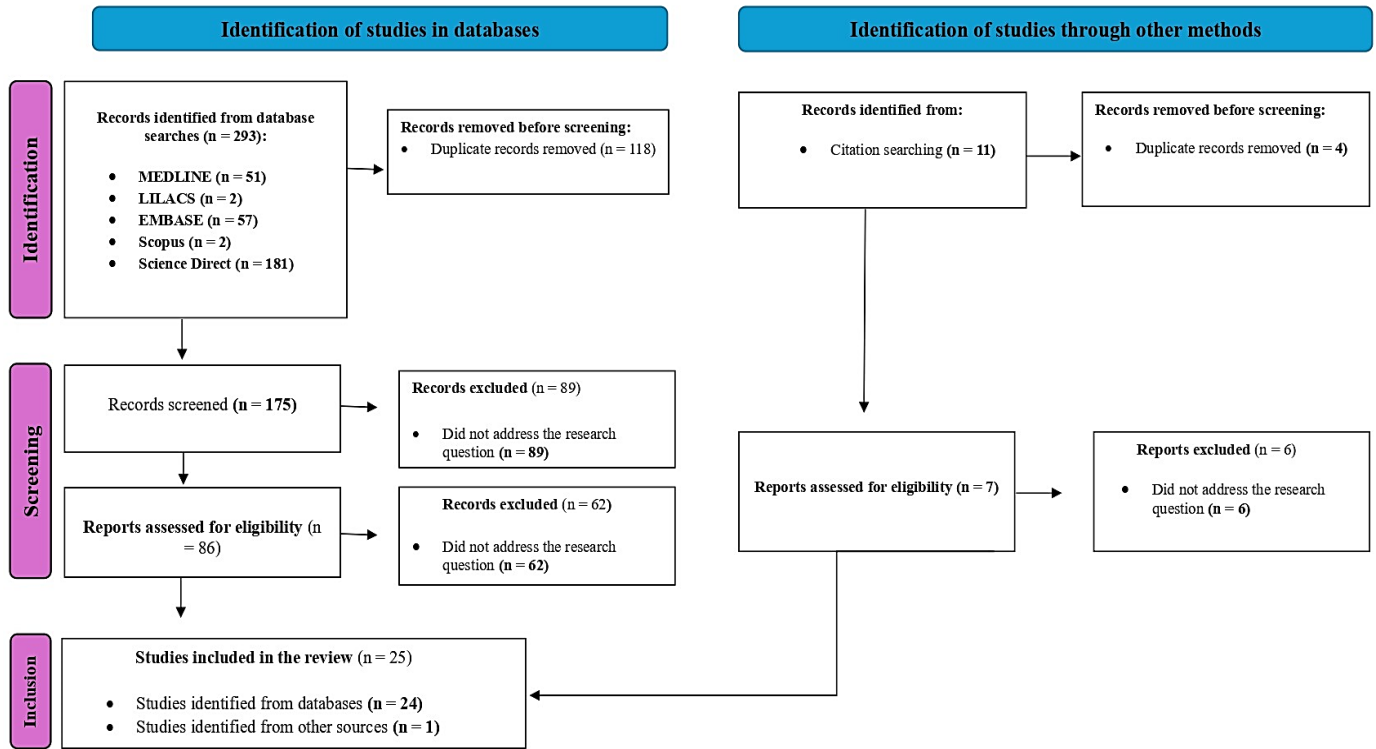


Figure 1. PRISMA-ScR flow diagram of the study selection process

Table 2. Characteristics of the included studies by authors, publication year, country, study design, and reported opportunities and challenges of ICT use

N	Authors/Year	Country	Study type	Objective	Sample/Participants or Units of analysis	Possibilities	Challenges
1	Carolan M; 2007	Canada	Exploratory Qualitative Study	To explore the information needs, information-seeking experiences, and dilemmas faced by first-time mothers aged over 35 years during pregnancy and early motherhood.	22 first-time mothers; Three supplementary focus groups with midwives and maternal-child health nurses (Number of professionals not reported)	ICTs can expand access to health information during pregnancy and encourage active information-seeking behavior, contributing to greater informational autonomy among pregnant women.	Excess unfiltered information can lead to cognitive overload, anxiety, and decisional insecurity, highlighting that greater access does not necessarily translate into higher health literacy.
2	Foster J et al.; 2015	United States	Descriptive Study	To assess the acceptability and feasibility of an interactive mHealth intervention supporting perinatal mental health and continuity of care among low-resource African American women.	14 women; Additional feedback from 62 obstetric clinicians and 19 family-medicine residents	Mobile message-based interventions show acceptance among pregnant women and have the potential for continuous reinforcement of health guidance, especially on sensitive topics such as perinatal mental health.	Adherence tends to decrease over time, indicating limited sustained engagement and the need for personalization strategies and behavioral reinforcement.
3	Wieland D et al.; 2017	United States	Cross-sectional Study	To assess technical resources and skills, interest in health information, and the perceived usefulness and barriers of electronic patient portals among postpartum safety-net patients.	100 postpartum women	Electronic health portals can facilitate access to clinical results, appointment scheduling, and care monitoring, strengthening pregnant women's active participation in the healthcare system.	Low institutional dissemination and lack of awareness of the tools limit their adoption, revealing gaps in the implementation of user-centered technologies.
4	Overdijkink S et al.; 2018	Netherlands	Systematic Review	To systematically evaluate the usability and effectiveness of mobile health applications for lifestyle support and medical care during pregnancy.	29 studies (19 lifestyle-related and 10 medical-care studies)	Mobile applications contribute to the promotion of self-care, health education, and improved access to information during prenatal care.	Methodological heterogeneity and the lack of standardization of interventions hinder the comparison of results and the generalization of evidence.
5	Hughson JP et al.; 2018	Australia	Narrative Review	To review the use, functions, utility, and quality of pregnancy applications, including their relevance to culturally and linguistically diverse women.	38 studies	Digital applications provide support for fetal monitoring, information personalization, and social interaction, strengthening continuity of care.	The lack of specific regulation compromises the reliability of information and limits the safety of clinical use.

Table 2 (Continued)

6	Hughson JA et al.; 2018	Australia	Qualitative Study	To identify maternity-care health-literacy barriers and enablers for culturally and linguistically diverse women and propose integrated strategies for care.	18 maternity-care clinicians, as reported by the study	The findings highlight the need for digital interventions integrated into the healthcare system to support health literacy among culturally diverse populations.	Structural, linguistic, and digital literacy barriers hinder the equitable implementation of these technologies.
7	Dorst MT et al.; 2019	United States	Cross-Sectional Study	To characterize pregnant women's support systems, examine the role of health information technologies, and assess associations with perceived stress.	100 participants: 71 pregnant women and 29 caregivers	Pregnant women show a strong preference for websites, applications, and social networks as sources of health information, indicating high receptivity to ICTs.	Divergence between preferred and reliable sources indicates a risk of exposure to unvalidated information.
8	Sousa MGP; 2019	Brazil	Dissertation	To develop and validate the Gestar mobile-application prototype for health promotion among pregnant women.	Situational analysis: 10 studies and 13 applications; validation by obstetrics and informatics experts (Number of judges not reported)	The development of mobile applications highlights the potential of educational technologies for promoting maternal health in the Brazilian context.	The lack of clinical validation and effectiveness assessment limits the practical application of the developed technology.
9	Chung K et al.; 2020	South Korea	Cross-Sectional Study	To examine associations among medical help-seeking strategies, online health-information use, perinatal health-literacy self-efficacy, consultation intentions, and changes in medical decisions.	164 perinatal women	Active online information seeking influences health-related decisions and may strengthen pregnant women's self-efficacy in gestational care.	The use of non-validated information can compromise the quality of clinical decisions and increase avoidable risks.
10	Choudhury A et al.; 2021	India	Quasi-Experimental	To evaluate the Mobile for Mothers mHealth intervention as a tool to improve maternal-health awareness and behaviors in tribal communities.	1,480 pregnant women: 740 intervention and 740 control participants	mHealth interventions show potential to increase knowledge about prevention, vaccination, and obstetric warning signs in vulnerable populations.	Dependence on technological infrastructure and low digital literacy limit the scalability of interventions.
11	Karamolahi PF et al.; 2021	Iran	Clinical Trial	To determine the effect of mobile application-based education on maternal health literacy among pregnant women.	140 pregnant women	Educational applications promote a significant short-term increase in maternal health literacy.	Lack of evidence regarding long-term maintenance of effects and impact on clinical outcomes.
12	Gourounti K et al.; 2022	Greece	Qualitative Study	To explore pregnant women's learning needs and digital health literacy regarding perinatal health and maternity care in Greece.	13 pregnant women participating in two focus groups	The multiplicity of information sources contributes to expanding pregnant women's informational repertoire.	Difficulty in critically evaluating online information compromises evidence-based decision-making.
13	Rahdar S et al.; 2023	Iran	Cross-Sectional Study	To investigate the relationship between eHealth literacy, acceptance of information technology, and willingness to share personal and health information.	220 pregnant women who completed the questionnaires	High acceptance of digital technologies and willingness to share data when there is adequate understanding.	Digital inequality and privacy concerns limit sustainable adoption.
14	Nabovati E et al.; 2023	Iran	Descriptive Cross-Sectional Study	To examine current mobile-phone use and pregnant women's attitudes toward prenatal mHealth services.	168 pregnant women	Widespread smartphone use facilitates continuous access to health information.	Low use of advanced mHealth functionalities highlights a gap in digital health literacy.
15	Pierce P et al.; 2023	United Kingdom	Descriptive Cross-Sectional Study	To quantify use of and engagement with the MyCare platform, identify disparities, and explore barriers and facilitators among vulnerable pregnant women and healthcare professionals.	636 women in the engagement dataset; 250 non-users in a second dataset; surveys of 22 vulnerable pregnant women and 62 healthcare professionals	Digital platforms can integrate pregnant women into healthcare services and expand access to information.	Linguistic, cultural, and cognitive barriers hinder equity in the use of technologies.
16	Xu J et al.; 2024	China	Mixed-Methods Study	To assess eHealth literacy among women with gestational diabetes mellitus, identify influencing factors, and explore their experiences of using online health information.	Quantitative phase: 235 women; qualitative phase: 11 women, including four who participated in both phases	eHealth literacy directly influences the ability of pregnant women with specific clinical conditions to interpret and apply online health information.	The evaluation of the reliability of online information remains a central challenge for self-care.

Table 2 (Continued)

17	Korkmaz Aslan G et al.; 2024	Turkey	Cross-Sectional Study	To determine the relationship between eHealth literacy and healthy lifestyle behaviors during pregnancy.	201 pregnant women	eHealth literacy is associated with healthier lifestyle behaviors during pregnancy.	Methodological limitations prevent causal inference between variables.
18	Mulyani EY et al.; 2024	Indonesia	Bibliometric Review	To map the state of research on digital communication media in maternal health education through bibliometric analysis, methodological analysis, and meta-synthesis.	98 Scopus-indexed empirical papers	ICTs strengthen maternal health education, autonomy, and engagement in self-care.	The heterogeneity of evidence limits the consolidation of practical recommendations.
19	Hsieh MF et al.; 2025	Taiwan	Systematic Review	To systematically evaluate the effects of mHealth interventions on pregnant women's quality of life and pregnancy outcomes, with emphasis on psychosocial health.	Original studies published from 2013 to 2023; The total number included was not reported in the published article	mHealth interventions improve access to information and adherence to prenatal care.	Variability in interventions and outcomes reduces comparability across studies.
20	Asadollahi F et al.; 2025	Iran	Qualitative Study	To explore Iranian pregnant women's and healthcare stakeholders' perspectives on barriers and facilitators influencing mHealth use in pregnancy care.	21 participants: 14 pregnant women and seven healthcare stakeholders	ICTs facilitate continuous communication between pregnant women and healthcare services and provide personalized support.	Structural, cultural, and technological barriers hinder implementation.
21	Zhou N et al.; 2025	China	Cross-Sectional Study	To examine the relationship between digital health literacy and childbirth readiness and assess the mediating role of childbirth self-efficacy.	350 pregnant women	Digital health literacy increases readiness for childbirth through self-efficacy.	The study design does not permit causal inferences regarding the variables analyzed.
22	Naderi M et al.; 2025	Iran	Quasi-Experimental Study	To evaluate the effectiveness of a digital mHealth self-care intervention in improving sleep quality and maternal health literacy during pregnancy.	72 pregnant women: 36 intervention and 36 control participants	Digital interventions improve self-care and sleep quality during pregnancy.	Limited generalizability and a short follow-up period.
23	Moreira ÉTR; 2025	Brazil	Dissertation	To estimate the prevalence of low oral health literacy and identify associated sociodemographic and healthcare-access factors among pregnant women.	393 pregnant women; a separate pilot involved 30 women who were not included in the final sample	The findings highlight the importance of health literacy among pregnant women in the Brazilian context.	Low integration with digital health technologies.
24	Zhao Y et al.; 2026	China	Methodological Study	To develop an eHealth literacy scale for pregnant women and evaluate its psychometric properties.	23 Delphi experts; 220 pregnant women for item analysis; 230 for psychometric testing; 30 women formed the test-retest subset.	Development of a specific instrument for measuring eHealth literacy among pregnant women.	A need for cross-cultural validation and application in different contexts.
25	Asadollahi F et al.; 2026	Iran	Randomized Clinical Trial	To evaluate the effectiveness of a comprehensive mHealth application in promoting health-enhancing behaviors among pregnant women.	80 pregnant women: 40 intervention and 40 control participants	mHealth interventions promote positive changes in maternal health behaviors.	Sustainability and cultural adaptation require further investigation.

Source: Prepared by the author (2026)

The geographic distribution showed a predominance of studies from Iran, the United States, China, Australia, and Brazil, with additional contributions from Canada, the Netherlands, South Korea, India, Greece, the United Kingdom, Turkey, Indonesia, and Taiwan.

A wide variety of methodological designs was identified, including cross-sectional, qualitative, quasi-experimental, and mixed-methods studies; clinical trials; systematic and narrative reviews; methodological studies on instrument development and validation; bibliometric analysis with meta-synthesis; and academic dissertations. This methodological heterogeneity reinforces the appropriateness of a scoping review for mapping the breadth of existing evidence on the topic.

Discussion

The analysis of the studies included in this review provides a clearer understanding of the potential and challenges associated with using ICTs to strengthen health literacy among pregnant women in the context of pregnancy and childbirth. Overall, the findings indicate that although ICTs improve access to health information, their effectiveness depends on factors such as digital literacy, information reliability, and structural conditions of access. The discussion is organized around thematic axes that emerged from the data analysis: health literacy in maternal care, types of ICTs used, acceptance, barriers, positive outcomes, gaps, and implications. Critical interpretation of the findings is prioritized over the isolated description of individual studies.

Health literacy in maternal care: a multidimensional concept

From a conceptual standpoint, the findings of this review should be understood in light of the health literacy model proposed by Sørensen et al. (2), in which health literacy is defined as a multidimensional construct involving knowledge, motivation, and competencies to access, understand, evaluate, and apply health information across the interrelated domains of healthcare, disease prevention, and health promotion.

In maternal health, Putri, Irawan, and Lu (4) emphasize that this construct is fundamental to empowering pregnant women, contributing to greater autonomy, enhanced self-care, and more informed decision-making concerning their own health and that of their babies.

This review indicates that ICTs can facilitate each of these domains; however, their effectiveness is contingent on a triad of interdependent factors: (a) the user's digital literacy, which encompasses the technical and cognitive skills needed to navigate, select, and evaluate information; (b) the reliability of the information accessed; and (c) the integration of these technologies into professional healthcare. This finding shifts the focus from the technology itself to users' competencies and the quality of professional mediation in the care process.

The literature analyzed shows that access to information alone does not automatically translate into improved health literacy. Carolan (14) previously noted that even with extensive access to information, many pregnant women have difficulty interpreting it critically, which may result in uncertainty in decision-making and information overload. This finding is supported by Gourounti et al. (15), who emphasize that although multiple information sources broaden the available range of information, they also hinder the critical evaluation of online information, thereby compromising evidence-based decision-making.

Accordingly, ICTs emerge as tools that mediate health literacy rather than as direct determinants of it. Their effectiveness depends on social, cognitive, and institutional conditions that must be considered when planning, developing, and implementing digital interventions in maternal health.

Types of ICTs used by pregnant women to acquire health information

The included studies demonstrate the diversity of technological resources used by pregnant women to seek health information, particularly smartphones, mobile applications, websites, and social networks. Nabovati et al. (16) report high smartphone uses for internet access, although their specific use to obtain prenatal information remains limited, revealing a gap between technological access and effective health-related use.

Similarly, Dorst et al. (17) found that pregnant women use various digital sources as part of their informational support systems, with a strong preference for websites, applications, and social networks. Hughson et al. (18) further note that pregnancy applications offer features such as gestational monitoring, data recording, and personalized information, thereby increasing access to digital care. In the Brazilian context, Sousa (19) demonstrates the potential of mobile applications developed to promote maternal health, although the lack of clinical validation and effectiveness assessment limits their practical application.

However, the quality of the information available on these platforms varies, as highlighted by Hughson et al. (18) and Overdijkink et al. (20). This heterogeneity raises concerns about the reliability and safety of decisions based on unvalidated digital content, particularly during a sensitive period such as pregnancy. Hsieh et al. (8) support this finding by demonstrating that although mHealth interventions improve access to information and adherence to prenatal care, variability in interventions and outcomes reduces comparability across studies.

Acceptance of ICTs for health literacy

Pregnant women's acceptance of ICTs is strongly associated with their level of digital literacy and the perceived usefulness of the technology. Rahdar et al. (21) demonstrate a positive association between eHealth literacy and technology acceptance, indicating that pregnant women with greater digital competence tend to share more personal information in digital health environments and use these tools more effectively.

Hughson et al. (18) report high acceptance of digital technologies across different international contexts, indicating that pregnant women recognize the potential of these tools to support prenatal care. However,

Dorst et al. (17) observe that their use as a primary information source remains limited, suggesting that acceptance does not necessarily translate into continuous or structured use. Foster et al. (22) further show that although mobile messaging interventions are initially accepted, adherence tends to decline over time, indicating limited sustained engagement.

Acceptance is therefore a relational phenomenon that depends not only on the technology itself but also on its perceived relevance, its suitability for the pregnant woman's clinical and cultural context, and trust in the information source. Interventions that do not account for these dimensions risk perpetuating inequalities by benefiting only users with greater cultural and digital capital.

Barriers related to the use of ICTs

The studies analyzed identify numerous barriers that limit the adoption and effective use of ICTs by pregnant women. These barriers can be grouped into three interrelated dimensions: structural, cognitive, and institutional.

At the structural level, barriers include the lack of continuous internet access, device instability, and financial constraints, as highlighted by Pierce et al. (23) and Levey et al. (24). These barriers disproportionately affect low-income populations, reinforcing the so-called "double barrier" described by Hung et al. (9), which combines geographic and digital access difficulties. Choudhury et al. (25) support this finding by showing that dependence on technological infrastructure and low digital literacy limit the scalability of interventions in vulnerable populations.

The cognitive dimension encompasses low digital literacy, difficulty understanding content, and an inability to evaluate information critically. Hughson et al. (18) emphasize that cultural and linguistic barriers hinder understanding of digital health content, whereas Wieland et al. (26) note that inadequate institutional dissemination limits the adoption of electronic health portals. Gourounti et al. (15) highlight concerns about the reliability of online information and reluctance to share personal data, while Asadollahi et al. (10) identify structural, cultural, and technological barriers that compromise the equitable implementation of ICTs.

The institutional dimension encompasses the lack of integration of ICTs into health services, limited institutional dissemination, and the absence of specific regulations. Overdijkink et al. (20) and Hsieh et al. (8) emphasize that methodological heterogeneity and variability among interventions hinder the comparison of results and the generalizability of the evidence. Mulyani et al. (27) support this conclusion by showing that although ICTs strengthen maternal health education, heterogeneity in the evidence limits the development of practical recommendations.

Overcoming these barriers requires an integrated approach that combines investment in infrastructure, the development of digital competencies, and the strengthening of health systems to incorporate ICTs into routine care.

Positive outcomes of ICT application

Despite the barriers identified, several studies demonstrate important positive effects of ICTs on maternal health, particularly in terms of access to information, enhanced self-care, and adherence to prenatal care.

Choudhury et al. (25) show that mHealth applications increase knowledge of warning signs and preventive practices, even among populations with low literacy. This finding is particularly relevant because it suggests that well-designed technologies can overcome cognitive barriers and improve health literacy in historically excluded populations. Chung et al. (28) demonstrate that pregnant women use digital information to complement professional care, particularly when they perceive the sources as reliable.

Foster et al. (22) emphasize that mobile messages support adherence to prenatal care and the organization of self-care through appointment reminders and health guidance. Karamollahi et al. (29) show that educational applications significantly improve maternal health literacy in the short term, while Naderi et al. (30) demonstrate that digital interventions improve self-care and sleep quality during pregnancy.

Zhou et al. (31) further report that digital health literacy increases readiness for childbirth through self-efficacy, while Korkmaz Aslan et al. (32) identify an association between eHealth literacy and healthier lifestyle behaviors during pregnancy. Xu et al. (33) demonstrate that

eHealth literacy directly influences the ability of pregnant women with specific clinical conditions to interpret and apply online information.

These findings suggest that ICTs have the potential to strengthen maternal health literacy, particularly when integrated into professional care and adapted to users' contexts. However, the available studies are predominantly short-term, and an important gap remains regarding the sustainability of these effects and their impact on objective clinical outcomes, such as reductions in maternal and neonatal morbidity and mortality, as noted by Karamollahi et al. (29) and Asadollahi et al. (34).

Critical synthesis and conceptual contribution

The main contribution of this review is the systematization of the evidence, which supports the proposal of a conceptual model in which the potential of Information and Communication Technologies (ICTs) to promote health literacy among pregnant women depends on the interaction among three interdependent pillars.

The first pillar is the user's digital literacy, which encompasses the technical and cognitive skills required to navigate, select, and evaluate information, as demonstrated by Rahdar et al. (21), Xu et al. (33), and Zhou et al. (31). Pregnant women with greater digital competence tend to use ICTs more consistently and make more informed decisions, whereas those with low digital literacy have difficulty discerning the quality of the information they access.

The second pillar is information reliability, which requires validation criteria and regulation of the content available on digital platforms, as highlighted by Hughson et al. (18), Overdijkink et al. (20), and Zhao et al. (35). The absence of specific regulations compromises information reliability and limits the safety of clinical use, exposing pregnant women to unvalidated content that may generate uncertainty and lead to misguided decisions.

The third pillar is integration into professional care, which requires ICTs to be used as an extension of care rather than as substitutes for the professional-user relationship, as demonstrated by Wieland et al. (26), Hughson et al. (18), and Asadollahi et al. (34). Professional mediation is essential for guiding the selection of reliable sources and the appropriate interpretation of information, thereby ensuring that technologies are incorporated effectively and safely into prenatal care.

Accordingly, ICTs should be understood not as direct determinants of health literacy but as tools that mediate this process, with their impact depending on social, cognitive, and institutional conditions.

Implications for practice, education, and public policies

The evidence from this review indicates that ICTs can support nursing and obstetric nursing practice by strengthening health literacy among pregnant women and improving access to information, self-care, and recognition of warning signs. In this context, nurses and obstetric nurses play a central role in mediating the critical use of digital technologies by helping pregnant women select reliable information and interpret health content appropriately.

Digital literacy assessment should be incorporated into clinical practice, particularly in vulnerable contexts, with consideration given to cultural, social, and technological barriers. Furthermore, professional training in the ethical use of ICTs is essential, with attention to privacy and data security and to the development of digital competencies in undergraduate and graduate nursing and obstetrics curricula.

The findings of Zhao et al. (35), who developed a specific instrument to measure eHealth literacy among pregnant women, highlight the need for cross-cultural validation and application in different contexts, which could support clinical practice by providing standardized tools. In the Brazilian context, Moreira (36) demonstrates the importance of health literacy among pregnant women but notes its limited integration with digital health technologies, reinforcing the need for public policies that promote such integration.

Finally, ICTs should be used as complementary tools to in-person care rather than as substitutes for the professional-user relationship. Integrating technologies into obstetric care requires a paradigm shift in professional training and the organization of health services, together with investment in infrastructure, training, and regulation.

The methodological heterogeneity of the included studies is an important limitation because it restricts direct comparison and quantitative synthesis of the findings. Furthermore, the predominance of observational studies limits the ability to draw causal inferences. The strengths of the review include its broad geographic and methodological

scope, the inclusion of studies with different designs, and the use of a comprehensive and structured search strategy, which increases the representativeness of the evidence analyzed.

Conclusion

The findings of this review indicate that ICTs play an important role in supporting maternal care and strengthening health literacy during pregnancy. However, their effectiveness depends on the interaction among digital literacy, information reliability, and professional mediation rather than merely on access to technologies.

The review proposes a conceptual model based on these three pillars, demonstrating that ICTs do not exert an isolated effect but are influenced by inequalities in access, cognitive limitations, and the absence of health-information regulation. In this context, the role of nursing in mediating digital care is particularly important, as are the integration of digital literacy into professional training and the implementation of public policies aimed at reducing digital inequalities and improving the quality of health information.

Future studies should investigate the longitudinal impact of digital interventions and their effects on maternal-perinatal outcomes, as well as develop validated instruments for measuring digital health literacy.

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Ethical Statement

Because this study was based on secondary data from publicly available sources, ethical approval was not required. Nevertheless, the principles of scientific integrity, transparency, and proper source citation were strictly observed.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Author Contributions

E. F., A. F., E. A., and S. A. contributed to the conception and design of the review, the literature search and study selection, data extraction and charting, data analysis and interpretation, manuscript drafting, and critical revision for important intellectual content. All authors read and approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

Data Availability Statement

All data generated or analyzed during this review are included in this article and its supplementary files. The data-charting form and additional extraction materials are available from the corresponding author upon reasonable request.

Use of Artificial Intelligence

OpenAI's ChatGPT was used to assist with English-language editing, improve clarity, and support formatting during manuscript revision. It was not used to select studies, extract or analyze data, or make scientific interpretations.

References

1. Bar A, Moran R, Mendelsohn-Cohen N, Kohanim YK, Mayo A, Toledano Y, et al. Pregnancy and postpartum dynamics revealed by millions of lab tests. *Sci Adv.* 2025;11(13):eadr7922. [View at Publisher] [DOI] [PMID] [Google Scholar]
2. Sørensen K, Van Den Broucke S, Fullam J, Doyle G, Pelikan J, Słowska Z, et al. Health literacy and public health: a systematic review and integration of definitions and models. *BMC Public Health.* 2012;12:80. [View at Publisher] [DOI] [PMID] [Google Scholar]
3. Liu C, Wang D, Liu C, Jiang J, Wang X, Chen H, et al. What is the meaning of health literacy? A systematic review and qualitative synthesis. *Fam Med Community Health.* 2020;8(2):e000351. [View at Publisher] [DOI] [PMID] [Google Scholar]

4. Putri AP, Irawan A, Lu YY. Development of Maternal Health Literacy Measurements: A Scoping Review. *Int J Nurs Health Serv.* 2023;6(2). [View at Publisher] [DOI] [Google Scholar]
5. World Health Organization. WHO guideline: Recommendations on digital interventions for health system strengthening. Geneva: World Health Organization; 2019. [View at Publisher]
6. World Health Organization. Telemedicine: opportunities and developments in Member States: report on the second global survey on eHealth 2009. Geneva: World Health Organization; 2010. 93 p. [View at Publisher]
7. Choudhury A, Choudhury M. Mobile for Mothers mHealth intervention to augment maternal health awareness and behavior of pregnant women in tribal societies: randomized quasi-controlled study. *JMIR Mhealth Uhealth.* 2022;10(9):e38368. [View at Publisher] [DOI] [PMID] [Google Scholar]
8. Hsieh M-F, Slavin V, Huang M-Z, Wang H-H, Hsieh H-F. mHealth use during pregnancy: a systematic review. *Int J Gynecol Obstet.* 2025;171(1):124-30. [View at Publisher] [DOI] [PMID] [Google Scholar]
9. Hung P, Granger M, Boghossian N, Yu J, Harrison S, Liu J, et al. Dual barriers: examining digital access and travel burdens to hospital maternity care access in the United States, 2020. *Milbank Q.* 2023;101(4):1327-47. [View at Publisher] [DOI] [PMID] [Google Scholar]
10. Asadollahi F, Zagami SE, Eslami S, Roudsari RL. Barriers and facilitators for mHealth utilization in pregnancy care: a qualitative analysis of pregnant women and stakeholder's perspectives. *BMC Pregnancy Childbirth.* 2025;25(1):144. [View at Publisher] [DOI] [PMID] [Google Scholar]
11. Pollock D, Davies E, Peters MDJ, Tricco AC, Alexander L, McInerney P, et al. Undertaking a scoping review: a practical guide for nursing and midwifery students, clinicians, researchers, and academics. *J Adv Nurs.* 2021;77(4):2102-13. [View at Publisher] [DOI] [PMID] [Google Scholar]
12. Aromataris E, Lockwood C, Porritt K, Pilla B, Jordan Z, editors. *JBIManual for Evidence Synthesis.* JBI; 2024. Available from: <https://synthesismanual.jbi.global> [View at Publisher] [DOI]
13. Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. *Ann Intern Med.* 2018;169(7):467-73. [View at Publisher] [DOI] [PMID] [Google Scholar]
14. Carolan M. Health literacy and the information needs and dilemmas of first-time mothers over 35 years. *J Clin Nurs.* 2007;16(6):1162-72. [View at Publisher] [DOI] [PMID] [Google Scholar]
15. Gourounti K, Sarantaki A, Dafnou M-E, Hadjigeorgiou E, Lykeridou A, Middleton N. A qualitative study of assessing learning needs and digital health literacy in pregnancy: Baby Buddy Forward Greek findings. *Eur J Midwifery.* 2022;6:55. [View at Publisher] [DOI] [PMID] [Google Scholar]
16. Nabovati E, Farzandipour M, Vahedpoor Z, Akbari H, Anvari S, Sharif R, et al. Pregnant women's use and attitude toward mobile phone features for self-management. *BMC Med Inform Decis Mak.* 2023;23(1):77. [View at Publisher] [DOI] [PMID] [Google Scholar]
17. Dorst MT, Anders SH, Chennupati S, Chen Q, Purcell Jackson G. Health information technologies in the support systems of pregnant women and their caregivers: mixed-methods study. *J Med Internet Res.* 2019;21(5):e10865. [View at Publisher] [DOI] [PMID] [Google Scholar]
18. Hughson JP, Daly JO, Woodward-Kron R, Hajek J, Story D. The rise of pregnancy apps and the implications for culturally and linguistically diverse women: narrative review. *JMIR Mhealth Uhealth.* 2018;6(11):e189. [View at Publisher] [DOI] [PMID] [Google Scholar]
19. Sousa MGP. Desenvolvimento e validação de um protótipo de aplicativo para plataforma móvel para promoção da saúde de gestantes [dissertação]. Fortaleza: Universidade Federal do Ceará; 2019. 112 f. Disponível em: https://bdtd.ibict.br/vufind/Record/UFC7_6e825d314ec364f7f0389f349dfe821d. [View at Publisher]
20. Overdijkink SB, Velu AV, Rosman AN, Van Beukering MD, Kok M, Steegers-Theunissen RP. The usability and effectiveness of mobile health technology-based lifestyle and medical intervention apps supporting health care during pregnancy: a systematic review. *JMIR Mhealth Uhealth.* 2018;6(4):e109. [View at Publisher] [DOI] [PMID] [Google Scholar]
21. Rahdar S, Montazeri M, Mirzaee M, Ahmadian L. The relationship between e-health literacy and information technology acceptance, and the willingness to share personal and health information among pregnant women. *Int J Med Inform.* 2023;178:105203. [View at Publisher] [DOI] [PMID] [Google Scholar]
22. Foster J, Miller L, Isbell S, Shields T, Worthy N, Dunlop AL. mHealth to promote pregnancy and interconception health among African-American women at risk for adverse birth outcomes: a pilot study. *Mhealth.* 2015;1:20. [View at Publisher] [DOI] [PMID] [Google Scholar]
23. Pierce P, Whitten M, Hillman S. The impact of digital healthcare on vulnerable pregnant women: a review of the use of the MyCare app in the maternity department at a central London tertiary unit. *Front Digit Health.* 2023;5:1155708. [View at Publisher] [DOI] [PMID] [Google Scholar]
24. Levey EJ, Onyeaka H, Bartles SM, Sanchez Calderon E, Sanchez SE, Prom MC, et al. Mobile technology access and use among adolescent mothers in Lima, Peru: mixed methods study. *JMIR Pediatr Parent.* 2021;4(3):e30240. [View at Publisher] [DOI] [PMID] [Google Scholar]
25. Choudhury A, Asan O, Choudhury MM. Mobile health technology to improve maternal health awareness in tribal populations: Mobile for Mothers. *J Am Med Inform Assoc.* 2021;28(11):2467-74. [View at Publisher] [DOI] [PMID] [Google Scholar]
26. Wieland D, Gibeau A, Dewey C, Roshto M, Frankel H. Patient portal readiness among postpartum patients in a safety net setting. *Appl Clin Inform.* 2017;8(3):698-709. [View at Publisher] [DOI] [PMID] [Google Scholar]
27. Mulyani EY, Rakhmawati T, Damayanti S, Sumaedi S. Digital communication media and maternal health education: integration of bibliometric analysis, methodological analysis, and meta-synthesis. *Digit Health.* 2024;10:20552076241304819. [View at Publisher] [DOI] [Google Scholar]
28. Chung K, Cho HY, Kim YR, Jung K, Koo HS, Park JY. Medical help-seeking strategies for perinatal women with obstetric and mental health problems and changes in medical decision making based on online health information: path analysis. *J Med Internet Res.* 2020;22(3):e14095. [View at Publisher] [DOI] [PMID] [Google Scholar]
29. Karamollahi PF, Bostani Khalesi Z, Niknami M. Efficacy of mobile app-based training on health literacy among pregnant women: a randomized controlled trial study. *Eur J Obstet Gynecol Reprod Biol X.* 2021;12:100133. [View at Publisher] [DOI] [PMID] [Google Scholar]
30. Naderi M, Alipour Z, Khalajinia Z, Momenimovahed Z. The impact of a digital self-care intervention based on mHealth on reducing sleep disorders during pregnancy: a quasi-experimental controlled study. *Reprod Health.* 2025;23(1):18. [View at Publisher] [DOI] [PMID] [Google Scholar]
31. Zhou N, Wu D, Liu M, Hu S, Zhang F, Zan Y, et al. The mediating role of self-efficacy in the relationship between eHealth literacy and childbirth readiness among pregnant women: a cross-sectional study. *Front Public Health.* 2025;13:1561855. [View at Publisher] [DOI] [PMID] [Google Scholar]
32. Korkmaz Aslan G, Kılınç İşleyen E, Kartal A, Koştü N. The relation between eHealth literacy and healthy lifestyle behaviours in pregnant women. *Health Promot Int.* 2024;39(2):daae022. [View at Publisher] [DOI] [PMID] [Google Scholar]
33. Xu J, Chen Y, Zhao J, Wang J, Chen J, Pan X, et al. Current status of electronic health literacy among pregnant women with gestational diabetes mellitus and their perceptions of online health information: a mixed-methods study. *BMC Pregnancy Childbirth.* 2024;24(1):392. [View at Publisher] [DOI] [PMID] [Google Scholar]

34. Asadollahi F, Zagami SE, Roudsari RL. The impact of mHealth interventions on health-promoting behaviors in pregnant women: a randomized clinical trial. *BMC Public Health*. 2026. [[View at Publisher](#)] [[DOI](#)] [[PMID](#)] [[Google Scholar](#)]
35. Zhao Y, Gu R, Pan Y, Wang J, Li Q, Tang Y, et al. Development and validation of an e-health literacy scale for pregnant women. *Mhealth*. 2026;12:16. [[View at Publisher](#)] [[DOI](#)] [[PMID](#)] [[Google Scholar](#)]
36. Moreira ÉTR. Letramento em saúde bucal de gestantes e fatores associados [dissertação]. Curitiba: Universidade Federal do Paraná; 2025. 1 recurso online. Disponível em: <https://hdl.handle.net/1884/98054>. [[View at Publisher](#)]

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