Ethical and regulatory governance of digital communication for maternal and perinatal medical products: A systematic review

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Abstract

Digital transformation has profoundly altered the landscape of maternal and perinatal healthcare communication. Over the past decade, online platforms such as social media communities, pregnancy information websites and direct-to-consumer digital services have become major sources of information about medical products used during pregnancy, including medication abortion, perinatal pharmaceuticals, teratogenic risk information and prenatal supplements. This review synthesizes empirical studies published between 2021 and 2025 to examine how digital communication environments shape maternal decision-making, influence safety behaviors and interact with regulatory constraints. A narrative systematic review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines, searching Scopus and PubMed for evidence related to digital communication, medical products and governance issues in maternal and perinatal health. Ten studies met the inclusion criteria. The findings show that restrictive legal environments, particularly after the Dobbs decision in the United States, have redirected individuals toward digital sources for guidance on medication abortion and related services. Digital communities such as Reddit now function as primary information ecosystems where users share experiential knowledge but also encounter inconsistent or inaccurate medical guidance. Studies on perinatal medication safety in Europe demonstrate similar challenges, with both patients and healthcare professionals reporting fragmented and contradictory online information. Across settings, the evidence highlights significant ethical and regulatory concerns, including misinformation, unclear legal boundaries, inconsistent safety communication and the absence of authoritative digital infrastructures. Demand for evidence-based digital counselling systems, such as Teratology Information Services, was strong among both clinicians and the public. The review concludes that effective governance of digital reproductive health communication requires coordinated action across clinical, regulatory and digital platform sectors to ensure safe, accurate and equitable access to maternal medical product information.

Keywords: Digital communication, Maternal health, Medication abortion, Regulatory governance, Perinatal medical products

1.Introduction

Digital transformation has significantly altered the landscape of maternal and perinatal healthcare communication. Pregnancy applications, social media platforms, online communities and targeted digital advertising now mediate a large share of public engagement with information about medical products used during pregnancy, including medication abortion, prenatal supplements, teratogenic risk information and maternal healthcare devices(1-3). These digital environments function as parallel information systems that operate with minimal clinical oversight (4). While they broaden access to health information, they also introduce new ethical and regulatory challenges that are particularly consequential for pregnant individuals and their clinicians (5, 6).

Pregnancy and the perinatal period represent physiologically and psychologically vulnerable stages in which medical decisions involve complex benefit–risk trade-offs for both the pregnant individual and the fetus. Information encountered online about medication safety, contraindications or self-managed abortion may influence decision-making in the absence of professional counselling (7). The rapid spread of unverified claims, persuasive testimonials and commercially motivated content increases the likelihood of inappropriate product use or delayed clinical intervention. Digital marketing practices have intensified these concerns. Influencer promotion of supplements, algorithm-driven prioritization of emotionally engaging content and cross-platform advertising of medical products can shape risk perception in ways that do not reflect established clinical evidence (8).

Regulatory frameworks have struggled to keep pace with these developments. Traditional medical

communication laws were designed for identifiable commercial actors operating through regulated advertising channels. By contrast, contemporary digital ecosystems facilitate transnational communication, user-generated content, commercial and non-commercial hybrid messaging and limited transparency regarding responsibility for harmful or misleading claims (9,24). The reproductive health policy environment provides a clear example of this complexity. Following the Dobbs decision in the United States, restrictions on abortion services have reshaped information-seeking behavior and accelerated the use of digital platforms such as Reddit to obtain guidance on medication abortion (10). These regulatory constraints have increased reliance on unmoderated digital communication channels, thereby magnifying exposure to misinformation and confusing legal interpretations. Similar governance gaps are documented internationally in relation to online marketing of prenatal supplements, fertility technologies and teratogenic risk information, where health claims often circulate without rigorous oversight (11,23).

Existing research on these issues remains fragmented across disciplines. Digital health studies commonly investigate user behavior and platform dynamics but rarely examine legal accountability. Research on reproductive policy focuses on access, equity and the consequences of regulatory change but often overlooks the role of digital communication flows in shaping real-world decision-making. Work in marketing and communication science examines message credibility, persuasion and consumer trust but seldom engages with the clinical risks specific to maternal and perinatal populations. As a result, there is limited integrated understanding of how digital information ecosystems influence decisions about medical products during pregnancy, or how clinicians can effectively respond to patients whose expectations have been shaped by online content.

This systematic review addresses this gap by synthesizing evidence on the ethical and regulatory challenges posed by digital communication about medical products used in maternal and perinatal health. The review examines studies published between 2021 and 2025, a period defined by unprecedented digital uptake and significant policy changes affecting reproductive healthcare. Its objectives are to identify the dominant digital

pathways through which maternal health information is accessed, evaluate the ethical and regulatory risks arising within these pathways and consider the implications for clinical practice, product governance and digital platform regulation. The review also explores how sociopolitical contexts influence digital information-seeking, particularly where individuals rely on online sources because clinical services are legally restricted, financially inaccessible or geographically distant.

The synthesis focuses on three interconnected areas: digital communication about medication abortion, information on pregnancy-related pharmaceuticals, and emerging models of digital counselling such as Teratology Information Services. Across these domains, attention is given to patterns of peer-to-peer information exchange, the perceived credibility of user-generated content and the ways individuals interpret or challenge regulatory constraints. The findings provide insight into how digital communication practices intersect with clinical risk and governance gaps, and how health authorities, clinicians and platform operators might improve the safety and reliability of maternal medical product information.

Digital communication now plays an integral role in maternal healthcare decision-making. It influences clinical encounters, reshapes patient expectations and challenges regulators who must balance autonomy with protection from harm. A synthesized, cross-disciplinary review is essential for informing governance mechanisms capable of supporting safe, equitable and evidence-based communication in the digital era.

2. Methodology

2.1 Review design

This review adopted a narrative systematic review approach to synthesize empirical and conceptual evidence on digital communication relating to medical products used in maternal and perinatal health. The review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines (12). A narrative approach was selected to integrate studies spanning clinical communication, regulatory policy and digital behavior, which varied substantially in design and

analytic technique. A meta-analysis was not feasible due to this heterogeneity. Although no formal protocol registration was required, all methodological steps were documented prior to data collection to ensure transparency.

2.2 Databases and search strategy

Two databases, Scopus and PubMed, were selected to capture interdisciplinary research across biomedical, public health, legal and digital communication domains. The search covered January 2021 to January 2025, reflecting a period of rapid digitalization in healthcare communication and major regulatory changes affecting reproductive care. Search terms were developed iteratively to include four domains: maternal or perinatal context, medical products, digital communication channels and governance or ethical considerations. Boolean operators were used to refine precision. Title and abstract fields were prioritized to identify studies explicitly examining digital information pathways or regulatory implications. Representative searches included combinations of pregnancy, medication, social media, online information, digital communication, regulation, governance and policy.

2.3 Inclusion criteria

Studies were eligible if they focused on maternal, perinatal or reproductive-aged populations and examined the communication, interpretation or use of medical products relevant to pregnancy within digital environments. Eligible products included medication abortion, pregnancy-related pharmaceuticals, supplements with regulatory implications and maternal health devices. Studies needed to analyze digital transmission channels such as social media platforms, online communities, pregnancy applications or dedicated health information websites. Only peer-reviewed English-language articles published between 2021 and 2025 were included, and full-text accessibility was required. Studies also needed to address ethical, regulatory, governance or safety-related dimensions of digital medical product communication.

2.4 Exclusion criteria

Studies were excluded if they presented purely clinical or laboratory findings without analyzing communication processes. Research focusing solely on offline counselling or emotional experiences unrelated to product communication was also excluded. Articles on general nutrition without regulatory context, non–peer-reviewed publications, conference abstracts, commentaries lacking empirical evidence and articles outside the timeframe were removed. These exclusions ensured that the final dataset centered on the interaction between digital communication, maternal medical products and governance frameworks.

2.5 Screening procedure

The initial search identified 77 Scopus records and 7 PubMed records. After applying filters for publication year, article type and language, 49 Scopus and 5 PubMed records remained. Title and abstract screening yielded 15 potentially eligible studies. Eleven full texts were accessible, and two duplicates were removed. Ten studies met all criteria and were included in the final synthesis. The PRISMA flow diagram summarizes identification, screening, eligibility assessment and final inclusion.

2.6 Quality appraisal

Given the diversity of study designs, appropriate appraisal tools were applied. Qualitative studies were assessed using the Critical Appraisal Skills Program checklist, and mixed-methods studies were evaluated using the Mixed Methods Appraisal Tool. All included studies met minimum criteria for methodological transparency, relevance and credibility. No study was excluded on the basis of quality.

2.7 Data extraction and analysis

A structured extraction framework captured key information including study setting, population, medical product type, digital platform, communication processes, safety concerns and regulatory implications. Thematic synthesis was used to analyze the data. Initial open coding identified recurrent concepts, which were grouped into broader categories through axial coding. Final themes were developed to explain how digital communication practices intersect with clinical risk, user behavior and regulatory governance. This analytic strategy enabled integration of multidisciplinary findings while maintaining conceptual clarity.
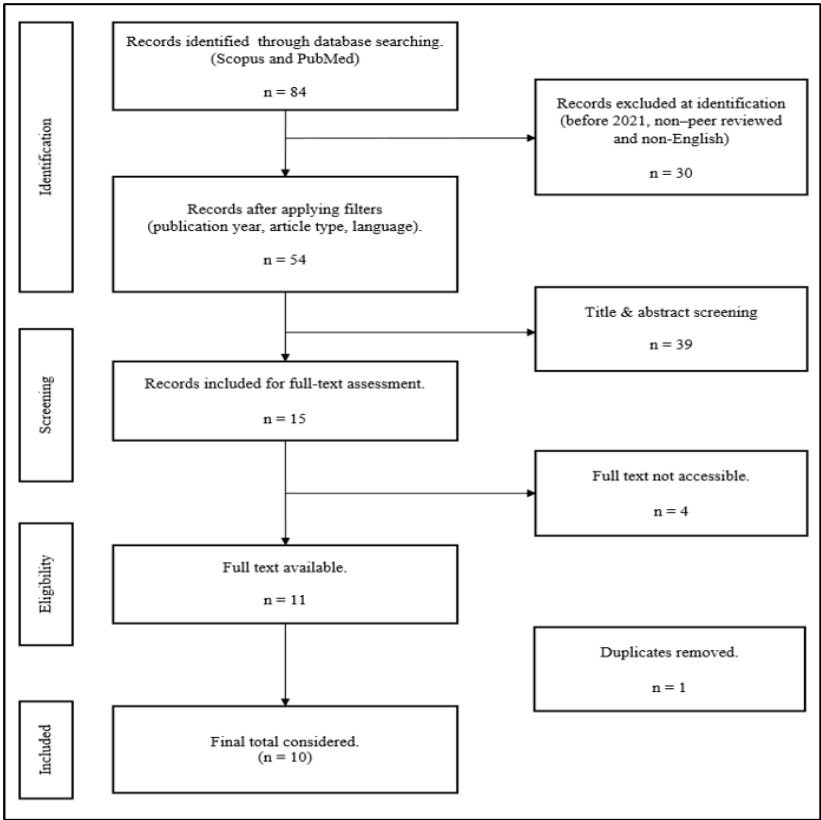
Figure 1. Prisma flow

3.Findings

3.1 Study selection

A total of 84 records were identified across Scopus and PubMed. After applying filters for publication year (2021–2025), article type and language, 54 records remained for screening. Title and abstract assessment yielded 15 eligible studies, of which 11 were accessible in full text. Following duplicate removal, 10 studies met all criteria and were included. The final evidence base consisted of qualitative analyses of Reddit discussions, online surveys examining attitudes toward medication abortion, evaluations of digital patient information materials, studies of self-managed abortion pathways and surveys on perinatal medication information needs. All included studies were published within a period marked by rapid digital uptake and significant regulatory change.

Table 1. Overview of included studies

Article Title	Country	Population / Sample	Digital / Information Channel	Medical Product or Topic	Study Design	Key Insight
Using Natural Language Processing to Describe the Use of an Online Community for Abortion During 2022: Dynamic	USA	Reddit users (7,273 posts)	Reddit	Medication abortion	NLP + qualitative	Reddit functions as a primary decision-making space where users seek peer-generated

Topic Modeling Analysis of Reddit Posts (13)						guidance on medication abortion.
Abortion Access Barriers: A Qualitative Analysis of Reddit Posts Following the Dobbs Decision (14)	USA	523 posts + 88 comments	Reddit	Abortion access, legal restrictions	Qualitative	Post-Dobbs restrictions redirect users toward digital pathways, often increasing confusion and urgency.
Real-Time Effects of Payer Restrictions on Reproductive Healthcare Seeking: A Qualitative Study of Reddit Posts (15)	USA	194 Reddit posts	Reddit	Financial barriers, insurance restrictions	Qualitative	Insurance and cost barriers push users toward self-managed options and informal digital advice.
Interest in Advance Provision of Abortion Pills: Results From a National Online Survey (16)	USA	634 respondents	Online social media survey	Abortion pills	Cross-sectional survey	65% support advance provision; distrust of health systems predicts interest in advance access.
Evaluating Information on Medication Abortion (17)	USA	Adult participants	Web-based handouts	Mifepristone	Experimental study	Evidence-based digital handouts significantly improve comprehension and perceptions of safety.
Supporting Self-Managed Abortion Care in Practice, Not Premise: Provider Perspectives from India (18)	India	Women using SMA pathways (via providers)	WhatsApp, online info	Misoprostol (SMA)	Qualitative	Digital messaging apps and online info constitute core support structures for SMA decision-making.
Information and support needs of women planning an abortion according to counselling regulations in Germany (19)	Germany	Women planning abortion	Online information sources	Pregnancy-related medication information	Mixed-methods / survey	Online information is highly variable; women report unmet needs for clear, trustworthy medication guidance.
Information	Belgium	1,508 public;	Websites,	Perinatal /	Cross-	Strong demand

Needs and Counseling Preferences among Potential Users of the Future Teratology Information Service in Belgium (20)	& Netherlands	702 HCPs	email, chat, phone	pregnancy medication safety	sectional	for nationalized digital Teratology Information Services (TIS).
The Awareness of and Adherence to the Pregnancy Prevention Program for Oral Retinoids: A Questionnaire Survey in Denmark (21)	Denmark	Patients prescribed oral retinoids	Online questionnaire	Teratogenic medications	Online survey	Suboptimal awareness & adherence to PPP; highlights gaps in digital risk communication for teratogenic drugs.
U.S. Businesses Engaged in Direct-to-Consumer Online Marketing of Perinatal Stem Cell Interventions (22)	USA	300 businesses (website audit)	Company websites, online advertising	Perinatal stem-cell products	Market analysis, content analysis	DTC online marketing of unapproved perinatal stem-cell products is widespread, raising safety and regulatory concerns.

3.2 Characteristics of included studies

The included studies varied in geography, design and medical focus, yet collectively illustrated how digital environments mediate maternal and perinatal decision-making. Most studies originated in the United States, reflecting the substantial impact of the post-Dobbs landscape on information-seeking behavior and access to medication abortion (13-17). Studies from Belgium and the Netherlands examined perinatal medication-safety communication and highlighted strong demand for structured digital counselling systems such as national Teratology Information Service (20). Research from India contributed qualitative insights into digitally mediated pathways to self-managed abortion, particularly through messaging applications and informal provider networks(18). Studies from Germany and Denmark further demonstrated that online medication-safety information is often inconsistent or incomplete, affecting both abortion-related and teratogenic drug decision-making (19, 21).

Medication abortion was the most frequently studied category, with users relying heavily on online communities for guidance on dosing, expected symptoms and safety considerations in the absence of clinical support (13-17). Studies on pregnancy-related pharmaceuticals showed similar challenges: public users and clinicians alike encountered conflicting or unclear safety information across websites, forums and digital patient leaflets (19-21). Across the dataset, platforms such as Reddit, web-based surveys, patient-information portals, company websites and messaging applications formed a hybrid ecosystem shaping early-stage decision-making on maternal medical products (13, 22).

3.3 Thematic findings

3.3.1 Regulatory barriers and legal restrictions

Legal restrictions strongly influenced digital information-seeking. In the United States, reduced access to facility-based abortion care following Dobbs

led many individuals to rely heavily on online platforms to interpret legal constraints, locate telehealth options and plan self-managed medication abortion (14, 15). Users frequently encountered jurisdiction-specific misinformation regarding telemedicine legality, mail-order medication and cross-state travel, intensifying safety risks and exposing tensions between autonomy and clinical oversight (14).

3.3.2 Digital communities as primary information ecosystems

Digital communities—especially Reddit—served as major sources of peer-generated guidance on medication abortion (13). Users valued anonymity, emotional support and experiential knowledge, viewing these communities as more accessible than clinical environments when facing stigma, cost barriers or logistical constraints (13, 14). However, the accuracy of shared information varied widely, and the absence of systematic verification created potential for misinformation, mirroring broader patterns of consumer reliance on user-generated digital content.

3.3.3 Ethical challenges in Self-Managed pathways

Across studies of self-managed abortion, individuals relied on digital content to obtain pills, determine dosing and manage complications without clinical supervision (18). Conflicting advice and variable health literacy elevated risks of inappropriate or delayed care. Parallel concerns emerged in perinatal medication-safety research, where inconsistent online information contributed to uncertainty and, in some cases, unwarranted medication avoidance (19, 21). Clinicians reported difficulty countering misconceptions shaped by online sources, illustrating broader ethical dilemmas in balancing autonomy and safe practice.

3.3.4 Need for evidence-based digital governance

Participants across regions expressed strong demand for authoritative, accessible digital counselling systems. Belgian studies reported wide support for a national Teratology Information Service integrating websites, apps, email and chat services (20). Evaluations of digital medication-abortion materials similarly demonstrated that evidence-based online communication improves comprehension and perceived safety (17). Collectively, these findings underscore the need for coordinated governance across clinical, regulatory and digital sectors, including improved content verification, moderation and legal clarity.

3.4 Synthesis of findings across digital, medical and regulatory domains

Taken together, the studies show that digital environments now play a central role in how individuals interpret and access maternal and perinatal medical products. Regulatory constraints, financial barriers and evolving consumer behavior have pushed medication abortion into digitally mediated pathways where users frequently substitute peer-generated guidance for clinical advice (13-15). Perinatal medication-safety information exhibits similar reliance on online resources due to limited availability of authoritative, consistent guidance (19-21). The convergence of medical complexity, regulatory uncertainty and fragmented digital communication underscores the need for integrated governance frameworks that support accuracy, safeguard autonomy and promote safe decision-making within increasingly digital reproductive-health ecosystems (13-22).

4. Discussion

4.1 Interpretation of findings: This review shows that digital environments have become essential infrastructures for maternal and perinatal medical decision-making, particularly where regulatory restrictions, fragmented services or limited clinical capacity constrain access to care. Across the included studies, individuals relied on digital platforms to navigate medication abortion, interpret pregnancy-related drug safety information and compensate for gaps in formal care (13, 14, 19). In the United States, the post-Dobbs landscape substantially reshaped how people access and interpret reproductive health information, directing many toward online communities for legal clarification, emotional support and procedural guidance (10, 15). These digital spaces often operate as parallel health systems—providing rapid, anonymous access to information but with variable accuracy and safety, reflecting broader patterns observed in digital maternal-health engagement research (1, 2, 6).

The findings also reveal how digital communication intersects with consumer-oriented dynamics. Direct-to-consumer online pharmacies, telemedicine platforms and algorithm-driven content flows increasingly shape exposure to reproductive health information (22). Users frequently substituted peer-generated narratives for clinical guidance, particularly when stigma, cost or geography limited access to professional care (13, 18). While experiential narratives may offer emotional reassurance, they also carry risks of circulating inaccurate medical advice regarding dosing, symptoms or complications—consistent with broader concerns about digital misinformation and deception in health information environments (8, 9). European studies further highlighted inconsistent digital communication on perinatal medication safety, with contradictory or incomplete information across websites, leaflets and forums contributing to uncertainty among both patients and clinicians (7, 20, 21). Collectively, the evidence exposes a structural gap: digital information is abundant but unevenly governed, emotionally supportive yet medically unreliable. These dynamics underscore the need for governance mechanisms capable of balancing patient autonomy with evidence-based safety (4, 5).

4.2 Comparison with existing literature

The findings align with global evidence documenting the rise of digital health ecosystems and the increasing use of social media for health information-seeking, especially for stigmatized or legally restricted services (2, 3). Prior research shows that restrictive reproductive laws frequently redirect individuals toward informal information networks rather than reducing demand—a pattern mirrored in the post-Dobbs shift toward online support communities (10). This review extends existing literature by demonstrating how these dynamics operate across both medication abortion and perinatal pharmacotherapy, where clinical risk is substantial and misinformation can have significant consequences (20, 21).

From a policy perspective, the results reinforce longstanding arguments that restrictive laws push reproductive care into less regulated digital spaces, creating parallel systems of informal guidance (14). The findings also reflect broader concerns about misinformation in rapidly changing legal environments (9). From a communication and marketing perspective, the results align with evidence that users privilege experiential, peer-generated content when navigating complex or sensitive decisions (6, 11). In maternal health, however, the clinical implications of such reliance are amplified. The observed demand for authoritative digital counselling systems is consistent with WHO guidance encouraging trustworthy, accessible and equitable digital infrastructures for reproductive health. These findings also resonate with broader discussions on systematic review quality and reporting rigor (12).

4.3 Practical implications

The review highlights actionable implications for clinicians, regulators and digital platforms. Clinicians increasingly encounter patients whose expectations and decisions are shaped by online information. This underscores the importance of proactive digital counselling, addressing misinformation and integrating evidence-based digital tools into routine perinatal care (1, 7). Training in digital health literacy and effective communication can strengthen shared decision-making and improve safety.

For regulators, the findings point to the need for modernized oversight of digital medical-product communication, including clearer policies around online pharmacies, telehealth-based medication distribution and digital advertising (5, 22). Harmonized legal communication is especially important in jurisdictions experiencing rapid regulatory change.

Digital platforms also carry substantial responsibility. Improved content moderation, elevated visibility of authoritative resources and partnerships with clinical organizations could enhance information reliability. Embedding evidence-based guidance into search functions and community rules may reduce exposure to harmful or inaccurate material—an approach supported by systematic reviews of digital health engagement (2, 3).

4.4 Strengths and limitations

A key strength of this review is its multidisciplinary integration of reproductive medicine, digital

communication, public policy and consumer behavior, capturing the complex realities of maternal medical decision-making within digital ecosystems. The use of a PRISMA-guided methodology and the inclusion of contemporary studies enhance the review's relevance (12).

Limitations include the modest number of eligible studies, reflecting the emerging nature of this research area; the restriction to English-language publications; and reliance on qualitative and self-reported data, which may limit generalizability. The focus on highly digital user populations may also underrepresent individuals with limited internet access. Despite these constraints, the synthesis provides timely insight into how digital environments, regulatory shifts and consumer behavior are reshaping maternal and perinatal medication practices.

5. Conclusion

This review demonstrates that digital environments have become integral to how individuals interpret, access and use maternal and perinatal medical products. Across settings, online platforms served as primary sources of guidance for medication abortion and pregnancy-related drug safety, particularly where clinical care was restricted by legal, financial or geographic barriers. The findings reveal a persistent tension between digital autonomy and clinical safety: although online spaces offer accessibility, anonymity and emotional support, they also expose users to inconsistent, unverified and at times medically harmful information. These challenges appeared across both abortion-related communication and perinatal pharmacotherapy, underscoring structural gaps in regulatory clarity and the absence of authoritative, well-governed digital infrastructures.

A coordinated governance response is needed to ensure safe and equitable access to maternal medical information. Clinicians should proactively address digitally informed expectations and incorporate evidence-based digital counselling tools into routine care. Regulators must strengthen oversight of online medical-product communication, clarify legal frameworks and develop verification pathways for high-risk reproductive health content. Digital platforms also play a critical role and should enhance

accuracy through improved moderation, transparency and integration of trusted clinical resources. Future research should examine the potential of artificial intelligence, cross-platform interventions and comparative policy approaches to support a more reliable and equitable global ecosystem for digital reproductive-health communication.

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Author contributions: S.W. conceptualized the study, designed the methodology, conducted the review, analyzed the data and drafted the manuscript. N.C. contributed to data screening, verification and manuscript revision. Both authors approved the final version of the manuscript.

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