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Impact of Digital Health Interventions on Access, Quality, and Outcomes of Antenatal and Postpartum Care: A Systematic Review

Siska Ilannur Lubis[1], Desmawati Desmawati[2]
[1]Magister Program of Midwifery, Medical Faculty, Universitas Andalas, Padang, Indonesia[1]
[2]Department of Nutrition Science, Medical Faculty, Universitas Andalas, Padang, Indonesia[2]
E-mail: desmawati@med.unand.ac.id

Abstract

Digital health technologies are increasingly adopted to enhance access, quality, and outcomes of antenatal and postpartum care, particularly in low- and middle-income countries (LMICs), yet empirical evidence on their effectiveness and implementation challenges remains heterogeneous. This systematic review aimed to evaluate the impact of digital health interventions on service utilization, quality of care, and clinical outcomes across the antenatal and postpartum continuum, while identifying multilevel implementation challenges. A systematic search of PubMed, Scopus, and Taylor & Francis (2021–2025) identified 19 eligible studies assessing digital health applications, including e-registries, clinical decision support systems (CDSS), telehealth, SMS/audio messaging, and community-based mHealth tools. Data were synthesized narratively across three domains: access and utilization, quality and user experience, and maternal–neonatal outcomes. The findings show that digital interventions consistently improved ANC attendance, timeliness, screening completeness, adherence to clinical guidelines, and communication quality between clients and providers. However, improvements in hard outcomes such as maternal or neonatal morbidity and mortality remained modest or non-significant. Key challenges were identified at multiple levels, including gender norms and device control at the household level; workload and infrastructure gaps at the facility level; data fragmentation and financing sustainability at the system level; and the need for co-design and behavior-theory-based development at the intervention level. Overall, digital health functions as an enabler that strengthens access and quality of antenatal and postpartum care, but measurable reductions in maternal–neonatal complications require integration with system strengthening, improved service coverage, and broader socio-cultural interventions.

Keywords: digital health, pregnancy, antenatal care, postnatal care, quality of care

1. INTRODUCTION

Maternal and perinatal morbidity and mortality remain unacceptably high, and many countries are not on track to meet Sustainable Development Goal targets for maternal and neonatal mortality. High-quality antenatal, intrapartum, and postnatal care are fundamental to womens and newborns health, yet service coverage and the uptake of recommended practices remain suboptimal in many low- and middle-income countries (LMICs). Conventional indicators such as the number of antenatal contacts capture visit frequency but do not adequately reflect the content or quality of care, leading to gaps between nominal coverage and effective coverage [1], [2].

In response, the World Health Organization (WHO) has issued comprehensive recommendations and implementation toolkits for antenatal, intrapartum, and postnatal care, including digital adaptation kits that translate guideline content into operational digital

specifications to support decision support, longitudinal client tracking, and linkages to services such as immunization and family planning. In parallel, digital health technologies such as mobile applications, SMS and voice messaging, remote monitoring platforms, teleconsultations, and electronic registries have expanded rapidly in maternal health, with a large scoping review showing increasing use of these tools for consultations, remote monitoring, and health education and reporting generally high acceptability and satisfaction among users. Evidence from LMIC focused reviews indicates that digital interventions can improve antenatal care utilization, appointment adherence, client education, and behaviour change communication, although relatively few studies rigorously evaluate their impact on the quality of care and effective coverage [2], [3], [1].

Beyond pregnancy, mobile health (mHealth) interventions have also been deployed during the extended postpartum period to address breastfeeding, postpartum family planning, and broader reproductive health needs, with realist review findings highlighting that effects on knowledge and contraceptive uptake are strongly shaped by women's independent phone access, digital literacy, household gender norms, and social support. Collectively, these developments suggest that digital health has substantial potential to enhance access, continuity, and selected outcomes across antenatal and postpartum care, while also raising questions about equity, quality, and contextual fit [4].

Recent reviews have begun to map how digital health is used within maternal care, but they typically focus on specific segments of the continuum or on selected outcomes rather than providing an integrated view from antenatal through the postpartum period. A scoping review of digital technologies in antenatal care highlighted positive effects on utilisation, self-management, and selected clinical conditions, yet did not comprehensively assess postpartum care or link process improvements to maternal–neonatal outcomes across time. Similarly, a scoping review of digital health interventions for antenatal care in LMICs showed that most implementations concentrate on client education and behaviour-change communication, with relatively limited attention to quality of care, effective coverage, or postpartum follow-up. In the postpartum domain, a realist review of mHealth interventions for family planning elucidated context mechanism outcome pathways but was restricted to contraceptive outcomes and did not systematically examine broader maternal and neonatal health indicators [3], [2], [4]. These gaps underscore the need for a systematic review that jointly examines how diverse digital health interventions influence access, quality of care processes, and maternal–neonatal outcomes across both antenatal and postpartum care, thereby providing a more comprehensive evidence base for programme design and policy.

2. RESEARCH METHODOLOGY

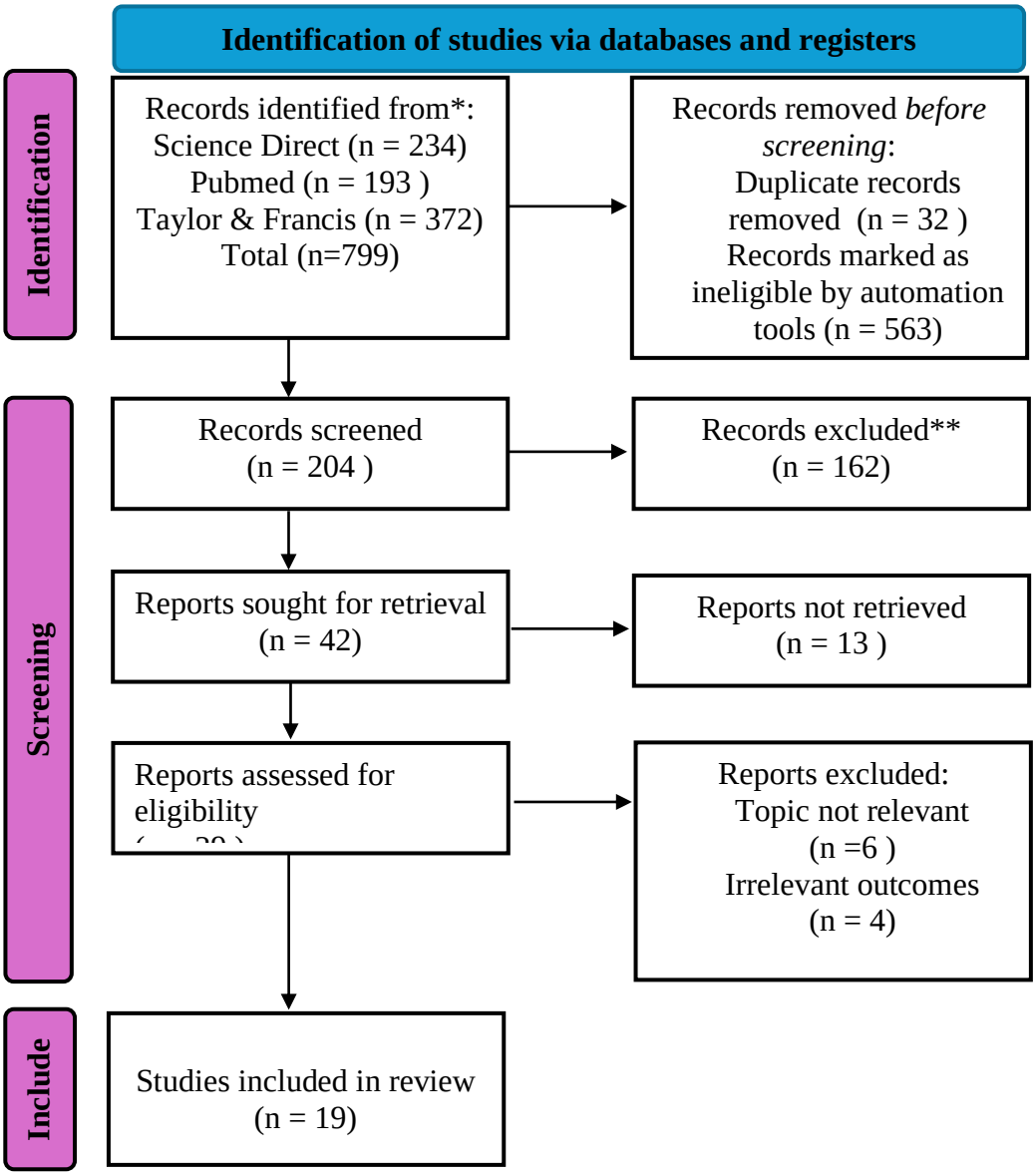
This study employed a systematic review design to synthesize empirical evidence on the impact of digital health interventions on access, quality, and outcomes of antenatal and postpartum care. The review process followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure methodological rigor and transparency. A comprehensive literature search was conducted across three major databases PubMed, ScienceDirect, and Taylor & Francis Online covering publications from 2021 to 2025 to capture the most recent evidence on the utilization of digital health in the context of maternal care. The search strategy for ScienceDirect used the following combination of

keywords: ("telemedicine" OR "digital intervention") AND ("prenatal care" OR "postnatal care") AND ("maternal health" OR "patient satisfaction"), along with an additional search using the full article title "Impact of Digital Health Interventions on Access, Quality, and Outcomes of Antenatal and Postpartum Care." For PubMed, search terms were expanded using Medical Subject Headings (MeSH), including "Telemedicine," "Mobile Health Units," "Cell Phone," "Computers, Handheld," "Medical Informatics Applications," and "Internet." Meanwhile, the Taylor & Francis Online search strategy employed the Boolean combination: ("digital health" OR "telehealth" OR "mHealth" OR "mobile app*" OR "telemedicine") AND ("antenatal" OR "prenatal" OR "postpartum" OR "postnatal" OR "pregnancy") AND ("access" OR "quality" OR "outcome*"). In the initial screening stage, all retrieved articles were assessed against predefined inclusion and exclusion criteria developed using the PICOS framework (Population, Intervention, Comparison, Outcomes, and Study Design).

The inclusion criteria covered pregnant and postpartum women receiving maternal health services. The review focused on digital health interventions for antenatal and postpartum care, including telemedicine, mHealth (e.g., SMS, mobile applications, and voice calls), web-based platforms, and clinical decision support systems. Eligible studies were primary research using quantitative, qualitative, or mixed-method designs that evaluated digital health interventions and reported outcomes related to at least one of the following domains: (1) access to and utilization of antenatal or postpartum services, (2) quality of care and user experience, or (3) maternal and neonatal health outcomes. Studies were excluded if they involved non-maternal populations (such as children, adolescents, men, or the elderly), used non-digital or non–maternal-health–focused technologies, lacked relevant outcomes related to access, quality, or health results, or were secondary or tertiary publications such as reviews, commentaries, or editorials.

All search results from the three databases were exported, merged, and deduplicated before screening. Two independent reviewers assessed titles and abstracts against the predefined criteria, followed by full-text review to determine final eligibility. To ensure a structured and unbiased screening process, Rayyan software was used to enable blinded assessment, where reviewers labeled studies as "include," "exclude," or "maybe" and systematically documented reasons for exclusion. Discrepancies between reviewers were resolved through discussion, with a third reviewer consulted when consensus could not be reached. The overall process of identification, screening, eligibility assessment, and study inclusion was presented using the PRISMA 2020 flow diagram. In this review, the methodological characteristics of each included study such as design, sample size, setting, type of digital intervention, and outcome measures were described and considered when interpreting the strength of the evidence.

Figure 1. PRISMA flow diagram



3. RESULTS

The search across three databases, ScienceDirect, PubMed, and Taylor & Francis, yielded a total of 799 articles (ScienceDirect, n = 234; PubMed, n = 193; Taylor & Francis, n = 372). After removing 32 duplicate records, 563 articles were screened at the title and abstract level, resulting in 204 articles selected for further assessment. Of these, 42 articles were retrieved for full-text review as they were deemed potentially eligible based on titles and abstracts. Following a comprehensive eligibility assessment, 23 articles were excluded due to irrelevance of topic or failure to report outcomes related to access, quality, or care results that aligned with the objectives of this systematic review. Consequently, 19 studies met all inclusion criteria. They were included in the final synthesis to analyze the impact

of digital health interventions on access, quality, and outcomes of antenatal and postpartum care.

Table 2. Summary of Studies on the Impact of Digital Health Technologies on Access, Quality, and Outcomes of Antenatal and Postpartum Care

No.	Author & Year	Study Design / Type of Digital Health	Sample	Main Findings
1	Bogale et al., 2021	RCT – SMS TCC via eRegistry	454 pregnant women	SMS TCC did not affect maternal anxiety or ANC satisfaction.
2	Venkateswaran et al., 2022	RCT – eRegistry + CDSS	6367 pregnant women	Improved screening and management of anemia, hypertension, and diabetes.
3	Bulcha et al., 2024	RCT – mHealth SMS (message framing)	588 pregnant women	Message framing increased service uptake; supports mHealth policy in Ethiopia.
4	Atukunda et al., 2021	Developmental – eBirth App (SMS/audio)	Pregnant & postpartum women (Uganda)	Weekly dual SMS/audio preferred; supports user-centered design.
5	van Pelt et al., 2023	Qualitative – eCDSS prototype	46 pregnant women (Tanzania)	Positive perception; concerns on provider attitude, drug costs, and infrastructure.
6	Dinh et al., 2022	Observational – iDeliver system	1164 deliveries	Increased adoption and completeness of clinical documentation.
7	El Ayadi et al., 2025	RCT – Kushal Maa (group mHealth, WhatsApp)	2100 pregnant women (India)	Improved postpartum follow-up; enhanced generalizability across sites.
8	Choudhury, 2022	Quasi-controlled – Mobile for Mothers app	Rural women (India)	Increased awareness and maternal health behavior.
9	Chen et al., 2023	RCT – “Healthy Future” app for	Pregnant women & infants <6	Real-time monitoring improved visit frequency and care quality.

No.	Author & Year	Study Design / Type of Digital Health	Sample	Main Findings
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10	Pendse et al., 2022	Mixed-method – Postpartum mHealth calls	102 mothers	Highlighted need for context-sensitive mHealth design beyond phone access.
11	Thirugnasundralingam et al., 2023	Observational – Telehealth (video/phone)	Public hospital pregnancies	Replaced 46% of face-to-face visits without adverse outcomes.
12	Silva et al., 2024	Design Science – mobile app (NLP chatbot, monitoring)	400 women (aged 14–45)	Enabled real-time monitoring, early danger detection, and patient engagement.
13	Kim et al., 2022	RCT – Smartphone app	150 pregnant women	Improved healthy behaviors and reduced complications among high-risk mothers.
14	Haq et al., 2024	Mixed-method – Sehat Ghar video app	250 mother–infant pairs	Feasible, user-friendly, and community-accepted tool.
15	Cheung et al., 2023	Cross-sectional – Telehealth	664 women (various stages)	Preferred for non-physical care (education, exercise, breastfeeding).
16	Bekyieriya et al., 2023	Qualitative – T4MCH (SMS & calls)	52 mothers, 9 health workers	Increased awareness; faced infrastructure and social barriers.
17	Kachimanga et al., 2025	Quasi-experimental – YendaNafe app	Facility data (Malawi)	Improved early ANC uptake; limited effect on PNC.
18	Coulibaly & Kouanda, 2023	RCT – PANDA app (telemedicine, CDSS)	695 women	Enhanced ANC quality, satisfaction, and male involvement.
19	Atukunda et al., 2023	RCT – SupportMoms-Uganda (SMS/audio)	120 pregnant women	Feasible, acceptable; increased ANC and skilled delivery rates.

4. DISCUSSIONS

A. Impact of Digital Health Technologies on Access to and Utilization of Antenatal and

Postpartum Services

Overall, digital health technologies, particularly mHealth, telehealth, and electronic registries, show clear potential to improve access to and utilization of antenatal services and, to a lesser extent, postpartum services across various LMIC and high-income contexts.The YendaNafe application in Malawi, operated by community health workers during home visits, demonstrated gradual increases in new ANC registrations, first-trimester visits, and facility-based deliveries by bringing pregnancy screening, referral, and appointment reminders closer to women's homes. These findings suggest that community-based digital tools are effective because they reduce geographic and informational barriers, embed decision support into routine outreach, and strengthen the link between households and facilities. However, the lack of significant improvement in postnatal visits within 42 days indicates that digital prompts alone are insufficient to overcome deeper structural and socio-cultural constraints on postpartum care, such as low perceived importance of PNC, competing domestic responsibilities, and limited mobility after childbirth [5].

A targeted client-communication approach integrated into an electronic registry in Palestine showed that personalised SMS reminders and educational messages generated from clinical data can support timely ANC visits and screening for anaemia, hypertension, and gestational diabetes without increasing maternal anxiety or reducing satisfaction, suggesting that carefully framed, data-driven communication can enhance access while maintaining psychosocial safety [6]. A telehealth-integrated ANC model implemented during the COVID-19 pandemic replaced nearly half of all face-to-face ANC visits with teleconsultations without reducing the total number of contacts or compromising detection of preeclampsia and fetal growth restriction, indicating that remote consultations can maintain continuity of antenatal care when supported by robust infrastructure and clear clinical pathways [7].

In lower-resource contexts, structured SMS interventions have also been applied to improve ANC attendance and maternal compliance [8]. Gestation-specific text messages sent not only to mothers but also to partners or family members have been used to promote ANC attendance, facility delivery, and PNC visits, recognising that digital messages are more effective when they activate behavioural and social mechanisms such as partner support and collective planning rather than simply providing information to individual women. In remote or socio-culturally constrained areas, the Mobile for Mothers (MfM) application in Jharkhand, India, operated by community health workers using feature phones with localised audio-visual content, increased maternal knowledge and contributed to more timely use of ANC and PNC services, suggesting that combining auditory and visual elements in digital counselling can make complex information easier to understand and remember, especially for women with low literacy [9], [10].

Access to and control over digital devices themselves also influence service utilization. In Punjab, India, more than 70% of postpartum women owned a mobile phone, but over half shared it with family members, and women whose husbands controlled phone use faced communication barriers due to household norms and limited access during working hours [9]. Similar findings in Uganda and Tanzania indicated that women often preferred short, local-language audio messages over complex smartphone applications and that spousal or family support was critical for effective

engagement with digital tools, highlighting how gender norms and language adaptation shape who can benefit from digital innovations [11], [12], [13].

Collectively, these studies indicate that digital health technologies expand access to antenatal care primarily by reducing informational, geographic, and scheduling barriers and by reinforcing provider client and intra-household communication, yet their impact on postpartum service utilization remains constrained by enduring socio-cultural and structural barriers, including gendered control of technology, limited mobility, and fragmented information flows between community and facility levels.

B. Impact of Digital Health Technologies on the Quality of Antenatal and Postpartum Care

The most consistent impact of digital health interventions across the reviewed studies was observed in the quality of care processes, particularly in screening completeness, adherence to clinical guidelines, documentation quality, and patient communication and experience. All studies assessing quality focused on electronic clinical decision support systems (eCDSS), digital health registries, decision-support applications, or digital education platforms, indicating that digital tools are mainly being used to structure clinical content and to support more systematic decision-making. One eRegistry-based clinical decision support system integrated within DHIS2 significantly improved the screening and management of anaemia, hypertension, and gestational diabetes and enhanced fetal growth monitoring, suggesting that embedding guideline logic directly into providers' workflows can reduce missed opportunities for essential assessments [7], [14].

During the intrapartum and early postpartum phases, the iDeliver application in Kenya demonstrated substantial improvement in the completeness and quality of obstetric documentation when digital checklists and automated reminders were integrated into routine practice [15]. By guiding providers through essential steps and prompting real-time data entry, such tools help ensure that key procedures are less likely to be omitted and that information required for audits and quality improvement is captured more reliably. Improvements in information quality and maternal experience also emerged as critical aspects of service quality, in Tanzania, women perceived that a tablet-based eCDSS prototype could help health workers follow ANC steps more systematically, clarify test results through visual tables and alerts, and safeguard pregnancy documentation that might otherwise be lost in paper-based systems [13]. Similarly, an mHealth intervention combining SMS and audio messages, designed using a structured behaviour-change taxonomy, showed that women preferred supportive, structured messages aligned with their concerns, which increased feelings of preparedness and emotional support during ANC, childbirth, and newborn care [12], .

Digital communication integrated into an eRegistry has also been shown not to increase maternal anxiety while maintaining high satisfaction with ANC services, indicating that co-designed digital messaging grounded in behavioural theory and framed positively can improve informational quality and health behaviours without compromising psychosocial aspects of care. The PANDA system in Burkina Faso and Madagascar further demonstrated how comprehensive eCDSS platforms that integrate registration, screening, checklists, and education can standardize ANC delivery in line with WHO and national protocols, improve documentation completeness, and potentially strengthen maternal knowledge, birth preparedness, and

satisfaction. On the supply side, such eCDSS tools appear to enhance providers' confidence and the patient provider relationship, but they may also increase workload and require substantial workflow adaptation and continuous training, which can lead to resistance if implementation is not adequately supported [6], [16].

In community-based ANC and PNC contexts, the YendaNafe application in Malawi showed that providing community health workers with CDS tools and digital reminders can support pregnancy screening, scheduling of ANC visits, referrals for danger signs, and planning of early PNC visits, extending quality-oriented monitoring beyond facility walls. Likewise, the Mobile for Mothers programme in India, using text, images, and audio content, improved mothers' knowledge of the "five cleans," tetanus immunisation, HIV awareness, and recognition of reproductive tract infections, and this enhanced knowledge was associated with better adherence to iron supplementation, reflecting higher-quality counselling and education in ANC and PNC [5], [10].

Taken together, evidence from these studies indicates that digital health technologies can enhance the quality of antenatal and postpartum care through three core mechanisms: (a) standardisation of clinical content and procedures, as demonstrated by eRegistry, PANDA, iDeliver, and YendaNafe; (b) improved communication and maternal education, as seen in TCC, eBirth, and Mobile for Mothers; and (c) strengthened data systems for quality monitoring, exemplified by iDeliver, eRegistry, and PANDA. Nevertheless, the studies consistently emphasise that digital process improvements alone cannot replace broader health-system inputs: persistent limitations such as inadequate infrastructure, workforce shortages, and insufficient access to essential diagnostics and medicines, particularly noted in Tanzania and Burkina Faso, suggest that digital interventions will achieve optimal impact only when implemented alongside comprehensive health-system strengthening strategies.

C. Impact of Digital Health Technologies on Maternal and Neonatal Outcomes

Evidence on the impact of digital health technologies on maternal and neonatal outcomes, such as morbidity and mortality, remains limited and inconsistent, although several intermediate indicators show positive trends. One large pragmatic trial in Palestine found that implementing a clinical decision support system (CDS) integrated within an eRegistry significantly improved the completeness of screening and management for anaemia, hypertension, and gestational diabetes, yet did not produce a statistically significant reduction in a composite outcome that included moderate-to-severe anaemia at delivery, severe hypertension, undetected large-for-gestational-age or small-for-gestational-age infants, or unrecognised malpresentations before delivery (adjusted odds ratio approximately 0.99; 95% CI: 0.87–1.12). This pattern suggests that process improvements alone may not be sufficient, within typical study time frames and sample sizes, to shift relatively rare and multifactorial clinical endpoints [7], [17], .

A telehealth-integrated ANC model in a high-income setting demonstrated that substituting a substantial portion of in-person visits with teleconsultations did not increase the risk of preterm birth, fetal growth restriction (FGR), or stillbirth, and was associated with a reduction in inductions for FGR without more undetected cases, indicating that well-designed hybrid models can maintain, or even optimise, perinatal outcomes among low-risk populations when high-risk management protocols are consistently applied. Evaluations of an eCDSS platform in Madagascar and a

cluster trial protocol in Burkina Faso showed that such systems can improve ANC quality and documentation, but also highlighted that causal evidence linking these process gains to reduced maternal and neonatal morbidity in low-resource settings remains scarce; a randomised controlled trial in Burkina Faso was therefore explicitly designed to test this causal pathway [18], [17]. Similarly, the YendaNafe intervention in Malawi primarily demonstrated improved service utilisation higher new ANC registrations, earlier first visits, and more facility-based deliveries as immediate mediators of better clinical outcomes, while no direct changes in maternal or neonatal mortality were observed, likely due to limited follow-up duration and the low baseline frequency of such events [10], [19].

In India, the Mobile for Mothers (MfM) programme showed that strengthening maternal knowledge can translate into tangible preventive behaviours: the proportion of women adhering to recommended iron tablet consumption increased from roughly two-thirds to more than 90% in the intervention group, a change that is biologically linked to reduced anaemia and improved pregnancy outcomes. Although the study did not directly measure morbidity or mortality, the observed behavioural shift provides a plausible pathway toward better maternal and neonatal health. Reviews and quasi-experimental studies cited in relation to MfM and YendaNafe further suggest that digital interventions targeting supplement adherence, nutrition, and early recognition of complications are associated with reductions in anaemia and pregnancy-related complications, even when hard endpoints are not consistently reported. In the postpartum phase, most available studies indicate that digital interventions alone have yet to produce substantial improvements in clinical outcomes for mothers and newborns; research from Malawi, Rwanda, and Tanzania shows inconsistent effects on PNC attendance and neonatal outcomes, with qualitative analyses pointing to barriers such as post-delivery relocation, length of hospital stay, delays in communication between facilities and community health workers, and family perceptions that PNC is less critical than ANC [10], [16], [5].

Additional findings from hybrid interventions suggest that digital technologies are more likely to generate measurable improvements in clinical outcomes when combined with broader health-system strengthening measures, such as performance-based incentives for health workers, improved supply-chain management, and investments in infrastructure and supervision. Trials in Ghana and Tanzania cited in relation to PANDA and YendaNafe illustrate that the success of digital health interventions depends heavily on supportive structural conditions and coordinated service-delivery systems, rather than on technology alone [16], [5], [20]. Overall, this synthesis reinforces the understanding that digital health technologies primarily function as enablers within the health system expanding service coverage, improving process quality and health behaviours, and generating data for monitoring and learning while significant reductions in obstetric complications and maternal–neonatal mortality are unlikely to occur unless digital health interventions are strategically integrated with enhanced service coverage, strengthened health-system capacity, and broader socio-structural interventions.

D. Challenges in Implementing Digital Health Technologies for Antenatal and Postpartum Care Utilization

Challenges in implementing digital health technologies for antenatal and postpartum care occur across multiple interrelated levels, namely the individual or household level, the health facility level, the health system level, and the

intervention-design level itself [13]. At the individual level, social and gender norms remain primary barriers to women's engagement with digital technologies: mobile phone ownership does not automatically translate into unrestricted access for women, because in many households husbands or in-laws control device use, citing moral concerns, fears of radiation exposure to the fetus, or worries about "mobile addiction," which hinders participation in postpartum tele-groups and messaging-based support [9]. In some tribal communities, although an mHealth application improved women's knowledge of maternal health, many women remained passive users because devices were operated by community health workers rather than by the women themselves, underscoring the need for further studies in contexts where women are active users to assess true digital literacy and constraints on device ownership [7]. In settings where only a minority of women own smartphones and most prefer voice calls over complex applications, developers have had to adapt intervention designs to local preferences and digital capacities, for example by prioritising voice and SMS over app-based interfaces [8], .

At the facility level, key challenges revolve around workload, workflow integration, and infrastructure limitations [8]. Evidence from digital intrapartum tools shows that healthcare workers often postpone data entry during "gloves-on" time to prioritise clinical procedures, leading to incomplete real-time data and highlighting the need for more user-friendly interfaces, realistic data-entry expectations, and designs that support rather than compete with direct patient care [15]. Evaluations of systems such as PANDA and eRegistry have identified concerns about increased documentation burden, risks of technical failures (such as power outages and network instability), and major workflow disruptions, leading to recommendations for 24-hour technical support, regular refresher training, and backup manual recording mechanisms to ensure service continuity and maintain provider trust in digital systems [10], [7], [21].

At the health-system level, challenges include application fragmentation, poor data interoperability, financial sustainability, and a weak culture of data use. Before implementation of unified eRegistries, many maternal CDS systems operated in parallel, limiting the ability to obtain a comprehensive picture of care quality; integrating these systems required strong data governance and careful alignment of clinical guidelines with CDS algorithms [7]. In some countries, digital ANC platforms have been positioned as prototypes for national maternal-health digitalisation, with embedded economic evaluations designed to weigh equipment, training, and maintenance costs against expected improvements in ANC quality [10], underlining the importance of long-term financing strategies. In Tanzania and Malawi, studies found that although eCDSS and related tools were generally well received, limitations in broader digital records, weak data-driven decision-making, and a lack of provider incentives slowed the translation of digital adoption into consistent practice change [17], [13], [22].

Collectively, the reviewed articles reaffirm that digital technologies are not a "silver bullet" for improving maternal health service utilisation. Without fundamental improvements in infrastructure such as reliable electricity, availability of medicines and diagnostics, and an adequate health workforce digitalisation risks functioning mainly as a reminder system in resource-constrained settings rather than transforming care [5]. Therefore, effective implementation strategies must integrate digital innovations with supply-side strengthening, capacity building for community and facility level providers, transformative social-norm interventions, and robust data-governance mechanisms,

so that digital tools are embedded within supportive systems rather than operating in isolation. Only through such systemic and sustained approaches can digital health technologies achieve their full potential in enhancing access, quality, and outcomes of antenatal and postpartum care.

5. CONCLUSION

The implementation of digital health technologies, including mobile health (mHealth), telehealth, electronic clinical decision support systems (eCDSS) and digital registries, shows substantial potential to strengthen antenatal and postpartum care. Across the reviewed studies, these interventions consistently supported better processes of care by improving the timeliness and regularity of contacts, helping providers deliver more standardised clinical content, enhancing the completeness of screening and documentation, and facilitating clearer communication between women and health-care providers. Digital tools in this context function mainly as enablers, they extend the reach of services, support continuity of care along the maternal continuum and generate data that can inform ongoing quality monitoring and programme learning. At the same time, the effects on maternal and neonatal morbidity and mortality remain modest and context-dependent, indicating that digital interventions alone are unlikely to transform hard health outcomes without concurrent improvements in underlying service coverage and quality. Realising the full benefits of digital health therefore requires its integration with broader supply-side strengthening such as adequate human resources, reliable infrastructure and functional supply chains as well as with social interventions that address gender norms, digital literacy and cultural perceptions that shape who can access and use technology. Implementation challenges observed at individual, facility, health-system and intervention design levels underscore that success depends not only on the availability of digital solutions, but also on how appropriately they are adapted, accepted and embedded within complex health systems.

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7. ACKNOWLEDGMENTS

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