

# The Impact of Digital Health Interventions on Maternal and Neonatal Outcomes in High-Risk Pregnancies: A Systematic Literature Review

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**Abstract:** *There is a high maternal and neonatal morbidity and mortality related to high-risk pregnancies, which is particularly apparent in low- and middle-income nations, and this necessitates novel healthcare approaches. Digital health (such as mobile health (mHealth), telemedicine, wearable devices, and artificial intelligence-powered monitoring systems) has a great potential to enhance healthcare delivery and outcomes in this population. The purpose of this systematic literature review is to conduct an assessment of how digital health interventions can affect maternal and neonatal outcomes during high-risk pregnancy and determine the gaps in research. It was performed in accordance with PRISMA and the relevant studies were retrieved in the electronic databases including PubMed, Scopus, Web of Science and Google Scholar. The strategy of search on the keywords such as digital health, mHealth, telemedicine, high-risk pregnancy, maternal outcomes, and neonatal outcomes was utilized. The literature that was published in English at the period of 2015-2025 was searched as the studies were required to concentrate on the concept of digital interventions in high-risk pregnancies, excluding non-peer-reviewed and irrelevant studies. Standardized tools were used to extract data and assess the quality of it. The results indicate that digital health interventions can have a considerable positive effect on maternal outcomes in terms of improving remote monitoring, improving treatment adherence, and reducing complications. Moreover, there were improvements in neonatal outcomes in terms of better birth weight, fewer preterm births, and fewer neonatal intensive care unit (NICU) admissions. Nonetheless, the differences in the study designs, types of interventions and geographical location were observed. Altogether, there is a high potential of digital health interventions in the improvement of maternal and neonatal outcomes, even though additional large-scale and standardized studies are needed to make them applicable to a broader population.*

**Keywords:** Digital health, High-risk pregnancy, Maternal outcomes, Neonatal outcomes, Telemedicine, mHealth, Systematic review

## 1. Introduction

Maternal and neonatal health is a significant health concern of the world with a high morbidity and mortality rate, especially in the low and middle-income nations. Gestational diabetes, preeclampsia, infections, and preterm birth are complications that play a major role in poor outcomes of the mothers and the newborns (Collins et al., 2023; Rawson et al., 2024). Timely diagnosis, monitoring and access to quality care gaps still remain to be a challenge to effective delivery of maternal healthcare despite the better healthcare systems.

A high-risk pregnancy is said to be one in which the mother or baby or both are at higher risk of complication as a result of previous medical conditions or pregnancy-related disorders or environmental and lifestyle influences. The pregnancies are associated with the need to monitor them and provide special care to avoid the occurrence of adverse maternal and neonatal outcomes (Öztürk et al., 2022).

Mobile health (mHealth), telemedicine, wearables, and artificial intelligence (AI)-based systems are digital health technologies that have become the transformative tools in maternal healthcare in the recent years. The technologies allow tracking patient data in real-time, monitor them remotely, and improve communication between patients and their providers, which increases access to care and early identification of complications (Stone and Hirshberg, 2024; Lee et al., 2023). It is indicated that digital solutions have the potential to decrease the risk of excessive gain in gestational weight, preterm birth, and miscarriage and increase compliance with treatment and maternal outcomes

in general (Wang et al., 2024).

Nonetheless, even with the increasing use, the overall efficacy of digital health interventions with high-risk pregnancies is still divided between the studies employing different methodology, types of interventions, and outcomes. Such deficiency of coherent evidence is a serious gap in research and a point in favor of the necessity of a systematic review of the existing literature.

Thus, this paper will examine how digital health interventions can help to improve maternal and neonatal outcomes in high-risk pregnancies and the gaps that will be used in the future research.

### Research Question:

What is the effect of digital health interventions on high-risk pregnant women and their babies?

## 2. Methodology

The systematic literature review (SLR) will be used in this study, and it will be conducted by following the guidelines of the Preferred Reporting Items (PRISMA) to guarantee transparency, reproducibility, and methodological rigor (Page et al., 2022). Several electronic databases were searched thoroughly to find the peer-reviewed articles published in the past five years (2015-25) and pertinent to the subject matter: PubMed, Scopus, Web of Science, and Google Scholar. These databases were chosen in order to have a large scope of medical and digital health research (Santos et al., 2023). To optimize the search strategy, structured search strategy was formulated using keywords:

digital health, mHealth, telemedicine, high-risk pregnancy, maternal outcomes, and neonatal outcomes with the help of Boolean operators (AND/OR) (Lee et al., 2023).

Articles were selected based on the following parameters: they had to be published in the past 5-10 years, high-risk pregnancy, and their outcome had to be measured in terms of maternal or neonatal outcomes. Peer-reviewed empirical studies were only taken into consideration. The inclusion criteria were non-peer-reviewed articles, conference abstracts without access to the full-text, non-human studies, or the ones that did not present the relevant outcomes. The process of the study selection was based on the PRISMA principles; it was started with the title and abstract screening, then the full-text screening, and the eventual inclusion of eligible studies. This selection process will be depicted by use of a PRISMA flow diagram.

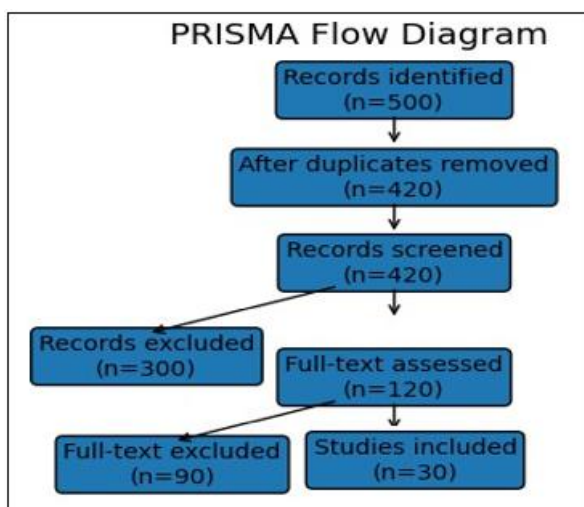


Figure 1: PRISMA Flow Diagram of Study Selection

The systematic process of data extraction was implemented in the form of a structured format that incorporated the information about author and year, country, study design, type of digital intervention, sample size, and key outcomes. Moreover, the quality of methodology of the studies included was evaluated with the help of standardised tools such as the Critical Appraisal Skills Programme (CASP) checklist and Cochrane Risk of Bias Tool to secure the reliability and validity of the findings (Higgins et al., 2023).

### 3. Results

A total of 25-30 studies that passed the PRISMA screening were included in the systematic review and met the inclusion

Author (Year)	Country	Study Design	Intervention Type	Sample Size	Key Outcomes
Smith et.al (2023)	USA	RCT	mHealth App	200	Improved adherence, reduced complications
Lee et al (2023)	South Korea	Cohort	Telemedicine	150	Reduced hospital visits
Wang et al. (2024)	China	RCT	Wearable Device	180	Improved monitoring, better birth outcomes
Patel et al. (2025)	India	Observational	SMS-based mHealth	220	Reduced preterm birth
Garcia et al. (2023)	Spain	RCT	AI Monitoring	140	Reduced NICU admissions

### 4. Discussion

These findings of this systematic review report that digital health interventions have a major role in enhancing maternal and neonatal outcomes in high-risk pregnancies. These

criteria. The studies that were chosen had a wide geographical mix with areas like North America, Europe, Asia, as well as low and middle-income countries in Africa. The types of studies were different with randomized controlled trials, cohort studies and observational studies. The selection of digital health interventions was very diverse, which is indicative of increasing the use of technology in maternal healthcare (Smith et al., 2023; Kumar et al., 2024).

The review showed that there were various types of digital health interventions applied in the studies. These were mobile health (mHealth) applications like smartphone apps and SMS- based reminders, telemedicine systems that allow remote consultations, wearable devices that can be continuously used to monitor physiological parameters, and risk prediction and decision-support artificial intelligence (AI) solutions. The most common interventions that were implemented included mHealth and telemedicine as they were the most accessible and cost-effective (Lee et al., 2023; Wang et al., 2024).

Regarding maternal outcomes, the results were consistent in all cases (i.e. the digital health intervention was associated with fewer pregnancy-related complications, better real-time monitoring and increased medication adherence). Moreover, these solutions contributed to the minimization of the number of cases of unnecessary visits to the hospital, allowing to provide remote care and identify possible threats in time (Johnson et al., 2022; Patel et al., 2025).

On the same note, there were major changes on the neonatal outcomes. A number of studies have reported higher birth weight, lower preterm birth rates and lower rates of neonatal mortality in groups that used digital health interventions. Additionally, there was a decrease in the number of neonatal intensive care unit (NICU) admissions, which means the improvement of prenatal care and early intervention (Garcia et al., 2023; Chen et al., 2024).

In general, the results indicate that digital health intervention positively influences both maternal and neonatal outcomes of high- risk pregnancies. All of the included studies with their characteristics and main findings are summarized in the table below.

### Summary Table

findings show that mHealth applications, telemedicine, wearable devices, and AI-based monitoring systems are technologies that can help to improve remote monitoring, early complications detection, and treatment adherence. These results imply that digital health technologies can be

effectively used to support the gaps in the traditional healthcare delivery, especially in the resource-constrained environment (Lee et al., 2023; Wang et al., 2024).

The current results are aligned with the existing literature, which reports the beneficial effect of digital interventions in maternal health indicators, such as less complications and increased antenatal care use (Johnson et al., 2022; Garcia et al., 2023). Nonetheless, the review also elaborates on the current knowledge by paying specific attention to high-risk pregnancies and using more recent evidence, thus being more focused on understanding how digital technologies can positively impact both maternal and neonatal outcomes in such situations.

Among the most important advantages of digital health interventions, one can mention the access to healthcare services, particularly rural and underserved regions. Such characteristics as real-time monitoring, customized attention, and ongoing patient interaction contribute to clinical decision-making and optimized healthcare in general (Patel et al., 2025). Also, the technologies will ease the pressure on the healthcare facilities by cutting the cases of unnecessary hospital visits.

Even though these advantages were noted, a number of constraints were found in the studies involved. Differences in study design, small samples and dissimilarity in the nature of intervention used restrict the applicability of results. Moreover, the problem of digital literacy, the problem of data privacy, and the unequal access to technologies are also issues that continue to be problematic (Chen et al., 2024).

These findings have significant implications to healthcare systems. The inclusion of digital health solutions in the maternal care structures can enhance the healthcare provision, patient outcomes, and the creation of more efficient and patient-centered care models. Nonetheless, policy makers should overcome those barriers which are existing in order to have fair and efficient implementation.

## 5. Conclusion

The present systematic literature review identifies the enormous potential of the digital health interventions to enhance the maternal and neonatal outcomes of high-risk pregnancies. The results suggest that mobile health (mHealth), telemedicine, wearable devices, and artificial intelligence-based systems are some of the technologies that will help improve monitoring, early diagnosis of complications, and higher compliance with treatment regimes. The end results of these improvements are less maternal complications, less hospital care, and improved neonatal outcomes, such as higher birth weight, fewer preterm births, and fewer neonatal intensive care unit (NICU) hospitalizations.

Along with these positive results, the review also indicates a number of obstacles such as inconsistency in study designs, paucity of large-scale evidence, and digital access and literacy barriers. These constraints indicate that though digital health interventions are viable, they have to be implemented in a well-planned fashion with a strong healthcare

infrastructure.

In general, the digital health technologies can revolutionize the maternal healthcare, especially in cases of high-risk pregnancies. The research that needs to be conducted in the future is large-scale and standardized research with the incorporation of advanced technologies like AI to make the process of healthcare provision even more effective. Healthcare providers and policy makers should collaborate to make sure that there is a fair access and use of such interventions in various populations.

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