

Digital Health Integration in Obstetric Care: A Paradigm Shift Toward Equitable Maternal Health Outcomes

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Dear Editor

Maternal mortality and morbidity remain formidable global health challenges, with postpartum haemorrhage, hypertensive disorders of pregnancy, and puerperal sepsis collectively accounting for the majority of preventable maternal deaths, particularly in low- and middle-income countries (LMICs). While evidence-based clinical protocols exist, implementation gaps and diagnostic delays continue to compromise maternal outcomes across resource-constrained healthcare systems (Demissie *et al.* 2025). Here I propose that strategic integration of medical informatics technologies represents a critical and often underutilized opportunity to address these systemic vulnerabilities and strengthen the quality and accessibility of obstetric care delivery. The contemporary obstetric care landscape is characterized by fragmented clinical workflows, inadequate real-time data accessibility, and limited capacity for risk-informed decision-making, especially in resource-limited settings (Lawrence *et al.* 2022). Electronic health records (EHRs) serve as the foundational digital infrastructure for addressing these challenges by enabling longitudinal documentation, automated risk stratification algorithms, and seamless care coordination across the antenatal, intrapartum, and postpartum continuum. Beyond passive data storage, EHR systems facilitate clinical decision-making through integrated clinical alerts and standardized protocol enforcement, thereby reducing communication breakdowns and enhancing adherence to evidence-based guidelines (Makhni *et al.* 2025). Furthermore, digital partograph implementations have demonstrated improvements in labour monitoring accuracy and early detection of abnormal labour progression, contributing to timely clinical interventions and reduced obstetric complications. Clinical decision support systems (CDSS) represent a particularly valuable innovation for obstetric environments where critical decisions must be rendered rapidly in high-acuity scenarios. In emergency situations such as peripartum haemorrhage or acute hypertensive emergencies, CDSS platforms deliver guideline-concordant recommendations at the point of care, reducing cognitive burden on clinicians and minimizing diagnostic and therapeutic delays (Bignell and Petrovskaya 2024). By encoding clinical evidence and institutional protocols into decision algorithms, CDSS platforms standardize management approaches across providers, thereby reducing variation in care quality and improving patient safety. This standardization is especially critical in obstetrics, where time-sensitive interventions directly influence maternal and neonatal survival. Artificial intelligence and machine learning methodologies have emerged as transformative tools for prenatal risk stratification and prognostication. Contemporary AI models have demonstrated high predictive performance in identifying high-risk pregnancies such as preeclampsia, gestational diabetes, and preterm birth, with several studies reporting strong sensitivity and predictive accuracy (Cai *et al.* 2024). By integrating multi-modal data sources, including maternal demographics, clinical vitals, laboratory parameters, and serial imaging findings, AI-driven predictive analytics provide clinicians with individualized risk assessments that exceed the discriminatory capacity of traditional clinical assessment alone. Such risk-informed stratification optimizes resource allocation and ensures that intensive monitoring is directed toward patients with the greatest likelihood of adverse outcomes, particularly valuable in resource-constrained healthcare systems.

Telemedicine platforms have improved access to specialized obstetric care, enhanced patient follow-up, and reduced healthcare access barriers in rural and underserved populations. Virtual consultation capabilities facilitate specialist input for complex pregnancies and high-risk situations, reducing the necessity for patient travel and enabling timely clinical input (Medani *et al.* 2025). Telemedicine-facilitated care coordination between primary care facilities and referral centres strengthens the continuum of care and enhances the feasibility of evidence-based protocols in resource-limited settings (Khan *et al.* 2025). As illustrated in Figure 1, the synergistic integration of EHRs, CDSS, telemedicine, and AI-based predictive analytics creates a comprehensive digital ecosystem for maternal health optimization. This multi-modal informatics approach enables early risk identification, real-time monitoring, and timely clinical intervention across the entire spectrum of obstetric care, with particular applicability in resource-constrained settings where traditional clinical infrastructure may be limited.

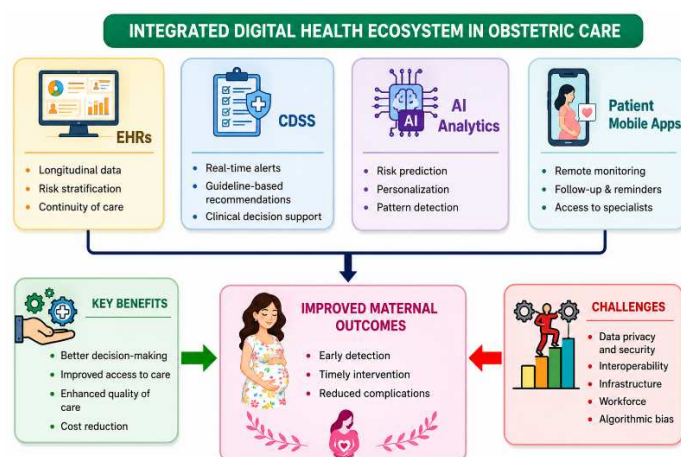


Figure 1. Integrated digital health ecosystem in obstetric care showing the role of EHRs, CDSS, telemedicine, and AI-driven predictive analytics in maternal risk assessment, clinical decision support, and improved maternal healthcare outcomes.

Despite the considerable promise of medical informatics in obstetrics, substantial implementation challenges warrant deliberate attention. Data privacy and information security concerns, particularly regarding sensitive reproductive health information, require robust governance frameworks and compliance with international standards. The lack of

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interoperability between diverse EHR and clinical devices systems creates hurdles for data sharing and integration into a full-scale digital environment. In low resource contexts, these barriers can be further exacerbated by unreliable internet access, insufficient digital infrastructure, inadequate training in digital technologies, and insufficient trained healthcare personnel (Ezeamii et al. 2024). Algorithmic bias, arising from training datasets that inadequately represent diverse maternal populations, may perpetuate or amplify existing health disparities, necessitating rigorous validation and performance monitoring across demographic strata (Conduah et al. 2025). Moving forward, successful implementation of digital health technologies in obstetrics requires multifaceted investments: robust information technology infrastructure, provider training and change management, robust data governance frameworks, and continuous evaluation of clinical effectiveness and equity outcomes. LMICs, in particular, should prioritize scalable, low-cost digital solutions that function within existing resource constraints while maintaining clinical efficacy (Awoyemi et al. 2025). In conclusion, the integration of medical informatics, encompassing EHRs, CDSS, telemedicine, and AI-driven analytics, presents a compelling opportunity to enhance maternal health outcomes globally. Systematic adoption of these technologies, coupled with attention to equity, privacy, and interoperability, may substantially reduce preventable maternal mortality and morbidity, particularly in resource-limited settings where the burden of maternal death remains highest.

2. Disclosure Statements

2.1. Author Contribution

AS: Conceptualization, study design, supervision, data interpretation, manuscript writing and revision. **MD:** Data collection, manuscript drafting, Data curation, literature review, manuscript preparation. **SM:** Data collection, Review, Revise, figure preparation. **PT:** Language checking and revising the manuscript. The corresponding author have read and approved the final manuscript.

2.2. Declaration of Generative AI

The authors used generative artificial intelligence tools solely for language editing and grammatical correction. The AI tools did not contribute to the study design, data collection, analysis, interpretation, or generation of scientific content. All content has been reviewed and approved by the authors, who take full responsibility for the integrity and accuracy of the work.

2.3. Ethics approval (for clinical/animal studies)

This study is entirely computational and does not involve human participants, clinical samples, identifiable personal data, or experimental animals. All analyses were performed using publicly available datasets and in silico methods. Therefore, ethical approval from an institutional review board or ethics committee was not required.

2.4. Informed Consent Statement

This study utilized publicly available datasets that do not contain identifiable personal information. Therefore, informed consent was not required.

2.5. Data Availability Statement

The computational data used and generated from this study are available from the corresponding author upon reasonable request.

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2.10. Supplementary Information

Supplementary material is not available for this article; all data are included within the manuscript.

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