Journal: Texila Advanced Journal of Multidisciplinary Health Research
Publisher: Texila International Journal
ISSN: 3105-3564
Volume 6 Issue 1, 2026
DOI: 10.21522/TAJMHR.2016.06.01.Art022

Harnessing Artificial Intelligence for Maternal and Child Digital Health in India: A Narrative Review

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Abstract

Artificial Intelligence (AI) and digital health systems are transforming maternal and child healthcare through the application of predictive analytics, risk stratification, remote monitoring, and clinical decision support systems(CDSS) for better health outcomes. This narrative review examines the integration of AI-enabled digital health interventions in India's Maternal and Child Health (MCH) systems, and synthesizes the existing evidence and their impact on key areas of its application. It also examines the structural, socio-behavioral, and ethical factors influencing their implementation, informed by global, low- to middle-income countries (LMIC), and India-specific evidence. Literature was obtained from PubMed, Google Scholar, and Scopus (2015–2026) and supplemented by reports from governmental and multilateral organizations. In India, digital health platforms such as mMitra, SMART health pregnancy system, and telemedicine (eSanjeevani) have demonstrated feasibility and acceptability in rural settings. Whereas AI-enabled platform eSanjeevani CDSS have enhanced the quality of teleconsultations and improved diagnostic accuracy for gestational diabetes mellitus and pregnancy-induced hypertension at the primary healthcare level. Ayushman Bharat Digital Mission (ABDM), supported by over 863 million Ayushman Bharat Health Accounts (ABHA), establishes the interoperability infrastructure necessary for the integration of AI. For the responsible use of AI in Healthcare, two initiatives have been launched by the Government of India: the Strategy for Artificial Intelligence in Healthcare (SAHI) and Benchmarking Open Data Platform for Health (BODH) in February 2026. Review concludes that responsible AI deployment, grounded in ethical governance, equity, and context-sensitive adaptation, is essential to achieve Sustainable Development Goal 3 (SDG 3) and universal quality MCH care in India.

Keywords: *Artificial Intelligence, Digital Health, India, Maternal and Child Health, mHealth, Predictive Analytics*

Introduction

Globally, maternal and child health (MCH) remains a priority under Sustainable Development Goal 3 (SDG-3) [1]. Historically, digital health, including mHealth and teleconsultations, has improved antenatal care adherence and immunization tracking [2]. The emergence of AI-enabled digital health marks a fundamental shift. Artificial Intelligence and digital health systems have significantly advanced maternal and infant healthcare through early risk detection, predictive modeling, and remote monitoring, addressing key complications such as preterm birth, gestational diabetes, and preeclampsia,

Received: 31.03.2026 ***Accepted: 23.04.2026*** ***Published on: 29.05.2026***
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facilitating timely medical interventions, and improving maternal and infant health outcomes [3–5].

Role of Digital Health and AI in MCH

Digital health has improved antenatal care adherence to protocols including Iron-Folic Acid Supplementation (IFAS), blood glucose monitoring, birth preparedness, and access to MCH services, especially in low-resource settings [2]. Global and national digital health initiatives align closely with SDG-3, targeting reductions in maternal and child mortality [2], disease surveillance, immunization tracking, and growth monitoring to support improved early childhood health outcomes [6]. Digital health applications, such as mHealth applications and teleconsultations, have effectively minimized the need for frequent physical visits, particularly during the COVID-19 pandemic, without compromising care quality [7]. AI is increasingly being explored in maternal and child healthcare, including clinical decision support systems and predictive models to identify high-risk pregnancies, pediatric diagnostic tools, and further applications for improved health outcomes [7, 8].

Implementation of AI-enabled Digital Health

Although AI and digital health offer substantial benefits, challenges remain regarding data privacy, ethical AI use, robust infrastructure, and algorithmic biases. Addressing these issues is crucial for the successful and equitable integration of AI into public health systems, requiring strong governance frameworks and comprehensive stakeholder collaboration [9–11]. The mHealth initiative, through which tailored voice messages were sent to pregnant women and mothers through mobile phones, has shown improvement in maternal and infant healthcare behaviors and knowledge, particularly in practices such as hospital deliveries and immunization, specifically tetanus toxoid doses, among women in low-resource settings [12].

Low- to middle-income countries (LMICs) have adopted mHealth applications rapidly to advance healthcare [12]. Information and Communication Technology (ICT) interventions, such as eHealth kiosks, have proven to improve infant care awareness by influencing mothers' healthcare behaviors through social networks [13]. However, the universal implementation of AI in public health is impeded by limited infrastructure, insufficient technical understanding, and data scarcity [10].

Health System Bottlenecks

Adoption and broader implementation of AI in healthcare face significant challenges, including data quality and access, data privacy, technical infrastructure, organizational capacity, algorithmic bias, and ethical practices [9–11, 14, 15]. Significant issues related to data privacy, surveillance, safety, transparency, fairness, regulatory policies, and biases in AI systems must be addressed for their effective use [5, 10]. The interoperability gap remains a primary bottleneck, for which the Ayushman Bharat Digital Mission (ABDM) aims to create an integrated digital health ecosystem in India [10, 16].

Validation of AI in clinical settings is time-consuming and resource-intensive, requiring multi-institutional collaboration and effective communication between AI engineers and radiologists. [5, 17]. Despite these validation challenges, potential benefits of AI in healthcare are significant; but due to its ethical, privacy, and reliability related concerns, these models are not yet fully utilized in medical centers [17].

India's Digital Health Ecosystem

India is gearing towards tackling these technological challenges owing to its strong technology ecosystem and commitment to

innovation [15]. Over the past decade, India has made substantial investments in digital health infrastructure, creating an enabling environment for AI adoption in healthcare. Through interoperable electronic health records, unique health identifiers, Ayushman Bharat Health Account (ABHA) with its 14-digit ID, and health facility registries, the Ayushman Bharat Digital Mission (ABDM) aims to establish an integrated digital health ecosystem in India [16].

The government-led eSanjeevani telemedicine platform has expanded remote consultations for better accessibility to healthcare services in rural and underserved areas of India [16]. As of early 2026, this digital health ecosystem is anchored by over 863 million ABHA accounts that serve as unique longitudinal health identifiers (https://www.pib.gov.in/PressReleasePage.aspx?PRID=2234141&reg=3&lang=1). To bridge the gap between innovation and clinical safety, the Ministry of Health and Family Welfare introduced the Strategy for Artificial Intelligence in Healthcare (SAHI) framework, operationalized through the Benchmarking Open Data Platform for Health AI (BODH) [18].

Research Gap

Despite the rapid expansion of AI and digital health technologies globally [11], evidence on their integration into maternal and child health services in India remains fragmented, with challenges related to infrastructure, data governance, and scalability. Many existing studies focus on specific technological innovations, pilot projects, or individual digital platforms, with limited synthesis of broader health system implications, implementation challenges, or long-term scalability [8]. A comprehensive review is therefore needed to better understand the current applications, reported outcomes, and implementation barriers associated with AI-driven digital health interventions for MCH in India [19].

Review Objective

The primary objective of this narrative review is to examine the integration of AI-enabled digital health interventions within the (MCH) systems in India. This narrative review aims to:

- List out the AI-enabled digital health interventions in India's maternal and child healthcare.
- Synthesize the reported evidence and quantitative outcomes regarding the impact of AI-enabled digital health interventions on clinical decision support systems, diagnostic precision, and service delivery efficiency.
- Examine the structural, socio-behavioral, and ethical considerations, including user resistance and data governance, that influence the deployment and scalability of AI integration in the Indian context.

Materials and Methods

Study Design

A narrative review was conducted to examine the role of artificial intelligence in maternal and child digital health in India. The existing literature was comprehensively synthesized across interdisciplinary domains, including digital health, AI, MCH, public health, and health systems research, to provide an overview of emerging evidence, identify key thematic areas, and to highlight implementation considerations for the integration of AI in MCH services.

Data Sources and Literature Search

A comprehensive literature search was performed on PubMed, Google Scholar, and Scopus to identify the articles published from 2015 to 2026. "Artificial Intelligence," "Maternal Health," "Child Health," "Mobile Health," "India," and "Digital Health Ecosystem"; are the key search terms used to develop the search strategy. Additional sources were identified through the searches of the reference lists of selected articles, as well as

relevant government documents and reports from multilateral organizations. A comprehensive search strategy was developed by combining these search terms, to capture the rapid evolution of AI-driven digital health systems.

Inclusion and Exclusion Criteria

Peer-reviewed articles, reports from multilateral organizations, government documents (e.g., ABDM, NHM, NITI Aayog), and case studies that focused on maternal and child health, AI-supported digital health in India, or comparable LMIC settings were included for this narrative review. Studies focusing purely on clinical drug trials without a digital or AI component and studies that did not involve digital health or AI were not included in the comprehensive search for this narrative review.

Study Selection and Screening

Articles identified by the search process were initially screened based on their titles and later the abstracts were screened to determine their relevance to the objectives of this narrative review. Full-text articles were selected based on their relevance and contribution to AI-driven digital health system for maternal and child healthcare. Articles that met our inclusion criteria were thoroughly reviewed, and relevant outcomes were analysed and presented in the results and discussion sections.

Data Availability and Extraction

No datasets were generated or analysed for this review. Relevant information from the included articles was extracted, organized, and documented in this review to capture key characteristics, of the type of AI-driven digital health system or platform, its context of implementation, and its reported outcomes related to maternal and child healthcare.

Thematic Synthesis Approach

A thematic synthesis approach was followed to group the extracted information under these thematic categories. Which includes : (1) global evidence on AI in maternal and child digital health; (2) lessons from LMICs; (3) emerging developments within India's digital health ecosystem; (4) empirical evidence on AI-supported digital health systems in India; and (5) implementation barriers and enabling factors.

Results

Key Domains of AI in Digital Health

AI in Clinical and Public Digital Health Systems

The World Health Organization (WHO) classifies digital health interventions into four overarching groups: interventions for clients, interventions for healthcare providers, interventions for health systems or resource managers, and interventions for data services [6]. Across multiple disciplines in healthcare, Artificial Intelligence (AI) is transforming health systems by enabling advanced data analysis, predictive modeling, and clinical decision support systems, with the potential to improve diagnostic accuracy, optimize treatment decisions, and enhance health system efficiency through data-driven insights [19]. AI is being used, tested, or considered in healthcare, and the examples of AI use depending on their role are stratified across four broad functional areas: includes population health, individual care, Health Systems and Pharma & MedTech [20]. Figure 1 presents the framework that shows which use cases are included in each group.

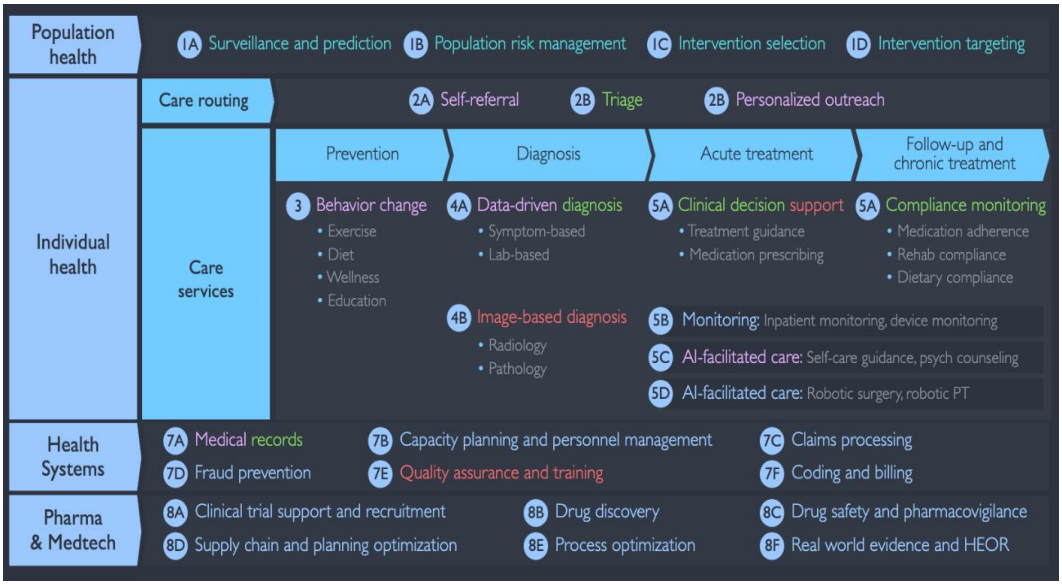

Figure 1. Framework of all AI use cases in healthcare categorized into four key groupings

Source: *https://digital.library.unt.edu/ark:/67531/metadc2289561/m2/1/high_res_d/AI-in-Global-Health_webFinal_508.pdf*

In maternal healthcare, AI has shown efficacy in predicting adverse outcomes, such as preterm birth, gestational diabetes, and preeclampsia, facilitating timely interventions [5]. AI-enabled digital health optimizes the processing of Electronic Health Records (EHRs) by facilitating insights into personalized treatments and disease patterns. In diagnostics, AI improves the speed and precision by analyzing medical images and laboratory results [10]. AI's capability to analyze extensive medical datasets enables the early detection of diseases like latent cancers and tuberculosis, allowing for proactive treatment strategies [15]. One key application is the Clinical Decision Support System (CDSS), which assists healthcare professionals in disease diagnosis and risk identification across various medical specialties [21].

Policy and Governance Landscape

Global and national initiatives for MCH are aligned with SDG-3, targeting the reduction of maternal mortality (target 3.1), preventable deaths of newborns and under-5 children (target 3.2), universal access to sexual and reproductive healthcare services (target 3.7), and Universal Health Coverage (UHC) (target 3.8) [1]. In India, the National Health Policy (NHP) guides the overall policy approach towards the health sector and recognizes the role of technology in healthcare delivery, envisioning a dedicated institutional mechanism to develop, deploy, and regulate digital health [22].

The National Digital Health Blueprint (NDHB) was subsequently introduced to integrate localized, fragmented health data through digital services and it was later strengthened strategically and renamed as ABDM, providing a standardized digital health usage system and centralizing longitudinal health records through the ABHA [23]. This infrastructure enables the seamless flow of maternal data across the Unified Health Interface (UHI), facilitating continuity of care from antenatal screening to postnatal follow-up [24, 25].

AI governance within the digital health ecosystem is defined by SAHI and BODH strategies to establish national standards for ethical, transparent, and evidence-based AI deployment with validated clinical AI models against indigenous datasets and to ensure accuracy with reduced algorithmic bias [18, 26]. The Digital Personal Data Protection (DPDP) Act (2023) and its 2025 rules together

create a citizen-focused and innovation-friendly framework for the responsible use of digital personal data, mandating explicit consent [27].

Global Evidence on AI-Enabled Digital Health in Maternal and Child Healthcare

Global Evidence on AI-Enabled Care

Globally, to enhance clinical decision-making, improve diagnostic accuracy, and support timely identification of high-risk conditions, AI has been integrated into digital health systems primarily through AI-CDSS, telemedicine platforms and predictive analytical platforms [28]. Research shows that AI-driven diagnostic tools, such as fetal cardiotocography, ultrasonography, and magnetic resonance imaging, enhance clinical accuracy and patient monitoring [3, 28]. In public health surveillance, these AI systems can rapidly evaluate data from various sources to identify trends and provide early warnings of potential outbreaks, thereby improving public health outcomes [10].

Evidence from real-world implementations demonstrates that these AI-driven digital health systems can contribute to improved healthcare outcomes [4, 7, 21]. In this context, the compilation of real-world evidence on the impact of AI in health, as presented in a casebook by the WHO and the Ministry of Health and Family Welfare (MoHFW), Government of India, serves as a comprehensive resource for policymakers, innovators, and researchers to promote the responsible and ethical integration of AI [29].

Evidence from a systematic review and meta-analysis identified 47 maternity-specific CDSS, which demonstrated positive contributions to maternity care and resulted in improved outcomes, with 1.69 times increase in the odds of receiving WHO-recommended quality of care [7]. In neonatal care, AI-driven predictive models assist to assess the likelihood of complications and identify at-risk newborns with the help of birth weight, gestational age, and maternal age [4]. Another AI predictive model is; AI-assisted ultrasound, which assess preterm delivery timing with high-sensitivity AI prediction [17]. Table 1 presents a summary of the key global AI-enabled digital health initiatives in maternal and child healthcare.

Table 1. Summary of Key Global AI-Enabled Digital Health Initiatives in Maternal and Child Healthcare

Initiative	AI Characterization	Geography	Status	Key metric/Impact
PROMPTS [30] (digital maternal health platform with AI-supported triage, not as fully autonomous AI)	AI-enabled / AI-supported maternal messaging and tele-triage	Kenya (40 facilities; scaled to 900+ facilities)	Implemented and scaled	Improved maternal knowledge, birth preparedness, care seeking, newborn care, and postpartum care practices
BabyChecker *(https://delft.care/sierraleone/)*	AI-guided obstetric ultrasound	Sierra Leone	Pilot / early implementation	Enabled frontline workers to perform ultrasound with ~83% acceptable image quality, improving antenatal risk detection

AI-enabled ultrasound *(https://www.philips.com/a-w/about/news/archive/features/2025/how-ai-enabled-ultrasound-helps-increase-access-to-maternal-care.html)*	AI-assisted fetal imaging and measurement	Kenya and LMIC settings	Early implementation	Expected improvement in identification of high-risk pregnancies and expanded access to imaging

Computer-Vision Ultrasound

AI optimizes obstetric imaging and measurement accuracy, thereby reducing errors, enhancing patient outcomes, and lowering health care costs [3, 15]. In fetal care, AI techniques are used to monitor fetal health through ultrasound images, to assess pregnancy age, fetal and placental location, cervix evaluation, identification of congenital defects, and overall fetal development [5, 17]. AI software, such as caption guidance, aids doctors in taking echocardiographic images [24]. AI can perform diagnostic tasks faster and at a lower cost, potentially improving healthcare delivery and assisting in development of medical protocols and drug development [14, 17, 24]. Evidence suggests that AI in obstetric ultrasound has high accuracy and technical performance, with a limited translation into measurable population health outcomes.

Chatbots and Virtual Assistants

AI-driven innovations support automation, remote patient monitoring through intelligent telehealth and wearables devices. Virtual assistants and chatbots assists in direct patient outreach, and timely comprehensive care through precision diagnostics, such as those implemented in Babylon (babylonhealth.com) and Ada (ada.com) for at-risk patients [14, 20]. In connected care settings, virtual assistants and AI chatbots facilitate the integration of healthcare clinics, hospitals, social care services, patients, and caregivers into a unified, interoperable digital infrastructure, offering insights for enhancing behavior, sleep, and general wellness [14]. AI chatbots can further enhance medical education by providing personalized learning resources and contributing to ongoing professional development. [31].

LMIC Lessons: Context for India

The Kilkari program, one of the world's largest direct-to-beneficiary mobile health (mHealth) initiatives, has significantly improved contraceptive use and immunization rates, demonstrating the practical effectiveness of large-scale digital health interventions [32]. The SMART health pregnancy system for mobile clinical decision support, suggests a possible improvements in mean hemoglobin (anemia) and demonstrated feasibility and acceptability among pregnant or postpartum women and Community Health Workers (CHW) [33]. Similarly, ICT interventions, such as eHealth kiosks, have proven to improve infant care awareness by influencing mothers' healthcare behaviors through social networks [13].

Tailored voice messages to pregnant women and mothers have shown improvement in maternal healthcare behaviors and their knowledge, particularly regarding institutional deliveries and immunization practices, in low-resource settings [12]. LMICs have demonstrated that mHealth adoption is rapid, but infrastructural and literacy gaps persistently limit their equitable impact [10, 13]. This highlights that technology deployment without addressing structural barriers produces suboptimal outcomes. These LMIC experiences establish a critical foundation of evidence that contextualizes the Indian AI-supported digital health innovation landscape.

AI-Supported Digital Health Systems in the Indian Innovation Ecosystem

India's digital health ecosystem has evolved rapidly from 2022-2025 by integrating AI-enabled initiatives by government of India to improve public health delivery, and is anchored by the ABDM, which has registered over 863 million digital health IDs as of early 2026 (https://www.pib.gov.in/PressReleasePage.aspx?PRID=2234141&reg=3&lang=1). The Ayushman Bharat Health Accounts (ABHA) establishes a unique longitudinal health identifier infrastructure for the integration of AI to the existing digital health ecosystem [16, 34]. The eSanjeevani telemedicine platform provides the data ecosystems and service delivery channels through its remote consultations for rural and underserved populations which enables the integration of AI-supported clinical decision tools [16]. As for the recent government reporting, it was documented that; from April 2023 to November 2025; 282 million tele consultations were benefited, and 12 million were aided specifically by AI-recommended diagnoses through eSanjeevani CDSS initiative [34].

India's AI healthcare ecosystem has transformed with the existing digital infrastructure through the ABDM and its ABHA accounts, under which the private sector has developed and implemented AI-driven initiatives for a better healthcare delivery in the recent years [34]. Key AI-enabled platforms in maternal and child health by the private sector include CareNX (Fetosense) for fetal monitoring and gestational risk stratification, which has supported over 500,00+ mothers across 20+states [35], and NemoCare Raksha an indigenous wearable neonatal monitoring system, which has supported over 20,00+ newborns since 2022 [36].

The Ministry of Health and Family Welfare's SAHI framework and the BODH platform operationalizes AI evaluation, adoption, and integration through a human-centric, ethical and transparent model [18, 26]. The Digital Personal Data Protection Act (2023) and its 2025 rules address data privacy concerns using a citizen-focused consent framework [27]. Table 2 summarizes the key AI-supported digital health platforms in the Indian ecosystem.

Table 2. AI-Supported Digital Health Platforms in India

Health Focus	AI solution/Initiative	Process, Technology and Treatment experience	Clinical/Operational Impact
Telemedicine	eSanjeevani CDSS [34]	Differential Diagnosis: Streamlines patient complaints and provides AI-based differential diagnosis recommendations	282 million consultations benefited from April 2023 to November 2025; 12 million aided specifically by AI-recommended diagnoses
Maternal care	CareNX [35]	Integrated Ecosystem: Portable antenatal care kits and wireless fetal monitoring (Fetosense) used by frontline workers for household-level screenings (BP, hemoglobin, fetal heart rate) of pregnant women	Supported 500,000+ mothers across 20+ states. Lowered out-of-pocked expenditure and reduced operational costs
Neonatal Monitoring	NemoCare Raksha [36]	Wearable IoT/AI: A wireless sock-like wearable device for newborns that continuously tracks heart rate, respiratory rate, blood oxygen	Supported 20,000+ newborns since 2022

		saturation, and body temperature. Wireless data transmission allows one nurse to monitor 40–50 infants simultaneously.	
Health AI ecosystem	SAHI [18, 26]	AI guidance framework	To strengthen secure, evidence-based, transparent and accountable AI deployment in healthcare
Health AI ecosystem	BODH [18, 26]	Structured mechanism	For testing and validating AI solutions before deployment

Empirical Evidence from AI-Supported Digital Health Systems in India

Empirical Impacts in India

Current evidence suggests a fundamental shift in India's healthcare system. The transition from digital health systems, which primarily focused on improving service utilization and appointment adherence [26], to AI-enabled digital health integrating predictive analytics, advanced data analysis, and CDSS signifies a paradigm shift. AI platforms such as CareNX (Fetosense), NemoCare Raksha and the eSanjeevani CDSS system have shown measurable increase in diagnostic accuracy at the primary healthcare level [29, 34]. These advancements suggest that AI-enabled interventions can significantly reduce the burden on tertiary care centers by identifying complications before they escalate into neonatal or maternal emergencies [4, 30].

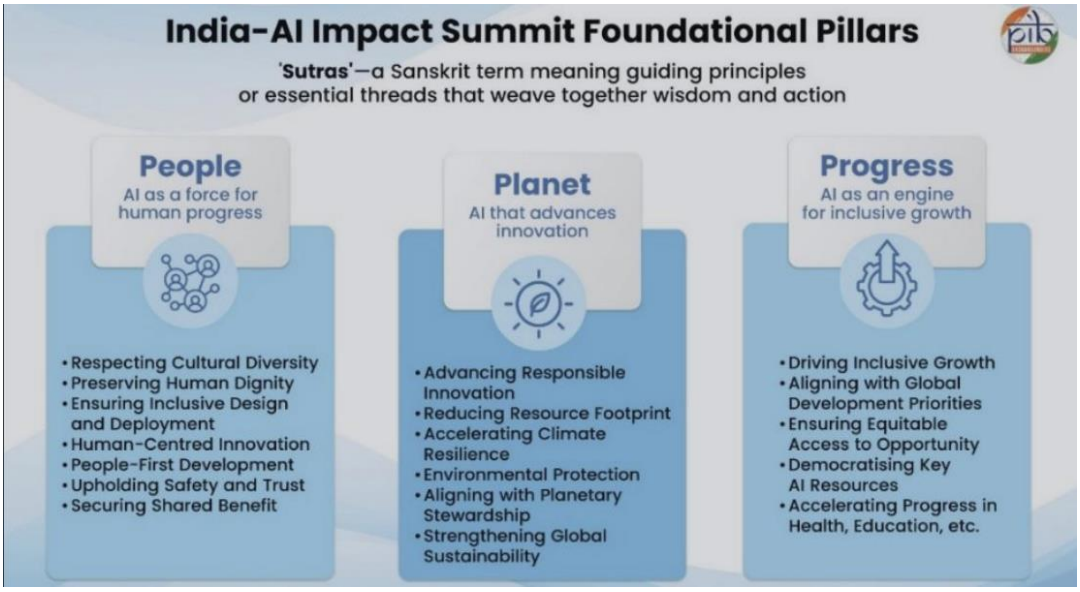

Figure 2. India AI Impact Summit Foundational Pillars

Source: *https://static.pib.gov.in/WriteReadData/specificdocs/documents/2026/feb/doc20262137887O1.pdf*

India hosted the Global South's first International AI Impact Summit in February 2026, focusing on three foundational pillars, as shown in Figure 2. The AI-enabled healthcare ecosystem is helping in early detection and screening, enhancing clinical decision support systems, and providing remote care [34]. AI-enabled tools within the National TB Elimination Programme have resulted in a 27% decline in adverse TB outcomes and over 4,500 outbreak alerts [34].

Service Delivery Metrics

The SMART health pregnancy system, deployed in rural India, demonstrated pilot cluster randomized controlled trial evidence of feasibility, acceptability, and preliminary improvements in maternal health metrics, including anemia management [33]. Mobile messaging interventions, such as mMitra, assessed through a pseudo-randomized controlled trial, showed improvements in IFAS adherence, birth preparedness, and healthcare-seeking behaviors among low-income women [12]. Kilkari, evaluated through a randomized controlled trial, demonstrated improved reproductive and child health outcomes, including immunization rates and an increase (approximately 2.3%) in contraceptive use [32]. Even though India's transition from digital health systems to AI-enabled digital health initiatives through the recent years (2022-2025), further research is needed to assess their impact on long-term health outcomes.

Cost-Effectiveness

AI-supported digital health systems may contribute to reduced healthcare costs through optimizing obstetric imaging, reducing unnecessary hospital visits via telemedicine consultations, and early detection of high-risk conditions before they require expensive tertiary interventions [5, 15]. A strategic approach involving public-private partnerships and community-driven initiatives can enhance cost-effectiveness while ensuring equitable access to AI-driven healthcare solutions across socioeconomic and geographical divides [9]. Even though there is evidence from digital health related studies on cost savings through reduced hospital visits [14], the evidence on the cost-effectiveness of AI-supported digital health systems is limited, with few or no direct economic evaluation studies in this context.

Implementation Barriers and Enablers

While AI is being applied across multiple domains of digital health systems, including diagnostics, clinical workflows, population health, system optimization, and care delivery; there remains a persistent global challenge in relation to limited evidence generation, lack of standardized evaluation frameworks, and the absence of clear regulatory pathways for its safe and effective use in healthcare [10, 29].

Barriers

To ensure the equitable and sustainable deployment of AI-enabled digital health initiatives, it is essential to address key implementation barriers, such as limited infrastructure, data related issues, individual level factors, and system-level constraints, which are interdependent. Infrastructure related barriers are frequently reported in low resource settings, they include low or limited internet connectivity, inadequate digital infrastructure, and availability of devices [13]. Data related challenges include data scarcity, lack of standardized datasets, incomplete or biased datasets, and data validation, which compromises the accuracy and reliability of decision support systems [10, 17]. System related and individual level factors, such as organizational capacity limitations, standardized frameworks, low digital literacy, and user resistance hinder AI and digital health implementation in healthcare settings [10, 14, 21].

Enablers

AI integration in health systems necessitates a strategic and human-centered collaborative approach involving diverse stakeholders, innovative solutions, and sustained efforts [9, 14]. Collaboration with specialists, such as obstetricians and public health experts, can enhance the dataset dimensions and improve health system performance for better AI integration [28, 37]. Enhancing technology access in remote regions requires improved digital infrastructure, emphasizing last-mile connectivity and public-private partnerships [9]. Equitable and sustainable deployment can

be achieved through enhanced policy frameworks, public-private partnerships and community-driven initiatives [10, 13].

Discussion

Implications for Maternal and Child Healthcare

The evidence synthesized in this review demonstrates an evolving transition in India's MCH landscape, from digital health systems to AI-enabled digital health systems. AI's potential to improve diagnostic accuracy through predictive analytics, early identification of high-risk conditions such as pregnancy-induced hypertension and gestational diabetes mellitus, and to expand remote consultations through eSanjeevani CDSS can contribute to improved maternal and neonatal health outcomes [4, 34]. These advancements align with India's SDG-3 commitments and demonstrate that AI-enabled interventions can significantly improve early risk identification and decision support, which may contribute to improved health outcomes [1, 20].

Digital health interventions have reported measurable improvements in service utilization, continuity of care, and MCH practices, as evidenced by cluster randomized evaluations in LMIC settings [30]. Evidence from systematic reviews suggests that CDSS improves the timely identification of complications and adherence to clinical guidelines [7]. The convergence of evidence from global CDSS meta-analyses and India-specific pilots suggests that when AI is embedded within existing health system structures, which are supported by robust infrastructure, such as the ABDM in India, it can improve the quality of maternal and child healthcare [7, 23].

Governance and Ethical Considerations

Ethical AI Principles

An ethical principle is a statement of duty or responsibility in the context of the development, deployment, and continuing assessment of AI for health [28]. AI integration in healthcare serves to supplement rather than replace human clinical judgment by providing deep insights into patient journeys and complex care processes [14]. Strategic investments in AI research, infrastructure enhancement, and ethical governance are necessary to mitigate challenges, such as data privacy concerns and biased algorithms. [15]. Education and awareness among policymakers and the public regarding AI's capabilities and limitations are essential for sustainable integration [34].

For the appropriate use of AI for health by adopting ethical approaches, the WHO proposed six ethical principles (protecting human autonomy, promoting human well-being and safety, ensuring transparency and explainability, fostering accountability, and ensuring inclusiveness and equity to promote AI) for use as a basis for governments, technology developers, companies, civil society, and inter-governmental organizations [28]. In the Indian context, the Indian Council of Medical Research (ICMR) reinforces these principles, with additional emphasis on contextual relevance, data privacy, fairness, and responsible innovation, highlighting the need for algorithmic validation [37]. Figure 3 shows the ten ethical principles to address issues specific to AI for Health in the Indian context. DPDP 2025 rules marks the full operationalization of the DPDP 2023 Act with citizen focused and innovation friendly framework for the responsible use of digital personal data [27]

Along with these global [28] and national [37] specific guidelines, for better governance, global analyses highlight the need for evolving regulatory frameworks in AI for healthcare. A major ethical concern identified across global and national frameworks is the risk of algorithmic bias arising from incomplete or unrepresentative data [10, 28]. For the safe, ethical, and evidence-based deployment of AI in India's digital healthcare ecosystem, the

Ministry of Health and Family Welfare, India, launched the strategy for AI in healthcare during the AI impact summit, February 2026 held in NewDelhi, India. The SAHI includes a governance framework to serve as a policy roadmap to guide AI evaluation, adoption, and integration within the healthcare ecosystem. The BODH platform provides a structured mechanism for testing and validating AI solutions [18, 26].

Figure 3. Ethical Principles in AI for Health, India

Source: *https://www.icmr.gov.in/icmrobject/custom_data/pdf/Ethical-guidelines/Ethical_Guidelines_AI_Healthcare_2023.pdf*

Privacy

To address the multifaceted challenges related to data governance, there is a need for rights-based frameworks, robust regulations, strong data management, and informational privacy mechanisms, with focus on the unique needs of marginalized populations [10]. Data privacy specifically concerns the protection of individual rights, including consent, confidentiality, and control over personal health information [28]. Maternal health data are deeply personal, requiring strong privacy safeguards supported by clear communication and transparency regarding how data are collected, used, and shared to ensure informed consent and maintain patient trust [38]. Strategic investments in AI research, data infrastructure strengthening, and ethical governance can effectively address challenges related to data privacy concerns [15, 25]. The DPDP Act (2023) and its 2025 rules represent a significant step towards citizen-focused data protection in India by establishing a rights-based legal framework [27].

Equity and the Digital Divide

A strategic approach involving the design of affordable and accessible AI applications, targeted interventions, and resource distribution for underprivileged communities can ensure equitable access to AI-driven healthcare solutions across socioeconomic and geographical divides [9]. Developing a national digital health infrastructure with standardized data systems can expand digital health access in rural areas; however, its effectiveness is strongly dependent on infrastructure readiness, system integration, and user-level accessibility [9, 39]. In India, strengthening the ABDM infrastructure and integrating it with the Unified Health Interface (UHI) enables real-time AI risk stratification across the maternal health continuum, from antenatal screening to postnatal follow-up [24, 25].

Ethical frameworks from the WHO and ICMR emphasize that AI systems must ensure equity, inclusiveness, and fairness, particularly by using representative datasets and avoiding bias that may reinforce existing health disparities [28, 37]. India's high rural population (approximately 65% according to the economic survey 2022-2023) and associated unfamiliar clinical conditions present unique equity challenges. For this rural population, DPDP 2023 Act's explicit consent requirement during any health emergencies may conflict to avail the required timely healthcare and suggests the need for context-sensitive legal provisions [37].

Research Gaps and Future Directions

Despite recent advancements in India's DPDP 2023 Act, significant gaps remain in the governance of AI-enabled healthcare, these include the non-availability of AI-specific regulatory frameworks, standardized evaluation methodologies, and accountability mechanisms for automated decision-making which highlights the need for dedicated AI governance provisions [10, 40]. Even though the DPDP 2023 Act has enhanced with the 2025 rules to strike a careful balance between protecting citizens' privacy and promoting innovation and growth, it still needs time to meet the phased compliance with organisations and to strengthen privacy and support for the responsible innovation [27].

Further research is required to explore the development or to strengthen the existing AI regulatory authority with the integration of AI-specific provisions into existing data protection laws, AI-human collaboration in health care and rigorous methodologies to better understand the impact of AI on maternal, newborn, and child health (MNCH) outcomes.

Conclusion

Artificial Intelligence and digital health systems are reshaping maternal and child healthcare through the implementation of clinical decision support systems, early risk identification, and service delivery processes. Evidence indicates that digital health interventions have led to measurable improvements in health-seeking behavior, service utilization, and continuity of care. Although public-private partnerships, community-driven initiatives, and policy frameworks have facilitated the progress of digital health systems, barriers exist in the form of limited digital infrastructure, low digital literacy, data governance gaps and algorithmic bias. To address these barriers and to strengthen the existing digital health systems a clear need exists for a single regulatory authority at the national level which is AI-integrated.

While AI-integrated digital health platforms are evolving to strengthen the health system, they also introduce ethical, legal, and governance challenges, including concerns related to privacy, transparency, accountability, and algorithmic bias. To address these challenges, and to strengthen the existing AI driven initiatives by ABDM enabled applications, the Government of India launched novel initiatives such as the SAHI governance framework, BODH open data platform, DPDP Act 2023 for personal data protection, and notified the DPDP rules 2025 for the responsible use of digital personal data. Overall, AI-integrated digital health systems require alignment with established ethical frameworks to ensure their safe deployment for equitable and better health outcomes. AI integration should not be considered as a technological innovation but as a collaborative, responsibly designed, validated approach to achieve SDG-3 goals and to provide universal, high-quality maternal and child healthcare.

Conflict of Interest

The authors declare no conflicts of interest.

Ethical Approval

Formal ethics approval was not required for this review, as the analysis was primarily based on review of existing published data.

Data Availability

This narrative review is based on published literature, including peer-reviewed articles, government documents, and reports from multilateral organizations, which are appropriately cited in the reference list. No datasets were generated or analyzed for this narrative review.

Funding

This narrative review did not receive any institutional or external funding.

Author Contributions

Pavani Divi: Responsible for conceptualization, literature search, thematic synthesis of relevant information, preparation of original draft, and subsequent review. **Abiodun Olaiya Paul:** Engaged in review and editing, provided methodological guidance, critical revision of intellectual content, and supervisory oversight. **Leena Gaikwad, Pragath Kumar Ponnam:** Involved in review and editing, validation of India-specific content, and conducted critical appraisal.

Acknowledgements

The authors express their gratitude, and acknowledge the contributions of researchers, clinicians, and public health professionals, whose published work has formed the foundation of this narrative review.

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