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Review Article

From paper records to digital platforms: web-based applications in maternal and child healthcare in India

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ABSTRACT

India's maternal and child health (MCH) landscape has undergone a significant digital transformation over the past decade. The shift from paper-based records to web and mobile-based platforms has enabled more systematic tracking, monitoring, and delivery of essential health services. Digital tools are now central to India's national health programmes, particularly those addressing reproductive, maternal, neonatal, and child health (RMNCH). This review describes key web-based and mobile applications currently in use for MCHcare in India, with a focus on their features, scope, and role in programme delivery and monitoring. A narrative review was conducted using published literature, government reports, and programme documentation available up to January 2026. Applications reviewed include the reproductive and child health (RCH) portal, ANM Online (ANMOL), POSHAN tracker, U-WIN, electronic vaccine intelligence network (e-VIN), and Kilkari. Each platform serves a distinct yet interlinked function: beneficiary registration and tracking, nutritional surveillance, immunisation management, vaccine logistics, and health communication. Together, they form an increasingly integrated digital MCH ecosystem. However, persistent challenges, including poor network connectivity, limited digital literacy, device availability, cost sustainability, and data security concerns, continue to constrain their effectiveness, particularly in resource-limited settings. Web-based applications have strengthened the delivery and monitoring of MCH services in India. Realising their full potential requires sustained investment in digital infrastructure, workforce capacity building, and governance frameworks that ensure data privacy and interoperability.

Keywords: Digital health, Maternal and child health, Web-based applications, ANMOL, RCH Portal, mHealth India

INTRODUCTION

Historically, public health records have been maintained on paper to support routine documentation and reporting across health programmes.¹ However, as the scale and complexity of public health services increased, reliance on paper records began to reveal practical limitations, particularly in storage, retrieval, information sharing, and the timely use of data for decision-making.² These challenges became more evident as large-scale, national programmes expanded, requiring continuous monitoring and follow-up.

In response, India's health system has gradually moved towards digital methods of record management. This shift has occurred in stages, starting with digitisation, where information is converted from paper to basic digital formats, followed by digitalisation, which has enabled data to be accessed and managed through software applications. Recently, the focus has moved towards digital transformation, where digital tools are used to analyse data and link information across platforms.³ As health information systems have evolved along this continuum, both the usability of data and its potential to inform action have improved.⁴

Digital health, which earlier emerged through concepts such as eHealth and mHealth, now includes a broad range of technologies used in healthcare delivery. Mobile and web applications form a significant component of this ecosystem, as highlighted by frameworks such as those described by the Stanford Centre for Digital Health.⁵ In India, this transition gained traction with the national health policy 2017, which bolsters the use of digital technologies and improves access, efficiency, and quality of healthcare services. The use of appropriate technology has been recognised as one of the four pillars of primary healthcare to improve the quality of care. These efforts are further consolidated through the development of a national digital health framework and the launch of the Ayushman Bharat Digital Mission.⁶

Within this evolving digital landscape, MCH is a key area where web-based applications have been widely adopted. Over the past decade, several digital platforms have been introduced to support service delivery, beneficiary tracking, nutrition monitoring, immunisation, and logistics management. Together, these applications illustrate how digital tools are being used to strengthen continuity of care and programme monitoring in India.

ANMOL: SUPPORTING ANMS ACROSS THE CONTINUUM OF CARE

Launched on April 7, 2016, by the Ministry of Health and Family Welfare with technological support from UNICEF, the ANMOL application represents a key milestone in digitally supporting India's frontline health workforce. Now implemented across 28 States and Union Territories, the platform was developed to assist Auxiliary nurse midwives (ANMs), who routinely serve populations of 3,000-5,000 people while managing extensive paper-based records.⁷ Although manual registers remain part of the system, ANMOL significantly reduces this workload by consolidating multiple registers into a single tablet, enabling near real-time data entry and linkage with the RCH Portal, ABHA ID, and POSHAN tracker. QR-code-based scanning of mother and child protection (MCP) cards further allows rapid retrieval of beneficiary records during field visits.⁸

ANMOL follows the RCH life-cycle approach and is organised into three interlinked components. The eligible couple (EC) module captures reproductive-age couples, documenting family planning status and contraceptive practices. The pregnancy component comprises nine structured sub-modules that cover registration, antenatal care, identification of high-risk pregnancies, delivery details, and post-delivery follow-up. The child care module extends care beyond birth, tracking infants and young children up to two years of age, with a focus on immunisation, growth monitoring, and early childhood services. Built-in audio-visual counselling modules further support the delivery of consistent, good-quality health education to beneficiaries.⁹

From an operational perspective, ANMOL supports ANMs by generating automated work plans and due-overdue service lists, enabling better planning of field visits, outreach sessions, and Village Health Nutrition and Sanitation Days (VHNDs). Its hybrid design allows offline data entry with later online synchronisation, making it practical even in low-connectivity settings. Together, these features strengthen last-mile service delivery, improve programme oversight, and help establish a sustained continuum of care across MCH services.¹¹

POSHAN TRACKER: TRACKING NUTRITION TO STRENGTHEN EARLY CHILDHOOD CARE

Launched on March 1, 2021, by the Ministry of Women and Child Development, the POSHAN tracker is a mobile-based application developed to support the delivery and monitoring of nutrition and early childhood services under the integrated child development services (ICDS) scheme. Introduced as a core digital component of POSHAN Abhiyaan 2.0, the application serves as a practical field-level tool for Anganwadi workers (AWWs), enabling them to record beneficiary details and service delivery directly through their smartphones.¹²

The platform allows registration and tracking of key beneficiary groups, including pregnant women, lactating mothers, children below six years of age, and adolescent girls. Daily programmatic activities such as marking attendance, recording the distribution of supplementary nutrition (hot cooked meals and take-home rations), and documenting preschool education sessions can be entered with ease. An important feature of the application is the POSHAN calculator, which simplifies growth monitoring by automatically comparing height and weight measurements with WHO growth standards. This facilitates early identification of undernutrition, including stunting, wasting, and underweight, and supports timely follow-up.¹³

To reduce the risk of missed services, the POSHAN tracker provides alerts for pending tasks and scheduled home visits. The application supports multiple Indian languages and offers offline functionality, making it usable even in areas with poor network connectivity. Its linkage with platforms such as the RCH portal strengthens convergence between health and nutrition services. Despite some operational challenges, the POSHAN Tracker has emerged as an important tool for improving nutritional monitoring, programme oversight, and last-mile service delivery under POSHAN 2.0.

U-WIN: A UNIFIED REGISTRY FOR UNIVERSAL IMMUNISATION COVERAGE

Launched nationally on October 29, 2024, by the Ministry of Health and Family Welfare, U-WIN was developed to address long-standing gaps in the universal immunisation programme (UIP) arising from fragmented paper records, misplaced immunisation cards, and incomplete registers.

These gaps often resulted in "zero-dose" children and pregnant women being missed by the system. Conceived as a unified digital registry, U-WIN provides a permanent electronic immunisation record, beginning from the first antenatal visit and continuing through childhood vaccinations.

The platform is organised into five functional modules: Beneficiary, vaccinator, mobilizer, delivery point, and administrator, making it accessible to beneficiaries, ASHA workers, vaccinators, and programme managers. Beneficiaries can self-register, locate nearby routine immunisation sessions, book slots, and receive automated reminders. For health workers, U-WIN enables real-time vaccination entry, Aadhaar-based authentication to avoid duplication, and the generation of digital immunisation cards and certificates. All records are linked with ABHA IDs under the Ayushman Bharat Digital Mission, ensuring continuity of health records across locations.¹⁴

Beyond beneficiary tracking, U-WIN strengthens programme management by enabling real-time monitoring of vaccine coverage, stock availability, and cold-chain conditions. Integrated dashboards enable supervisors to track progress, identify low-coverage areas, prevent stockouts and wastage, and ensure timely procurement and distribution of vaccines. The "vaccination anywhere" feature further supports migrant and mobile populations by allowing access to immunisation services at any session nationwide. Early pilot experiences, including in Madhya Pradesh, demonstrated improved identification of unimmunised individuals and better service planning. Overall, U-WIN brings pregnancy tracking, newborn registration, and routine immunisation onto a single digital platform, reinforcing the delivery of safe, timely, and reliable vaccination services under the universal immunization programme.¹⁵

E-VIN: STRENGTHENING INDIA'S VACCINE SUPPLY CHAIN

Introduced in 2015 by the Ministry of Health and Family Welfare in collaboration with the United Nations Development Programme (UNDP), the e-VIN serves as the digital backbone of India's vaccine logistics system. It was developed to replace opaque manual processes that were often marked by stock-outs, overstocking, and loss of vaccine potency due to inconsistent temperature control. By bringing visibility and accountability into vaccine management, e-VIN has laid the foundation for a more reliable immunisation supply chain.¹⁵

The platform operates through an integrated network of smartphones, cloud-based systems, and SIM-enabled temperature loggers installed across more than 29,000 cold-chain points. Cold-chain handlers use the application to record vaccine utilisation, batch numbers, and expiry details at the end of each immunisation session. This information is transmitted to a central server, enabling programme managers at district, state, and national levels

to monitor stock positions through real-time dashboards. At the same time, temperature loggers provide round-the-clock monitoring of storage units and generate alerts when temperatures exceed safe limits, enabling timely corrective action and preventing vaccine spoilage.

By standardising vaccine logistics from manufacturers to peripheral health facilities, e-VIN supports immunisation services for nearly 2.5 crore infants and 3 crore pregnant women each year. The system has substantially reduced stock-outs and improved vaccine availability across health facilities.¹⁶ Its effectiveness has also informed adaptation in other countries, including Indonesia, Malawi, and Sudan, highlighting e-VIN's role as a practical and scalable model for strengthening vaccine supply chains.¹⁷

RCH PORTAL: A UNIFIED PLATFORM FOR RMNCH PROGRAMME MONITORING

India's digital journey in maternal and child health began in 2009 with the mother and child tracking system (MCTS), launched by the Ministry of Health and Family Welfare to support timely delivery of services and follow-up of pregnant women and children. As programme requirements expanded, MCTS was upgraded into the RCH portal in 2015, marking a shift from basic tracking to structured, name-based reporting.

The portal was further strengthened through the roll-out of RCH 2.0, developed with technical support from UNICEF and implemented nationwide by June 2025. RCH 2.0 introduced a more responsive mobile interface, cloud-based architecture, and alignment with the Ayushman Bharat Digital Mission, including mandatory use of ABHA IDs and linkage with health facility and health provider registries.¹⁸ These upgrades improved data consistency, interoperability, and ease of access across levels of the health system.

The RCH portal is primarily accessed by authorised health personnel, such as auxiliary nurse-midwives, health managers, and designated data entry operators, while ASHAs and AWWs are mapped within the system as mobilisers. It captures comprehensive programme information, including family planning services, antenatal and postnatal care, identification of high-risk pregnancies, birth outcomes, and child health services.

One of the portal's distinguishing features is its role in facilitating incentive payments under schemes such as Janani Suraksha Yojana, where Aadhaar-linked bank transfers ensure timely disbursement to both beneficiaries and frontline workers, reducing administrative delays. The portal also serves as a central convergence point by sharing data with complementary digital platforms such as U-WIN for immunisation tracking and POSHAN Tracker for nutritional monitoring. Through this coordinated approach, the RCH Portal strengthens programme oversight and supports more integrated delivery of maternal and child health services across India.¹⁹

KILKARI: RIGHT INFORMATION AT THE RIGHT TIME

Kilkari is a mobile-based audio messaging service designed to bridge persistent information gaps faced by mothers during pregnancy and early childhood. Introduced nationally as part of India's Digital India initiative, Kilkari delivers free, weekly, stage-specific health messages to women registered on the RCH portal, beginning from the second trimester of pregnancy and continuing until the child completes one year of age.

The service uses interactive voice response (IVR) calls, making it accessible even in low-literacy and low-resource settings.

Each message provides simple, practical guidance on pregnancy care, childbirth, breastfeeding, complementary feeding, family planning, and newborn care. By offering timely information aligned with a mother's stage of pregnancy or the child's age, Kilkari reinforces key behaviours that support healthy outcomes. The messages complement frontline workers' counselling and also address sensitive topics that may otherwise be difficult to discuss during home visits. Initially piloted in Bihar in 2013 and later scaled nationally, Kilkari is now operational across multiple States and Union Territories, helping ensure that essential health information reaches families regularly and reliably during this critical period.²⁰

CHALLENGES AND LIMITATIONS

Despite the progress made, several challenges continue to limit the effective implementation of web-based applications for MCH in India. Inadequate network connectivity and gaps in information technology infrastructure remain significant barriers in rural and remote settings. The costs of implementation, including digital systems, training, and distribution of devices, raise concerns about long-term sustainability, particularly at sub-district levels. Limited technical expertise among frontline workers is frequently cited as a barrier, with many health personnel reporting difficulties in navigating digital platforms alongside their routine workload.^{2,21}

It is equally important to recognise that digital tools cannot substitute for clinical assessment and physical examination. Exclusive reliance on platform-generated data carries the risk of missed diagnoses or delayed care if workers are not adequately supervised. Issues of data privacy and cybersecurity also persist; reported breaches in major hospitals in 2022 have underscored the need for robust safeguards.¹⁰ As the digital MCH ecosystem expands, ensuring that sensitive beneficiary data, including reproductive history and immunisation records, is protected must remain a priority. Governance frameworks addressing consent, data ownership, and cross-platform sharing are an area that warrants greater attention.⁹

Table 1: Summary of web-based applications used in maternal and child healthcare in India.

Applications	Launch date	Organisations	Key features
MCTS	2009	Ministry of health and family welfare	Name-based registration; service tracking for pregnant women and children.
RCH portal	2015; RCH 2.0 by June 2025	Ministry of health and family welfare (technical support: UNICEF)	Tracks ANC, PNC, family planning, child health, and high-risk pregnancies; JSY incentive payments; links U-WIN and POSHAN tracker; ABHA integration
ANMOL (ANM online)	7 April 2016	Ministry of Health and family welfare (technical support: UNICEF)	Consolidates ANM registers; covers EC, pregnancy, and child care; QR-code MCP card scanning; offline data entry; due-overdue list. Integration with RCH portal.
POSHAN tracker	1 March 2021	Ministry of women and child development	Multilingual app, registers key beneficiary groups; records nutrition distribution; preschool sessions; poshan tracker for growth monitoring.
U-WIN	29 October 2024	Ministry of health and family welfare	Immunisation registry from ANC to childhood; self-registration and slot booking; digital certificates; ABHA linkage; real-time coverage monitoring; outreach session generation; vaccination access for migrants
e-VIN	2015	Ministry of health and family welfare (in collaboration with UNDP)	Vaccine stock management across cold-chain points; temperature monitoring with breach alerts; real-time dashboards for all levels.
Kilkari	Piloted Bihar, 2013; scaled nationally	Ministry of health and family welfare	Free weekly IVR audio messages from 2nd trimester to child's first year; covers key MCH topics; accessible in low-literacy settings

*ABHA-Ayushman Bharat Health Account; ANC-Antenatal care; ANM-Auxiliary nurse midwife; EC- Eligible couple; IVR-Interactive voice response; JSY-Janani Suraksha Yojana; MCP-Mother and child protection; MCTS- Mother and Child Tracking System; PNC-Postnatal Care; UNDP-United Nations Development Programme; UNICEF- United Nations Children's Fund.

CONCLUSION

The expansion of digital applications in maternal and child health has contributed to better tracking, coordination, and monitoring of services across India. These tools have helped improve continuity of care, reduce administrative delays, and support programme implementation at scale. Moving forward, strengthening an integrated digital framework under the Ayushman Bharat Digital Mission, improving capacity building, and cautiously adopting emerging technologies such as artificial intelligence will be essential to ensure safe, equitable, and effective maternal and child healthcare through digital health support in India.

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