

Artificial Intelligence for Strengthening Primary Health Care in India: Governance, Equity and Indigenous Innovation

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Primary health care (PHC) is the foundational level of India's health system, yet the country continues to grapple with deficits in infrastructure, human resources, diagnostics, and essential medicines at this level. Under Ayushman Bharat, the Government of India has converted sub health centres and primary health centres into Ayushman Arogya Mandirs (AAMs) to deliver comprehensive primary care. As of July 2025, 1,78,154 AAMs had been established nationwide, with further expansion to over 1,80,000 centres by October 2025 and large-scale screening for hypertension and diabetes under the national NCD programme. Despite this impressive expansion, multiple reports and audits indicate persistent gaps in the availability of trained health workers, functional diagnostics, and uninterrupted essential drug supply at many facilities, particularly in rural and peri-urban areas.^[1-3]

Paradoxically, India's aggregate doctorpopulation ratio, estimated at 1:811, appears better than the WHO benchmark of 1:1000. Yet this national average masks substantial maldistribution, with shortages of medical officers, nurses, and specialists at primary and secondary levels, and concentration of providers in urban and tertiary centres. The routine burden of undifferentiated symptoms, chronic disease management, maternal&child health care, and geriatric problems therefore falls on an overstretched PHC workforce, often with limited access to specialist support, quality-assured diagnostics or robust clinical decision support. It is in this context that indigenous artificial intelligence (AI) applications, designed for India's primary-care realities, can act as an important force multiplier.^[4]

Emerging Indian AI applications in primary care

Over the past few years, India has moved from scattered AI pilots to structured deployment across public-sector platforms. The Ministry of Health and Family Welfare has reported the integration of an AI enabled Clinical Decision Support System

(CDSS) into the national telemedicine platform e Sanjeevani, supporting hundreds of millions of consultations and providing AI-assisted differential diagnosis recommendations for frontline providers. AI tools have also been used for diabetic retinopathy identification and abnormal chest X ray classification, enhancing early detection of eye disease and pulmonary pathology in resource-constrained settings. These initiatives demonstrate that appropriately governed AI can be embedded at scale within routine digital health services, including those linked to AAMs and other primary-care facilities.^[5-7]

For India's PHC system, the most immediately relevant AI applications include:

Decision support at point of care: Symptom-based triage, risk stratification, rational prescribing and referral prioritization, especially for noncommunicable diseases, maternal complications, paediatric emergencies and geriatric syndromes.

AI-assisted screening and diagnostics: Automated interpretation of images (retinal photographs, chest X rays), pattern recognition in ECGs or vital-sign trends, and risk scoring for hypertension, diabetes, anaemia, depression and common cancers.

Predictive surveillance and supply management: Early detection of local outbreaks, monitoring of malnutrition, and forecasting of medicine and diagnostic consumable requirements at PHC level.

Workflow optimisation: Predicting patient load, supporting teleconsultation workflows, identifying defaulters for follow-up and improving continuity of care across PHC and higher levels.^[6]

Critically, many of these functions are not "luxury add ons" but pragmatic solutions to everyday gaps that PHC teams face.

The imperative of AI governance

The governance framework must have the following components:

1. Access evaluation
2. Clinical application
3. Staff training
4. Risk management
5. Data governance
6. Patient rights

Without such governance, AI risks amplifying inequities, introducing opaque bias into clinical decisions, and eroding patient trust; with robust governance, it can strengthen PHC while safeguarding rights.

1. Access evaluation: AI tools must be evaluated for equitable availability across states, districts, and facility types. Indigenous development and local language interfaces are essential to avoid deepening digital divides between well-resourced urban centres and rural PHCs.
2. Clinical application: AI solutions such as CDSS modules or image-analysis tools require rigorous validation on Indian datasets, clear clinical protocols, and integration into existing workflows rather than parallel "pilot-only" systems.^[7-8]
3. Staff training: PHC medical officers, nurses, community health officers, and ASHAs need systematic training not only to use AI tools but to understand their limitations, question outputs, and maintain clinical accountability.
4. Risk management: Structured processes are needed to identify, assess, and mitigate risks such as misclassification, algorithmic bias, over-reliance, and cybersecurity threats. Risk registers should be incorporated into routine PHC quality-improvement cycles.
5. Data governance: AI depends on high-quality, interoperable data. The Ayushman Bharat Digital Mission (ABDM) and the National Health Stack provide an emerging digital public infrastructure, but strong policies on data quality, security, consent, and interoperability are vital.^[6]

6. Patient rights: Privacy, informed consent, explainability and autonomy must be central. Patients should know when AI is being used in their care and have recourse if they perceive harm or discrimination.

From pilots to a resilient PHC ecosystem

India does not need AI for its own sake; it needs context-sensitive, low-cost, interoperable, and ethically governed AI that solves practical PHC problems: missed diagnoses, delayed referrals, fragmented records, and weak surveillance. The rapid expansion of AAMs and telemedicine platforms provides an unprecedented opportunity to embed such tools at scale. If guided by strong governance, co designed with PHC providers, and evaluated for patient-centred outcomes, Indian AI applications can help transform PHCs and AAMs into smarter, more equitable, and accountable gateways to health, aligning technological innovation with the long-standing public health goal of universal, people-centred primary care.

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