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Harnessing AI and Big Data for Managing Emerging Health Challenges in India

Durga Chavali

Trinity Health/Oklahoma State University

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Abstract

India faces a complex landscape of emerging health challenges, including the rise of non-communicable diseases, infectious disease outbreaks, and disparities in healthcare access. The integration of Artificial Intelligence (AI) and Big Data analytics offers transformative potential to strengthen healthcare delivery, enhance disease surveillance, and support real-time decision-making. This paper explores the current and potential applications of AI and Big Data in the Indian healthcare system, highlighting successful case studies in epidemic prediction, diagnostics, resource optimization, and personalized medicine. It also discusses the infrastructural, ethical, and policy-related challenges that need to be addressed to fully leverage these technologies. With strategic investments and a collaborative framework involving government, academia, and industry, India can harness AI and Big Data to build a resilient, data-driven healthcare ecosystem capable of responding swiftly and effectively to current and future health threats.

INTRODUCTION

India's health sector is being challenged by an unseen disease—non-communicable diseases (NCDs) are becoming the top cause of most deaths, and it accounts for over 60% of India's overall death rate [1]. Non communicable diseases are group of diseases that are caused over the time due to the lifestyle changes, include cardiovascular diseases, cancers, chronic respiratory diseases. With such healthcare dangers piling up even higher, India now turns to cutting-edge technologies like artificial intelligence (AI) and big data in order to better detect, treat, and avert disease. Not only are these technologies reshaping the mode of care delivery but also bridging the rural-urban divide in health through scalable and low-cost solutions.

AI AND BIG DATA IN TACKLING NON-COMMUNICABLE DISEASES

1. Cancer Care Gets Smarter

According to the National Cancer Registry Programe (NCRP) under the Indian Council of Medical Research (ICMR), the cancer burden in India is projected to increase significantly. A study published in Scientific Reports forecasts that the number of breast cancer patients in India will rise steadily from 2021 to 2030, with an annual increase rate of approximately 5.6% [2]. AI is

already making significant headway in cancer care through early detection and treatment optimization.

- Niramai's Thermalytix technology[3], which fuses thermal imaging with AI, offers a non-invasive and affordable breast cancer screening solution. Research shows that this technology achieves 90% sensitivity during its rural testing programs thus providing essential help to those in need**.**
- OncoStem's can assist Breast includes AI-driven tumor biomarker analysis that decreases unnecessary chemotherapy by 30% and provides more precise and cost-effective cancer treatment[4].
- Trend of cancer is being investigated through big data compilation of 250 hospitals by National Cancer Grid in order to maximize treatment planning on a population basis[5].

2. Combating the Obesity Epidemic

A study published in *The Lancet* in 2025 reports that India had the second-highest number of adults with overweight and obesity in 2021[6], with an estimated 180 million individuals affected .AI is stepping in with tailored solutions for lifestyle management and public health monitoring.

- Personal Coaching: HealthifyMe's AI coach Ria draws on the experience of over 2 million users to provide customized nutrition guidance. Clinical trials yielded a mean BMI reduction of 8% over six months[7].
- Risk Forecasting: Apollo's ProHealth initiative forecasts 85% with certainty the occurrence of diabetes due to obesity three years in advance, based on electronic health records and machine learning[8].

India is also a hub for low-cost, high-impact digital health tools that combine local context with cutting-edge technology.Tata Memorial Centre's *OralScan*, a smartphone-based AI app, identified pre-cancerous lesions with 92% sensitivity in screenings of 50,000 tobacco users. At only ₹50 per screening, it is a viable candidate for nationwide rollout [9].

CHALLENGES AND RECOMMENDATIONS

Despite promising advancements, India still faces hurdles in scaling AI and big data in healthcare.

Barriers

- **Fragmented Health Data:** With over 30 state-level systems, there's a lack of interoperability and standardization [10].
- **Workforce Gaps:** Most healthcare professionals lack training in AI tools
- **Ethical Concerns:** Algorithmic bias and unequal access to digital resources raise fairness and privacy concerns [11].

Strategic Recommendations

- **Unified Data Platforms:** The government should integrate datasets from Ayushman Bharat with private EHR systems to create a unified national AI health platform
- **Training Programs:** The Medical Council of India's upcoming "AI in Medicine" curriculum, set to launch in 2025, is a step in the right direction.
- **Clear Regulations:** The Central Drugs Standard Control Organization (CDSCO) is drafting guidelines for AI-based medical devices, aiming to ensure responsible use (Chavali, 2024).

CONCLUSION

The country stands at a favorable position right now to handle rising NCD requests at a time when digital health innovations are expanding rapidly. AI-based diagnostic software for cancer has joined mobile application treatments for obesity as the country implements evidence-based healthcare models through the use of accessibility together with affordability and personalization principles. Such interventions will bring sustainable returns for India only when the nation develops strong data infrastructure alongside effective policy tools together with digital-savvy healthcare personnel. According to Chavali (2024)[12] society will achieve sustainable ethical innovation when AI touches all populations with both equality and justice. The establishment of appropriate pillars will enable India to conquer the global arena and generate disruptive effects throughout the world through ethical digital health advancement.

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