

# Blockchain for Secure Health Records in India: Aligning with Ayushman Bharat

Kevin Joseph<sup>1,\*</sup>

## Abstract

India's healthcare ecosystem continues to face significant hurdles, particularly in the efficient management, protection, and accessibility of patient health records. For decades, medical data in the country has remained scattered across institutions, recorded in incompatible formats, and stored in systems that rarely communicate with each other. These gaps not only slow down clinical decision-making but also increase exposure to data breaches and other cybersecurity risks. In this context, blockchain technology emerges as a strong contender for modernizing health information systems. With its decentralized architecture, transparent data-handling features, and tamper-proof record-keeping, blockchain offers a reliable path toward secure and patient-controlled health data. This paper explores how blockchain can be integrated into India's digital health landscape to create a more scalable, trustworthy, and patient-centric record management structure. It outlines potential advantages, implementation challenges, and strategic steps required for adoption. Furthermore, the paper examines how blockchain-enabled health solutions can complement the Ayushman Bharat Digital Mission and align with the broader vision of inclusive, equitable healthcare articulated in the Viksit Bharat policy framework.

**Keywords:** Blockchain, health records, scalability, security, digital India

## INTRODUCTION

Under the Ayushman Bharat Digital Mission, India's healthcare infrastructure is being reformed by digitizing health records and integrating all healthcare services into a logical and unified structure [1]. However, there are several obstacles that continue to hinder progress in this area. Typically, patient data are split across hospitals, clinics, and diagnostic centers, causing treatment delays, recurrent diagnostic tests, and high administrative costs [2]. Additionally, the occurrence of cyberattacks and buckling data sharing undermines patient trust, while the lack of standardized data sharing protocols cripples coordinated efforts by healthcare providers.

Using a decentralized ledger system, blockchain technology can resolve some of these problems [3]. Eliminating the central points of failure and allowing for transparent, immutable record-keeping allows blockchain to have a significantly positive impact on the efficiency and reliability of healthcare systems. As a first step, this study examines the potential of blockchain in India for the healthcare sector with technical, infrastructure, and policy challenges in the development of this technology [4].

### \*Author for Correspondence

Kevin Joseph  
E-mail: [Kevinjoseph.college@gmail.com](mailto:Kevinjoseph.college@gmail.com)

<sup>1</sup>Research Scholar, MCA, Thakur Institute of Management Studies, Career Development and Research (TIMSCDR) Mumbai, Maharashtra, India

Received Date: March 10, 2025

Accepted Date: August 25, 2025

Published Date: March 26, 2026

**Citation:** Kevin Joseph. Blockchain for Secure Health Records in India: Aligning with Ayushman Bharat. International Journal of Information Security Engineering. 2026; 4(1): 1–5p.

## LITERATURE REVIEW

### Challenges in Current Health Record Systems

The architecture of Indian healthcare data is fragmented and inefficient. Consequently, delays in patient care are exceedingly long, redundant diagnostic tests often occur, and substantial administrative overhead is incurred. The inefficiencies are magnified by the fact that 70% of healthcare providers in India continue to rely on paper-based systems, leading to an increased risk of

loss and error of data [5]. Finally, interoperability is also a big problem, as dissimilar systems in place in various healthcare entities fail to communicate sufficiently well, making it difficult for the data to be shared and for care to be coordinated.

To address these issues, the Ayushman Bharat Digital Mission aimed to build a single digital health ecosystem. Nonetheless, the achievement of the mission depends on eliminating obstacles to interoperability, data privacy, and scalability. Today, digital health initiatives do not have layered security and data integrity that provide protection for the types of sensitive health information that are subject to cyber threats and breaches [6].

India's existing health care data management system is dismal. The lack of a unified system causes care to be delayed, diagnostic tests to be repetitive, and creates greater administrative burdens. Unfortunately, more than 70% of healthcare providers in the country still rely on paper-based systems to render their services, which complicates these problems.

The goal of the Ayushman Bharat Digital Mission is to forge a coherent digital health ecosystem; however, this will be difficult to achieve in the face of existing challenges such as interoperability, data privacy, and scalability [7].

### **Blockchain in Global Healthcare Systems**

The place of blockchain in healthcare systems worldwide has already been proven. For instance:

1. *Estonia*: In Estonia, there exists a national blockchain-based healthcare system that grants citizens the ability to secure access to their medical records [8]. Data integrity and privacy guarantee preserve patients' privacy and allow healthcare providers to access accurate records.
2. *United states*: Platforms like MedicBloc in the United States create a blockchain-based platform that gives patients ownership and control over their health data. In addition to providing secure data sharing between patients and healthcare providers, MedicBloc increases data interoperability while improving patient engagement.

In fact, these are global examples of how blockchain can improve healthcare efficiency and security. However, as India is an extremely large country with a vast number of people and a huge variety in healthcare needs and the infrastructure they can access, this is a different challenge when applying blockchain technology [9]. To be successful, blockchain solutions must be tailored to India's context.

### **Gaps in Current Research**

There has been very little work on blockchain in healthcare from current research, which has tended to favor developed countries with sophisticated digital infrastructure. Despite the preliminary exploration of blockchain applications in low-resource environments, such as in rural India, with very low digital literacy levels and limited infrastructure, little attention has been paid to their use for achieving development goals [10]. Furthermore, there have been some imbalances in the emphasis of existing studies in that they tend to neglect the impact of sociocultural factors in the adoption of new technologies in healthcare settings. These gaps are important for developing technically viable and socially acceptable blockchain solutions in the Indian context.

## **METHODOLOGY**

### **Proposed Blockchain Model**

A Blockchain-based health records system for India would include as follows.

#### ***Decentralized Ledger***

- *Data storage*: Data concerning patients will be archived on a blockchain network for tamper-proof purposes. The ledger would be immutably logged with each transaction, whether it was a doctor's visit or a diagnostic result.
- *Distributed access*: Because there are no single points of failure, the data is more available and resilient against cyberattacks when it comes to blockchain.

### **Smart Contracts**

- *Automated permissions:* Patient data would be under the control of smart contracts, and this would manage access to patient data based on the use of smart contracts. If testing occurs at a diagnostic lab, for example, it can obtain temporary access to specific test results to pass data on to approved institutions.
- *Interoperability protocols:* This would provide standardized data formats and protocols through smart contracts that would allow interoperability (between different healthcare providers and systems).

### **Patient-Centric Design**

- *Data ownership:* Health data are retained in ownership by patients, deciding when and how their data are made accessible to doctors and other staff. Instead, they would be given secure digital keys, which would enable patients to manage permissions and increase their trust and engagement.
- *Privacy compliance:* The system would also be in India's Personal Data Protection Bill terms that deal with the handling of patient data in accordance with legal and regulatory standards.

### **Implementation Steps**

#### **Infrastructure Development**

- *Blockchain-network construction:* Create a strong blockchain network that joins hospitals, diagnostic laboratories, and government health databases. The secure data exchange depends on the network as the backbone.
- *Integration with existing EHR systems:* After the inclusion of blockchain functionalities into existing Electronic Health Record (EHR) systems, the data can migrate seamlessly and become completely interoperable.

#### **Policy Framework**

- *Regulatory compliance:* Bake in the Personal Data Protection Bill for India to use to establish compliance guidelines for handling, storage, and sharing of data in the course of the blockchain system.
- *Standardization:* Establish standardized data formats and interoperability protocols to facilitate consistent and efficient data exchanges across different healthcare entities.

#### **Pilot Programs**

- *Urban and rural deployment:* Run pilot programs in both urban and rural settings to determine how the blockchain system works and how it can be altered. Existing digital infrastructure can enable urban pilots, and rural pilots can address the difficulty in obtaining connectivity and digital literacy.
- *Collaboration with technology providers:* Work with blockchain technology vendors in the development of purpose-built solutions and guarantee training for healthcare professionals and administrators.

#### **Awareness and Training**

- *Educational campaigns:* Workshops and run awareness campaigns to inform healthcare providers and patients regarding the uses, features, and benefits of blockchain technology.
- *User training:* Create user-friendly interfaces and have comprehensive training on blockchain-based systems so that adoption and usage become easy.

## **RESULTS AND DISCUSSION**

### **Benefits of Blockchain-Based Health Records**

#### **Enhanced Security**

- *Data integrity:* The blockchain's immutable ledger also ensures that patient data cannot be tampered to the level of providing high safety of patient information from unauthorized modification.

- *Access control*: Encryption and digital keys keep sensitive health information from the hands of hackers and cyberattacks, protecting it from breaches.

### **Scalability**

- *Handling large data volumes*: The ability of blockchain networks to efficiently manage large volumes of data over India's large population and varied healthcare requirements makes blockchains appealing for the Indian healthcare sector. Scaling out can be achieved via sharding and side chains (which allows data processing to spread across multiple nodes).

### **Improved Interoperability**

- *Standardized data formats*: Blockchain ensures the availability of a standardized data format that eases the transport of information between disparate healthcare providers and related systems.
- *Unified health records*: Data silos are wiped out by a single blockchain-based system that makes patient records available and consistent across all healthcare entities.

### **Patient Empowerment**

- *Data ownership and control*: Therefore, patients own their health data completely by policy so that they can decide who has access to their information and how it can be used. Such power invigorates higher levels of trust and engagement in health care systems.
- *Transparent data sharing*: As this is a transparent system, patients know what is happening with their data, and trust in the healthcare system increases.

## **Challenges and Solutions**

### **Technical Barriers**

- *Computational demands*: Blockchain systems, especially proof-of-work consensus mechanism-based blockchain systems, are often computationally demanding. These challenges can be mitigated using lightweight blockchain architecture or hybrid models that incorporate chain and off-chain storage.
- *Integration with legacy systems*: Blockchain installation in an existing EHR system requires a tremendous amount of technical expertise and resources. With a bit of standardization in APIs and middleware solutions, integration processes can be made smoother.

### **Digital Literacy**

- *User adaptation*: While the implementation of blockchain-based systems should be facilitated by modern digital literacy, particularly in rural areas, this is not always the case. User-friendly interfaces and intensive training enable users to adapt to new technology.
- *Cultural resistance*: To overcome cultural resistance to digital systems, we build trust through transparency and demonstrate how blockchain in healthcare provides tangible benefits in social and moral spaces.

### **High Costs**

- *Initial investment*: The initial cost of blockchain infrastructure implementation has a significant footprint. Public-private partnerships and government funding share these costs and help in widespread adoption.
- *Maintenance and upgrades*: The system needs to be maintained and periodically upgraded to maintain continuity and security. Long-term success requires an established, sustainable funding model. Support for the National Goals chain's transparent nature ensures that patients are aware of how their data is being used, thus enhancing accountability and trust in the healthcare system.

### **Alignment with National Goals**

- Blockchain technology is a match made in heaven when considering India's national health and digital initiatives. Under the Ayushman Bharat Digital Mission, blockchain can provide security

afforded by blockchain and interoperable health records through e-health. By addressing inefficiencies, improving data security, and cultivating trust in digital health systems, this integration supports the vision of Viksit Bharat for inclusive yet advanced healthcare for every citizen of India.

- Furthermore, blockchain's scalability and security features contribute to broader initiatives such as Digital India and Sustainable Development Goals (SDG-3: Good Health and Well-being). Blockchain helps to deliver the overarching objective of improving accessibility, quality, and sustainability in India through enhanced data management and secure information exchange.

## CONCLUSION

Blockchain technology is a paradigmatic change in India's health records management system, providing a secure, scalable, and interoperable tool that remedies many shortcomings in the current system. Using the blockchain's decentralized and tamper-resistant features, India can enhance data security, increase interoperability, and provide patients with control over their health information. This resonates well with Indian objectives such as the Ayushman Bharat Digital Mission and Viksit Bharat, testifying to the mighty potential of blockchain for redefining the healthcare ecosystem in India. The technical and infrastructural challenges of this work will be addressed in future work, which will refine the blockchain model through incremental pilot programs in a variety of settings and illustrate integration with increasingly technical healthcare devices, such as wearable health devices and artificial intelligence for predictive healthcare analytics. These efforts will be critical in consolidating a resilient and efficient healthcare system for complex and diversified India. The Ayushman Bharat Digital Mission Overview (2024), by the Ministry of Health and Family Welfare, Government of India, aligns with Sustainable Development Goal 3 (Good Health and Well-being). Blockchain supports the overarching objectives of improving healthcare accessibility, quality, and sustainability in India by enabling efficient data management and secure information exchange.

## REFERENCES

1. Ministry of Health and Family Welfare, Government of India. Ayushman Bharat Digital Mission: building blocks. New Delhi: MoHFW; 2023. Available from: <https://abdm.gov.in/>
2. Nakamoto S. Bitcoin: A Peer-to-Peer Electronic Cash System. 2008. Available from: <https://bitcoin.org/bitcoin.pdf>
3. Attaran M. Blockchain technology in healthcare: challenges and opportunities. *Int J Healthc Manag.* 2022;15(1):70–83. doi:10.1080/20479700.2020.1843887.
4. Naithani P. Analysis of India's Digital Personal Data Protection Act, 2023. *Int J Law Manag.* 2025;67(5):543–553. doi:10.1108/IJLMA-05-2024-0174.
5. Azaria A, Ekblaw A, Vieira T, Lippman A. MedRec: using blockchain for medical data access and permission management. *MedRec: Using Blockchain for Medical Data Access and Permission Management.* 2016 2nd International Conference on Open and Big Data (OBD), Vienna, Austria. 2016. p. 25–30. doi:10.1109/OBD.2016.11.
6. Wright CS. Bitcoin: a peer-to-peer electronic cash system. *SSRN Electron J.* 2008. doi:10.2139/ssrn.3440802.
7. Ghosh PK, Chakraborty A, Hasan M, Rashid K, Siddique AH. Blockchain application in healthcare systems: a review. *Systems.* 2023;11(1):38. doi:10.3390/systems11010038.
8. Mishra US, Yadav S, Joe W. The Ayushman Bharat Digital Mission of India: an assessment. *Health Syst Reform.* 2024;10(2):2392290. doi:10.1080/23288604.2024.2392290.
9. Sundara K, Narendran N. Protecting digital personal data in India in 2023: Is the lite approach, the right approach? *Comput Law Rev Int.* 2023;24(1):9-15. doi:10.9785/cr-2023-240103
10. Dubovitskaya A, Xu Z, Ryu S, Schumacher M, Wang F. Secure and trustable electronic medical records sharing using blockchain. In: *AMIA Annual Symposium Proceedings; 2017 Nov 4–8; Washington (DC): American Medical Informatics Association; 2017.* p. 650–659.