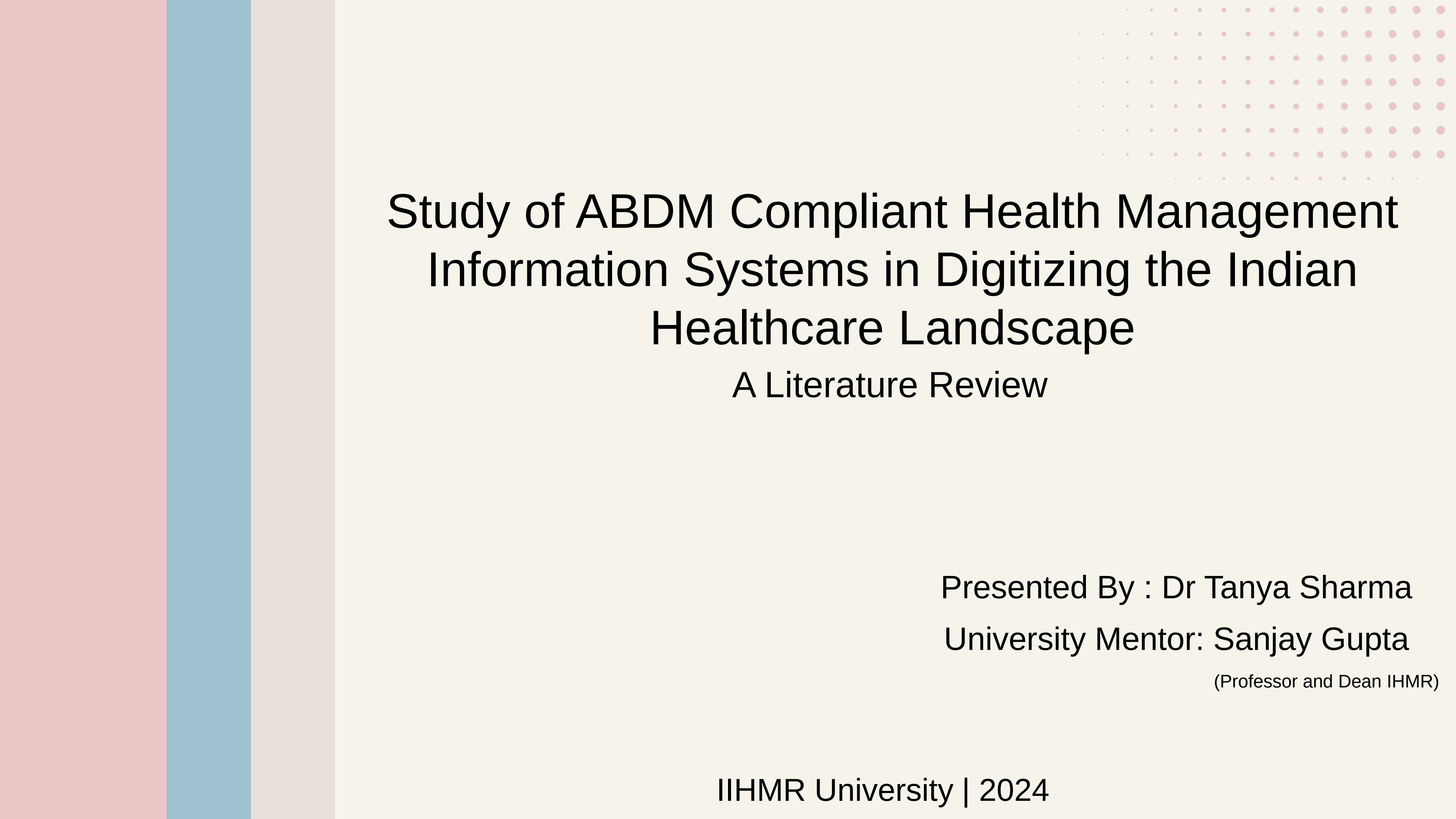




Study of ABDM Compliant Health Management Information Systems in Digitizing the Indian Healthcare Landscape

A Literature Review

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ABSTRACT

The Ayushman Bharat Digital Mission (ABDM) aims to revolutionize healthcare delivery in India through digitization. This study explores the implementation and impact of ABDM-compliant Health Management Information Systems (HMIS) on the Indian healthcare landscape. Key findings include extensive beneficiary registration, significant inter-state variations, advancements in digital tools, and challenges in data security, budget utilization, and user adoption. Recommendations focus on targeted interventions, enhanced data protection, and comprehensive training programs. The study highlights the transformative potential of digital health technologies and underscores the need for sustained effort and collaboration to achieve a resilient and advanced healthcare system in India.

Keywords: ABDM, HMIS, Digital Health, India, Healthcare Transformation, Data Security, Interoperability, Training Programs

OVERVIEW

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Overview of Digital Health Initiatives Globally

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Estonia (e-Health System):

Integrated platform for EHRs, e-Prescriptions, e-Consultations, Data security

2

United Kingdom (NHS Digital):

Summary Care Records, Telehealth, Data Analytics for improved access

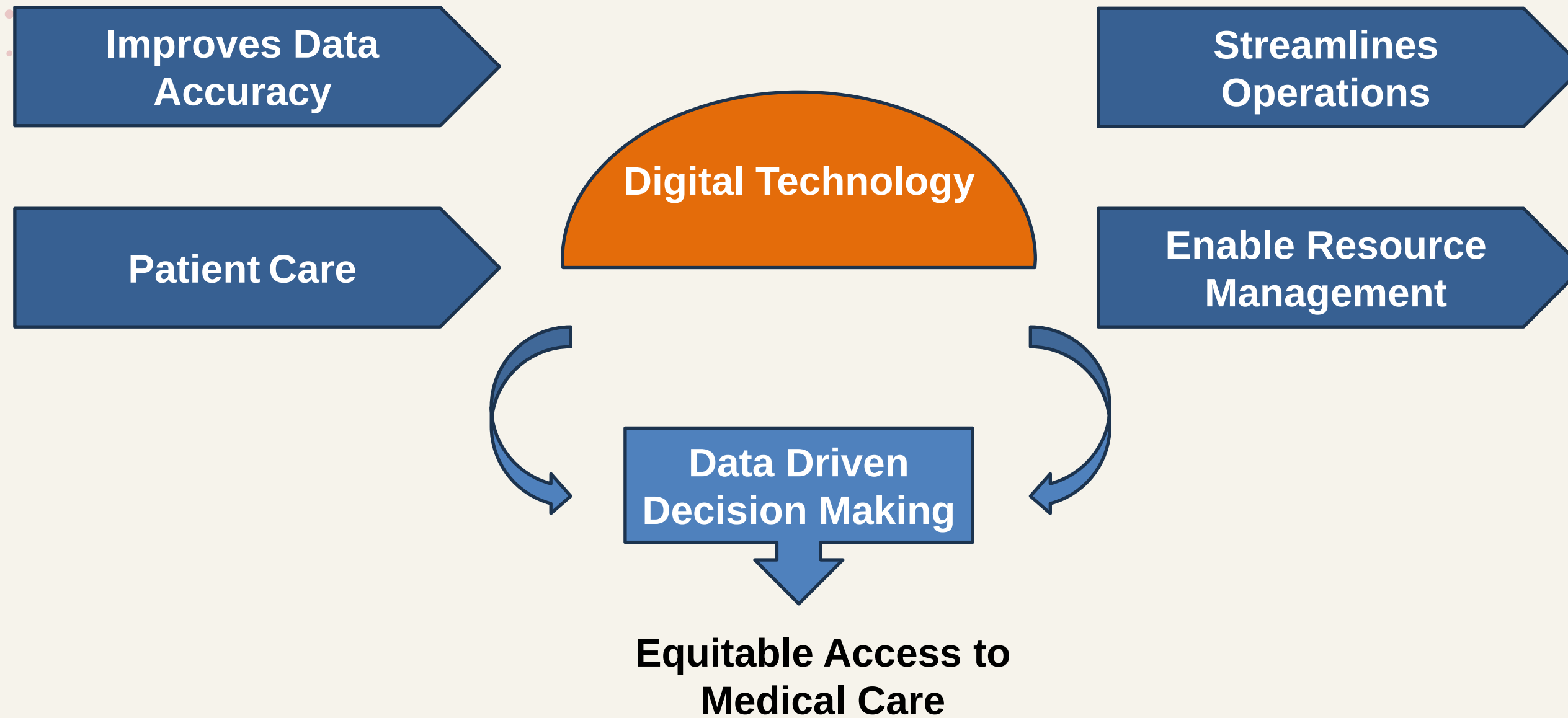
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Others: My Health Record System (Australia), Ontario Telemedicine Network

Benefits:

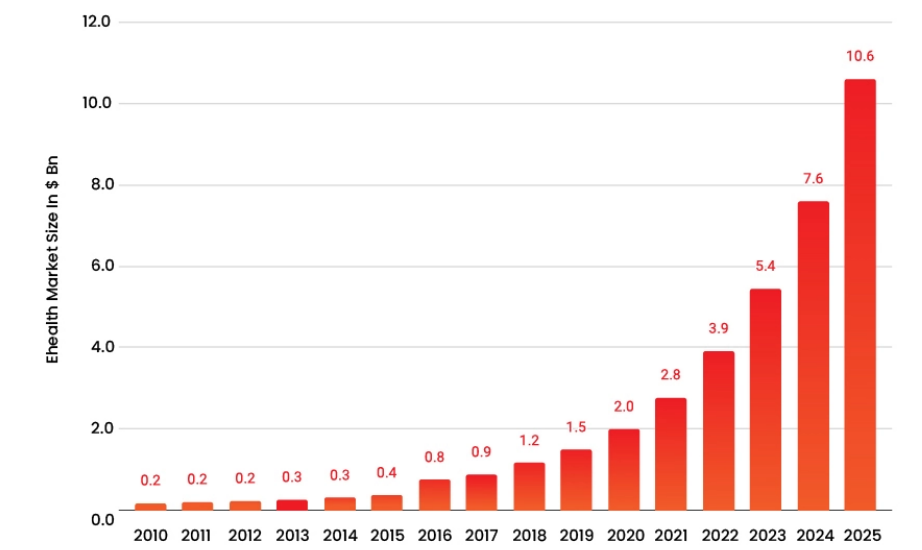
Increased Efficiency & Transparency, Improved Patient Access & Satisfaction, Enhanced Public Health Management

Importance of Digitization in HealthCare



India's eHealth Market Is Estimated To Touch \$10.6 Bn By 2025

The telemedicine market is expected to be the top revenue generator in the eHealth sector



Source: Inc42 Plus Analysis

Inc42 Plus

Current State of Healthcare Delivery in India

1. Fragmentation and Lack of Interoperability

- Health data siloed in individual institutions → Difficulties in sharing patient information

2. Inefficiencies in Care

- Leads to repeated diagnostic tests and disjointed patient care → Negative impact on health outcomes

3. Lack of Standardized Protocols

- No standardized health information exchange protocols → Hinders effective healthcare delivery and management

4. Overall Impact

- Inefficiencies and negative health outcomes → Fragmentation and lack of data sharing

INTRODUCTION

Ayushman Bharat Digital Mission (ABDM):

Launched in 2021 to digitize healthcare delivery across India. Aims to integrate digital health technologies to address challenges in accessibility, affordability, and quality of care.

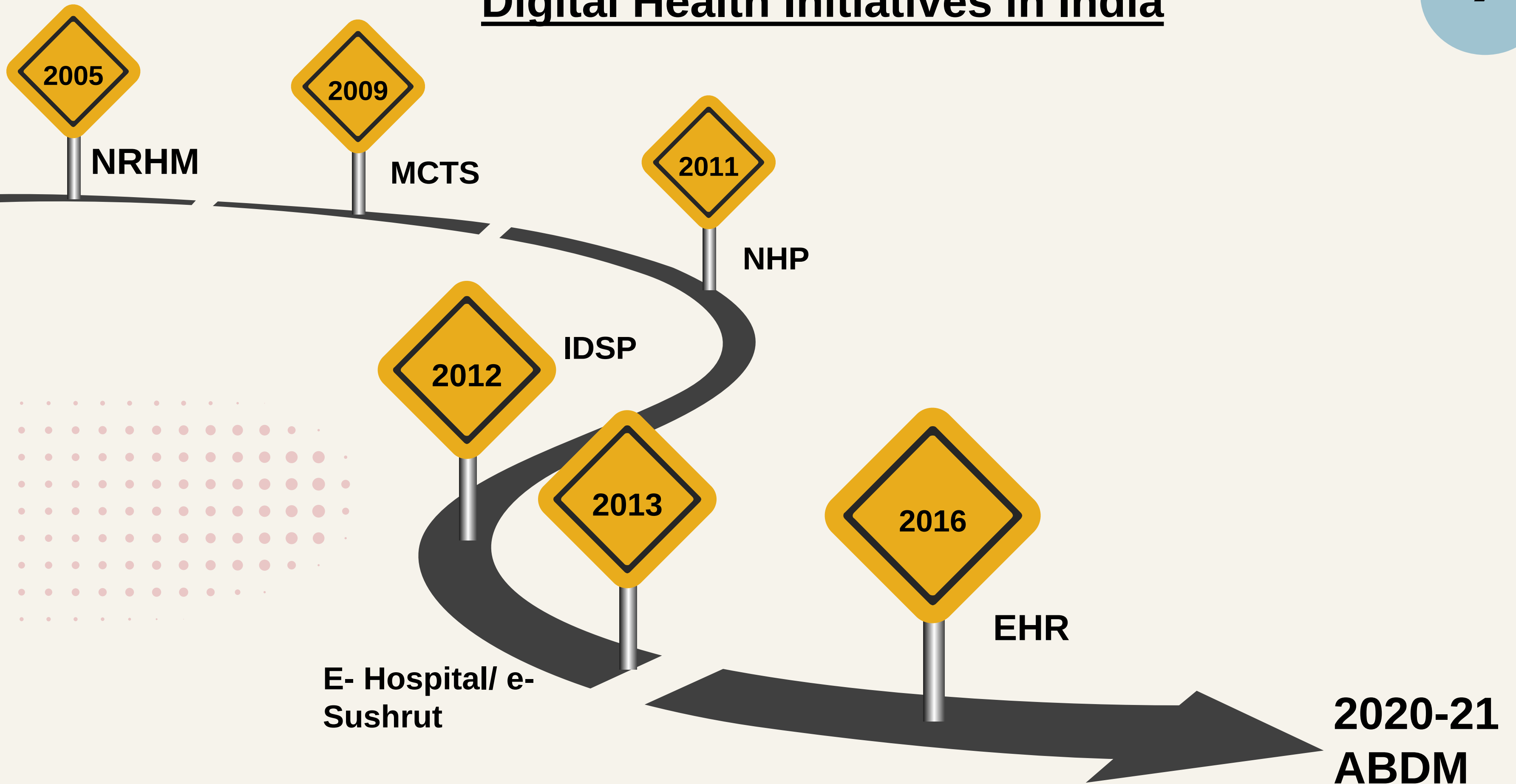
Significance:

A transformative initiative aimed at enhancing the efficiency and effectiveness of healthcare delivery.

Focuses on creating a unified digital health ecosystem involving all stakeholders.



Digital Health Initiatives in India



Research Question & Objectives

1. What are the key features and components of ABDM and how HMIS helps digitization in Indian Healthcare?
2. In what ways do ABDM-compliant HMIS improve patient care delivery and healthcare service efficiency through digitization?
3. What are the potential challenges associated with implementing ABDM-compliant HMIS in public health settings?

- . To review existing literature on ABDM and its role in Indian healthcare landscape.
- . To identify potential benefits and challenges associated with implementing ABDM-compliant HMIS.
- . To provide valuable insights for policymakers and healthcare professionals on maximizing the effectiveness of ABDM within public health settings.

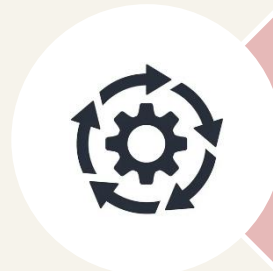
Role of HMIS in Achieving ABDM Goals



Secure and Centralized Health Data Management



Data-driven insights for improved decision-making



Efficient healthcare delivery and reduced burdens



Seamless information exchange for coordinated care

Key Components and Features of ABDM



ABHA ID

HPR

HFR

PHR

HIE

**TELEMEDICINE &
REMOTE
MONITORING**

HCXs

 ADOPTION	 UTILIZATION	 PUBLIC SECTOR
40% penetration of ABHA IDs with more than 56.2 crore ABHA created	35 crore health records linked to ABHA	70% of HFR registrations are from public sector
2.33 2.33 lakh HFR registrations	~43,000 tokens generated daily for "scan and share"	83% of HPR registrations are from public sector
2.8 2.8 lakh HPR registrations	~65,000 facilities use ABDM-enabled software	~97% of records linked to ABHA are from public sector
GOVERNMENT INITIATIVES TO PROMOTE ABDM INTEGRATION		
Multi-platform ABHA creation Including on CoWIN, PMJAY, BIS	DHIS Offers monetary incentives for linking records	HCX platform Single window for all insurance claims processing

Note: HFR = Health Facility Registry; HPR = Health Professional Registry
Source: Arthur D. Little; National Health Authority, ABDM dashboard, as of 21 February 2024

LITERATURE REVIEW

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Reference	Focus Area	Key Findings	Challenges	Opportunities
Joe W, Yadav S. The National Digital Health Mission (NDHM) of India: A Concurrent Assessment	NDHM Assessment	Concurrent assessment of NDHM's implementation and impact	Identifying implementation barriers	Opportunities for policy adjustments to enhance effectiveness
Accelerating Digitisation in Healthcare Delivery	Digital Health Initiatives	Strategies to accelerate digitization in healthcare delivery	Slow adoption rates, infrastructure issues	Strategic investments and targeted interventions
Dumiak M. E-health's future frontiers. Bulletin of the World Health Organization	Future of E-health	Exploration of future frontiers in e-health	Technological and regulatory barriers	Leveraging new technologies for improved healthcare delivery
National Health Policy 2017. Ministry of Health and Family Welfare	National Health Policy	Objectives of promoting digital health to improve healthcare delivery and outcomes	Infrastructure limitations	Strategic investments in digital infrastructure
Public Health Foundation of India. Health Information Systems in India: Challenges and Way Forward	Health Information Systems in India	Examines the state of health information systems, highlighting challenges and opportunities	Infrastructure limitations, data security concerns, low digital literacy	Strategic investments, robust data protection frameworks, capacity-building efforts
Catalyzing Digital Health in India	Digital Health Adoption	Critical pathways for user adoption and transformational use cases	Low digital literacy, resistance to change among healthcare professionals	Digital literacy programs, training initiatives
Chauhan V, Dumka N, Hannah E, Ahmed T, Kotwal A. Recent initiatives for transforming healthcare in India	Political Economy of Health	Analysis of recent initiatives to transform healthcare using a political economy framework	Policy implementation barriers	Policy recommendations to overcome barriers

Nundy S. Digital connections to improve India’s health	Digital Health Improvements	Discusses digital health improvements and their impact on healthcare outcomes	Implementation challenges	Leveraging digital connections for improved healthcare delivery
Sharma RS, Rohatgi A, Jain S, Singh D. The Ayushman Bharat Digital Mission (ABDM): making of India’s Digital Health Story	ABDM Implementation	Examination of ABDM implementation and its impact on healthcare delivery	Infrastructure and implementation challenges	Policy adjustments and strategic investments
Pathways to Scale Adoption of Digital Health in India	Digital Health Adoption	Strategies for scaling adoption of digital health	Digital literacy and infrastructure issues	Strategic investments in digital infrastructure and capacity building
Pandey A, Roy N, Bhawsar R, Mishra R. Health Information System in India: Issues of Data Availability and Quality	Health Information Systems	Issues with data availability and quality in health information systems	Data gaps, incomplete records, lack of granularity	Improving data collection and reporting practices
Haleem A, Javaid M, Singh RP, Suman R. Telemedicine for healthcare: Capabilities, features, barriers, and applications	Telemedicine	Capabilities, features, barriers, and applications of telemedicine	Technological barriers, regulatory issues	Leveraging telemedicine for improved healthcare access
Hersh W, Totten A, Eden K, Devine B, Gorman P, Kassakian S, et al. Health Information Exchange. Evid Rep Technol Assess (Full Rep)	Health Information Exchange	Comprehensive report on health information exchange	Interoperability issues, technological challenges	Enhancing interoperability standards and frameworks

Potential Benefits of ABDM

Benefit Area	Source	Data Point	Implication for ABDM
Improved Diagnosis	Association Between Electronic Health Record Use and Diagnostic Accuracy in Primary Care(14).	10% reduction in diagnostic errors with electronic health records	ABDM's verified health records could lead to more accurate diagnoses in India.
Reduced Duplication of Services	Learning from Beacon Communities: How High-Performing Health Systems Reduce Low-Value Care (Report, The Commonwealth Fund, 2020)	17% decrease in duplicate imaging tests with data-sharing initiatives	ABDM's data exchange capabilities could minimize unnecessary tests in India.
Increased Efficiency	The Effects of Electronic Health Records on Hospital Efficiency (Health Affairs, 2019) by Jha et al.	5% reduction in hospital length of stay with electronic health records	ABDM could potentially improve efficiency in Indian hospitals.
Improved Patient Outcomes	The Impact of Statewide Health Information Exchange on Hospital Mortality Rates in California (Journal of the American Medical Informatics Association, 2018) by Jha et al.	13% decrease in mortality rates for heart attack patients with health information exchange	ABDM has the potential to improve patient outcomes in India.(15)
Enhanced Access to Care	The National Health Policy 2017 (Ministry of Health and Family Welfare, Government of India)	Over 70% of India's population resides in rural areas	ABDM's telemedicine integration could bridge the gap in access to specialist care in rural India.
	Impact of Telemedicine on Access to Specialty Care in Rural India (International Journal of Medical Informatics, 2020) by Singh et al.	25% increase in access to specialist care with telemedicine consultations in rural India	ABDM-enabled telemedicine can potentially improve access to care in remote areas of India.
Cost Savings	Economic Evaluation of a Statewide Health Information Exchange in California (Journal of Medical Economics, 2017) by Jha et al.	Estimated annual savings of \$1.4 billion in California due to reduced duplication of services	ABDM has the potential for cost savings in India through improved care coordination.

METHODOLOGY

Research Design

Systematic literature review using PubMed, Google Scholar, and relevant databases.

Comparative Analysis

Compare high-performing and low-performing states to identify success factors and challenges

Inclusion Criteria

Studies on the Indian healthcare system, ABDM compliance, HMIS implementation. English publications (2018-2024)

Data Collection

Sources: ABDM Dashboard, Journals, NITI Aayog Health Index, NFHS, MoHFW reports

Key Indicators

% Ayushman Bharat Health Account (ABHA) Numbers Generated

% Health Records Linked

Limitations

Data gaps, lack of granularity, temporal limitations.

Keywords: "Ayushman Bharat Digital Mission," "Health Management Information Systems," "Healthcare Digitization."

Future Research: Improve data collection, conduct longitudinal studies, collect granular data.

Results and Discussions

Stats of High Performing States and Important Digital Health Coverage Indicators

State/UT	% ABHAs	% Health Records Linked	% Verified HFR	% Verified HPR
Kerala	39.9	91.7	11.8	13.5
Chandigarh	52.1	86.1	28.6	100.0
A & N Islands	100.0	57.9	73.0	NA
Ladakh	98.3	45.1	100.0	NA

(Data as of June 2024)

Stats of Low Performing States and Important Digital Health Coverage Indicators

State	% ABHAs	% Health Records Linked	% Verified HFR	% Verified HPR
Bihar	13.5	1.9	19.4	35.3
Nagaland	0.0	0.0	0.0	0.0
Meghalaya	6.2	0.0	100.0	1.9

Summary of Quantitative Findings

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High-Performing States and Union Territories: Kerala, Tamil Nadu, Chandigarh, and Andaman & Nicobar Islands

Key Factors Contributing to Success

- 1. Robust Healthcare Infrastructure:** Kerala and Tamil Nadu have well-established healthcare systems with a high number of healthcare facilities per capita, leading to better healthcare delivery.
- 2. Effective Governance and Policies:** These states have implemented effective health policies and programs, ensuring better health outcomes.
- 3. High Health Literacy:** Higher literacy rates contribute to better health awareness and utilization of health services.
- 4. Government Initiatives:** Strong initiatives under the National Health Mission and state-specific programs have significantly improved healthcare access.

Healthcare Outcomes

- **Kerala:** Known for its high life expectancy and low infant mortality rate.
- **Tamil Nadu:** Excellent maternal health services leading to lower maternal mortality rates.
- **Chandigarh and A&N Islands:** High overall health index scores indicating good access to healthcare services.

Challenges in Low-Performing States

State	Challenges	Healthcare Outcomes
Bihar	High population density, Socioeconomic challenges, Limited healthcare infrastructure, Low health outcomes	High infant and maternal mortality rates, Poor healthcare services
Uttar Pradesh	Poor health indicators, Significant healthcare infrastructure challenges, Similar to Bihar	High disease prevalence, Low healthcare access
Nagaland	Geographical challenges, Lower health access, Represents northeastern states	Lower health index scores, Significant gaps in healthcare delivery and access
Meghalaya	Similar challenges as Nagaland, Issues in healthcare delivery in remote areas	Lower health index scores, Reflecting significant gaps in healthcare delivery and access

Relation with Healthcare Outcomes

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Trends and Patterns

1. Increase in Digital Health Coverage:
e.g. % ABHAs and % Health Records Linked have increased in Kerala and Tamil Nadu



Improvement in Healthcare Outcomes

Correlation Analysis

- **Lower Mortality Rates** in states like Kerala and Tamil Nadu due to efficient health information systems
- **Lower Disease prevalence** in states with robust digital health infrastructure
- **Improved Healthcare Access** in high-performing states with telemedicine and health information systems

Challenges and Recommendations

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Challenges	Recommendations	Examples
Infrastructure Limitations	Strategic investments in digital infrastructure	• BharatNet Project for rural internet connectivity • NDHM funding for infrastructure upgrades
Data Security and Privacy Concerns	Development of robust data protection frameworks	• Implementation of data security measures and compliance standards with DISHA • End-to-end encryption, multi-factor authentication
User Adoption and Digital Literacy	Capacity building and training programs	• Digital health training programs, workshops on EHRs and telemedicine • Improved competency of healthcare providers
Interoperability Issues	Policy recommendations for enhancing interoperability	• HL7 and FHIR for data exchange • Uniform coding systems like ICD and SNOMED CT • National Digital Health Blueprint (NDHB) • Singapore's National Electronic Health Record (NEHR) system

Future Directions



**Enhanced
Data
Security**



**Targeted
Interventions**



**Effective
Fund
Utilization**



**Comprehensive
Training
Programs**

Future Prospects of Technologies in Digital Health

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Artificial Intelligence (AI)

 Enhanced Diagnostic Accuracy

 Automated Administrative Tasks

 Virtual Health Assistants

IoT

 Widespread Adoption of Wearable Devices

 Integration with Smart Hospital Technologies

 Remote Patient Monitoring

Blockchain

 Secure Health Data Exchange

 Decentralized Health Records

 Automates insurance claims and supply chain management

Cloud Computing

 Supports telemedicine, remote diagnostics, and research

 Data-Driven Healthcare

 Global Collaboration

 Scalability and Flexibility

 Cost Efficiency

CONCLUSION

Impact of ABDM: The Ayushman Bharat Digital Mission has revolutionized the Indian healthcare system by enhancing data accuracy, improving efficiency, and increasing accessibility, particularly in rural areas.

Future Vision: Continued investment in digital infrastructure, capacity-building, and innovative research are essential to create a resilient and advanced healthcare system for all citizens



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