Sattva Knowledge Institute SKI primer

TRANSFORMING HEALTHCARE DELIVERY WITH DIGITAL HEALTH INITIATIVES IN INDIA

June 2023

Acknowledgements

Contributors

Dr Aditi Hegde, Arnab Mukherjee, and Granthika Chatterjee.

Review

Lakshmi Sethuraman, Rathish Balakrishnan, and Anantha Narayan.

About Sattva Knowledge Institute

Sattva Knowledge Institute (SKI), established in 2022, is our official knowledge platform at Sattva. The SKI platform aims to guide investment decisions for impact, shedding light on urgent problems and high potential solutions, so that stakeholders can build greater awareness and a bias towards concerted action. Our focus is on offering solutions over symptoms, carefully curating strong evidence-based research, and engaging decision-makers actively with our insights. Overall, **SKI aims to shift intent and action toward greater impact by influencing leaders with knowledge.** All of our content proactively leverages the capabilities, experience and proprietary data from across Sattva.

Editing: Anagha Wankhede | **Design:** Usha Sondhi Kundu; *cognitive.designs@gmail.com*

CONTENTS

EXECUTIVE SUMMARY

Digital technology is emerging as a key enabler of healthcare delivery in India. Advanced technology such as AI and Blockchain are being deployed across a wide range of applications from patient management and care delivery to administration. Increasingly, digital interventions are being linked to key healthcare outcomes such as improved quality and access, reduced costs, and increased personalisation.

In India, digital health interventions have grown to cover ~80% of the population, 300k health facilities and 400k health workers. This has been enabled through an array of policies and regulations that promote innovation, standardise service delivery, and strengthen the ecosystem, while offering relevant security measures such as data protection. The Ministry of Health and Family Welfare, Ministry of Electronics and Information Technology, and Ministry of Consumer Affairs are responsible for legislation around digital interventions, with the first two playing dominant roles.

ABDM intends to develop the backbone necessary to support the unified digital health infrastructure of the country by leveraging unique IDs, registry systems, and data analytics. The public health system has seen rapid adoption and integration with ABDM. Private facilities and providers are also being on-boarded in record numbers. Private organisations, however, are increasingly involved in digital health solutions, particularly in the health technology and MIS segments.

Recent digital health solutions have been developed to address the needs of an array of end-users across the healthcare ecosystem. Solutions for health service users support health education and disease management, while certain services, like the ABDM consent manager, allow users control over their data. Capacity-building solutions and patient management tools enable healthcare providers to dispense better quality care for their patients. Specialised digital solutions, like e-Aushadhi - a web-based drug procurement system, strengthen governance and supply chain management. Data systems solutions bolster data collection, analysis, and exchange across the ecosystem.

Payers, providers, enablers contribute towards development and adoption of healthcare technology. As the premier policy-making body, the government and its ministries govern, finance, and design digital health programmes. Apex bodies, multilateral institutions, philanthropic bodies, NGOs, and industry associations hold influence over digital health policy. Philanthropic donors, in particular, play a significant role in funding or designing digital health programmes. However, most stakeholders in the ecosystem are involved in implementing digital health across both public and private sector entities.

The Government's investment in digital health, demonstrated by ABDM budgetary allocation, has grown sharply from Rs. 30 crores in FY 2020-21 to Rs. 200 crores in 2023-24. In addition, private organisations also fund digital health solutions, however their funding has been uneven in recent times. Philanthropic organisations are also major funders, but the funding is usually project-specific where digital health may be the primary or secondary component.

Stringent, effective regulations and sustainable financing have the potential to accelerate digital transformation at scale. A seamless regulatory mechanism for digital health will ease ecosystem navigation for solution providers. Investments, especially in infrastructure, are likely to benefit small healthcare providers and the public system where capital required for digital transformation is scarce. Most individual-level challenges can be addressed by increasing access to technology among the underserved populations and improving awareness of digital health in citizens and providers.

Driven by technological innovation, healthcare will be more accessible, cost-effective, personalised, transparent, and collaborative. Digital health equity, however, is essential to ensure that the vulnerable populations are able to reap the benefits. Conscious decision-making by policy makers and long-term investments have the potential to drive digital health uptake, support solution providers, and create enabling environments. Efforts to advance digital literacy and further promote digitisation positively affect citizen behaviour, while providing capital assistance and offering innovative financial instruments promote innovation.

WHAT IS DIGITAL HEALTH?

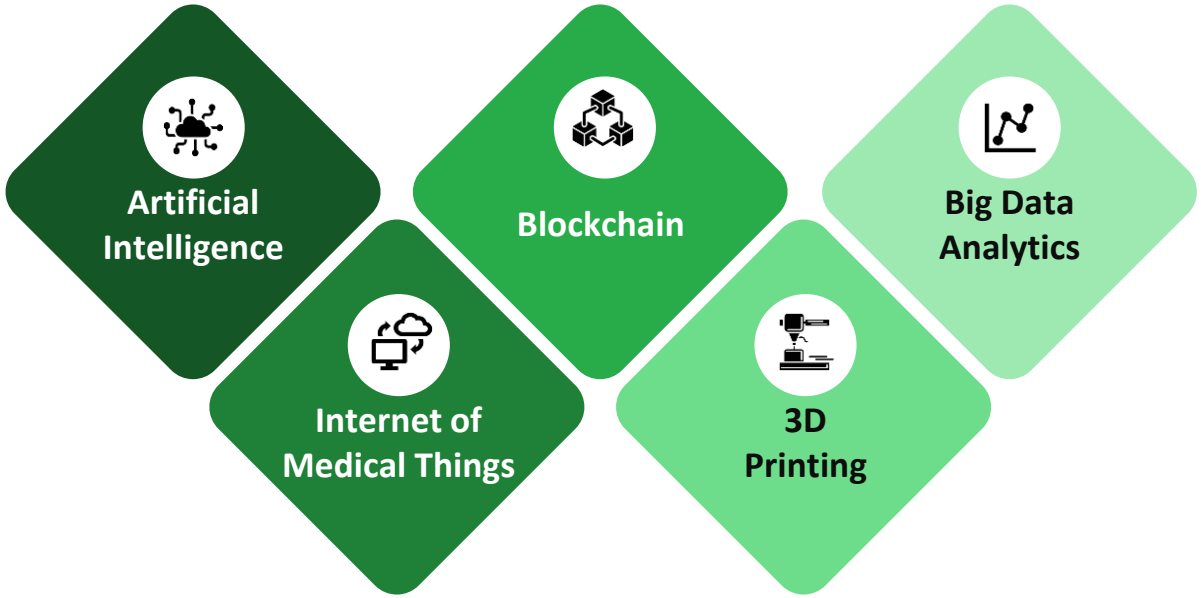
Digital health is emerging as a key enabler to accelerate and strengthen Indian healthcare delivery.

Digital health…

✓…is the application of **information and communication technology…**

✓… to **manage diseases and support wellness…**

✓…through **data, images, and other forms of digital information**



(World Health Organization 2020)

… will result in positive health sector outcomes.

Improved access
to healthcare

Reduced inefficiencies
in the healthcare system

Improved quality
of care

Reduced cost
of healthcare

More personalised healthcare
for the patient

(Ronquillo et al. 2022)

Digital technologies ubiquitous in healthcare with varied applications, from patient management and care delivery to administration.

Digital technologies (Stanford Center for Digital Health 2020)		Select applications in health
ARTIFICIAL INTELLIGENCE	Ability of computers or robots to perform tasks commonly associated with intelligent beings.	**Administrative AI** records digital notes, optimises processes, and automates tasks. **Clinical AI** predicts health trajectories, supports diagnostics, non-invasive procedures and treatments, and monitors patients (Davenport and Kalakota 2019).
INTERNET OF (MEDICAL) THINGS	Network of smart medical equipment with technologies, solutions, infrastructures; connection between medical and healthcare applications.	**IoMT finds application** in advanced health monitoring, smart management, and collaborations between health workers (Thomason 2021).
BLOCKCHAIN	Tamper-resistant distributed digital ledgers implemented without a central authority such as the government.	Blockchain facilitates **secure transfer of patient medical records, management of pharmaceutical supply chains, and strengthening research** (Haleem et al 2021).
3D PRINTING	3D printing or additive manufacturing is the construction of a physical object from a CAD or a digital 3D model.	3D printing enables **commercial manufacturing of medical devices** such as external prostheses, implants, instrumentation guides as well as patient-specific devices (Kumar Gupta et al 2022).
BIG DATA ANALYTICS	Analytics based on a large set of health and customer behaviour data revealing deep insights.	Big data combined with analytics **enables health professionals to generate data-driven healthcare solutions and improve patient health outcomes** (Thomason 2021).

Digital health allows payers to make better decisions, improves efficiency of health providers and helps citizens access quality health services.

BENEFITS of digital health for different stakeholders

	Stakeholders	Examples	Benefits
PAYERS	Health Administrators	Government officials Administrators of health facilities	• Access to high quality data, enabling appropriate decision-making and targeted interventions • Real-time evidence for improved health surveillance • Lower administrative and management costs
PAYERS	Insurance Providers	Public sector and private, third-party insurers	• Access to comprehensive individual and population-level data leading to accurate risk assessment • Efficient integration of insurance industry into healthcare • Lower administrative and management costs
PAYERS	Citizens	Patients and healthy populations	• Increased access to healthcare through new care delivery models (e.g. telemedicine, self-care apps) • Stronger linkages to government schemes relevant to health • Easy storage and retrieval of longitudinal health data • Increased access to health-related information enabling enhanced knowledge and behaviours • Greater control to track and monitor own health
Providers	Health Facilities	Public and private sector hospitals	• Improved management with more efficient storage, availability, and analytics of patient data • Access to longitudinal data of patients • Interoperability of patient data • Seamless and faster processing of reimbursements and incentives
Providers	Healthcare Professionals	Public and private sector doctors and allied health workers	• Automation of routine processes (e.g. record keeping) leading to lower administrative time • Access to high quality data, enabling evidence-based decision-making • Access to supportive tools enabling improved quality of care

EVOLVING LANDSCAPE AND POLICY TAILWINDS

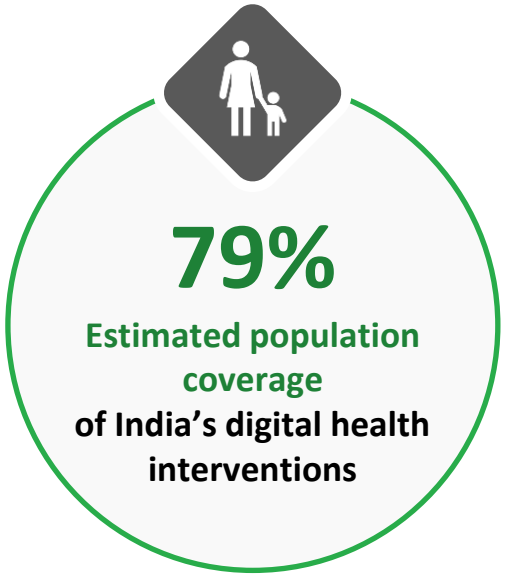
India's digital health strategy has evolved in sync with WHO guidelines, and the current focus is on scale-up and mainstream integration.

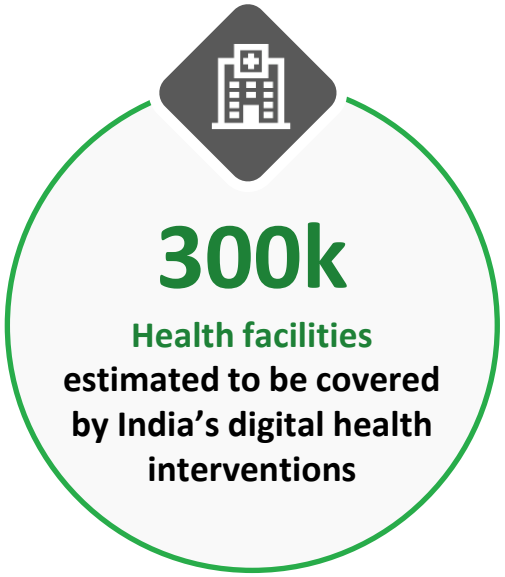
Key global and Indian milestones in the evolution of digital health

	Age of LEARNING (2003-2010)	Age of INTEREST (2011-2018)	Age of IMPLEMENTATION (2018-2020)	Age of SCALE (2021 onwards)
Global Development	**2005:** WHO passes first resolution on eHealth urging member states to strategise for equitable, affordable, and universal access to health.	**2013:** WHO urges member states to develop "policies and legislative mechanisms linked to an overall national eHealth strategy".	**2018:** WHO identifies global priority areas and course of action for digital health. **2020:** G20 pushes for digital health interventions to manage pandemic.	**2022:** WHO releases guidelines for integrating digital health with existing programmes. Globally, the digital health market is expected to grow at 20% CAGR till 2027 (Netscribes 2023).
Indian Development	**Pre-2005**, ad hoc usage of digital technologies such as data analytics and telemedicine.	**2013:** Launches National Health Portal for its eHealth initiatives **2017:** National Health Policy envisions a digital health technology ecosystem integrated into the health system.	**2018-19:** Launches the National Health Stack in anticipation of the push for digital health. **2020:** Launches the pilot of Ayushman Bharat Digital Mission in six union territories.	**2021:** Rolls out Ayushman Bharat Digital Mission nationwide. In India, the digital health market is expected to grow at an estimated 28.5% CAGR till 2027 (Netscribes 2023).

Digital health interventions have grown to cover ~79% of the population, 300k health facilities and 400k health workers.

Estimated coverage of India's digital health interventions





(Digital Health Atlas 2023)

The ABDM has evolved from national health policy goals to develop a digital health ecosystem in India.

Ayushman Bharat Digital Mission (ABDM) is India's flagship digital health programme. It aims to develop the backbone necessary to support the integrated digital health infrastructure of the country. ABDM will **bridge the existing gap amongst different stakeholders of the healthcare ecosystem through digital highways.**

Genesis of Ayushman Bharat Digital Mission

National Health Policy 2017

Provided specific **goals** for digital architecture

- Registries
- Data standards and electronic health records
- Federated architecture

National Health Slack 2018

Provided specific **components** for digital health

- Electronic registries
- Claims performance
- Personal health records
- Federated architecture
- Health analytics

National Digital Health Blueprint 2019

Provided **implementation** guidelines

- Layered framework
- Building blocks
- Standard and regulations
- Institutional framework

Ayushman Bharat Digital Mission 2020

On-ground implementation

- Pilot intervention started on 15 Aug 2020 in 6 Uts
- Nationwide rollout of intervention on 27 Sep 2021

(National Health Authority 2022)

Unique IDs, strong registration systems, digital networks, and data analytics are integrated within ABDM.

Building blocks of the Ayushman Bharat Digital Mission

Health Data Analytics

All health information aggregated and integrated with health analytics platform.

Health Facility Registry

One record and a unique identifier for each healthcare facility in the country.

Open Telemedicine and e-pharmacy Network

Open digital playground for all market players; core control with the government.

Unique Health ID

Unique health ID, managed by a health data consent manager and linked to Aadhaar, to be a repository for all health-related information.

Health Professionals Registry

Master data of information on doctors, nurses, paramedical staff, and other healthcare professionals.

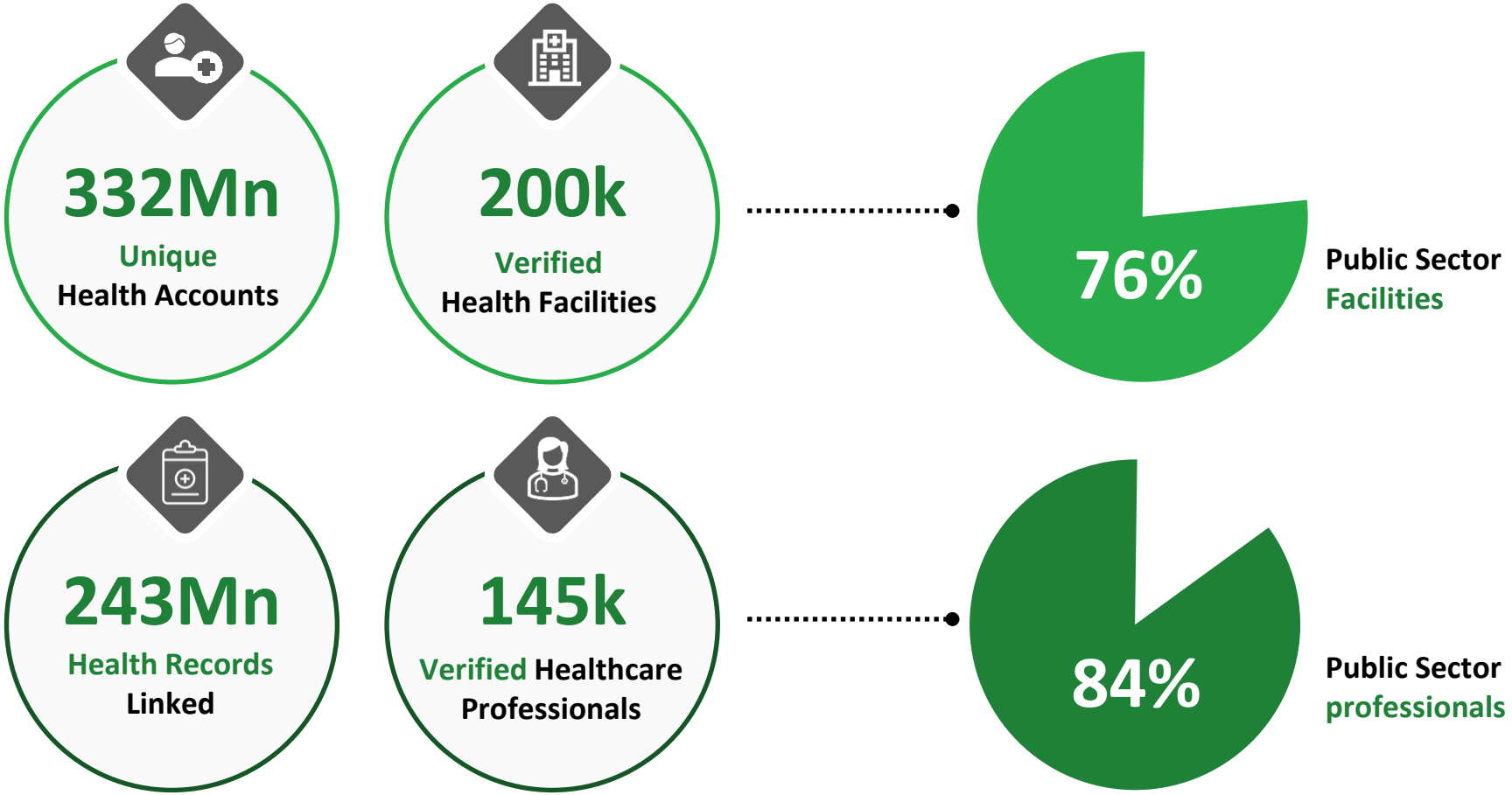
Consent Manager and Gateway

Portal for exchange of health information. Health records can only be issued or viewed with patient consent.

(National Health Authority 2022)

ABDM has seen remarkable adoption with over ~300 million digital health accounts created since its launch.

Coverage of Ayushman Bharat Digital Mission



(ABDM 2023)

Nearly 100 private sector entities have integrated their products with ABDM, mainly in hospital management and information systems, and health technology.

Successful integrators

Type of system	Total successful integrators (by sector)			Select examples of integration with ABDM
Health Management and Information System (HMIS)	21	Public	14%	Apollo HOSPITALS; Piramal Swasthya; Narayana Health
		Private	86%	
Laboratory Management and Information System (LMIS)	3	Public	0%	SRL Diagnostics; Dr Lal PathLabs; CrelioHealth
		Private	100%	
Insurance	3	Public	0%	Edelweiss General Insurance; Aditya Birla Health Insurance; HDFC ERGO Health
		Private	100%	
Health Locker	2	Public	50%	DigiLocker; doc prime
		Private	50%	
Health Technology	22	Public	0%	ALACARE Redefining Healthcare; Paperplane WhatsApp Clinic; practo
		Private	100%	
Patient Health Records	3	Public	33%	Aarogya Setu; eka.care; Paytm
		Private	67%	
Others	9	Public	100%	Co-WIN Winning Over Covid-19; national health authority; PM-JAY
		Private	0%	

(National Health Authority 2022)

Regulations for digital health protect consumer interests, regulate the digital ecosystem, and support and guide digital healthcare in India.

Different legislations regulating digital health and data protection in India

Frameworks

- National Health Stack 2018
- ABDM Strategy Overview 2020

Bills

- Digital Personal Data Protection Bill 2022

Acts

- Drugs and Cosmetics Act, 1940
- Information Technology Act 2000
- Clinical Establishments Act 2010
- Draft Digital Information on Security in Healthcare Act 2018
- National Medical Commission Act 2019
- Consumer Protection Act 2019

Standards

- Electronic Health Record Standards 2016

Policies

- National Health Policy 2017
- Health Data Management Policy 2020

Guidelines

- The National Digital Health Blueprint 2019
- Telemedicine Practice Guidelines 2020

Rules and Regulations

- Drugs and Cosmetics Rules, 1954
- Indian Medical Council Regulations 2002
- Information Technology Rules 2011
- Draft E-pharmacy Rules 2018
- Consumer Protection (E-commerce) Rules 2020
- Information Technology Rules 2021

Note: Refer to appendix for additional details on legislations related to digital health

LEGEND

Ministry of Health and Family Welfare
Ministry of Electronics and Information Technology
Ministry of Consumer Affairs

Specific to digital health

Others are applicable to digital health by extension.

They prioritise innovation, standardisation of service delivery, ecosystem development and data protection.

Policies, guidelines and frameworks make the following interventions in the digital health ecosystem

Regulations facilitate…	…by focusing on…	…as an example…
INNOVATION	Creation of favourable environments for digital health innovators such as startups to encourage innovation.	The **National Health Stack 2018** is a visionary digital framework envisaging centralised health records, creation of master health data, individual personal health records, and digital health IDs.
STANDARDISATION OF SERVICES	Protocols, workflow and minimum standards for delivering digital healthcare, outlining how healthcare professionals should respond.	The **Telemedicine Practice Guidelines 2020** provided guidelines for medical providers to practice telemedicine through various modes (text, audio, video).
ECOSYSTEM DEVELOPMENT	Guiding frameworks for implementation of Ayushman Bharat Digital Mission by defining architectures, building blocks and so on.	The **ABDM Strategy Overview 2020** presents the broad context, scope, rationale, key constructs, and implementation strategy for developing digital healthcare services.
DRUG REGULATION	Protocols and procedures for handling and administering of pharmaceuticals.	Draft **ePharmacy Rules 2018** regulate provision of drugs by e-pharmacies and includes rules for registration, data localisation, periodic inspections, and procedure for distribution.
PERSONAL DATA PROTECTION	Standardised rules and mechanisms for recording or storing data and facilitating consensual sharing of data with required authorities.	The **Health Data Management Policy 2020** provides a framework for management of digital health data privacy of individuals, registered health professionals and participating entities in ABDM.

DIGITAL HEALTH SOLUTIONS IN INDIA

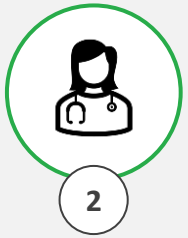
Digital health solutions are characterised by their target user group and service line.

WHO Classification of Digital Health Interventions (2023)

Health Service Users (HSUs)

Patients and general population

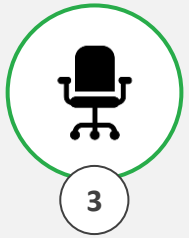
- Targeted/untargeted communication to HSUs
- HSU-HSU communication
- Personal health tracking
- HSU-based reporting
- On-demand communication with HSUs
- HSU financial transactions
- HSU consent management



Healthcare Providers

Doctors and allied health workers

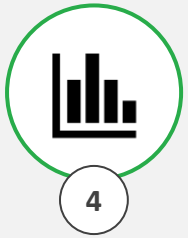
- HSU identification, registration, health records
- Healthcare provider decision support
- Telemedicine
- Communication and training
- Referral coordination
- Scheduling and activity planning
- Prescription and medication management
- Laboratory and diagnostics imaging management



Health System Managers

Administrators and Managers

- Human resource management
- Supply chain management
- Public health event notification
- Civil registration and vital statistics
- Health financing
- Equipment and asset management
- Facility management
- HSU's health certificate management



Data Services

Cross-cutting data systems

- Data management and coding
- Geospatial information management
- Data exchange and interoperability

(World Health Organization 2022)

A variety of digital health solutions cater to end users across the continuum.

Select digital health solutions in India

Health Service Users (HSUs)	Healthcare Providers	Health System Managers	Data Services
Patients and general population using digital health technologies	**Doctors, allied health workers and frontline workers** using digital health technologies to deliver healthcare	**Governing authorities, managers and administrators of the healthcare system** using digital health technologies	**Cross-cutting data systems** used by HSUs, healthcare providers, and health system managers

HealthPlix, DRIEFCASE, Health, TATA MD, qure.ai, onco.com, navya, PORTEA HEAL AT HOME, CrelioHealth, mfine, cult.fit, HealthifyMe, PharmEasy, practo, credihealth, Co-WIN, NHP National Health Portal, lybrate, eka.care, dozee, myupchar Aapka Apna Doctor, wellthy, Aarogya Setu, e-Sanjeevani, HEALTHKART, WebMD, SIGTUPLE, TATA 1mg, DELL Technologies, paytm, eSanjeevaniOPD, DocEngage, national health authority, iKure, MEDIKABAZAAR, CLINIKK, ALACARE REDEFINING HEALTHCARE, doc prime, DigiLocker Your documents anytime, anywhere, Paperplane WhatsApp Clinic, Edelweiss General Insurance, Niramai, SRL Diagnostics, IHHC, Dr Lal PathLabs India's leading and most reputed diagnostic chain, Piramal Swasthya, Aditya Birla Health Insurance Company, PM-JAY, ABHA, Narayana Health, HDFC ERGO Health, Apollo

Interventions for HSUs provide health information and support disease management.

Select digital health interventions in India

Health Service Users (HSUs)

Patients and general population

Kilkari

Mobile health education service providing pregnant women, new mothers, and their families with timely and accurate information about maternal and child health.

Aarogya Setu

Mobile application providing COVID-19 contact tracing, syndromic mapping and self-assessment digital service.

mDiabetes

SMS-based information service for diabetics providing information on diabetes management, and dietary and lifestyle advice.

Nikshay

One-stop portal for patients enabling treatment adherence, direct benefit transfer of incentives, counselling services and treatment support.

CoWIN portal

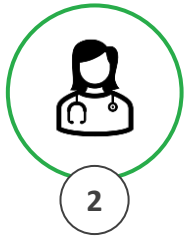
Online portal for COVID-19 vaccination services enabling registration, appointment scheduling, certification and reporting of adverse events.

ABDM Consent Manager

Online services managing personal data consent and supports exchange of interoperable health data across ecosystem players.

Interventions for healthcare providers support training and patient management.

Select digital health interventions in India



Healthcare Providers

Doctors and allied health workers

TB Detect

Interactive mobile application for TB symptom screening based on WHO guidelines, and training tools for healthcare providers caring for TB patients.

eSanjeevani

Flagship telemedicine service facilitating patient-doctor and doctor-doctor teleconsultations through mobile application and website.

Mobile Academy

Mobile-based Reproductive Maternal Neonatal and Child health refresher training course for ASHA workers to improve knowledge and quality of engagement.

Mitaan and similar apps

Tablet-based application for ANMs in Chhattisgarh providing reminder services, work plans, due lists and budget monitoring tools. Similar apps are used in other states.

ASHA Pay and similar apps

Mobile-based application providing a digital platform for ASHA incentives claims, payments and monitoring of ASHA services in Haryana. Similar apps are used in several other states.

Mother and Child Health Tracking

Individual tracking system for reproductive and child health, providing alerts to health service providers about services due and service delivery gaps.

Interventions for HSMs help governance and supply chain management, and those for data services support data collection, analysis and exchange.

Select digital health interventions in India

Health System Managers (HSMs)

Administrators and Managers

Health Professionals Registry, ABDM

Comprehensive digital repository of all healthcare professionals involved in healthcare service delivery across modern and traditional medical systems.

Health Facility Registry, ABDM

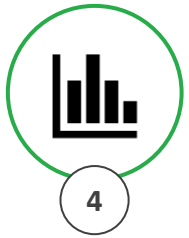
Comprehensive digital repository of public and private health facilities including hospitals, clinics, diagnostic laboratories, imaging centres and pharmacies.

E-Aushadhi

Web-based drug procurement system providing the real-time status of the availability of medical products for supply chain management of drugs and other medical items.

SUGAM

Online e-governance portal for drug and medical device regulation that enables tracking clinical trials, monitoring, and maintaining a comprehensive central database.



Data Services

Cross-cutting data systems

Nikshay

Web-enabled patient management system for TB control under the National Tuberculosis Elimination Programme. Used by health functionaries at all levels and sectors for patient management and monitoring, referral, disease surveillance.

ABDM Health Information Exchange

Online services managing personal data consent and supports exchange of interoperable health data across ecosystem players.

HMIS

Web-based portal for monitoring National Health Mission programmes that records monthly service delivery data from public health facilities and is integrated with GIS to improve programme monitoring.

MCTS

Individual-based tracking system for reproductive and child health, providing alerts to health service providers about services due and service delivery gaps.

India also has digital health interventions specific to mental health, maternal health, and tuberculosis care.

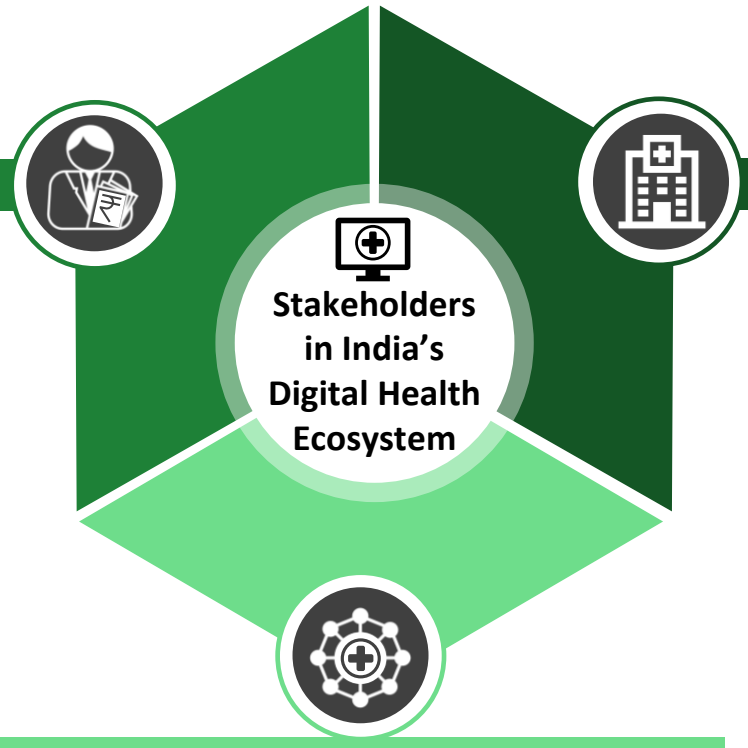
Select thematic digital health interventions in India

Thematic Area	General	Mental Health	RMNCH	TB Care	Tobacco Cessation
Intervention	**eSanjeevani** **MoHFW's flagship telemedicine service** runs on two models – 1. **eSanjeevani Ayushman Bharat-Health and Wellness Centre** (AB-HWC) connects general physicians and allied health workers in remote areas with specialists in tertiary health facilities. 2. **eSanjeevani OPD** can be used by the patient independently to consult a generalist or specialist.	**TeleMANAS** **Flagship tele-mental health programme** which makes mental health assistance available 24×7, especially for people in remote or underserved areas.	**Mobile Academy** This has an **RMNCH e-training course** designed to refresh ASHA workers' knowledge of life-saving preventative health behaviours, and improve quality of engagement with new or expecting mothers and their families.	**PMSMA App** This platform for **volunteer engagement and participation** enables registration of private sector/voluntary/retired physicians willing to provide free antenatal services to pregnant women at government health facilities. **Nikshay** **One-stop portal for TB patients** and providers enabling treatment adherence, direct benefit transfer of incentives, patient tracking and so on. Counselling services and treatment support are also available.	**Tobacco Cessation** **Mobile-based intervention to help smokers quit tobacco use**. Users receive counselling and motivation via text messages.

KEY STAKEHOLDERS IN INDIA'S DIGITAL HEALTH ECOSYSTEM

Various stakeholders contribute towards ensuring effective technology development and adoption in healthcare.

STAKEHOLDERS in India's digital health ecosystem



Payers and Funders

Government Bodies
- Central government and ministries (e.g., MoHFW)
- State governments and ministries

Donors
- Multilateral institutions
- Foundations
- CSR

Development Partners
- National and international NGOs

Insurers
- Insurance providers

Citizens
- Patients
- Users of digital health

Providers

Healthcare Facilities
- Hospitals and clinics
- Laboratories
- Pharmacies and wellness centres

Healthcare Professionals
- Doctors (allopathy, AYUSH, others)
- Allied health workers
- Frontline health workers

Allied Health Industry
- Pharmaceutical companies

Enablers

Industries
- Health technology companies
- Industry associations

Quasi-governmental Bodies
- NITI Aayog
- National Health Authority

(National Health Authority 2022)

Most stakeholders are involved in implementation of digital health; both public and private sectors work in synergy (1/2).

ROLES of different stakeholders in the ecosystem						
	Stakeholders	Governance	Funding	Programme Design	On-ground implementation	Healthcare Delivery	Influencing Policy
PAYERS	Central government and ministries	✓	✓	✓			
	State governments and ministries	✓	✓	✓	✓		
	Multilateral institutions		✓	✓	✓	✓	✓
	CSR		✓				
	Foundations		✓	✓			
	National and international NGOs		✓	✓	✓	✓	
	Insurance companies		✓	✓	✓		✓
	Citizens		✓				✓

(National Health Authority 2022)

Most stakeholders are involved in implementation of digital health; both public and private sectors work in synergy (1/2).

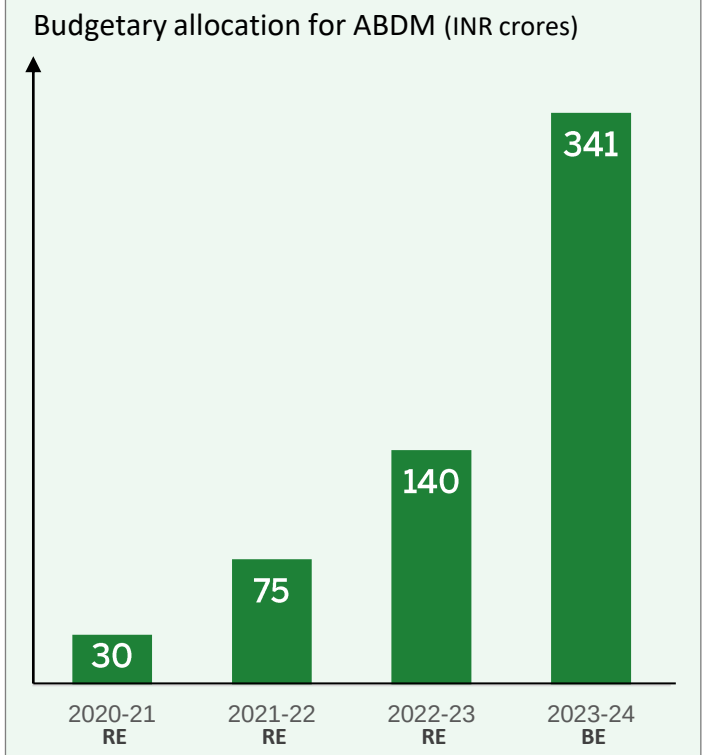
ROLES of different stakeholders in the ecosystem						
	Stakeholders	Governance	Funding	Programme Design	On-ground implementation	Healthcare Delivery	Influencing Policy
Providers	Hospitals and clinics				✓	✓	
	Laboratories and pharmacies					✓	
	Doctors (allopathy, others)				✓	✓	✓
	Allied health workers				✓	✓	
	Frontline health workers				✓	✓	
	Pharmaceutical companies		✓	✓	✓		
Enablers	NITI Aayog			✓			✓
	Healthtech companies		✓	✓			
	Industry associations		✓				✓

(National Health Authority 2022)

WHO INVESTS IN DIGITAL HEALTH IN INDIA?

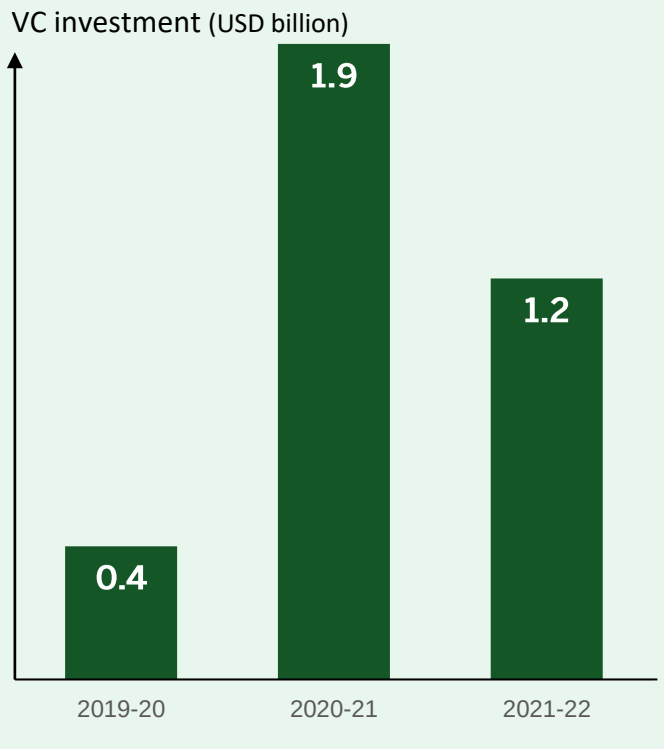
While government funding for digital health has grown, venture capital funding decreased by ~35% in 2022.

Government Funding
(PRS Legislative Research 2023)



BE – Budget Estimate; RE – Revised Estimate.
Note: RE for 2022-23 was INR 200 Cr

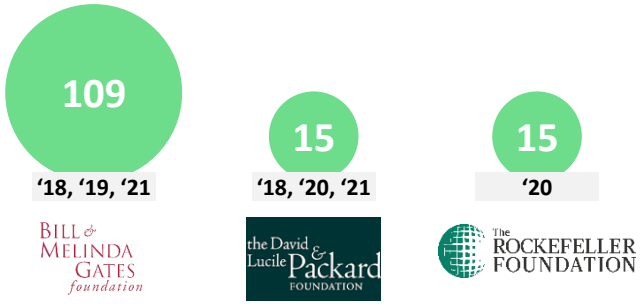
Venture Capital Funding
(Galen Growth 2020 2021 2022)



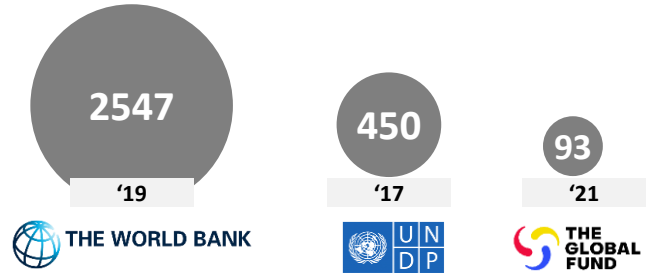
Note: Drop likely due to lower demand post-lockdown, more competitive markets and lower profit margins with increase in number of market players.

CSR Funding* (top 3, FY '19, in INR crores)

Foundation Funding* (top 3, in INR crores)



Multilateral Funding* (top 3, in INR crores)



* - These are illustrative examples. Sattva analysis based on annual reports, websites
Note: Tata Consultancy Services spent INR 296 crores on healthcare in FY'19 but data specific to digital health was unavailable.

CHALLENGES TO DIGITAL HEALTH ADOPTION

Despite existing regulatory policies and an array of digital health solutions, challenges continue to exist in the ecosystem.

Roles of different STAKEHOLDERS in the ecosystem

SOCIAL Challenges

- Disparities in access to, and utilisation of digital health
- Low awareness of the value of using digital health solutions
- Inadequately skilled workforce

TECHNOLOGICAL Challenges

- Data fragmentation and lack of interoperability
- Inadequate technology and infrastructure
- Lack of locally relevant digital health solutions

ECONOMIC Challenges

- High cost of change management
- Inadequate patient capital
- Unknown return on investment

LEGAL Challenges

- Ineffective implementation of existing regulations
- Lack of supporting legislation
- Ethical issues

POLITICAL Challenges

- Lack of comprehensive governance mechanisms
- Inadequate budget utilisation

ENVIRONMENTAL Challenges

- E-waste generation and GHG emissions
- Natural and man-made disasters affecting access

Ineffective regulatory mechanisms and inadequate budget utilisation hinder mainstreaming of digital health.

P POLITICAL CHALLENGES

Lack of comprehensive governance mechanisms	• Digital health falls under the purview of MoHFW and MEITy making it complicated for solution providers to navigate the ecosystem. • Insufficient clarity over Centre-State roles in ABDM leads to a lack of accountability among administrators. • Ineffective quality control mechanisms, especially for the private sector, result in poor quality healthcare.
Inadequate budget utilisation	• Consistently underutilised ABDM budget – 48% utilisation in FY 21, 56% in FY 22 leading to inadequate funding for digital health interventions (National Health Authority 2022).

High cost of change management, inadequate patient capital, and lack of research on cost-effectiveness hinder digital health investments.

High cost of change management	• Digital health adoption requires upfront capital expenditure investment which may be too high for smaller healthcare providers and facilities, thus hindering adoption (Chatterjee et al. 2022). • At-scale implementation in public systems requires entire health infrastructure to be upgraded, entailing high costs for the government with competing expenditures.
Inadequate patient capital	• Monetary returns on investment are not immediate in healthcare (PwC 2017). • Lack of long-term, sustainable investments into digital health – healthtech funding value and number of deals dropped by ~50% and ~23% from 2021 to 2022 (PwC 2023).
Uncertain return on investment	• Difficulty in defining and measuring value from investments in digital health (PwC 2017). • Lack of research on impact and cost-effectiveness of digital health technologies deterring public investments and uptake.

Disparities in access and low awareness about digital health have negative impact on uptake of digital health.

S SOCIAL CHALLENGES

Disparities in access to, and utilisation of digital health	• Gender, age, and socioeconomic status are cross-cutting factors that contribute to disparities in access and utilisation of digital health services. • A sizable population does not have access to the internet, smartphones, or other channels to access digital health technologies. The internet penetration is 37% in rural and 69% in urban areas (ICUBE, IAMAI, KANTAR 2021), while 38% of cell phone users do not have smartphones (Bendre 2021). • Digital health technologies may exacerbate existing health inequalities by excluding most vulnerable populations.
Low awareness of digital health and low perceived value	• Low awareness of ABDM among small healthcare providers – ABDM enrollment among small healthcare providers is ~27% (Chatterjee et al. 2022). • Skepticism about value and capabilities – only 37.8% and 26.7% of small healthcare providers recognised the scope of digital health for treatment adherence and disease prevention respectively.
Dearth of skilled workforce	• Deficiency of digital skills in health HR, leading to limited uptake of digital technologies. • Limited ability of users to navigate the digital health ecosystem leads to low motivation to use digital health technologies.

Lack of interoperability and poor infrastructure lead to underutilisation of existing digital health solutions.

T TECHNOLOGICAL CHALLENGES

Data fragmentation and lack of interoperability	• Lack of standardisation and compatibility between different digital health technologies leading to ineffective communication and data sharing. • Many sources of disparate data with no integration and standardisation.
Inadequate infrastructure and technology	• Insufficient digital infrastructure in health facilities leading to underutilisation. • Digital intervention restricted to less mature applications such as billing – < 50% of surveyed small healthcare providers surveyed by Sattva had ‘established’ digital health adoption (Chatterjee et al. 2022).
Lack of locally relevant digital health solutions	• Scarcity of relevant digital health solutions that cater to underserved markets resulting in poor uptake among citizens and providers.

Ineffective implementation of regulations and absence of supporting legislation lead to ineffective digital health systems

L

LEGAL CHALLENGES

Ineffective implementation of existing regulations	• Digital health regulations are in different stages of implementation with most covering only the public health sector. • Monitoring mechanisms to ensure fidelity of implementation are inadequate.
Dearth of supporting legislation	• Supporting legislation for telemedicine, personal data protection and so on are yet to be implemented (telemedicine practice only has guidelines, while rules for e-pharmacy are only in the draft stage), leading to a lack of accountability.
Ethical issues	• Absence of measures to ensure informed consent for children and those with disabilities.

Digital health can have a negative impact on the environment and must be accounted for in the interest of sustainability.

En 

ENVIRONMENTAL CHALLENGES

E-waste generation and GHG emissions	• Development and implementation of digital health technologies have an impact on the environment, such as through increased energy consumption or the disposal of e-waste.
Natural and man-made disasters affecting access	• Natural and man-made environmental disasters can weaken existing digital health infrastructure and negatively impact the populations' access to services.

WAY FORWARD

Availability of technologies, concerted investments, and user choice will drive India's digital health ecosystem.

Key drivers of digital health trends

Technological Advancement

Technologies are redefining healthcare delivery via digital solutions, bridging the patient-provider gap (BCG 2023).

Robotics | Healthcare Drones | Genomics

Incentives

The government's **Digital Health Incentive Scheme** will **boost digital health transactions** (National Health Authority 2022).

Upto **40mn** …**incentives** for health facilities and digital health companies to digitise health records.

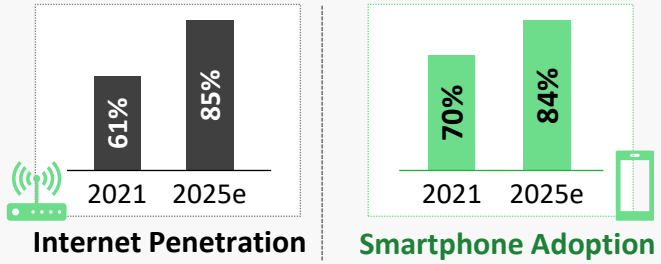
Convenience

Digital health platforms are convenient to use for patients and providers, even in Tier II and III cities (Arthur D Little and NatHealth 2022).

More than **35%** …patients in Tier I, II, and III cities **adopted digital health for reasons of convenience**.

Technology Penetration

Internet penetration and smartphone **usage will rise considerably** in the next three years (Netscribes (India) 2023).



Investments

Massive investments from India and internationally **will drive innovations** in the digital health sector (Economic Times 2022)

Approx **80%** …**expected increase in digital health investments** in the next five years

Access to and Quality of Care

Poor healthcare access and quality of care are high priorities that can be improved through digital health (Haakenstad et al. 2022).

With a score of **39.2** **out of 100,** India's Healthcare Access and Quality (HAQ) score indicates **poor healthcare access and quality.**

Digital health will make healthcare more accessible, cost-effective, personalised, transparent, collaborative and innovative.

Digital Health Trends

Increased ACCESSIBILITY

Even those living in remote areas and in vulnerable circumstances will access healthcare through digital interventions such as telemedicine. Access to better communication and referral mechanisms will ensure continuity of care even in underserved areas.

Increased AFFORDABILITY

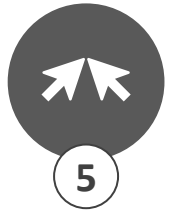
As digital health technologies become mainstream, providers and patients will avail them at lower costs. Remote health technologies will lower cost of transport and out-patient care.

Increased Personalisation

Healthcare will become more tailored to individual needs with the vast data on user health metrics available to healthcare providers, and the practice of precision medicine.

Increased Transparency

With democratisation of health information and **increased access to smart devices, patients will be better equipped to make choices and hold the health system accountable.**



Increased Convergence

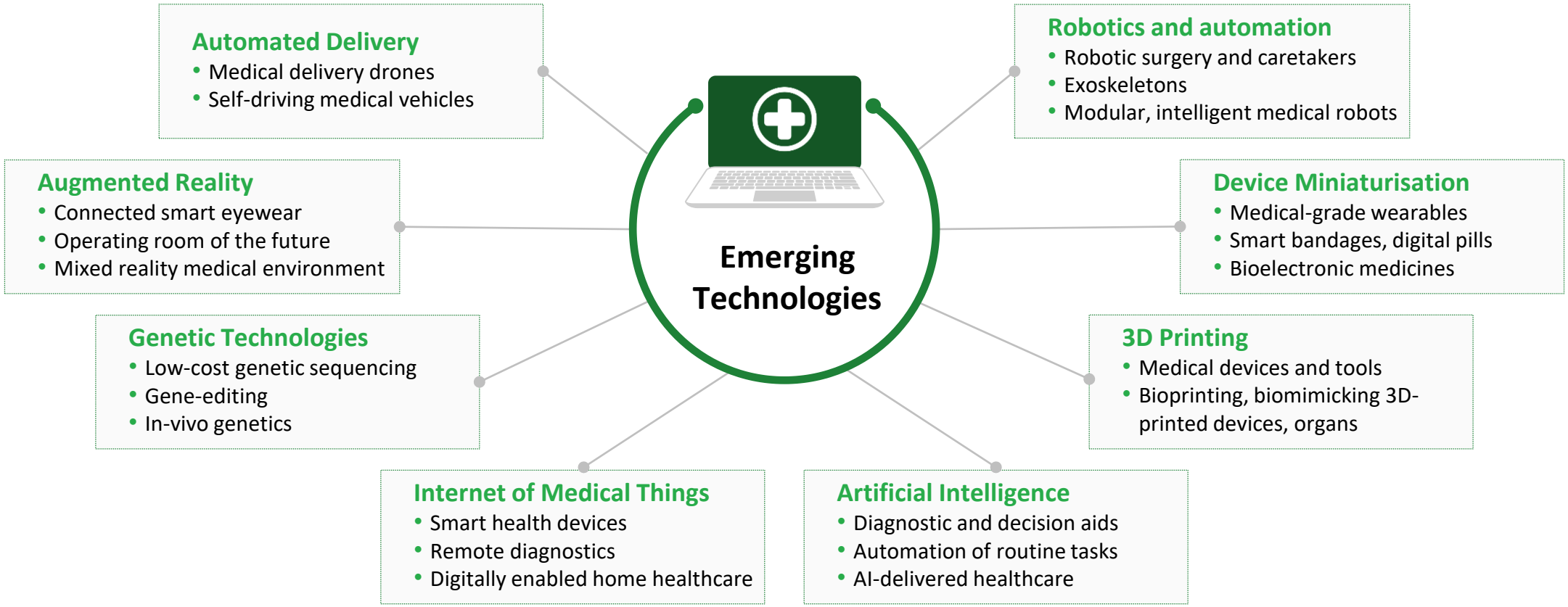
More non-healthcare players (large tech companies, gig economy players) will come together to develop products and services across the entire care pathway, leading **to non-traditional partnerships in healthcare.**

Increased Innovation

Remote sensing devices, drones, medical robotics, and augmented reality will revolutionise how health services are delivered to patients in the physical absence of doctors.

Future tech interventions likely to facilitate increased efficient, effective and personalised healthcare.

Upcoming digital health technology trends



(Consultancy.in 2019)

Driving digital health uptake, supporting solution providers, and creating enabling environments are imperative to ensure digital health equity.

APPROACHES TO PROMOTE digital health equity

Proactively address the needs of underserved communities

Drive Digital Healthcare Adoption among Citizens and Providers

- Promote health-seeking behaviour and build trust among rural populations and smaller healthcare providers.
- Incentivise adoption among healthcare providers and citizens by innovating newer models that reduce the cost burden on both (e.g. low-cost HMIS).
- Incentivise digitisation of health data by citizens for better preventive care and to access funds during curative care and health emergencies.
- Create a common philanthropic fund pool to promote provider and citizen adoption, through free trials and subsidised payments of digital health solutions.
- Build digital literacy for frontline workers and citizens.

Develop suitable and sustainable digital health solutions

Support Solution Providers Navigate System Complexities

- Implement regulatory changes, offer meaningful incentives and impose penalties for noncompliance.
- Establish communication with policy and decision-makers and create toolkits to build policy understanding.
- Provide capital support to solution providers in the initial phases of innovation and deployment.
- Create collaborative labs with solution providers, incubators and academic institutions to effectively test digital health solutions.

Create Enabling Environments to Address Challenges

- Identify innovative financial instruments, such as blended finance and outcome-based financing.
- Identify uptake challenges and bundling complementary solutions.

(Chatterjee 2022)

ANNEXURE: DIGITAL HEALTHCARE REGULATIONS IN INDIA

Regulations applicable to digital health in India (1/3)

DIGITAL HEALTH REGULATIONS	
Draft E-pharmacy Rules 2018 Rules	• Meant to regulate provision of drugs by e-pharmacies but remains in draft form. • Includes rules for registration, data localisation, periodic inspections, and procedure for distribution.
National Health Stack 2018 Framework	• Visionary digital framework for Centre and state. • Envisaged a centralised health record, creation of master health data, personal health records for individuals, and generating digital health IDs and health data directories.
The National Digital Health Blueprint 2019 Guidelines	• Recommended establishment of National Digital Health Mission (NDHM) and defined its objectives. • Identified 23 building blocks and critical capabilities of the National Digital Health Ecosystem.
Telemedicine Practice Guidelines 2020 Guidelines	• Provided guidelines for medical providers to practice telemedicine. • All modes of communications (text, audio, video, etc.) between the service provider and user are included in the broad rubric. • Classifies medicines and provides rules for prescribing.
National Digital Health Mission 2020 Framework	• Presents the broad context, scope, rational, key constructs and implementation strategy for developing a digital ecosystem for healthcare services in the country.

Regulations applicable to digital health in India (2/3)

OTHER APPLICABLE REGULATIONS	
Drugs and Cosmetics Act 1950 and Drugs and Cosmetics Rules 1954	• Online services pertaining to pharmaceuticals in India have to be compliant with the DCA and DCR framework.
National Medical Commission Act 2019 and Indian Medical Council Regulations 2002	• Applicable to digital health applications to the extent that the services involve the delivery of healthcare by a physician to patient.
Clinical Establishments Act 2010	• Requires the maintenance of electronic records of patients by clinical establishments.
National Health Policy 2017	• Focused on creating Digital Health Technology Ecosystem and suggested establishment of National Digital Health Authority. • Recommended linking and integrating Aadhaar with the health data of individuals.
Consumer Protection Act 2019 and Consumer Protection (E-commerce) Rules 2020	• Applicable to digital healthcare providers, as in the case of conventional healthcare providers.

Regulations applicable to digital health in India (3/3)

DIGITAL HEALTH DATA REGULATIONS	
Electronic Health Record Standards 2016 Standards	• Applicable to all clinical establishments • Formulated for the creation of a uniform standard-based system for EHRs in India.
Health Data Management Policy 2020 Policy	• Framework for management of digital health data privacy of individuals, registered healthcare professionals and participating entities in ABDM. • Introduced the concept of an electronic consent manager.
Draft Digital Information on Security in Healthcare Act 2018 Draft Act	• Proposed the establishment of state and national authorities to implement its provisions • Defines rules for maintaining, storing, protecting, and transmitting health data.
Data Security Council of India Privacy Guide for Healthcare 2021 Guidelines	• Enables organisations to understand and implement privacy controls, and demonstrate compliance to regulators. • Not a binding document.

OTHER APPLICABLE DATA REGULATIONS	
Information Technology Rules 2011	• Digital health data considered Sensitive Personal Data under the rules.
Digital Personal Data Protection Bill 2022	• Provides rules for processing of digital personal data. Lays down the rights and duties of citizens and duties/obligations of Data Fiduciary on the use of data.

REFERENCES

- Arthur D Little and NatHealth 2022, *A Bold Vision for India's Digital Health*.
- BCG 2023, *The Future of Digital Health*.
- Bendre, R 2021, *JioPhone Next: Google, Reliance Jio Eye the 'Next 500 Million Smartphone Users'*, Counterpoint.
- Chatterjee, C 2022, *What does it take to build and scale digital health solutions for the underserved?*, Sattva Knowledge Institute.
- Chatterjee, C, Chanchani, M and Shukla, A 2022, *Understanding digital readiness of Small healthcare Providers*, Sattva Knowledge Institute.
- Consultancy.in 2019, *Life Sciences 4.0: Digital opportunities in the Indian healthcare sector*, March 11, viewed on 12 February 2023.
- Davenport, T and Kalakota, R 2019, 'The potential for artificial intelligence in healthcare', *Future Healthcare Journal*., vol. 6, no. 2, pp. 94-98.
- Duggal, M, El Ayadi, A, Duggal, B, Reynolds, N and Bascaran, C 2022 'Challenges in implementing digital health in public health settings in low and middle income countries', *Frontiers in Public Health.*, vol. 1, no. 10, pp. 5491.
- Economic Times 2022, *India to see 80% increase in investment of digital healthcare tools in the next 5 years: MoS Jitendra Singh*, October 29, viewed on 23 February 2023.
- Galen Growth 2020, *Digital Health Ecosystem Key Trends FY 2020 – Asia Pacific*.
- Galen Growth 2021, *Digital Health Ecosystem Key Trends FY 2021 – Asia Pacific*.
- Galen Growth 2022, *Digital Health Ecosystem Key Trends FY 2022 – Asia Pacific*.
- Gudi, N, Lakiang, T, Pattanshetty, S, Sarbadhikari, SN and John, O 2021, 'Challenges and prospects in india's digital health journey', *Indian Journal of Public Health*., vol. 65, no. 2, pp. 209-212.
- Haakenstad, A, Yearwood, JA, Fullman, N, Bintz, C, Bienhoff K, Weaver, MR, Nandakumar, V, Joffe, JN, LeGrand, KE, Knight, M and Abbafati, C 2022, 'Assessing performance of the Healthcare Access and Quality Index, overall and by select age groups, for 204 countries and territories, 1990–2019: a systematic analysis from the Global Burden of Disease Study 2019', *The Lancet Global Health.*, vol. 10, no. 12, pp. e1715-e1743.
- ICUBE, IAMAI and KANTAR 2021, *Internet in India*.
- Itihaasa Research and Digital 2021, *History and Future of Digital Health*.
- Kumar A 2023, '*Budget 2023-24: Ayushman Bharat allocated Rs 7,200 crore*', February 1, viewed on February 14 2023.

- Kumar Gupta, D, Ali, MH, Ali, A, Jain, P, Anwar, MK, Iqbal, Z and Mirza, MA 2022, '3D printing technology in healthcare: applications, regulatory understanding, IP repository and clinical trial status', *Journal of Drug Targeting*., vol. 30, no. 2, pp. 131-150.
- Mordor Intelligence 2022, *Digital Health Market - Growth, Trends, COVID-19 Impact, and Forecasts (2022 - 2027)*.
- National Health Authority 2020, *National Digital Health Mission Strategy Overview*.
- National Health Authority 2022, *Annual Report 2021-2022*.
- National Health Authority 2023, '*ABDM Dashboard*', February 24, viewed on 24 February 2023.
- Netscribes (India) 2023, *Digital Healthcare Market in India 2022-2027.*
- Philips 2022, *Future Health Index 2022 - Healthcare hits reset India*.
- Philips 2022, *Future Health Index 2022 - Healthcare hits reset Global*.
- PRS Legislative Research 2023, '*Demand for Grants 2023-24 Analysis : Health and Family Welfare*', viewed on 23 February 2023.
- PwC 2017, *Digital health: Challenges and solutions to measuring Return on Investment (ROI)*.
- PwC 2023, *Startup Perspectives: India start-up deals tracker CY22*.
- World Health Organization 2019, *WHO guideline: recommendations on digital interventions for health system strengthening*.
- World Health Organization 2021, *Global strategy on digital health 2020-2025*.
- World Health Organization 2022, '*Second Call for Public Comment - WHO Classification of Digital Health Interventions*', viewed on 11 February 2023.
- World Health Organization 2022, '*WHO and partners launch world's most extensive freely accessible AI health worker*', WHO Press Release, October 22, viewed on 10 February 2023.
- World Health Organization 2023, '*Digital Health Atlas - India*', viewed on 10 February 2023.