eHealth Kerala- State Digital Health Mission

The legacy of Excellence

eHealth Kerala

State Digital Health Mission

Health and Family Welfare Department
Government of Kerala

KERALA.HEALTH

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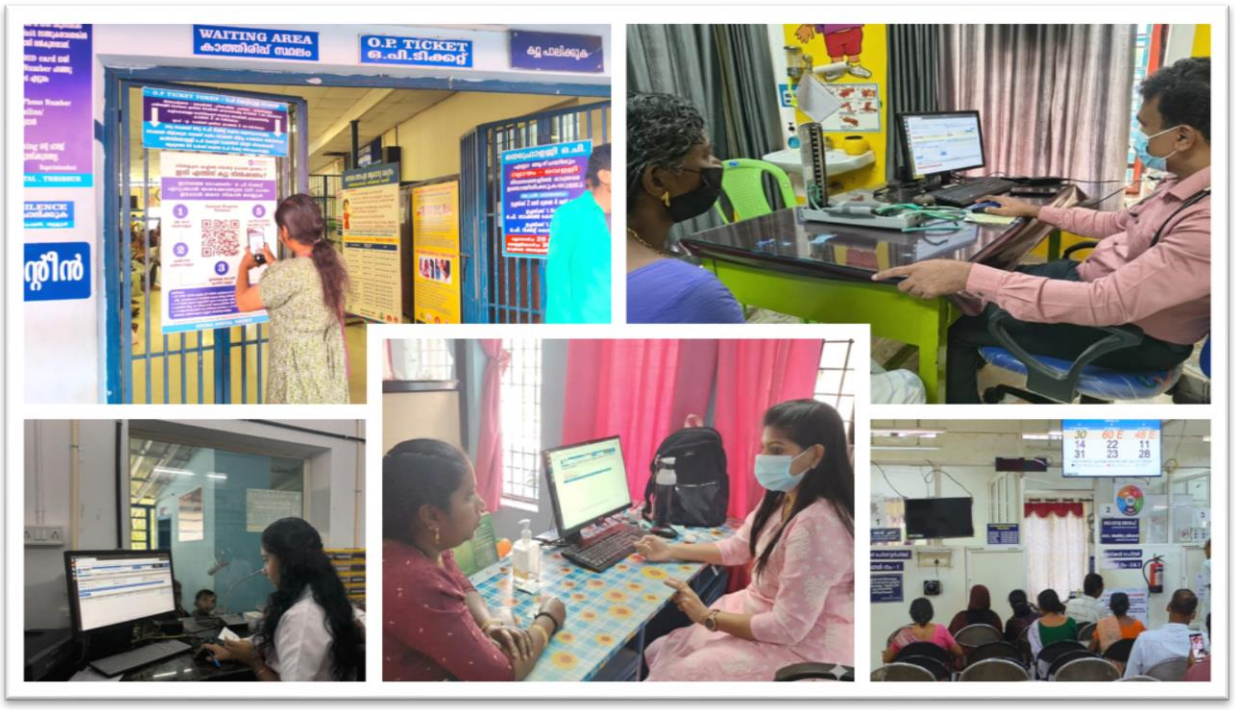

eHealth Kerala
State Digital Health Mission

Kerala.HEALTH

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Foreword

Kerala Health has embarked on an ambitious project to implement an e Health project in the State. It was ahead of its time by visualizing to have unique health identify card so as to do longitudinal electronic health records to cover all services right from OP ticket to the discharge in the hospital setting. The project has gone through its cycle of ups and downs. Subsequently, the project team was formed by giving tasks to complete the main components Project.

Over a period, the project progress was assessed regularly, and various milestones were achieved from doing Public Health survey and roll out of five essential modules in more than 725 institutions. Successive Project Directors Shri Safirulla, Smt Anu, Dr Vinay and Shri Rahul Sharma took efforts to facilitate completion of five modules, roll out of modules in the institutions, procurement and deployment of hardware and mobilization of the funding. After completing the module related works, simultaneously people centric facilities were developed. Online payment, appointment, report availability etc were incorporated into the system. The team worked on e Health modules and as per the requirements of the Departments, they concurrently worked on the modules for NIPAH outbreak, module of COVID death management system, Cancer Care field work etc.

The team is oriented to work on critical indicators in the dashboard so as to maintain the focus on the problem areas.

I appreciate the works done by the team of experts at e Health Dr Mahesh, Dr Roentgen, Mr Vinod, Mr Akhil and other support teams. All the successive Project Directors Mr Saffirulla, Ms Anu, Dr Vinay and Mr Rahul's efforts to facilitate project implementation were deeply appreciated.

I wish all the success to e Health team for their future initiatives.

Dr Rajan Khobragade IAS

Additional Chief Secretary

Health and Family Welfare

Govt of Kerala

Message

The advancement of healthcare today depends not only on medical expertise but also on the effective use of technology to support clinical care, education, research, and governance. Kerala has consistently demonstrated leadership in adopting innovative approaches to strengthen its healthcare system, and eHealth Kerala stands as a example of this commitment.

The State Digital Health Mission has successfully created a robust digital health framework that connects healthcare institutions across the State through a unified platform. For medical colleges and tertiary care institutions, the implementation of eHealth has brought significant improvements in clinical documentation, patient management, diagnostic services, pharmacy operations, and institutional administration. The availability of longitudinal electronic health records has enhanced continuity of care while creating valuable opportunities for academic research, quality improvement initiatives, and evidence-based clinical practice.

The integration of eHealth Kerala with the Ayushman Bharat Digital Mission further strengthens Kerala's position as a leader in digital health innovation. By embracing interoperability standards, digital identities, and citizen-centric services, the State is building a healthcare ecosystem capable of meeting future challenges while ensuring high standards of patient care.

This document reflects the remarkable journey of eHealth Kerala and the collective efforts of healthcare professionals, faculty members, technical experts, administrators, and government leadership who have contributed to its success. Their dedication has enabled Kerala to establish a digital health model that is being recognized across the country.

I extend my appreciation to the State Digital Health Mission team and all stakeholders involved in this transformative initiative. I am confident that the continued expansion of digital health services will further strengthen healthcare delivery, medical education, and research excellence in Kerala.

Dr. Vishwanathan
Director of Medical Education
Government of Kerala

Message

Kerala has long been recognized for its commitment to providing equitable, accessible, and quality healthcare to all citizens. As healthcare systems evolve in response to emerging challenges and growing expectations, digital transformation has become indispensable for delivering efficient, transparent, and patient-centric services.

The eHealth Kerala initiative, functioning under the State Digital Health Mission, represents one of the most significant reforms undertaken in the public healthcare sector of the State. What began as a vision to establish "One Citizen – One Electronic Health Record" has today evolved into a comprehensive digital health ecosystem connecting healthcare institutions across Kerala. The integration of clinical services, public health programmes, citizen-centric applications, and digital health records has substantially improved healthcare accessibility, continuity of care, and administrative efficiency.

The Directorate of Health Services has witnessed firsthand the transformative impact of eHealth across primary and secondary healthcare institutions. Digital registration, online appointment systems, electronic medical records, laboratory and pharmacy automation, and ABDM-enabled services have enhanced both patient experience and service delivery. Equally important is the availability of real-time health information, which strengthens disease surveillance, programme monitoring, and evidence-based decision-making.

The successful implementation of eHealth Kerala is a testament to the dedication of healthcare professionals, technical teams, administrators, and policymakers who have embraced innovation in the service of public health. As Kerala advances towards a fully integrated digital health ecosystem, the State Digital Health Mission will continue to play a pivotal role in shaping the future of healthcare delivery.

I congratulate the entire eHealth Kerala and SDHM team for their remarkable achievements and wish them continued success in their efforts to build a healthier and digitally empowered Kerala.

Dr. Reena
Director of Health Services
Government of Kerala

CHAPTER 1 BACKGROUND AND CONTEXT

Owing to the immense benefits that Healthcare Technology promises, it is gaining wide acceptance in both developed and developing nations. With the increased penetration of Information and Communication Technology (ICT) and the wider acceptance of computerisation in healthcare, the use of technologies for Health Informatics has gained momentum in the country. Healthcare is one of India's largest sectors, in terms of revenue and employment, and is expanding rapidly not only in infrastructure and availability but also in the quality and efficiency of healthcare, with the help of Health Informatics. It helps improve healthcare quality, reduce human errors in medical data capture, reduce healthcare costs, increase administrative efficiency, and expand access to affordable healthcare. It also provides an accurate, electronically stored medical record for each patient. Advancements in Healthcare Management Systems are not only improving the quality of healthcare but also initiating health awareness among people.

The communication infrastructure and connectivity in the country have now become robust enough to allow the seamless functioning of the HMIS solution on the cloud. The statewide implementation of HMIS from the state data centre allows a single application to cater to multiple hospitals within the State. This would enable a unique patient ID within the state, enabling patient mobility across all hospitals in the State. It allows doctors to consult a single patient across multiple hospitals.

The Dept of Health & Family Welfare, Government of Kerala, moved to the digital era through the eHealth Kerala project. eHealth Kerala is an IT enabled integrated framework for healthcare to ensure efficient service delivery to the common citizen.

With the aim of automating health care service delivery in the state public sector, this project is being implemented by the e-health Project Management Unit (PMU), which functions under the Department of Health & Family Welfare, Government of Kerala.

eHealth Project Management Unit functioning as State Digital Health Mission [SDHM]

Recognising the strategic importance of digital health governance, the Government of Kerala, vide G.O.(Rt) No. 2828/H&FWD dated 16-12-2021, accorded State Digital Health Mission (SDHM) status to the eHealth Project Management Unit. Initially conceptualised and implemented as the eHealth Kerala project under the PMU, the initiative was formally transitioned into the State Digital Health Mission in December 2021. This transition enabled the establishment of specialised divisions to oversee digital health standards, implementation, interoperability, and innovation across the State.

Today, eHealth Kerala functions as a flagship initiative under the State Digital Health Mission, embodying Kerala's vision of an integrated, interoperable, and citizen-centric digital health ecosystem.

STATE DIGITAL HEALTH MISSION

Components of SDHM

- eHealth Kerala
    - IT Infrastructure
    - eHealth Hospital Management System
    - Public Health Management System
- Citizen Centric Services
    - UHID- Unique Patient Health Record
    - Advance Online Appointment
    - meHealth- PHR Mobile app
    - eHealth Web portal
    - Scan n Book
    - Lab test results via
    - Digital Payments
- Ayushman Bharat Digital Mission Implementation
    - Creation of building blocks
        - ABHA (Ayushman Bharat Health Account)
        - HFR (Healthcare Facility Registry)
        - HPR (Healthcare Professional Registry)
    - Ensuring a digital health ecosystem across all systems of medicine in public, private and PPP
- Departmental Projects
    - SHAILI
    - Cance Care Suite
    - Covid Death Information System
- Health Care Innovations Health Care Innovations
  (in collaboration with KDISC & KSUM)
    - AI Chatbot
    - Blood bag Traceability
    - AI-based Token Prediction
    - AI-based Diabetic Retinopathy Screening

EHEALTH KERALA

The very concept of the project is 'One Person One Electronic Health Record' and to set up an Integrated Healthcare Cloud that can hold, update, and share the complete healthcare data of all residents in the State. The major highlight of the project is that the Hospital Management System is fully integrated with the Public Health Management System and is the first of its kind in India.

HISTORY

The Health Kerala project was initiated with the vision of implementing a comprehensive digital health ecosystem based on the concept of "One Citizen, One Electronic Health Record." The project focused on establishing an integrated Hospital Management System and Public Health system, along with supporting IT infrastructure, to digitise healthcare services across the State.

As part of this initiative, in 2013, the project proposal titled "e-Health Kerala" was submitted to the Government of India for possible funding under the World Bank–supported India e-Delivery of Public Services Project. The Standing Finance Committee of the Department of Electronics and Information Technology, Government of India, recommended the project for approval, with a total project outlay of 96.12 Cr, of which 86.69 Cr was to be contributed by DeitY and 9.43 Cr as the State share. Further, the e-Governance Group of the Department of Electronics and Information Technology (DeitY), Government of India, accorded Administrative Sanction for an amount of 96.12 Cr for the implementation of the e-Health Kerala project.

For the effective implementation of the e-Health Kerala project, the Government of Kerala, vide G.O.(Rt) No. 644/2013/H&FWD dated 27.02.2013, constituted a High-Level Governing Committee to take policy decisions and oversee the project's implementation. This step ensured coordinated governance and strategic supervision at the highest level. Following the accord of administrative and financial sanctions, the Government of Kerala initiated preparatory actions for the implementation of the e-Health Kerala project. An EOI was invited for the project, and a PMU Unit was constituted in accordance with the provisions of the approved DPR.

As part of the preparatory activities for implementation, the Government of Kerala constituted a committee to finalise the technical specifications for the hardware and networking required for the e-Health Kerala project. An eight-member committee was formed for this purpose to ensure that the technical requirements conformed to project objectives, scalability needs, and standard e-governance norms. The constitution of this committee marked a key step towards procurement planning and infrastructure readiness for the rollout of the e-Health Kerala project.

As a further step towards operationalising the project implementation framework, the Government of Kerala fixed the location of the Project Management Unit for the e-Health Kerala project, and the PMU was set up in the Directorate of Health

Services buildings. As per the order, the responsibility for executing these works was entrusted to the State Mission Director, NHM. The provision of office infrastructure enabled the PMU to become fully functional and supported the smooth initiation of implementation activities of the e-Health Kerala project.

After the Pre-Qualification of bidders, M/s Hewlett-Packard (HP) was selected as the Primary System Integrator (PSI). The decision was based on the recommendations of the High-Level Governing Committee and the Technical Advisory Committee, ensuring a transparent and technically sound selection process. HP, as the PSI, was entrusted with end-to-end project implementation, including software development, IT infrastructure deployment, networking, training, and pilot rollout of the e-Health Kerala platform across hospitals and population-based health systems. To ensure active staff involvement in the development and implementation of the e-Health Kerala project, the Government of Kerala constituted user groups. Staff members participating in these user groups were sanctioned to attend meetings to provide their input on the application's development, ensuring that the project design addressed practical workflow requirements and user needs.

To provide the e-Health Kerala project with a formal institutional and legal identity, the Government of Kerala sanctioned its registration as the "Kerala e-Health Society". This was formalised vide G.O.(Rt) No. 2055/2015/H&FWD dated 02.07.2015. The society was registered under the Travancore-Cochin Literary, Scientific and Charitable Societies Act, 1955, enabling it to function as a legal entity capable of implementing the project, managing funds, and entering into contracts.

It was also approved to engage M/s KELTRON as the Technology Service Provider (TSP) for the Project Management Unit. TSP starts supporting the PMU in coordination, monitoring, technical guidance, and implementation oversight. PMU begins functioning as a legal entity under the Society, enabling it to enter into contracts, manage funds, and conduct administrative activities.

The eHealth project was first piloted in mid-2016 in a few healthcare facilities in the Thiruvananthapuram district.. The project was officially launched by Kerala's Chief Minister at the Peroorkada District Hospital on 25th January 2017. It inaugurated the electronic medical record (EMR) system and began building a digital healthcare database.

After early adoption, the system grew gradually, and multiple government medical colleges and hospitals were added under eHealth, expanding digital services statewide.

In mid 2020, e-Health PMU took over software development to ensure continuity and avoid service disruptions. Subsequently, after taking over the software development activities, and in due course of time, the Government of Kerala recognised the e-Health PMU as the single agency responsible for addressing the IT needs of all institutions under the Health & Family Welfare Department as per the G.O(Rt) No-2828/2021/H7FWD, dated 16.12.2021. Thereafter, e-Health was re-designated as the State Digital Health Mission (SDHM)

Over time, numerous additional activities were assigned to the PMU beyond its original mandate of software development for the e-Health Project. Further assignments, such as the SHAILI Mobile Application, the Covid Death Information system, the Covid Vaccination Portal, the Cancer Care Portal, and other initiatives, were entrusted to e-Health/SDHM. Consequently, the scope and purview of e-Health/SDHM were significantly expanded, and it was required to shoulder wide-ranging and diverse responsibilities.

When e-Health was formed, the Government of Kerala sanctioned 11 posts to handle the assigned work, as per G.O.(Rt) No. 1539/2013/H&FWD dated 04.05.2013. However, after taking over the software development work and being identified as the single agency responsible for the IT requirements of all institutions under the Health & Family Welfare Department, it became very difficult to manage the workload with the existing staff. Hence, additional posts were created, and employees were recruited to handle the work assigned to e-Health.

In the meantime, the Ayushman Bharat Digital Mission (ABDM) was launched nationwide by the Hon'ble Prime Minister on 27.09.2021, to support the nation's integrated digital health infrastructure. The mission aims to develop the necessary backbone to enable seamless digital health services across the country.

The National Health Authority has issued detailed guidelines for establishing State Offices under ABDM. In accordance with these guidelines, the Government designated the eHealth Project Management Unit, Kerala, as the State Digital Health

Mission to lead the activities related to the Digital Health Mission in the State. Accordingly, as per G.O.(Ms) No. 188/2022/H&FWD dated 02.10.2022, sanction was accorded to eHealth Kerala to lead the rollout of ABDM in the State.

With the subsequent increase in staff strength, it became difficult to accommodate all employees within the space allotted in the Directorate of Health Services (DHS) buildings. Therefore, as per G.O.(Rt.) No. 2391/2020/H&FWD dated 24.12.2020, the Government allotted the half portion of the second floor of the new multi-storied building in the General Hospital compound for establishing a full-fledged office for the eHealth PMU.

Further, as per G.O.(Rt.) No. 1919/2022/H&FWD dated 05.08.2022, the Engineering Wing of the National Health Mission (NHM) was entrusted with the work of setting up and furnishing the eHealth PMU office. NHM initiated the tendering process to identify a Project Management Consultant from empanelled agencies, and the work was subsequently awarded to Kerala State Nirmithi Kendra.

Upon completion of the works, NHM handed over the office space to eHealth for functioning. eHealth has fully shifted to the new building and has been functioning from the new premises with effect from 01.12.2025.

The project captures the entire gamut of information, including demographic data, automates hospital processes, and brings all information into a centralised State Health Information system, ensuring continuity in health care through an effective IT-enabled backbone and Wide Area Network. eHealth is a robust and sustainable Healthcare IT solution supporting nearly 50,000 healthcare service personnel, including Doctors, Paramedical staff, and other non-clinical staff, at Primary, Secondary, and Tertiary care centres maintained by the State Government.

IMPLEMENTATION OF AYUSHMAN BHARAT DIGITAL MISSION (ABDM) IN KERALA

ABDM (Vision & Objectives)

Vision: Building an open, interoperable digital health infrastructure to give every Indian citizen a unique digital health identity and seamless access to their digital health records across providers, improving continuity of care and enabling better planning and financing of health services.

Core objectives

- Provide every citizen with a unique health identifier (ABHA/Ayushman Bharat Health Account).
- Create interoperable building blocks (ABHA, Health Facility Registry (HFR), Health Professional Registry (HPR), Health Information User (HIU)/Provider interfaces, Consent Manager, FHIR-based Health Data APIs) to enable secure exchange of health data.

- Promote paperless, patient-centric care (appointments, teleconsultation, EHR portability) and support analytics for public health and policy.
- Creation of unique digital health identities for citizens through ABHA (Ayushman Bharat Health Account)
- Establishment of digital registries for healthcare facilities and healthcare professionals
- Enablement of interoperable Electronic Health Records (EHR)
- Facilitation of seamless access and exchange of patient health information

Introduction of ABDM — how it works

- ABHA (Health ID): A voluntarily created digital identifier for every individual to link medical records across health service providers.
- Building blocks: Registries and gateways (HFR, HPR, HIP, HIU, Consent Manager, Health Data Management/Exchange). Each component has defined APIs and onboarding rules, enabling different software vendors and providers to integrate.
- Standards & Interoperability: ABDM relies on international standards (HL7 FHIR R4) and an ABDM FHIR Implementation Guide to ensure consistent semantics and exchange formats across systems.

Implementation of ABDM in Kerala

As per G.O.(Ms) No. 188/2022/H&FWD dtd 02.10.2022 of the Health & Family Welfare Department, State Digital Health Mission (SDHM) has been appointed as the agency to roll out ABDM in the State of Kerala. A State-level Coordination Committee, chaired by the Secretary (Health & Family Welfare), was formed to monitor the progress of ABDM implementation at the state level. District Coordination Committee, headed by the District Collector, was formed to monitor the district-level implementation progress. This committee have representatives from professional bodies and private hospitals.

Kerala, a leader in digital health initiatives through its eHealth Kerala project and other ICT-enabled healthcare systems, found the adoption of ABDM easy, in alignment with national guidelines. The State has undertaken multiple initiatives to integrate ABDM components with existing healthcare platforms and institutional workflows.

Practical steps taken

- Public healthcare facilities across the State have been onboarded to the Health Facility Registry (HFR), creating verified digital identities for healthcare

institutions and enabling their integration with ABDM-compliant digital health services.

- Doctors and nurses from public healthcare facilities have been successfully onboarded onto the Healthcare Professionals Registry (HPR), enabling the creation of verified digital professional identities and facilitating their integration into the ABDM digital health ecosystem.
- ABHA creation drives have been conducted across Government offices, Government organizations, and public institutions to enhance citizen coverage and accelerate the adoption of ABHA under the ABDM framework
- The process to implement the HMS has been initiated across all public healthcare facilities, encompassing all systems of medicine, to strengthen digital health service delivery and ensure ABDM compliance.
- The process has been initiated for onboarding pharmacists onto the HPR, to create verified digital identities for pharmacists and enable their integration into the national digital health ecosystem.
- The Scan and Share features have been implemented to facilitate seamless patient onboarding using the Unique Health ID. These features enable patients to quickly register and access healthcare services by scanning facility QR codes, thereby improving efficiency, reducing registration time, and promoting the adoption of ABDM-compliant digital health services.
- A total of 2.58 crore ABHA accounts have been created for the population of Kerala. Among the various applications integrated with ABDM, the eHealth HMS ranks 11th nationally in terms of the number of ABHA accounts created

Roles of key registries & components

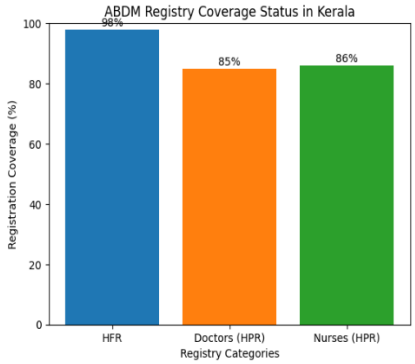
a. Health Facility Registry (HFR)

A canonical registry of health facilities (public/private), each with standardized metadata (location, services, contact, identifiers). It helps discover providers and route requests.

b. Health Professional Registry (HPR)

Registry of health professionals (doctors, nurses, pharmacists, etc.) with their professional details and identifiers so that services and attributions (e.g., who signed a prescription) are unambiguous.

c. Kerala - Onboarding under HFR and HPR in public sector



Role of Scan & Scare

a) Faster Patient Registration
   - Patients can scan the facility QR code using any ABDM-enabled mobile app (such as ABHA app, Aarogya Setu, or State health apps).
   - Their ABHA number and demographic details are instantly shared with the hospital registration system.
   - Eliminates the need for manual form filling at registration counters.

b) Reduced Waiting Time in Hospitals
   - Registration time is reduced from several minutes to a few seconds.
   - Helps reduce long queues, especially in OPD registration areas.
   - Improves patient experience and hospital efficiency.

c) Accurate and Error-free Data Capture
   - Patient details are fetched directly from the ABHA database.
   - Avoids manual data entry errors such as spelling mistakes, duplicate records, or wrong demographic details.

d) Enables ABDM-Compliant Digital Health Records
   - Ensures patient records are linked to their Unique Health ID (ABHA).
   - Facilitates creation and sharing of digital health records such as prescriptions, lab reports, and discharge summaries.

e) Supports Seamless Continuity of Care
   - Patient health records can be accessed across ABDM-enabled facilities with patient consent.
   - Enables better clinical decision-making by providing access to prior medical history.

f) Improves Hospital Workflow Efficiency
   - Reduces workload on registration staff.
   - Enables faster patient throughput in OPD and other service areas.
   - Supports digital transformation of healthcare facilities.

Scan and Pay under ABDM

The Scan and Pay feature under the ABDM is an important digital initiative aimed at enabling seamless, cashless, and contactless payment mechanisms in healthcare facilities. This feature allows patients to make payments for healthcare

services by scanning a QR code displayed at the healthcare facility using any UPI enabled mobile application or ABDM-enabled patient application.

The implementation of Scan and Pay also supports the broader objectives of ABDM by promoting digital transactions and facilitating end-to-end digital healthcare service delivery. Further, the Scan and Pay feature improves transparency, accountability, and auditability of financial transactions in healthcare facilities. It also enhances patient convenience by providing secure and user-friendly payment options.

In the State of Kerala, the Scan and Pay feature is being implemented as part of the ABDM integration with the eHealth Kerala Hospital Management System and other ABDM-enabled applications. This initiative is expected to strengthen digital health service delivery, improve patient experience, and support the State's efforts toward achieving full compliance with ABDM standards.

How the public uses the ABDM platform

a) Get an ABHA: Citizens create an ABHA (with basic KYC) via web/mobile apps. Once created, ABHA is the anchor for record linking.

b) Access & share records: Patients can request that a hospital attach a health record to their ABHA (Scan & Share), or allow providers to push structured records (via HIU/HIP). Sharing always requires the user's explicit consent managed via the Consent Manager.

c) Services enabled: Online appointments, teleconsult, retrieval of lab reports and prescriptions, linkage of insurance/claims workflows, and continuity when a patient moves between providers.

Onboarding Software Vendors

Kerala has a large number of software development companies providing digital solutions to healthcare institutions such as hospitals, laboratories, and pharmacies. However, many of these applications were not initially compliant with ABDM standards. To facilitate ABDM compliance and integration, conducted regional workshops for software vendors across the State. These workshops focused on creating awareness about ABDM, explaining integration requirements, FHIR standards, and onboarding procedures, and supporting vendors in aligning their applications with ABDM protocols. This initiative is aimed at strengthening the digital health ecosystem and ensuring seamless interoperability across healthcare systems in the State.

100 Model Facility Initiative under ABDM

The 100 Model Facility Initiative is a flagship implementation program launched under the ABDM by the National Health Authority (NHA) to demonstrate the

complete, end-to-end adoption of ABDM components in selected healthcare facilities across India. Under this initiative, three public healthcare facilities from the Indian Systems of Medicine (ISM) sector in Kerala have been selected. These facilities are being strengthened to achieve full ABDM compliance, including registration in HFR and HPR, ABHA-based patient registration, implementation of Scan and Share, and integration with ABDM-enabled digital health systems. The selected facilities will serve as model institutions to demonstrate ABDM workflows and support the scale-up of ABDM implementation across other healthcare facilities in the State. Now in the process of identify minimum one ABDM Model Facilities from each district to strengthen the ABDM objectives.

FHIR concept within ABDM

FHIR (Fast Healthcare Interoperability Resources) is the core data model used by ABDM to represent clinical and administrative information (Patient, Encounter, Observation, Diagnostic Report, Medication Request, etc.). ABDM provides a FHIR Implementation Guide (IG) that customizes FHIR for Indian workflows and prescribes mandatory/optional fields, data profiles, and exchange patterns (bundles, transactions).

Data security & privacy — principles and mechanisms

a) Policy & legal context

ABDM policy emphasizes "security and privacy by design", alignment with national data protection laws, and NHA-issued technical and operational guidelines for protecting health data. (The broader legal landscape includes the Digital Personal Data Protection Act and other statutory frameworks which service providers must follow.)

b) Technical mechanisms used by ABDM

- Consent Manager: Centralized consent mechanism allowing the data principal (patient) to give, revoke, or time-limit consent for sharing specific records with specific recipients
- Tokenized access & ABHA tokens: Access to records typically uses time-bound tokens so providers can retrieve only the records a user has consented to share.
- Audit trails & logging: All access and transfers are logged; audit logs are available for compliance and investigations.
- Encryption & secure transport: Data in transit uses standard secure channels (HTTPS/TLS) and sensitive data at rest is expected to be encrypted by participant systems following NHA guidelines.

Summary

ABDM aims to create a secure, interoperable digital health backbone in India based on ABHA identifiers, registries (HFR/HPR), consent management, and FHIR-based data exchange. Kerala's implementation follows national building blocks while adapting through its State Digital Health Mission - onboarding facilities, enabling ABHA creation, and integrating hospital software. Key technical workstreams are FHIR conformance, HIP/HIU integrations, and Scan & Share for legacy document flows. Strong privacy, consent orchestration, and encryption/audit mechanisms are central to public trust and legal compliance.

CHAPTER 2 EHEALTH KERALA

Objective of eHealth Kerala

The objective of eHealth Kerala to have a Universal healthcare system with the help of robust IT enabled management and monitoring system. The envisaged eHealth project is an integrated solution covering the entire health sector of Kerala including all the public health care institutions and at a later stage the private healthcare institute also. The data collected at all levels of interaction with the system to be captured and linked together to form the State Health Information System database in the Data Centre.

The solution seeks to achieve a set of objectives like increasing efficiency and effectiveness of the functioning of the health sector in Kerala. The solution is proposed to be deployed in a Data Centre centrally and the healthcare institutions are to be connected by way of a primary and secondary connectivity through MPLS VPN. M/s BSNL is providing primary connectivity to all e-health institutions and a secondary connectivity by another service provider is also ensured to maintain zero down time to communicate the sensitive health information. The State owned KFON system also is envisaged to become part of this connectivity framework. The project also captures the demographic data, automate the process of disease surveillance at grass root level, automate hospital processes and bring all information into a centralized State Health Information system through the Wide Area Network to ensure continuity in health care, provide close monitoring and control measures.

The main components of the framework are:

- A Central Repository of Demographic Data, Public Health Data and Electronic Medical Records pertaining to the State, which will get dynamically updated. Each citizen record in the demographic data repository will be uniquely identified which will be used by all the services provided by eHealth Kerala.
- Centralized Healthcare Information System with Central Electronic Medical Records (EMR) Repository which has the functionalities of an Integrated Hospital Management System, Disease Surveillance, Management Information System and Healthcare Planning.
- A high Bandwidth reliable Network connecting all hospitals (in Public Sector) in Kerala and linking them to Central Healthcare Data Repository and the Central Demographic Data Repository

eHealth Kerala – Key Benefits

Implemented by the Government of Kerala, eHealth Kerala provides a unified digital platform connecting government hospitals across the State.

Improvement in Patient Queue Management Post eHealth Implementation – Cardiology OP, MCH TVPM

Benefits to Citizens / Patients

- Unique Health ID (UHID) with lifelong digital records
- Online OP booking and reduced waiting time
- Access to lab reports and prescriptions online
- Continuity of care across hospitals
- Fewer repeated tests, saving time and cost
- Quality and faster service delivery

Benefits to Hospitals / Users

- Integrated system covering registration, OP, IP, lab, pharmacy, billing, and referral
- Reduced paperwork and streamlined workflows
- Real-time access to patient history
- Better inventory and pharmacy management
- Improved efficiency and service monitoring

Benefits to Government / State

- Real-time statewide health data
- Better disease surveillance and outbreak response
- Evidence-based planning and resource allocation
- Increased transparency and accountability
- Standardized digital processes across institutions

Overall, eHealth Kerala enhances accessibility, efficiency, transparency, and data-driven healthcare management across the State.

IT Infrastructure

The eHealth IT Infrastructure provides a secure, scalable, and reliable digital foundation for delivering healthcare services across institutions. It ensures high application availability, seamless data exchange, and uninterrupted operations.

Key Components:

eHealth Cloud System

- Centralised Database and Application Servers hosted at the State Data Centre (SDC), Thiruvananthapuram
- Ensures data security, scalability, backup, and disaster recovery

Network Connectivity

- Primary and secondary internet connections for redundancy and failover
- Assures continuous access to eHealth applications

Local Area Network (LAN)

- Structured LAN within healthcare institutions
- Connects registration, OP, lab, pharmacy, and administrative units

Power Backup

- Centralized UPS systems at institutions
- Supports uninterrupted functioning of critical IT infrastructure

Hardware Infrastructure

- Mini PC /laptops
- Printers, scanners, barcode readers, and other peripherals
- Enables smooth clinical and administrative workflows

Together, these elements create a robust IT ecosystem that supports efficient, secure, and patient-centric eHealth service delivery.

Major activities involved in setting up eHealth infrastructure in a healthcare institution include the following:

Establishment of Local Area Network:

Designing and implementing a structured LAN across all functional areas of the hospital, including registration counters, outpatient departments, laboratories, pharmacies, and the Nursing Station, to enable seamless internal connectivity and real-time data flow.

Provision of UPS Power Connectivity:

Installation of centralized UPS systems to ensure uninterrupted power supply at all computer points and critical networking equipment, thereby minimizing downtime and data loss during power fluctuations.

Procurement and Installation of Hardware:

Procurement, deployment, and configuration of required hardware, including Mini PCs, laptops, printers, barcode scanners, and other peripherals essential for clinical and administrative operations.

Establishment of WAN Connectivity:

Setting up Wide Area Network connectivity with both primary and secondary links from the hospital to the State Data Centre, ensuring secure, reliable, and continuous access to centralized eHealth applications.

Training of Hospital Staff:
Conducting role-based training programs for doctors, nurses, pharmacists, laboratory staff, and admins to ensure effective use of eHealth systems in day-to-day operations.

Handholding and On-site Support:

Providing handholding support during the initial rollout phase to address operational challenges, resolve user issues, and ensure smooth transition from manual or legacy systems.

Post-Implementation Support:

Offering ongoing technical and functional support, system monitoring, and issue resolution to ensure sustained adoption, system stability, and continuous improvement after go-live.

These activities together ensure a structured, reliable, and user-friendly implementation of eHealth within a healthcare institution.

Other major activities:

Call Centre: Disha Call Centre in Thiruvananthapuram handles the calls related to eHealth HMS and it provides support for the eHealth Application Users including public who are using the web portal.

F**acility Management Service: A** web based Centralised Facility Management Service is functional to monitor and ensure that the system is maintained with the prescribed level of availability and performance level. The FMS web application allows the users in the Institutions to log all complaints online. After the complaint is closed they will report the closure online.

CHAPTER 3: GOVERNANCE AND ORGANIZATIONAL STRUCTURE

Governing Body

The Governing Body serves as the apex policymaking and oversight authority of the organization. It provides strategic direction, ensures interdepartmental coordination, and oversees the effective implementation of initiatives in alignment with the objectives of the Government of Kerala.

Sl. No.	Name / Official Designation	Position in the Governing Body
1	Hon'ble Minister for Health	Chairperson
2	Secretary, Health Department, Government of Kerala	Vice Chairperson
3	Member, Planning Board	Special Invitee
4	Secretary, Finance (Expenditure) Department	Member
5	Secretary, Planning & Economic Affairs Department	Member
6	Secretary, Social Justice Department	Member
7	Secretary, Information Technology Department	Member
8	Director, Information Technology Mission	Member
9	State Mission Director, National Health Mission	Member
10	Director of Medical Education	Member
11	Director of Health Services	Member
12	Project Director, eHealth Kerala / SDHM	Convener/Member Secretary
13	Managing Director, KMSCL	Member
14	Representative of the Government of India (Director of Electronics and Information Technology)	Member
15	Representative of the Ministry of Health, Government of India	Member

Executive Committee

The Executive Committee serves as the operational and decision-making body responsible for executing, monitoring, and coordinating the organisation's activities. It facilitates timely administrative and technical decisions, ensures effective implementation of approved programs, and provides guidance on operational matters.

Sl. No.	Name / Official Designation	Position in the Executive Committee
1	Secretary, Health Department, Government of Kerala	Chairperson
2	Secretary, Finance (Expenditure) Department	Member
3	Project Director, eHealth Kerala / SDHM	Convener/Member Secretary
4	Director, Information Technology Mission	Member
5	Managing Director, KMSCL	Member
6	State Mission Director, NHM	Member
7	Director of Medical Education	Member
8	Director of Health Services	Member
9	Additional Director, eHealth	Member

CHAPTER 4 FINANCING AND FUND ALLOCATION

With an aim to automate the health care service delivery in the state public sector, Government of India (MeitY) accorded administrative approval for the eHealth project at a total estimated out lay of Rs.96.12 Crore (MeitY share Rs. 86.69 Crore and GoK share Rs.9.43 crore).

Central Fund

Funds are being allocated to the e-Health Kerala Project Management Unit by including it under a Central Sector Scheme of the Ministry of Electronics and Information Technology, Government of India. For implementing the e-Health Project, an amount of ₹43.35 crore along with the accrued interest, totalling ₹59.11 crore, was received from the Central Government at the initial stage. Subsequently, a second installment of ₹22.58 crore was received in March 2022, ₹5 crore in February 2024, and ₹1.40 crore in March 2025. Thus, the total Central fund received amounts to ₹88.09 crore. The Central fund was released with the condition that e-Health should be implemented in 650 institutions by December 2022.

State Fund

For the implementation of the e-Health Project, the State Government has been providing funds since the financial year 2015–2016 through the Directorate of Health Services (DHS) and the Directorate of Medical Education (DME). Ten percent of the amount earmarked for implementing the project in new institutions is allocated as administrative cost, through which the Project Management Unit (PMU) has been functioning. As this is a one-time income, it has become inadequate, and consequently, funds could not be mobilized for recurring expenditure. In the State Budget for 2022–23, an amount of ₹30 crore was sanctioned for SDHM / e-Health Kerala for the functioning of the Digital Health Mission under the head of account 2210-01-001-88(P).

National Health Mission Fund

In connection with the implementation of the e-Health Project, NHM funds have been made available since the financial year 2018–2019. Under ECRP II, the expenditure incurred for implementing e-Health with NHM financial assistance—excluding TSP charges and retention amounts—was directly released by the National Health Mission (NHM) to Keltron during 2022–23, as instructed by the e-Health PMU. The TSP charges and retention amounts were also made available to the e-Health account in a timely manner to ensure payment to Keltron.

Ayushman Bharat Digital Mission

The objective of the Ayushman Bharat Digital Mission is to strengthen the integrated digital health infrastructure of the country. ABDM is a Central Sector Scheme under the National Health Authority (NHA). It is envisaged to be implemented over a five-year period from 2021–22 to 2025–26. For implementing this scheme in the

State, Government approval was accorded and a Project Management Unit was constituted under the State Digital Health Mission, vide Government Order G.O.(Ms) No.188/2022/H&FWD dated 02-10-2022.

The order also sanctioned the appointment of 23 officials in the ABDM Project Management Unit under three divisions: IT (8), Coordination (8), and Administration Support (7). At present, 19 personnel designated from the e-Health Project Management Unit are functioning in the ABDM Project Management Unit. Notification has been issued for filling up the remaining sanctioned posts. The salaries of these personnel are being released by the National Health Authority (NHA) directly to their bank accounts in installments through the PFMS portal by fixing expenditure limits. In addition to salary expenses, funds are also being provided for CB-IEC activities. The income and expenditure details for the financial years from 2022–23 to 2024–25 are furnished below.

Financial Status of eHealth (Rs in lakhs)

Sl No	Particulars	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
1	Opening Balance		4389.9	4457.62	4801.57	3390.15	3679.08	4559.31	968.48	1041.21	2904.84	1923.84	964.46
2	Receipts:												
	Government of India	4334.73								2257.75		500	140
	Government of Kerala			100	710						1917.27	2116.64	1379.99
	DHS/DME				383	967	1450	46	1556.78	2820.3	138.98	123.28	34.25
	NHM						1832.69		1000	535.7	436.84	395.18	-
	LSGD	-	-	-	-	-	-	-	-	-	-	-	2324
	Other Receipts								371.78	86.54	11.02		
	Interest	74.97	449.75	396.21	380.99	176.69	105.64	81.2	60.46	29.82	76.15	64.79	62.13
3	Total (1+2)	4409.7	4839.65	4953.83	6275.56	4533.84	7067.41	4686.51	3957.5	6771.32	5485.1	5123.73	4904.83
4	Funds resumed by Govt.				405	24.62		79.04	753.05	201.11	1166.06	1495.77	823.19
5	Expenditure:												
	Government of India	19.8	382.03	152.26	2373.12	830.14	1858.04	296.3			1208.57	1549.18	140
	Government of Kerala				107.29		305				840.93	704.28	571.25
	DHS/DME						345.06	2389.14	801.87	2676.28	54.3	28.44	82.03
	LSGD	-	-	-	-	-	-	-	-	-	-	-	29.72
	NHM						0	953.55	1361.37	989.09	291.4	381.6	238.58
	Total Expenditure	19.8	382.03	152.26	2480.41	830.14	2508.1	3638.99	2163.24	3665.37	2395.2	2663.5	1061.58
6	Closing Balance (3-4-5)	4389.9	4457.62	4801.57	3390.15	3679.08	4559.31	968.48	1041.21	2904.84	1923.84	964.46	3020.06

Financial status of ABDM (Rs in lakhs)

Sl No.	Particulars	2022-23	2023-24	2024-25
1	Opening Balance		31.63	32.26
2	Receipts:			
	HR Activities	55.93	113.36	108.92
	IEC-CB Activities	22.1	53.88	41.4
	Admin		5	5
	Interest	0.35	1.25	0.64
3	Total (1+2)	78.38	205.12	188.22
4	Interest Refunded	-	1.31	0.93
5	Expenditure:			
	HR Activities	30.33	115.72	118.09
	IEC-CB Activities	16.42	50.84	49.6
	Admin		4.99	4.87
	Total Expenditure	46.75	172.86	173.49
6	Closing Balance (3-4-5)	31.63	32.26	14.73

CHAPTER 5: IMPLEMENTATION APPROACH

The implementation of eHealth Kerala was undertaken as a phased and structured digital transformation initiative aimed at modernizing healthcare service delivery across public healthcare institutions in the State. The implementation strategy focused on establishing a unified and interoperable healthcare ecosystem capable of supporting clinical services, public health programmes, citizen-centric services, and statewide health governance. The approach emphasized phased rollout, infrastructure readiness, workflow standardization, capacity building, and continuous operational support to ensure sustainable adoption across institutions ranging from primary care centres to tertiary care hospitals.

Institutional Preparation and Planning

The preparatory phase of eHealth Kerala involved extensive institutional planning, governance structuring, and technical groundwork. Following the approval of the eHealth Kerala project by the Government of India under the India e-Delivery of Public Services Project, the Government of Kerala initiated multiple administrative and technical measures to operationalize the project. A High-Level Governing Committee was constituted to oversee policy decisions and implementation activities, while a dedicated Project Management Unit was established under the Department of Health and Family Welfare.

Technical committees were formed to finalize hardware specifications, networking standards, and infrastructure requirements required for statewide implementation. The Government also initiated procurement planning and vendor selection processes. After completion of the pre-qualification process, M/s Hewlett-Packard was selected as the Primary System Integrator responsible for software development, infrastructure deployment, networking, training, and pilot implementation activities. Subsequently, M/s KELTRON was engaged as the Technology Service Provider (to support implementation coordination, monitoring, and technical supervision activities.

Pilot Implementation Phase

The implementation of eHealth Kerala commenced through a pilot phase initiated in 2016 in selected healthcare institutions in Thiruvananthapuram district. The pilot implementation focused on validating workflows, assessing infrastructure requirements, understanding operational challenges, and familiarizing healthcare staff with digital systems. The eHealth project was officially inaugurated by the Hon'ble Chief Minister of Kerala at Peroorkada District Hospital on 25 January 2017, marking the formal launch of the electronic medical record system and digital healthcare database.

The pilot phase played a critical role in evaluating the practicality of digitized workflows in government healthcare settings. Feedback obtained from doctors, nurses, laboratory personnel, pharmacists, and administrative staff during the pilot implementation helped refine workflows, improve software usability, and strengthen implementation strategies prior to statewide expansion.

Statewide Rollout Strategy

Following successful pilot implementation, the eHealth system was gradually expanded across healthcare institutions throughout Kerala using a phased rollout strategy. The implementation approach prioritized institutions based on infrastructure readiness, service volume, institutional category, and administrative feasibility. The rollout covered institutions under the Directorate of Health Services, Directorate of Medical Education and National Health Mission.

The phased deployment strategy enabled the State to progressively implement eHealth services across primary, secondary, and tertiary care institutions while ensuring continuity of healthcare services during the transition from manual systems to digital workflows. The implementation model included deployment of core modules such as registration, outpatient services, laboratory, pharmacy, and billing, followed by gradual expansion into additional modules and citizen-centric services.

To accelerate implementation in institutions with infrastructure limitations, later hybrid networking approaches using WiFi-enabled deployment and minimal physical cabling were adopted. Institutional readiness assessments were conducted prior to implementation to evaluate connectivity, electrical infrastructure, physical space, and operational preparedness.

IT Infrastructure Deployment

A major component of the implementation strategy involved establishment of robust IT infrastructure across healthcare institutions. The eHealth infrastructure framework included centralized application hosting at the State Data Centre, institution-level networking, power backup systems, hardware deployment, and wide-area network connectivity.

Structured Local Area Networks were established within hospitals to connect registration counters, consultation rooms, laboratories, pharmacies, nursing stations, and administrative units. Hardware infrastructure including Mini PCs, laptops, printers, barcode scanners, and other peripherals were procured and deployed to support digital workflows. Centralized UPS systems were installed to ensure uninterrupted functioning of critical systems and minimize downtime during power fluctuations.

The implementation also included establishment of secure Wide Area Network connectivity between healthcare institutions and the State Data Centre to enable centralized data access and statewide interoperability. Primary and secondary connectivity arrangements were established to ensure uninterrupted access to eHealth applications.

Connectivity and Network Strategy

The connectivity strategy adopted by eHealth Kerala was designed to ensure secure, reliable, and uninterrupted communication between healthcare institutions and centralized digital systems. The project utilized MPLS VPN-based connectivity to support secure data transmission across institutions. BSNL was engaged to provide primary connectivity to eHealth institutions, while secondary connectivity arrangements were established through alternate service providers to ensure redundancy and minimize service disruptions.

The State also envisaged integration of the Kerala Fibre Optic Network (KFON) into the connectivity framework to strengthen bandwidth availability and support long-term scalability. The dual-connectivity model was designed to support the project objective of maintaining zero downtime while handling sensitive health information and real-time healthcare transactions.

Capacity Building and Training

Recognizing that successful digital transformation depends on effective user adoption, eHealth Kerala implemented an extensive capacity-building and training programme across all levels of the healthcare system. Structured training programmes were conducted for doctors, nurses, pharmacists, laboratory personnel, administrative staff, and technical teams to ensure familiarity with digital workflows and applications.

The training framework included master trainer programmes, district-level training sessions, role-based user training, monthly online module-wise training sessions, and hands-on institutional support. Training materials, user manuals, and video-based learning resources were made available through the Learning Management System portal to facilitate continuous learning and skill enhancement.

The implementation approach also emphasized change management and user engagement to support transition from paper-based systems to digital workflows. Continuous feedback mechanisms were incorporated to identify operational challenges and improve usability.

Handholding and Post-Implementation Support

To ensure smooth operational transition during implementation, eHealth Kerala adopted a structured handholding and post-implementation support model. On-site technical and functional support was provided during the initial rollout phase to assist healthcare institutions in addressing workflow issues, troubleshooting operational challenges, and improving user confidence.

Post-implementation support mechanisms included centralized monitoring, technical issue resolution, software maintenance, workflow optimization, and continuous user support. Dedicated support teams worked closely with institutions to ensure sustained adoption and operational continuity after go-live.

Facility Management and Monitoring Systems

The implementation framework included establishment of centralized monitoring and support systems to maintain service availability and operational efficiency. The DISHA Call Centre in Thiruvananthapuram was designated to provide support for eHealth application users, including both healthcare staff and citizens utilizing digital services.

A web-based centralized Facility Management Service (FMS) platform was also established to monitor system performance, manage complaints, track issue resolution, and ensure adherence to prescribed availability and performance standards. Institutions were provided online complaint logging facilities, enabling systematic monitoring and closure of operational issues.

Software Transition and Internalization

During the initial implementation phase, software development and technical support activities were managed by external implementation partners. However, in 2020, the eHealth Project Management Unit assumed responsibility for software development activities to ensure operational continuity and strengthen long-term sustainability of the platform.

This transition enabled the State to internally manage software enhancements, workflow modifications, integrations, and support activities. Over time, the responsibilities of the PMU expanded significantly, with additional projects such as SHAILI, COVID-19 Death Information System, COVID Vaccination Portal, Cancer Screening Portal, and other digital health initiatives being assigned to eHealth Kerala under the State Digital Health Mission framework.

The implementation approach adopted by eHealth Kerala enabled statewide deployment of digital health systems across a large number of public healthcare institutions. The project successfully established integrated digital workflows connecting registration, consultation, diagnostics, pharmacy, billing, and citizen-centric services within a unified healthcare ecosystem.

The implementation contributed to significant improvements in service efficiency, digital record generation, continuity of care, statewide health data availability, and citizen access to healthcare services. The rollout of UHID-based electronic health records, online appointment systems, digital laboratory reporting, and ABDM integration positioned Kerala as one of the leading states in digital health implementation in India.

CHAPTER 6: DIGITAL HEALTH INITIATIVES AND PLATFORM COMPONENTS

EHEALTH HOSPITAL MANAGEMENT SYSTEM

The eHealth Hospital Management System (HMS) is a comprehensive, standards-based digital platform designed to transform the delivery, management, and governance of public healthcare services. It serves as the operational backbone of the broader eHealth ecosystem, enabling public health institutions to transition from fragmented, paper-driven processes to integrated, data-driven, and citizen-centric digital healthcare delivery.

At the time of conceptualization, the eHealth HMS was envisaged as an all-encompassing system that would digitize both basic hospital functions and advanced specialty modules, covering the full spectrum of clinical and administrative services. However, recognizing the need for phased implementation, operational stability, and rapid adoption at scale, a strategic decision was taken to prioritize the development and stabilization of core functional modules. Accordingly, efforts were focused on high-impact, universally required modules such as

- Reception,
- Outpatient (OP) Services,
- Laboratory,
- Pharmacy, and
- Billing.

This phased approach ensured early value realization, smoother change management, and a strong foundation for future expansion into specialty services.

The HMS is scalable, allowing healthcare institutions from primary care institutions to tertiary hospitals to adopt the platform based on their service complexity and readiness, while maintaining uniform data standards and interoperability.

Unified Electronic Health Record: One Citizen – One EHR

A defining principle of eHealth HMS is the vision of "One Citizen – One Electronic Health Record". Each citizen is assigned a Unique Health ID (UHID), serving as a permanent identifier across all healthcare encounters and institutions. This enables the creation of a unified and longitudinal Electronic Medical Record that consolidates clinical, diagnostic, and treatment data over time.

The system supports Aadhaar-based identification wherever applicable, strengthening identity verification while generating patient EHRs compliant with national and international standards. By ensuring portability, consistency, and availability of health records, eHealth HMS enhances continuity of care, reduces duplication of investigations, and improves clinical outcomes.

Interoperability

Interoperability is a cornerstone of the eHealth HMS design. The system enables seamless integration between the Hospital Management System and the Public Health Management System, ensuring real-time data flow for NCD Continuum of Care disease surveillance, programme monitoring, and health system planning.

Clinical documentation and diagnoses follow international standards such as ICD-10 and SNOMED-CT, while laboratory investigations adopt LOINC standards, ensuring uniform representation of test orders and results. Automation of laboratory workflows is achieved through integration with diagnostic equipment using HL7 interfaces, enabling bidirectional data exchange, reduced manual entry, and improved diagnostic accuracy.

The platform supports integration with all HL7-compliant medical devices, ensuring compatibility with modern diagnostic technologies and future digital health innovations.

DIGITIZED WORKFLOWS

eHealth HMS enables real-time data capture at the point of service, ensuring that every patient interaction is digitally recorded. End-to-end workflow automation connects registration, consultation, diagnostics, pharmacy, and billing into a seamless operational continuum.

Citizens can access services through online registration and advance appointment booking via mehealth app and eHealth web portal. These services are integrated with token-based queue management, supported by digital display systems at outpatient clinics to manage patient flow efficiently and reduce waiting times. Automated SMS alerts provide real-time updates on appointments, and availability of laboratory results.

Clinical interfaces are designed to be user-friendly, minimizing keyboard entry while enabling structured capture of symptoms, medical history, examination findings, diagnosis, and treatment. Prescriptions are generated digitally and made instantly available at pharmacy terminals. Laboratory tests ordered during consultation are automatically queued in the laboratory system, and results are accessible to clinicians at the consultation room and to patients through digital download facilities. Doctors can refer the patient to other departments in the same hospital and to other higher Hospitals through the system. Provisions are there to generate appointment and token to the referred department inside the same hospital and also to other hospital. Doctors can also give review tokens also. All treatment and service details are continuously updated in the patient's electronic record.

Integration with Health Ecosystem and Governance Systems

The eHealth HMS integrates seamlessly with key national and State digital health platforms such as

- Ayushman Bharat Health Mission,
- Kerala Medical Services Corporation Limited (DDMS),
- Aadhaar services,
- SMS Gateway
- Digital Payment
- POS
- CMDRF
- Aadhar Data Vault
- Various KDISC/KSUM innovations like
    - AI Chat Bot
    - Diabetic Retinopathy
    - Token Predictions
- Digilocker
- Integrated Health Information Platform (IHIP)
- National NCD Portal (classic Dashboard)
- Lab Machines (More than 45 types of machines)

These integrations enable beneficiary verification, insurance processing, medicine and inventory management, and coordinated service delivery across the health system.

For administrators and policymakers, the system provides real-time dashboards and analytical reports on service utilization, disease trends, laboratory workloads, drug consumption, and institutional performance. These insights support evidence-based planning, monitoring, and evaluation at multiple governance levels.

Secure, Scalable, and Open Digital Foundation

The platform is built on a highly secure open-source database and application stack, delivered through a Service-Oriented Architecture (SOA) that ensures scalability, flexibility, and long-term sustainability. Deployment in secure State Data Centres or approved cloud environments is supported by redundancy and disaster recovery mechanisms.

Strict role-based access control, authentication protocols, audit trails, and encryption mechanisms ensure confidentiality, data integrity, and compliance with data protection standards.

eHealth System – Major Modules and Functional Overview

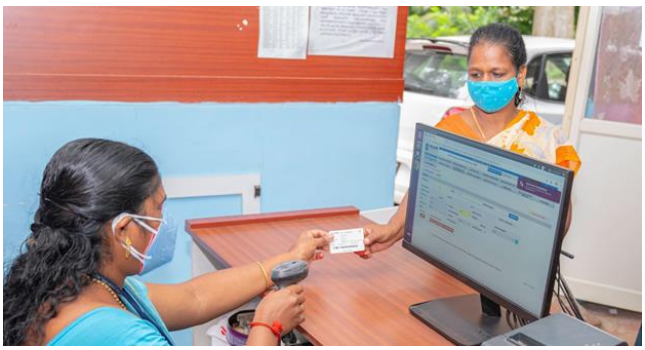
(Reception, OP, Billing, Laboratory, Pharmacy & In-Patient Modules)

The eHealth system is a comprehensive Hospital Information System designed to ensure seamless patient flow, standardized clinical documentation, financial transparency, and integrated service delivery across healthcare institutions. The system connects registration, consultation, diagnostics, pharmacy, billing, and inpatient services within a unified digital platform.

1. **Reception Module**

The Reception module acts as the primary entry point for patients into the eHealth system. It ensures proper identification, visit creation, appointment scheduling, and coordination of services. Permanent digital identity creation through UHID and ABHA integration strengthens continuity of care across institutions.

Major Functionalities:



- Patient registration with UHID generation
- Aadhaar and ABHA linking for unified health identity
- Revisit management and OP token/OP card printing
- Appointment booking within and across eHealth institutions
- Referral conversion to appointments
- Visit charge collection and receipt generation
- IP admission initiation and patient tracking
- Statistical and cash collection reports

This module ensures accurate demographic capture, improved patient tracking, and streamlined front-office workflow.

2. **OP-Clinic Module**

The OP module supports comprehensive outpatient consultation and clinical documentation. It enables both nurses and doctors to document, monitor, and manage patient care in a structured manner.

Nurses record pre-consultation details such as complaints and vitals, while doctors perform structured clinical documentation integrated with public health reporting and diagnostic ordering.

Major Functionalities:

- Pre-consultation documentation (vitals, complaints, screening)
- SNOMED-based consultation documentation
- Diagnosis entry with P-Form and NCD integration
- Laboratory, radiology, and procedure ordering
- Generic and external prescription generation
- Clinical templates for faster documentation
- Review appointments and referrals
- Admission request generation
- Lab result alerts and duplicate prescription alerts
- Case sheet and Patient entire EHR View
- NCD Care Continuum – Integrated with SHAILI and JAK app

The OP module ensures standardized clinical records, decision support, and digital continuity of care.

3**. Billing Module**

The Billing module manages financial transactions associated with investigations, procedures, and ward services. It is designed to ensure transparent cash management and scheme-based benefits.

Major Functionalities:

- Investigation, Procedures and service billing
- Automatic scheme and discount application
- Group billing for multiple orders
- Mobile number verification
- Multiple payment modes (Cash, UPI, POS/Card)
- Bill reprint and refund processing
- Pay ward booking and renewal
- Daily cash and billing summary reports

This module enhances financial accountability and improves patient payment convenience.

4. **Laboratory Module**

The Laboratory module manages the complete diagnostic workflow from sample collection to validated result reporting. It integrates analyzer-based reporting and ensures systematic tracking of investigations.

Major Functionalities:

Sample collection with barcode generation

- Analyzer integration for automatic result entry
- Numeric, descriptive, and microbiology reporting
- Result validation by authorized personnel
- Lab investigation tracker
- Lab stock management
- SMS alert and Lab results through SMS

The module improves efficiency, reduces manual errors, and ensures timely report availability.

5. **Pharmacy Module**

The Pharmacy module ensures accurate dispensing of prescribed medicines and real-time inventory management.

Major Functionalities:

- Dispensing of prescribed medicines
- Prescription print with dispensed/not dispensed details
- Indent request and approval workflow
- Stock receipt and consumption tracking
- Opening stock entry and approval
- DDMS Integration
- Reports and Registers

This module maintains dispensing accuracy, prevents stock discrepancies, and supports uninterrupted medicine availability.

6**. In-Patient (IP) Module**

The IP module manages the lifecycle of admitted patients from admission to discharge. It supports structured inpatient documentation and ward management.

Major Functionalities:

- Bed allocation and ward transfer
- Admission and care transfer management
- Discharge request initiation
- Discharge summary preparation and approval
- Duplicate discharge summary generation

The IP module ensures systematic inpatient documentation, improved coordination, and clear discharge communication.

PUBLIC HEALTH MODULE

Introduction

The Public Health Module was initiated in 2016 as a core component of the eHealth Project, Kerala, with the objective of establishing a comprehensive, technology-enabled foundation for community-based public health data management. The initiative aimed to create a unified, reliable, and continuously updated Digital Family Health Register, forming the backbone of public health planning, service delivery, monitoring, and evidence-based governance in the State.

The PH Module was envisioned not merely as a survey tool, but as a long-term public health informatics platform encompassing all Janakeeya Arogya Kendram (JAK)–level activities, including service delivery, disease surveillance, Reproductive and Child Health (RCH) services, communicable disease management, preventive public health interventions, JAK clinics, and programme monitoring across all administrative levels.

Pilot Phase and Proof of Concept (2016)

The pilot implementation commenced in 2016 at PHC Veli, Thiruvananthapuram district, using a tablet-based Android application. The application enabled structured data capture at multiple levels:

- House and housing characteristics
- Family composition and relationships
- Individual demographic and health profiles
- Village-level institutions and community assets

The pilot validated the feasibility of large-scale digital enumeration by field health staff and resulted in the creation of a localized digital public health registry. Based on its success, the pilot was expanded to Manamboor, Puthanthope, and Vellenad Health Blocks, establishing the operational and governance foundations for statewide scale-up.

Statewide Rollout (2017–2018)

In 2017, the Government initiated statewide rollout of the PH Module. Tablet devices were procured and distributed across districts to ensure uniform adoption.

A critical challenge during this phase was the standardisation of jurisdictional and institutional parameters across the State. This was addressed through the internally developed Tab Management System (TMS), which captured and maintained:

- Family Welfare Centres (FWC)
- Basic Sections (JHI Sections) with codes
- Parent institutions, health blocks, and districts

All tablets were configured with Mobile Device Management and assigned unique Tablet IDs mapped to serial numbers and MAC IDs. End-to-end digital tracking—from State to District, Block, Institution, and User ensured accountability, traceability, and optimal utilisation of public assets.

Governance Framework and Capacity Building

Each health institution designated a PH Admin responsible for institutional configuration, user management, and jurisdictional mapping. Mapping was carried out at FWC and Basic Section levels, covering Local Self Government Institutions wards, and localities.

A structured capacity-building framework was implemented:

- Training of District Master Trainers
- Cascade trainings at district and block levels
- Issuance of devices after completion of training and digital user mapping

This ensured uniform understanding of workflows, data standards, and accountability mechanisms.

Family Health Survey and Creation of Statewide Digital Registry

Following training, field-level implementation commenced with the Family Health Survey, conducted primarily by Junior Health Inspectors (JHI) and Junior Public Health Nurses (JPHN).

This resulted in Kerala's first comprehensive digital public health database, covering approximately:

- 68 lakh households
- 2.6 crore individual members

The PH Module progressively expanded to include Non-Communicable Diseases (NCDs), Reproductive and Child Health (RCH), Communicable Diseases, and preventive public health activities such as vector surveillance, well chlorination, and indoor residual spraying.

Disruptions, Emergencies, and System Constraints (2019–2022)

From 2019 onwards, flood-related emergencies followed by the COVID-19 pandemic significantly altered public health priorities. Field staff were redeployed for emergency response, leading to reduced routine tablet usage.

By mid-2022, systemic challenges emerged:

- Tablet obsolescence due to warranty expiry
- Battery degradation and lack of spare parts
- Absence of AMC support
- Conclusion of vendor support

Application development and maintenance responsibilities were transitioned to the internal technical team of the eHealth Project Management Unit (PMU).

Strategic Shift to BYOD and Policy Reorientation (2023)

Considering the financial and operational constraints associated with large-scale device procurement and maintenance, the Government approved a strategic shift to a Bring Your Own Device (BYOD) model in 2023, marking a significant evolution in Kerala's public health digital strategy. This policy decision was formalised through G.O. (Rt) No. 131/2023/H&FWD dated 19.01.2023, which redefined public health work patterns at the field level and introduced the Mid-Level Service Provider role within Janakeeya Arogya Kendrams .

Subsequently, the State Digital Health Mission/ eHealth PMU undertook the development of a new Public Health mobile application using Flutter technology, with technical collaboration from C-DAC. In parallel, the Directorate of Health Services issued circulars standardising the jurisdictional areas of JAKs, Basic Sections , and ASHA workers, ensuring administrative clarity and uniformity across the State.

Based on expert consultations and policy directions, the structural framework of the Public Health application was comprehensively redefined. The ASHA Block was introduced as the smallest functional unit, replacing earlier locality-based structures, and MLSP roles were formally integrated into field-level digital workflows. Reflecting this expanded scope and institutional alignment, the application was accordingly renamed as the JAK–Public Health (JAK-PH) Application, aligning digital workflows with revised public health service delivery models.

Structural Reforms: ASHA Block Model

As part of the revamp:

- The ASHA area was defined as the smallest functional unit
- ASHA Blocks were created as standardised micro-units
- All legacy households were systematically mapped to ASHA Blocks

Institution profile verification, ward mapping, ASHA mapping, ASHA Block creation, and house mapping were entrusted to Janakeeya Arogya Kendrams under defined supervisory structures. This statewide transition was completed by 2024, ensuring data continuity with structural standardisation. Institute Admins coordinate HMS-linked user management

JAK Mobile Application: Pilot and Statewide Rollout (2024–Present)

The JAK Mobile Application was piloted successfully in:

- Health Block Meenagadi (Wayanad)
- PHC Poomala (Thrissur)
- PHC Poozhanadu (Thiruvananthapuram)

Following structured training at State, District, Block, Institution, and JAK levels, statewide rollout commenced. As mandated by SOP:

- All household and population enumeration must be completed by JAK Team
- Thereafter, the Digital Family Health Register functions as a live, continuously updated registry

Administrative Roles

- District PH Admins manage user accounts, institutional profiles, inter-district transfers, and technical escalation
- Block PH Admins conduct trainings, handholding, and operational troubleshooting
- PH Admins (Institution level) manage user lifecycle, ward assignment, ASHA mapping, and local support

PH Web Portal and Integrated Official Dashboard

A PH Web Portal with Integrated Official Dashboard supports:

- Real-time monitoring from State to ASHA Block
- Population profiling and vulnerability analysis
- Disease burden and lifestyle risk tracking
- Programme-wise and officer-wise performance monitoring.

Benefits

For citizens, it improves access to preventive and promotive health services, ensures continuous care for non-communicable diseases (NCDs), and strengthens disease surveillance and preparedness for outbreaks. For field officials, it makes work easier by simplifying workflows using personal devices and reducing duplication and

paperwork. For policymakers and administrators, it provides reliable, real-time data to support better planning and review, enables evidence-based targeting of interventions, and ensures transparent monitoring and accountability

CANCER SCREENING PORTAL

For early detection, prevention, and control of cancer patients within the state Government of Kerala has launched a state-level "Kerala Cancer Control Strategy" program. The program intends to do a proactive population-based survey for identifying probably suspected persons and advise them to undergo an actual screening process at the nearest government cancer screening facilities. Along with the screening process the program indents to provide better and more efficient treatment to the diagnosed patients.

An Android-based mobile application, "SHAILI," has been launched by SDHM for ASHA workers to carry out population-based risk factor assessment for common NCDs such as hypertension, diabetes, oral cancer, cervical cancer, and breast cancer. Predefined questionnaires are provided in the application, through which ASHA workers assess risk factors during their home visits and update the details in the mobile app. Based on the responses, a Community-Based Assessment Checklist (CBAC) score is generated. Persons with a high CBAC score are referred to the nearest Sub-Centre / PHC / CHC for screening and diagnosis. Individuals referred for cancer screening are screened through the Cancer Screening Portal at the facility level. Facility-level users can view the list of referred individuals for cancer screening which helps them plan, prioritize, and mobilize beneficiaries effectively.

Cancer Screening Portal

For early detection, prevention, and control of cancer patients within the state Government of Kerala has launched a state-level "Kerala Cancer Control Strategy" program. The program intends to do a proactive population-based survey for identifying probably suspected persons and advise them to undergo an actual screening process at the nearest government cancer screening facilities. Along with the screening process the program indents to provide better and more efficient treatment to the diagnosed patients.

State Digital Health Mission has developed a comprehensive Cancer Screening Portal to digitally manage population-based cancer screening across the State. The portal serves as a digital platform that enables community-level risk

assessment, facility-level clinical screening, laboratory investigations, diagnosis documentation, and real-time analytics into a seamless workflow.

Core Technical Functionalities:

- Role-based access control (Doctor, Lab, Admin)
- Clinical examination entry modules for:
    - Breast cancer
    - Cervical cancer
    - Oral cancer
    - Colon cancer
- Digital ordering of laboratory investigations and Referral
- Entry option for lab reports
- Diagnosis documentation (benign / malignant/ suspected / confirmed)
- Follow-up tracking and referral monitoring

Analytics, Reports & Monitoring

A built-in analytics dashboard provides:

- Screening coverage reports
- Investigation compliance tracking
- Diagnosis outcome analysis
- Facility-wise performance monitoring
- District and state-level dashboards
- Campaign-based analytics (e.g., Arogyam Aanandam)

On 4th February 2025, the Government launched Arogyam Aanandam, focusing on universal screening of women above 30 years for breast and cervical cancer.

- 22,10,639 individuals screened
- 57,997 referred for further evaluation (4 Feb 2025 – 2 Feb 2026)

SHAILI MOBILE APPLICATION

The SHAILI Mobile Application is a flagship public health initiative of the Government of Kerala, designed to address the growing burden of lifestyle-related and non-communicable disease Developed by the State Digital Health Mission – eHealth Kerala under the Nava Kerala Karma Plan 2.0, SHAILI digitizes the State's annual population-based health screening programme for citizens aged 30 years and above.

The application equips ASHA workers with a standardized digital tool to conduct household-level risk assessment. During home visits, predefined questionnaires are administered, and responses are entered directly into the mobile application. Based on these inputs, the system automatically generates a Community-Based Assessment Checklist (CBAC) score, enabling risk stratification at the population level. Individuals identified with high-risk scores are referred to the

nearest Janakeeya Arogya Kendram (JAK), Primary Health Centre (PHC), or Community Health Centre (CHC) for further screening and diagnosis.

SHAILI functions as a frontline digital diagnostic support system for early identification of Non-Communicable Diseases, including mainly:

- Hypertension
- Diabetes Mellitus
- Cervical Cancer
- Breast Cancer
- Oral Cancer

The platform provides real-time dashboards and monitoring reports to supervise field activities, ensuring data accuracy, accountability, and statewide coverage. This annual, continuous activity enables systematic early detection and significantly strengthens preventive healthcare delivery.

Integrated Digital Continuum of Care

SHAILI is integrated with the eHealth ecosystem to ensure seamless referral, validation, treatment, and follow-up: High-risk individuals are referred to Janakeeya Arogya Kendrams , where Junior Health Inspectors, Junior Public Health Nurses, and Mid-Level Service Providers do the screenings using the JAK App and Public Health Portal. Screen-positive individuals are referred to designated Family Health Centres, confirmatory diagnosis and treatment through the eHealth Hospital Management System. The eHealth UHID system enables longitudinal tracking and follow-up, ensuring a structured continuum of care. This end-to-end digitization facilitates accurate disease mapping, population stratification, and data-driven public health decision-making at State, District, LSG, and Ward levels.

Pre-Deployment Scenario

Prior to SHAILI implementation:

- The exact burden of Non-Communicable Diseases in the State was unknown.
- Only limited survey-based data were available.
- District-wise or LSG-wise prevalence could not be accurately determined.
- Data on complications, treatment status, risk populations, addictions, and comorbidities were not systematically available.

Post-Deployment Impact

Following deployment, the State is now able to:

- Generate line lists of patients with known NCDs from State to Ward level.
- Assess district-wise and LSG-wise disease prevalence.
- Identify elderly persons, individuals with addictions, comorbidities, and bedridden/homebound populations.
- Monitor treatment status and complications.

- Implement targeted interventions based on real-time, accurate risk-factor data.
- Reduce morbidity through early diagnosis and timely management.

Phased Implementation of SHAILI

SHAILI 1.0

Launched as a population-based screening initiative focusing on Hypertension and Diabetes among citizens aged 30 years and above.

- 15,426,176 individuals (83.34%) underwent risk-factor assessment
- 2,791,062 individuals (18.09%) referred for HT & DM screening
- 913,484 individuals (5.92%) referred for cancer screening

SHAILI 2.0

Expanded to include additional conditions such as Tuberculosis, Leprosy, Mental Health disorders, Visual and Hearing impairments, and Geriatric health issues.

- 14,391,077 individuals (77.75%) underwent risk-factor assessment
- 6,170,458 individuals (42.88%) referred for HT & DM screening
- 265,456 individuals (1.84%) referred for cancer screening

SHAILI 3.0

Moving beyond screening, Phase 3 establishes a robust continuum of care by integrating data with the eHealth Hospital Management System (HMS) and JAK app to facilitate Screening, systematic treatment, patient follow-up, and comprehensive family health mapping. SHAILI3.0 was inaugurated by Hon'ble Chief Minister of Kerala, on January 1st 2026

CITIZEN-CENTRIC DIGITAL HEALTH SERVICES UNDER EHEALTH

The eHealth initiative has been conceptualized and implemented with a strong focus on citizen-centric service delivery, ensuring that healthcare services are accessible, efficient, transparent, and inclusive. The transformation from paper-based, fragmented health records to a digitally integrated system marks a significant milestone in strengthening public healthcare delivery.

Traditional healthcare systems often place a significant burden on citizens in terms of repeated registrations, physical file maintenance, long waiting times, and lack of access to previous medical records. eHealth addresses these challenges by leveraging digital technologies to create a unified, patient-centric healthcare

ecosystem, where services are designed to minimize inconvenience and maximize continuity of care.

The citizen-facing features of eHealth aim to:

- Empower citizens with control over their health data
- Improve access to healthcare services
- Reduce avoidable hospital visits and waiting time
- Enhance transparency and trust in public health institutions
- Enable continuity of care across facilities and levels of care

UNIQUE HEALTH ID (UHID): FOUNDATION OF CITIZEN-CENTRIC CARE

The UHID is the foundational building block of the eHealth ecosystem. Every citizen is assigned a 16-digit Unique Health ID, which serves as a lifelong digital identifier within the public health system.

The UHID is generated instantly using Aadhaar-based OTP authentication, ensuring quick onboarding of citizens and ensure accurate identity verification. This will also eliminate duplicate or multiple patient records The simplified onboarding process ensures wide adoption across population groups, including rural and underserved communities.

Once generated, the UHID enables the creation of a comprehensive, lifelong digital health record, which includes outpatient consultation details, prescriptions and medication history, Laboratory and diagnostic reports, Referral notes and discharge summaries, Follow-up and review details etc

These records remain accessible across all eHealth-enabled hospitals, ensuring that clinicians have access to relevant medical history regardless of the point of care.

UHID - Benefits to Citizens and Health System

For citizens:

- No need to carry physical files or previous reports
- Reduced repetition of tests and procedures
- Improved quality of care
- Continuum of Care

For the health system:

- Improved data accuracy and standardization
- Reduced administrative workload
- Enhanced decision-making through longitudinal health data

ONLINE APPOINTMENT BOOKING AND DIGITAL SCHEDULING

Online appointment booking is a critical citizen-centric feature aimed at reducing overcrowding and improving patient flow management. Citizens can book OPD appointments at eHealth-enabled hospitals through digital platforms, allowing them to Select preferred dates and available time slots, Plan hospital visits efficiently and avoid early-morning queues and congestion. This feature is particularly beneficial for patients at tertiary centres and those travelling long distances for care.

Doctor-Initiated Appointments and Referrals

Doctors can schedule review appointments and issue advance appointments and can generate referral tokens for higher referral centre. This ensures Structured continuity of care and better coordination between facilities

Automated Alerts and Notifications

- Citizens receive SMS alerts regarding:
- Appointment confirmation
- Department unavailability

This minimizes unnecessary visits and improves communication between healthcare facilities and citizens.

MEHEALTH MOBILE APPLICATION: HEALTHCARE AT FINGERTIPS

The meHealth Mobile App provides a single mobile platform for citizens to access eHealth services. Citizens can log in securely using Mobile number or User ID and password. The authentication mechanisms ensure data security while maintaining ease of access.

Services available through MeHealth

The app enables citizens to:

- Book OPD appointments
- View prescriptions and consultation summaries
- Access laboratory and diagnostic reports linked to UHID
- Locate nearby hospitals and available specialties
- Identify laboratory services and rates

Impact on Citizen Experience

- One App, One Health Record: Instant access to prescriptions, lab reports, discharge summaries, and medical history
- No More Paper Files: Digital records available anytime, anywhere across government hospitals
- Easy Appointments & Follow-ups: Book consultations and digital review visits with ease
- Faster Referrals: Smooth and transparent referrals to higher centres
- Less Waiting, More Convenience: Reduced queues, travel, and repeat hospital visits
- Continuity of Care: Doctors can view past records for better and safer treatment
- Transparent & Citizen-Owned Data: Citizens can view and track their own health information
- Simple & User-Friendly

EHEALTH WEB PORTAL FOR PUBLIC ACCESS

The eHealth Web Portal extends digital health access to citizens who prefer browser-based services.

Through the portal, citizens can:

- Book OP appointments
- View and download prescriptions and lab reports
- Access services using UHID

The portal is designed to be Simple and intuitive, Accessible to users with basic digital literacy and Device-independent

SCAN N BOOK FACILITY: SIMPLIFIED ON-SITE ACCESS

The Scan N Book facility bridges digital access with on-site hospital services by QR-Based Token Generation

Citizens can Scan a QR code displayed within hospital premises and Instantly book a consultation token. This enables citizens to directly proceed for consultation without visiting registration counters.

Scan N Book – Benefits

- Quick Appointment Booking: Scan the QR code and book appointments instantly
- No Queues at Counters: Eliminates manual registration and long waiting lines
- Time-Saving for Citizens: Faster access to OP services with minimal effort

- Easy to Use: No complex steps—scan, select, and book
- Reduces Crowd at Hospitals: Improves patient flow and hospital efficiency
- Paperless & Digital: Promotes contactless and eco-friendly service delivery
- Citizen-Friendly Experience

SMS-BASED LABORATORY REPORT DELIVERY

Laboratory test results are delivered via SMS to verified mobile numbers. Lab results are made available immediately upon validation. Citizens can also View and download lab reports through the MeHealth App

SMS-Based Laboratory Report Delivery – Benefits

- Instant SMS Alerts: Lab results sent directly to the registered mobile number
- No Hospital Revisit: Avoids the need to collect physical reports
- Fast Follow-up Care: Enables quicker treatment
- Saves Time & Cost: Reduces travel, waiting, and associated expenses

DIGITAL PAYMENT INTEGRATION

To promote cashless and efficient transactions, eHealth integrates digital payment facilities. Hospitals are equipped with POS-enabled billing counters supporting UPI, Debit and credit cards and Other digital payment modes

Digital Payment Integration – Benefits

- Cashless & Convenient: Enables quick, secure payments at health facilities
- Saves Time: Faster billing and reduced queues at payment counters
- Anytime, Anywhere Payments: Supports multiple digital payment modes
- Transparent Transactions: Clear records for citizens and hospitals
- Citizen-Friendly Experience: Simple, reliable, and hassle-free payments

Overall Impact of Citizen-Centric Features

- Collectively, the citizen-centric features of eHealth:
- Enhance patient convenience and satisfaction
- Improve healthcare accessibility and equity
- Strengthen continuity and quality of care
- Reduce administrative and operational inefficiencies
- Support data-driven governance and planning

Conclusion

The eHealth citizen-centric services represent a paradigm shift in public healthcare delivery by placing the citizen at the center of digital transformation. Through integrated identifiers, digital access platforms, simplified workflows, and cashless services, eHealth ensures that healthcare is not only technologically advanced but also inclusive, responsive, and people-friendly.

COVID-19 DEATH INFORMATION SYSTEM (CDIS)

The COVID-19 Death Information System (CDIS) is a centralized, end-to-end digital platform developed and implemented by eHealth Kerala for the State of Kerala to ensure accurate, transparent, and verifiable reporting of COVID-19 related deaths. The system is one of its kind in India, providing a comprehensive, fully digital, and auditable framework covering death declaration, appeals, delayed reporting, certificate correction, and public disclosure, in alignment with Government of India and ICMR guidelines.

Objectives

- CDIS was designed to:
- Establish a uniform, state-wide mechanism for COVID-19 death reporting across all institutions.
- Ensure end-to-end digital workflow from hospital reporting to public declaration.
- Prevent duplicate or erroneous declarations through system-level validations.
- Enable citizen access and transparency while maintaining data integrity and accountability.
- Support district and state-level monitoring and policy decisions.

Sources of Death Reporting

- COVID-19 deaths are reported into CDIS from:
- Government health institutions
- Private health institutions
- Deaths occurring in transit
- Deaths occurring at home
- Modes of Death Declaration

The system supports three structured declaration pathways:

- Category-A – Daily Death Reporting through online Medical Bulletin submission by institutions.
- Category-B – Appeal Requests, enabling reconsideration of cases as per revised ICMR guidelines through a defined committee-based process.
- Category-C – Delayed Death Entry, permitting one-time declaration of deaths not reported earlier due to system or documentation constraints.

Stakeholders and Functional Coverage

- Public: Access to declared death lists with certificate numbers, appeal and correction request submission, certificate verification, dashboards, and ICMR certificate requests.
- Hospitals: Submission of daily and appeal Medical Bulletins, death entry, and DIR coordination.

- District & State Authorities: Approval and declaration of deaths, appeal scrutiny through district committees, institutional monitoring, and release of consolidated statistics.

System Features and Controls

CDIS incorporates robust duplicate prevention mechanisms using SRF ID, LSGD key numbers, and demographic validations across online, appeal, and legacy records. Multi-level dashboards provide real-time visibility for public users and administrators, ensuring transparency, traceability, and audit readiness.

In conclusion, CDIS stands as a pioneering digital public health system, one of its kind in India, that enabled Kerala to implement a transparent, accountable, and citizen-centric approach to COVID-19 death declaration and certification.

EHEALTH KERALA- COVID-19 VACCINATION PORTAL

During the initial phase of the COVID-19 vaccination programme, the Government of Kerala identified the need to ensure early and priority access to vaccination for specific vulnerable and frontline population groups. At that stage, the national CoWIN vaccination portal did not have provisions to operationalize state-specific priority identification and scheduling requirements.

In this context, as per Government directions, eHealth Kerala designed and implemented a State COVID-19 Vaccination Portal to enable timely vaccination of priority groups. The platform facilitated online submission of vaccination requests by eligible beneficiaries and enabled district-level scheduling of vaccination sessions based on vaccine availability, thereby bridging a critical operational gap in the national system.

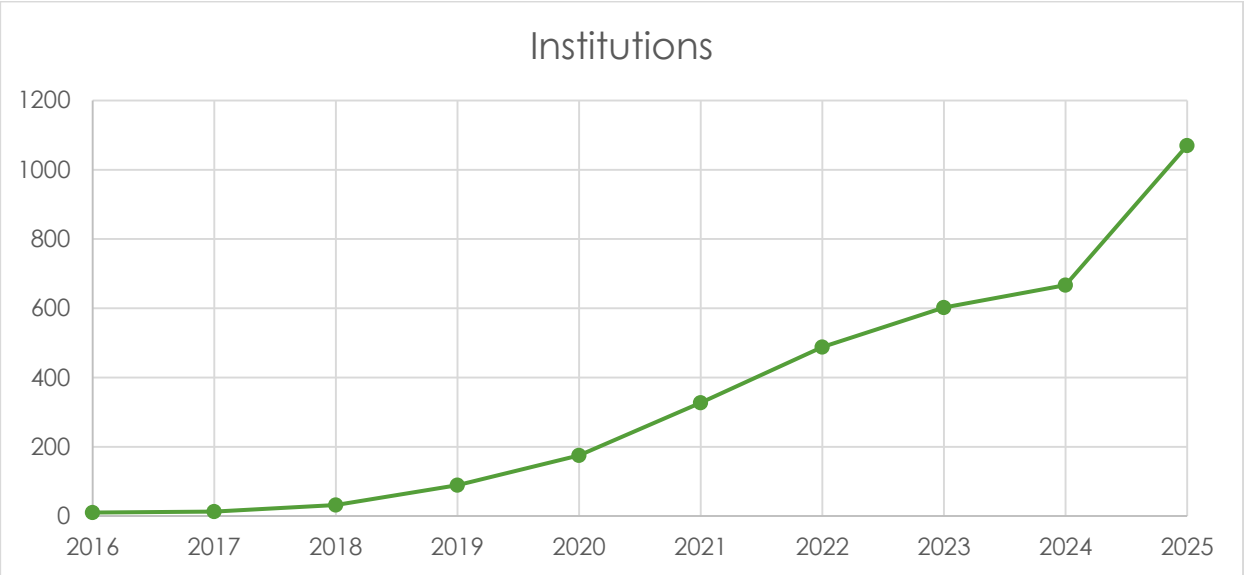
The portal was instrumental in supporting vaccination access for priority categories, including healthcare workers, police personnel, frontline and essential service workers, and individuals required to travel abroad, ensuring that these groups received vaccination at the earliest possible stage.

The digital COVID-19 Vaccination Portal significantly reduced manual processes, improved turnaround time, and strengthened district-level governance during a public health emergency. The initiative stands as a key milestone in Kerala's digital health journey, demonstrating the State's capacity to rapidly deploy scalable and citizen-centric digital health solutions.

CHAPTER 7: CURRENT COVERAGE, UTILIZATION, AND PERFORMANCE

eHealth HMS is implemented at 1076 hospitals currently in the State which ranges from primary care centres to tertiary care centres. Out of these 726 institutions with all infrastructure for the Core 5 Modules. As per the existing directions from Government HMS with the 5 basic modules must be implemented at all the remaining hospitals with focus on primary care hospitals. Considering the site-readiness and expected civil construction, hybrid mode of works with focus of WiFi mode of networking and minimal physical cabling is being undertaken.

Year-wise implementation Count



Department -wise Count

Department	Count
DHS Institutions	784
DME Institution	18
NHM Institutions	270
SC / ST Department	1
Others	3
Total	**1076**

District-wise Count

District	Count
Alappuzha	72
Ernakulam	112

Idukki	32
Kannur	70
Kasaragod	39
Kollam	70
Kottayam	68
Kozhikode	89
Malappuram	110
Palakkad	76
Pathanamthitta	42
Thiruvananthapuram	153
THRISSUR	101
WAYANAD	42
Grand Total	**1076**

Hospital Type-wise Count

Category	Total # institutions
PHC/FHC	552
UHWC	169
UPHC/UCHC	99
BFHC/CHC	90
TH/THQH	88
Medical College Institutions	19
General Hospital	17
District Hospital	16
Speciality Hospital	13
Others	10
Public Health Laboratory	3
Grand Total	**1076**

Rollout of eHealth across districts

- eHealth is implemented at 1076 hospitals out of which 725 with infrastructure for all 5 core modules in different districts in Kerala as on 02- 02- 2026 and is in various stages of implementation.
- eHealth infrastructure setup is in progress at around 26 hospitals under DHS and 433 hospitals under NHM and eHealth will be functional at these hospitals by March 2026.
- eHealth IT infrastructure has to be provided at the remaining 590 hospitals to implement eHealth HMS

eHealth Impact in Numbers

Indicators	Count
UHID	2,65 Cr
Total OP Visits	22.48 Cr
Ip Admissions	18.23 Lakhs
Online Appointments	18.27 Lakhs
Doctor Consultations	10.78 Cr
Digital Prescriptions	7.09 %
Lab Tests	2.52 cr
	as on 19th February 2026

CHAPTER 8: DATA GOVERNANCE, PRIVACY, SECURITY, AND SYSTEM PERFORMANCE

The eHealth Kerala platform and the State Digital Health Mission (SDHM) are built upon the foundational principles of secure, interoperable, citizen-centric, and accountable digital healthcare governance. As healthcare systems become increasingly dependent on digital platforms and electronic health records, ensuring the confidentiality, integrity, availability, and responsible use of health data has become a critical requirement. The eHealth ecosystem handles large volumes of sensitive personal and clinical information generated through healthcare delivery, public health programmes, laboratory systems, citizen services, and statewide digital health initiatives.

To address these requirements, eHealth Kerala has adopted a comprehensive framework encompassing data governance, privacy protection, cybersecurity, interoperability standards, access control mechanisms, system monitoring, and operational resilience. The framework ensures that digital health information is securely managed while enabling seamless healthcare delivery, continuity of care, public health surveillance, and evidence-based governance.

Data Governance Framework

The eHealth Kerala platform follows a centralized and structured data governance model to ensure standardization, consistency, accountability, and controlled access to health information across institutions. The State Digital Health Mission functions as the nodal authority responsible for governance, oversight, and implementation of digital health standards across the State.

The data governance framework establishes policies and operational mechanisms for data collection, storage, access, sharing, retention, monitoring, and auditability. The framework ensures that healthcare data generated across public healthcare institutions remains standardized, interoperable, and securely accessible to authorized users based on defined roles and responsibilities.

The governance structure supports integration of multiple healthcare domains including hospital management systems, public health systems, laboratory systems, citizen-centric services, mobile applications, and disease surveillance platforms into a unified digital ecosystem. The framework also facilitates statewide monitoring, policy planning, programme evaluation, and evidence-based decision-making using real-time digital health information.

Digital Health Records and Data Standardization

A key principle of the eHealth Kerala ecosystem is the concept of "One Citizen – One Electronic Health Record." Each citizen is assigned a Unique Health ID , enabling

creation of a unified and longitudinal electronic health record across healthcare institutions and services.

The system ensures standardized capture of demographic information, clinical documentation, prescriptions, laboratory reports, radiology findings, discharge summaries, referrals, and public health records. To support interoperability and uniformity, the platform utilizes internationally accepted standards including ICD-10 for disease classification, SNOMED-CT for clinical terminology, LOINC for laboratory investigations, and HL7/FHIR standards for data exchange.

Standardized digital records reduce duplication, improve continuity of care, support accurate reporting, and enable seamless integration with national digital health initiatives including the Ayushman Bharat Digital Mission (ABDM).

Privacy and Confidentiality of Health Information

Protection of patient privacy and confidentiality is a critical component of the eHealth Kerala framework. The platform incorporates multiple safeguards to ensure that sensitive personal and health-related information is accessed only by authorized personnel for legitimate healthcare and administrative purposes.

Patient information is protected through role-based access controls, authentication mechanisms, audit logging, and secure communication protocols. Healthcare providers are granted access only to the information necessary for clinical care and operational responsibilities. Administrative users are assigned restricted access based on institutional and functional roles.

The system architecture emphasizes privacy-by-design principles to minimize unnecessary exposure of personal information and ensure responsible handling of citizen health data. The platform also supports secure handling of Aadhaar-linked services, ABHA integration, and citizen authentication workflows while maintaining confidentiality standards.

Role-Based Access Control and User Authentication

The eHealth platform utilizes a robust role-based access control framework to regulate user access across healthcare institutions and system modules. Each user is assigned specific access privileges based on their functional responsibilities, institutional role, and operational requirements.

Doctors, nurses, pharmacists, laboratory personnel, administrative staff, public health workers, and system administrators are provided different levels of access to ensure segregation of duties and controlled data visibility. Authentication mechanisms including user credentials, password policies, session management, and secure login protocols are implemented to prevent unauthorized access.

The system maintains detailed audit trails of user activities including login history, data access, modifications, clinical documentation, and transaction records.

These audit mechanisms strengthen accountability, facilitate monitoring, and support investigation of unauthorized activities when required.

Interoperability and Secure Data Exchange

Interoperability is a core design principle of the eHealth Kerala ecosystem. The platform supports seamless integration and secure data exchange between healthcare institutions, public health systems, diagnostic devices, citizen applications, and national digital health platforms.

The system adopts HL7 and FHIR-based interoperability standards to enable structured and standardized health data exchange. Integration with ABDM building blocks including ABHA, Health Facility Registry (HFR), Health Professional Registry (HPR), Consent Manager, and Health Information Exchange systems further strengthens nationwide interoperability.

Laboratory systems are integrated with diagnostic equipment through HL7 interfaces, enabling automated transfer of investigation results while minimizing manual data entry errors. The platform also supports integration with external systems including DDMS, Aadhaar services, SMS gateways, digital payment systems, Digi locker, IHIP, and other government platforms.

Consent Management and ABDM Compliance

Under the Ayushman Bharat Digital Mission framework, consent-driven data sharing forms a central component of digital health governance. The eHealth Kerala platform supports ABDM-compliant consent management mechanisms to ensure that citizens retain control over sharing of their health information.

The ABDM Consent Manager framework enables citizens to provide, review, revoke, or time-limit consent for sharing specific health records with other authorized healthcare providers and institutions which are using other HMS including government and private. Health information exchange occurs only after explicit patient consent, thereby strengthening citizen trust and transparency in digital healthcare systems.

The implementation of ABHA-linked digital identities, Scan and Share facilities, and ABDM-compliant workflows further enhances secure access to health information while ensuring compliance with national digital health standards and interoperability requirements.

Cybersecurity and Data Protection Measures

Given the sensitive nature of healthcare data, eHealth Kerala incorporates multiple cybersecurity safeguards to protect digital systems and citizen information against unauthorized access, cyber threats, and operational disruptions.

The platform utilizes secure communication channels, encryption mechanisms, firewall protection, centralized monitoring systems, and controlled network access to

strengthen cybersecurity resilience. Data transmission between healthcare institutions and centralized servers occurs through secure and authenticated channels.

The system architecture also incorporates backup mechanisms, redundancy frameworks, and controlled infrastructure access to ensure operational continuity and minimize the impact of technical failures or security incidents. Security protocols are periodically reviewed and strengthened to address evolving cybersecurity risks and digital health requirements.

Infrastructure Reliability and System Performance

The eHealth Kerala ecosystem is supported through centralized infrastructure hosted at the State Data Centre with scalable cloud-enabled architecture. The infrastructure is designed to support high-volume healthcare transactions, real-time data synchronization, and statewide digital health operations.

To ensure uninterrupted service delivery, the platform incorporates primary and secondary connectivity arrangements and centralized UPS systems. Redundant connectivity and centralized monitoring systems help minimize downtime and maintain operational stability across institutions.

System performance is continuously monitored through centralized dashboards and facility management systems. Performance indicators including application availability, transaction response times, network uptime, complaint resolution, and service utilization are monitored to ensure operational efficiency and user satisfaction.

Facility Management and Operational Monitoring

The State Digital Health Mission has established centralized operational monitoring mechanisms to support system stability, issue resolution, and service continuity. A web-based Facility Management Service (FMS) platform enables institutions to log technical issues, monitor complaint resolution, and track system performance metrics.

The DISHA Call Centre provides centralized support for healthcare institutions and citizens utilizing eHealth services. The support framework includes technical troubleshooting, workflow assistance, application support, and escalation management to ensure timely resolution of operational issues.

CHAPTER 9: IMPACT AND CHALLENGES

The implementation of eHealth Kerala and the State Digital Health Mission represents one of the most significant digital transformation initiatives undertaken in the public healthcare sector in India. The initiative has fundamentally transformed healthcare service delivery across the State by integrating hospitals, public health systems, citizen services, and digital health platforms into a unified and interoperable ecosystem. Over the years, the project has evolved from a hospital information system initiative into a comprehensive statewide digital health framework supporting clinical care, public health governance, disease surveillance, citizen-centric services, and digital health innovation.

The large-scale implementation of digital health systems across primary, secondary, and tertiary healthcare institutions has resulted in substantial improvements in healthcare accessibility, operational efficiency, continuity of care, and evidence-based governance. At the same time, the implementation process has also highlighted several infrastructural, operational, technological, and organizational challenges associated with large-scale digital transformation within the public healthcare system.

Impact on Citizens and Patient Care

One of the most significant achievements of eHealth Kerala has been the transformation of healthcare delivery from fragmented and paper-based processes into a citizen-centric digital healthcare ecosystem. The introduction of the Unique Health ID (UHID) and unified electronic health records has enabled citizens to access healthcare services across institutions without the need to repeatedly carry physical records or undergo repeated registration procedures.

Digital records have improved continuity of care by enabling healthcare providers to access previous prescriptions, lab reports, diagnoses, discharge summaries, and treatment history during consultations. This has reduced duplication of investigations, improved clinical decision-making, and enhanced the quality and safety of patient care.

Citizen-centric services such as online appointment booking, Scan and Book facilities, MeHealth mobile application, eHealth web portal, SMS-based lab report delivery, and digital payment integration have significantly improved convenience and accessibility for the public. These services have reduced waiting time, minimized overcrowding in hospitals, improved transparency, and enabled faster access to healthcare services.

The implementation of digital referral systems and integrated patient records has also strengthened coordinated care across different levels of healthcare

institutions, ensuring smoother patient movement from primary care centres to higher referral institutions.

Impact on Healthcare Institutions and Service Delivery

The eHealth platform has significantly improved operational efficiency within healthcare institutions by integrating registration, consultation, diagnostics, pharmacy, billing, inpatient management, and administrative workflows into a unified digital platform. The transition from paper-based processes to digital workflows has reduced manual documentation, improved record management, and enhanced coordination between departments.

Healthcare providers now have real-time access to patient history, laboratory reports, prescriptions, and clinical records, enabling faster and more informed clinical decisions. Automation of laboratory workflows, integration with diagnostic equipment, and digital prescription systems have reduced manual errors and improved service turnaround time.

The implementation of standardized workflows across institutions has also improved administrative efficiency, service monitoring, inventory management, pharmacy operations, and financial accountability. The digital platform has enabled healthcare institutions to monitor patient flow, service utilization, medicine consumption, laboratory workloads, and operational performance in real time.

Impact on Public Health Governance

The availability of centralized and real-time digital health data has significantly strengthened public health governance and evidence-based decision-making in Kerala. The integration of hospital management systems with public health modules will enable the State to monitor disease trends, programme performance, healthcare utilization, and population health indicators more effectively.

The Public Health Module and JAK-PH application have enabled creation of one of the largest digital family health registries supporting population profiling, vulnerability analysis, non-communicable disease management, and preventive healthcare interventions. Real-time dashboards and analytics have strengthened programme monitoring and facilitated targeted interventions at State, district, block, and ward levels.

Digital health initiatives such as SHAILI, Cancer Screening Portal, COVID-19 Death Information System (CDIS), and COVID Vaccination Portal demonstrated the State's ability to rapidly deploy technology-enabled public health solutions during emergencies and large-scale health programmes.

The availability of digital health information has also improved planning, resource allocation, outbreak response, and monitoring of healthcare delivery systems. Policymakers and administrators now have access to reliable statewide data for evidence-based governance and health system strengthening.

Impact of ABDM Integration

The implementation of Ayushman Bharat Digital Mission in Kerala has further strengthened interoperability and integration within the digital health ecosystem. The onboarding of healthcare facilities onto the Health Facility Registry (HFR), healthcare professionals onto the Health Professional Registry (HPR), and citizens onto the ABHA platform has enabled alignment with national digital health standards.

The implementation of ABDM will improved linkage of digital records with ABHA-linked health identities. Integration with ABDM building blocks has strengthened interoperability, portability of health records, and nationwide accessibility of healthcare information.

Kerala's proactive implementation of ABDM has positioned the State among the leading digital health ecosystems in the country and strengthened its capability to support future national digital health initiatives.

Challenges

Operational and Infrastructure Challenges

Despite significant achievements, the implementation of eHealth Kerala encountered several operational and infrastructural challenges. One of the major challenges was the variation in infrastructure readiness across healthcare institutions. Many institutions required substantial upgrades in networking, electrical systems, hardware deployment, and physical infrastructure before digital systems could be implemented effectively.

Connectivity issues, particularly in geographically remote and rural areas, posed operational difficulties during implementation and routine system usage. Maintaining uninterrupted internet connectivity and ensuring redundancy across institutions required continuous technical coordination and infrastructure strengthening.

Large-scale hardware deployment and maintenance also created operational challenges. In the Public Health Module, extensive tablet deployment initially supported field-level data collection activities; however, issues such as device obsolescence, battery degradation, lack of Annual Maintenance Contract (AMC) support, and vendor dependency affected sustainability. These challenges eventually necessitated transition towards Bring Your Own Device (BYOD) models and revised operational approaches.

The continuous expansion of digital health initiatives also increased demands on centralized infrastructure, technical support systems, and operational monitoring frameworks.

Human Resource and Capacity Building Challenges

Digital transformation within the healthcare sector required extensive change management and continuous capacity-building efforts. Many healthcare workers were initially unfamiliar with digital workflows and electronic documentation systems, requiring sustained training and handholding support.

Frequent staff transfers, workforce shortages, varying levels of digital literacy, and operational workload within healthcare institutions posed additional challenges to user adoption and system utilization. Continuous training programmes, refresher sessions, online learning resources, and institutional support mechanisms became essential to maintain effective implementation.

The rapid expansion of eHealth responsibilities beyond the original scope of the project also increased pressure on the existing workforce within the State Digital Health Mission and Project Management Unit. Additional technical, administrative, and operational manpower became necessary to support statewide implementation and growing digital health requirements.

Data Governance and Cybersecurity Challenges

As the volume and sensitivity of digital health information increased, ensuring privacy, cybersecurity, and secure data governance became increasingly important. The large-scale digitalization of healthcare records required implementation of robust access control mechanisms, audit systems, secure communication protocols, and data protection measures.

The integration of multiple applications, external systems, diagnostic devices, and ABDM components further increased the complexity of interoperability management and cybersecurity monitoring. Continuous strengthening of cybersecurity infrastructure, vulnerability management, backup systems, and disaster recovery mechanisms became essential to maintain public trust and operational resilience.

The increasing use of cloud-enabled systems, mobile applications, citizen portals, and digital payment systems also required continuous monitoring and enhancement of security protocols to address evolving cyber threats and operational risks.

Financial Sustainability Challenges

The implementation and expansion of statewide digital health systems involve substantial recurring expenditure related to infrastructure maintenance, software development, connectivity, cybersecurity, hardware replacement, technical manpower, and operational support. While initial funding support was obtained through Central and State Government mechanisms, ensuring long-term financial sustainability remains a key challenge.

Recurring maintenance costs, infrastructure modernization requirements, expansion of services, and increasing operational scale necessitate continuous financial planning and resource allocation. Sustainable funding models will be critical to maintaining and upgrading digital health infrastructure in the coming years.

Institutional Strengthening and Technology Modernization

With the rapid expansion of eHealth Kerala and the State Digital Health Mission, the responsibilities of the Project Management Unit have grown significantly beyond the original scope of the eHealth Hospital Management System. The PMU is now managing multiple statewide digital health initiatives including ABDM implementation, public health systems, citizen-centric platforms, interoperability frameworks, and digital innovations. This increasing scale of operations requires strengthening of the PMU through enhancement of human resources, technical divisions, operational support systems, and institutional capacity.

At the same time, the digital health ecosystem requires migration towards newer and scalable technology platforms, modernization of legacy systems, and integration of advanced technologies such as Artificial Intelligence, predictive analytics, and intelligent automation. However, recruitment and retention of skilled technical professionals remain a major challenge. Sustaining and scaling the digital health ecosystem will therefore require competitive technical manpower, continuous skill development, stronger infrastructure, and long-term investment in technology modernization and cybersecurity.

Lessons Learned and Strategic Insights

The implementation of eHealth Kerala has generated several important lessons for large-scale public sector digital transformation initiatives. One of the key lessons is the importance of phased implementation combined with strong governance structures, institutional coordination, and user engagement. Pilot-based deployment, continuous feedback collection, and gradual scaling helped improve system stability and operational acceptance.

The initiative also demonstrated the importance of combining technological solutions with organizational change management, capacity building, and sustained institutional support. Digital transformation in healthcare requires not only software and infrastructure but also strong leadership, policy support, operational adaptability, and stakeholder participation.

Future Opportunities and Roadmap

The future roadmap of eHealth Kerala includes strengthening statewide digital health integration, expanding ABDM compliance, enhancing interoperability frameworks, and increasing adoption of advanced digital technologies. Emerging opportunities include integration of artificial intelligence, predictive analytics,

telemedicine platforms, digital diagnostics, and advanced public health surveillance systems.

Further expansion of citizen-centric services, mobile health applications, digital referral systems, and analytics platforms will strengthen patient engagement and healthcare accessibility. Integration with emerging technologies and national digital health infrastructure will also improve continuity of care, portability of records, and evidence-based healthcare governance.

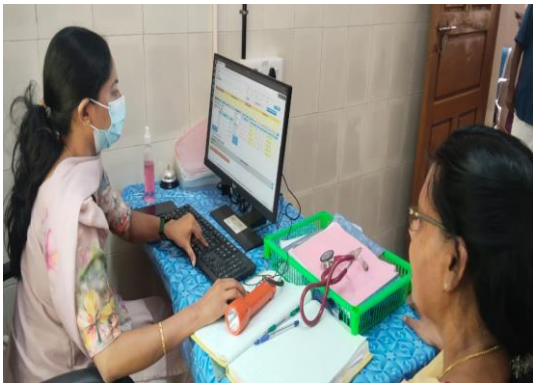
Conclusion

The eHealth Kerala initiative and the State Digital Health Mission have significantly transformed healthcare delivery, public health governance, and citizen engagement within the State. Through integrated digital systems, standardized workflows, citizen-centric services, and interoperable health platforms, Kerala has established one of the most comprehensive public digital health ecosystems in India.

The initiative has improved healthcare accessibility, continuity of care, operational efficiency, disease surveillance, and evidence-based planning while strengthening integration with national digital health frameworks such as ABDM. At the same time, the implementation journey has highlighted the importance of infrastructure readiness, cybersecurity, financial sustainability, capacity building, and continuous operational support in large-scale digital transformation programmes.

As the digital health ecosystem continues to evolve, sustained investment in governance, technology, infrastructure, workforce development, and innovation will be essential to further strengthen Kerala's leadership in digital healthcare transformation and ensure inclusive, secure, and sustainable healthcare delivery for all citizens.

ANNEXURE1 EHEALTH – PHOTO HIGHLIGHTS



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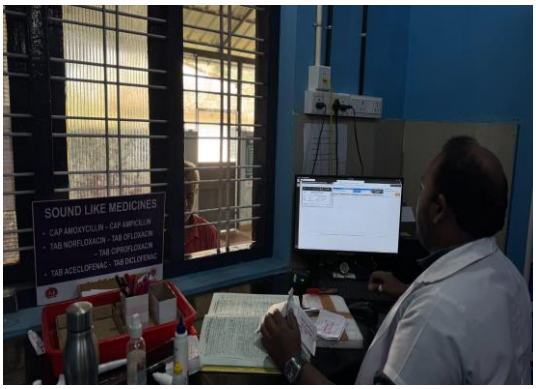

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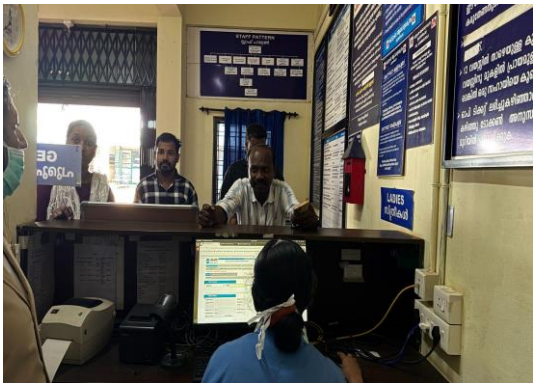

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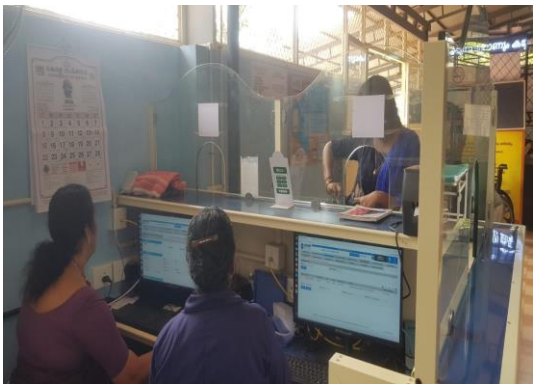

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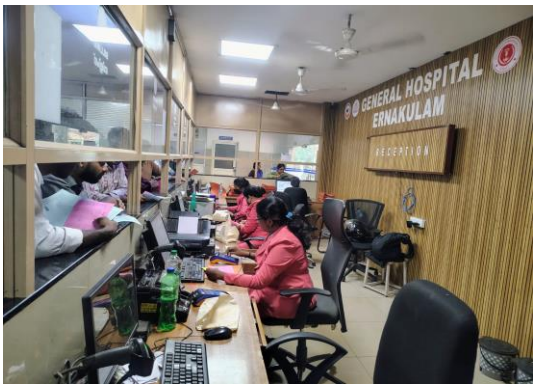

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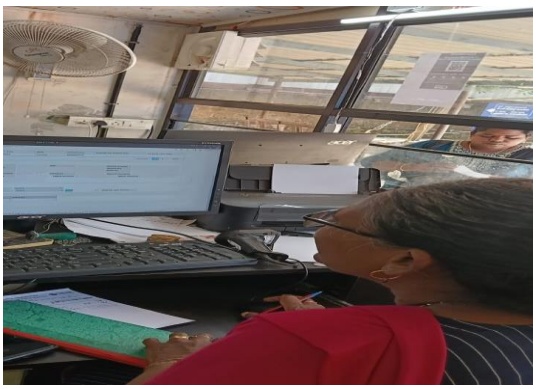

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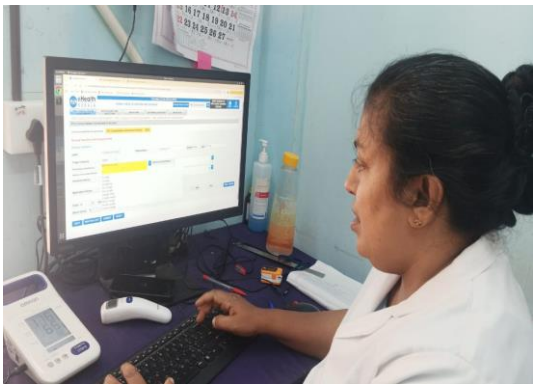

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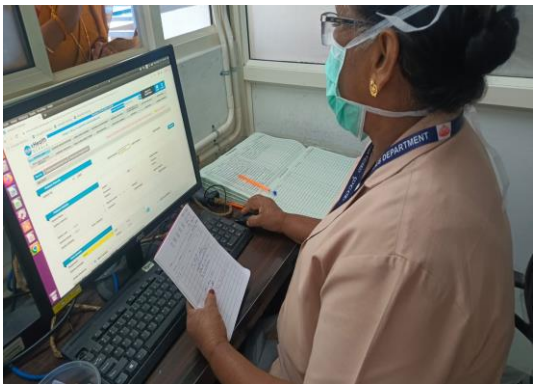

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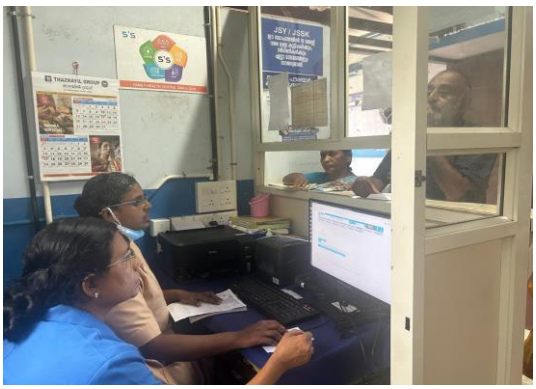

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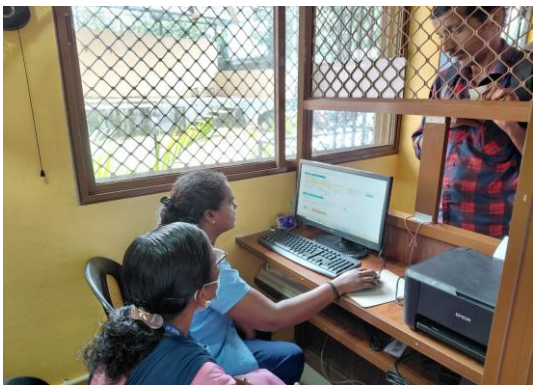

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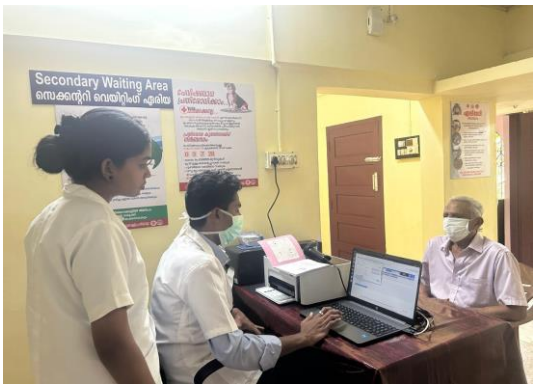

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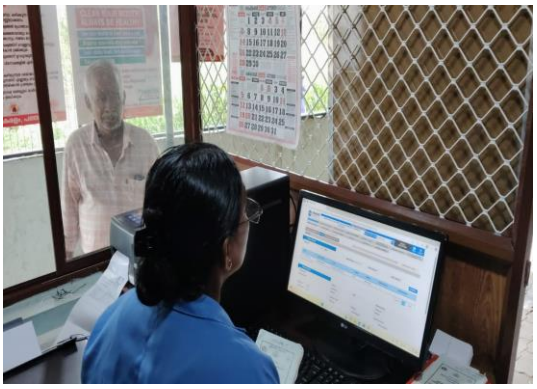

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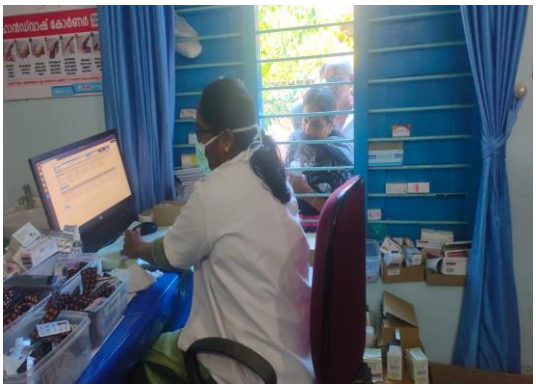

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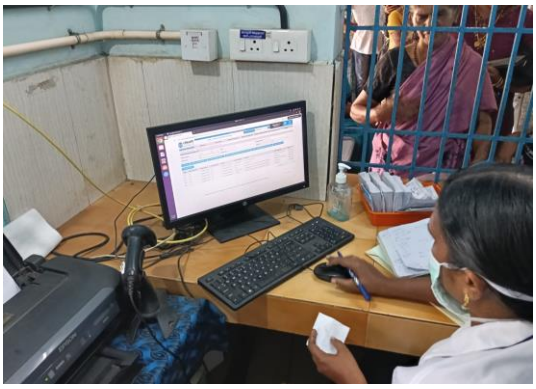

FHC VAYALAR

June 2026