



NON-COMMUNICABLE DISEASE (NCD) PROGRAMME - KERALA

Department of Health & Family Welfare
Government of Kerala

KERALA.HEALTH

Non-Communicable Disease Programme in Kerala

Prepared by
Directorate of Health Services
Department of Health & Family Welfare
Government of Kerala
Year: 2026

Foreword

Effective control of non-communicable diseases requires robust systems for planning, service delivery, monitoring, and long-term follow-up. This document has been developed to comprehensively document Kerala's NCD programme, capturing its institutional arrangements, operational strategies, innovations, and performance.

The documentation highlights key system innovations, including integrated screening and management at primary care level, task-sharing across cadres, use of digital health tools for decision support and patient tracking, and strengthened monitoring and review mechanisms. These initiatives have contributed to improved quality of care, better treatment continuity, and stronger accountability across the health system.

Now, the field functionaries have been oriented to prioritize coverage of BPL population to understand their health status and do linkages with the services. Very soon total BPL population will get screened for various NCDs and as per the health check up findings will be linked to the necessary required health services. This is done with the principle of 'THE LAST IN LINE IS THE FIRST FOR US'. This task would not have been possible without the efforts of the NCD Cell State team headed by Dr Bipin Gopal and Dr Manu along with the District NCD nodal officers. The team was ably supported by the WHO consultant, DHS and DME state level functionaries and NCD nodal officers at the districts. Now, at each Jankiya Arogya Kendram (Sub Centres) all the field functionaries have the line list of the people with knowledge of their health status. More than 80% of BPL population is covered and with their continued efforts soon Kerala Health will be in position to have 100% BPL population covered with the details regarding NCD related health status and their linking to care and support.

I am confident that this document will serve as an important reference for programme managers, policymakers, and development partners. It will support evidence-based decision-making, facilitate replication of best practices, and guide the next phase of Kerala's efforts to reduce the burden of non-communicable diseases and improve population health outcomes.

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CHAPTER 1

INTRODUCTION AND STATE CONTEXT

1.1 Kerala Health Model

Kerala is widely recognized for its achievements in public health and human development. Over the past several decades, the state has successfully achieved major improvements in health indicators such as maternal mortality rate, infant mortality rate, and total fertility rate. These achievements are the result of sustained investments in primary healthcare, strong public health infrastructure, high literacy rates, and effective implementation of national health programmes.

The “Kerala Health Model” has been widely studied in global public health literature due to its ability to deliver high health outcomes despite relatively modest economic resources. The state has demonstrated remarkable success in controlling communicable diseases and improving maternal and child health outcomes.

However, Kerala is now undergoing a significant epidemiological transition. Rapid urbanization, demographic ageing, and lifestyle changes have led to a growing burden of non-communicable diseases. Diseases such as diabetes, hypertension, cardiovascular diseases, cancers, stroke, and chronic respiratory diseases have become the leading causes of morbidity and mortality in the state.

1.2 Epidemiological Profile: Burden of Disease

Diabetes Mellitus

Kerala has one of the highest diabetes prevalence rates in India. Studies indicate that diabetes prevalence ranges between **20–27%**, which is significantly higher than the national average of approximately **11%**.

Recent studies conducted by national research institutions indicate that **24% of the population is diabetic and 14% is pre-diabetic**, meaning that nearly **38% of the population has abnormal glucose metabolism**.

A major challenge is that a significant proportion of individuals remain **undiagnosed until complications occur**, such as:

- Diabetic retinopathy
- Nephropathy
- Neuropathy

Hypertension

Hypertension is the most significant risk factor for cardiovascular diseases and stroke in Kerala. It is estimated that approximately **32% of adults in the state are hypertensive**, with higher prevalence reported in certain age groups.

Despite high health literacy, **blood pressure control rates remain suboptimal**, indicating the need for improved treatment adherence and monitoring systems.

Chronic Respiratory Diseases

Chronic respiratory diseases such as **Chronic Obstructive Pulmonary Disease (COPD)** and asthma contribute significantly to disability and mortality in Kerala.

The prevalence of COPD is estimated to range between **4.25% and 4.75% of the population**. Major contributing factors include:

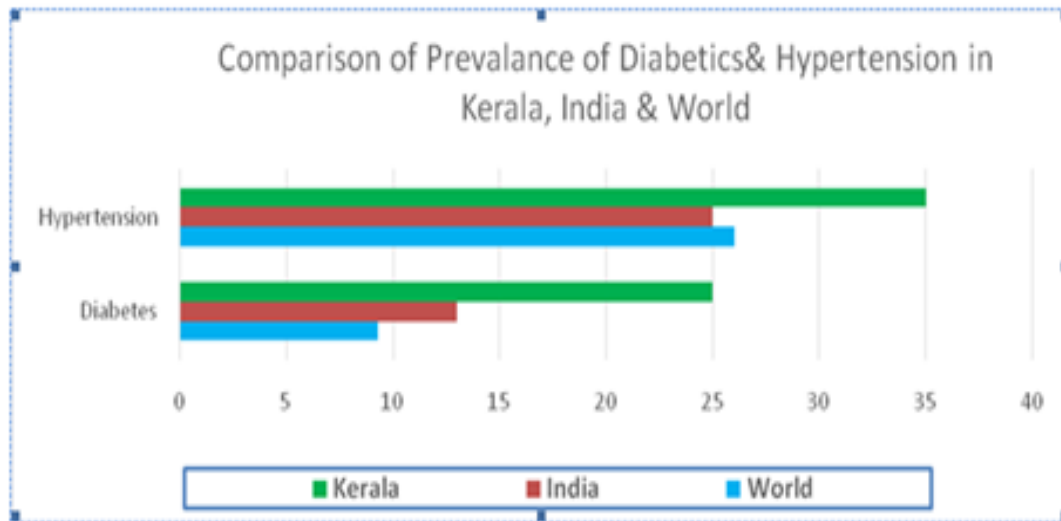
- Tobacco consumption
- Second-hand smoke exposure
- Indoor air pollution
- Occupational exposures

Table 1: Estimated Prevalence of Major NCDs in Kerala

Disease	Estimated Prevalence
Diabetes Mellitus	20–27%
Prediabetes	14%
Hypertension	~32%
COPD	4–5%
Cardiovascular Disease	Increasing trend

1.3 Demographic Profile and Ageing Population

Kerala is experiencing rapid demographic ageing. Currently, **more than 15% of the population is aged above 60 years**, and projections suggest this will exceed **20% by 2030**.



Population ageing leads to:

- Increased prevalence of chronic diseases
- Higher demand for long-term care
- Increased health system expenditure

Multimorbidity is increasingly common among elderly populations, with individuals often suffering from multiple conditions simultaneously.

1.4 Risk Factor Analysis

Nutritional Transition

The traditional Kerala diet has undergone significant transformation in recent decades. Increased consumption of refined carbohydrates, processed foods, and salt has contributed to rising rates of hypertension and diabetes.

Sedentary Lifestyle

Urbanization and motorized transport have reduced physical activity levels across the population. Sedentary lifestyles significantly increase the risk of obesity, cardiovascular disease, and diabetes.

Table 2: Major Risk Factors for NCDs

Risk Factor	Impact
Tobacco use	COPD, cancer
Alcohol consumption	Liver disease, hypertension
Physical inactivity	Obesity, diabetes
High salt intake	Hypertension
Poor diet	Cardiovascular disease

1.5 Objectives of the NCD Programme

The NCD programme in Kerala focuses on four levels of prevention.

Primordial prevention aims to reduce exposure to risk factors in the general population. Primary prevention focuses on health education and behaviour change related to diet, exercise, and substance use.

Secondary prevention involves screening individuals aged above thirty years for major non-communicable diseases. Early diagnosis allows for timely treatment and prevention of complications.

Tertiary prevention focuses on managing complications and improving quality of life for individuals living with chronic diseases.

1.6 Alignment with Sustainable Development Goals

Kerala’s NCD programme aligns with global targets for reducing premature mortality from non-communicable diseases by 2030.

Table 3: SDG Targets for NCD Control

Indicator	Target
Reduction in tobacco use	30%
Reduction in salt intake	10%
Reduction in alcohol use	5%
Increase in fruit and vegetable consumption	20%

Increase in drug therapy for stroke/MI	50%
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CHAPTER 2

ORGANIZATIONAL STRUCTURE

The implementation of the Non-Communicable Disease (NCD) programme in Kerala is carried out through a multi-tier administrative structure, integrating policy direction at the state level with management at the district level and service delivery at peripheral health facilities. This structure ensures effective planning, coordination, monitoring, and delivery of services related to prevention, screening, diagnosis, treatment, and follow-up of non-communicable diseases across the state.

The NCD programme operates under the Department of Health and Family Welfare and is implemented through the Directorate of Health Services in coordination with the National Health Mission. The structure also integrates community-level health workers and primary healthcare institutions to ensure population-level screening and early detection of diseases.

2.1 State NCD Division (Directorate of Health Services)

The State NCD Division functions as the apex body responsible for planning, policy formulation, and strategic oversight of NCD programmes in Kerala. The division is headed by the State Nodal Officer (SNO), who coordinates the implementation of the National Programme for Prevention and Control of Non-Communicable Diseases (NP-NCD) across the state. The division plays a key role in harmonizing national programme requirements with state-specific innovations and health priorities.

At the highest level, the NCD Division operates under the Department of Health and Family Welfare and functions within a structured administrative hierarchy that provides policy direction, technical oversight, and programme coordination.

Table 2.1

State Level Administrative Structure for NCD Programme

Level	Authority	Key Role
Political Leadership	Minister for Health & Family Welfare	Provides policy direction and chairs governing bodies

Administrative Leadership	Additional Chief Secretary (Health)	Responsible for policy formulation, programme oversight, and governance of the state health system
Programme Coordination	State Health Mission Director (NHM)	Oversees planning, implementation, and monitoring of NCD programmes under NHM
Health System Administration	Director of Health Services	Administrative head of all health services in the state
Public Health Oversight	Additional Director (Public Health)	Supervises public health programmes including NCD initiatives
Programme Management	Deputy Director (Planning/NCD)	Handles NCDs, Tobacco Control Programme, and Blindness Control Programme
Programme Coordination	State Nodal Officer (NCD)	Coordinates implementation of NP-NCD across the state

The State NCD Division is supported by a dedicated State NCD Cell, which functions as a specialized unit responsible for programme management, data analysis, financial monitoring, and coordination with district-level units. The cell consists of a State Programme Coordinator, finance and data managers, and other technical staff.

In addition to administrative staff, the division is supported by an NCD Expert Group, which serves as a consultative body consisting of specialists such as cardiologists, nephrologists, oncologists, and other experts. This group provides technical guidance in the development of clinical protocols, treatment guidelines, and programme strategies.

Figure 2.1

State NCD Programme Organogram

This figure illustrates the administrative hierarchy for the planning, coordination, and implementation of the NCD programme in Kerala.

Minister for Health & Family Welfare

|

Additional Chief Secretary (Health)

|



The administrative structure of the NCD programme in Kerala ensures coordination between the state, district, and peripheral levels of the health system. Policy direction is provided at the state level through the Department of Health and Family Welfare, while operational implementation occurs through district health authorities and healthcare institutions. Community-level health workers play an important role in identifying high-risk individuals and ensuring treatment adherence.

The State NCD Division performs several key functions related to programme planning, coordination, monitoring, and capacity building.

The division prepares the State Action Plan for implementation of NP-NCD, including physical and financial targets for programme activities. It also ensures implementation

of the National Multi-Sectoral Action Plan for prevention and control of NCDs. Human resource planning is another important responsibility, and the division ensures the availability of required personnel at different healthcare facilities.

The division maintains a district-wise epidemiological profile of major NCDs, which supports planning and monitoring activities. It also ensures the regular supply of drugs, diagnostics, and logistics required for NCD management at health facilities.

Programme monitoring is conducted through analysis of routine reports generated from the National NCD Portal, field visits, review meetings, and research studies. The division also develops information, education, and communication (IEC) materials and prepares media strategies to support health promotion activities.

Another major responsibility of the State NCD Division is the preparation of the State Programme Implementation Plan (PIP) for submission to the National Health Mission. The division also ensures timely release of funds to districts and monitors financial utilization through submission of statements of expenditure and utilization certificates.

Capacity building of health personnel is coordinated through state and district level training programmes. The division also maintains coordination with other national health programmes to ensure integrated implementation of public health interventions.

2.2 District NCD Division

At the district level, implementation of the NCD programme is coordinated through a dedicated District NCD Division. Kerala has fourteen districts, and each district has an administrative structure responsible for translating state-level policies into operational activities.

The District Medical Officer (DMO–Health) serves as the chief authority responsible for implementation of all health programmes in the district. A Deputy District Medical Officer is designated as the District Nodal Officer (DNO) for NCDs, who supervises programme implementation at the district level.

The National Health Mission also plays an important role in programme management through the District Programme Manager, who coordinates funding mechanisms, human resource management, and monitoring activities.

A District NCD Cell functions under the leadership of the District Nodal Officer and includes a District Programme Coordinator and Data Entry Operators who support programme monitoring, reporting, and logistics management.

Table 2.2

District Level Administrative Structure

Position	Role
District Medical Officer (DMO)	Chief administrative authority at district level
Deputy District Medical Officer (NCD)	District Nodal Officer responsible for NCD programme implementation
District Programme Manager (NHM)	Coordinates funding, human resources and programme support
District NCD Cell	Programme coordination, data management and monitoring

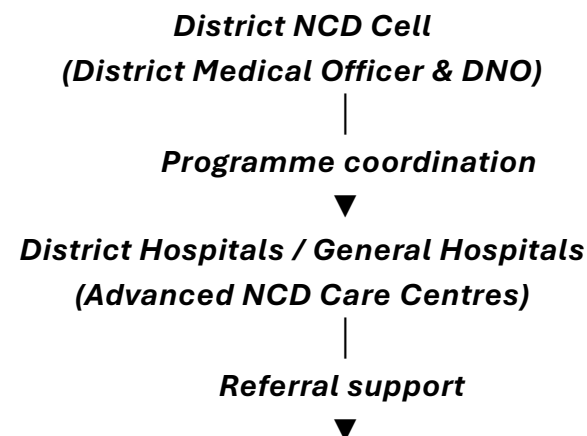
The District NCD Cell prepares the District Action Plan, incorporating NP-NCD strategies along with district-specific health priorities. It also ensures that required human resources are available at various healthcare facilities.

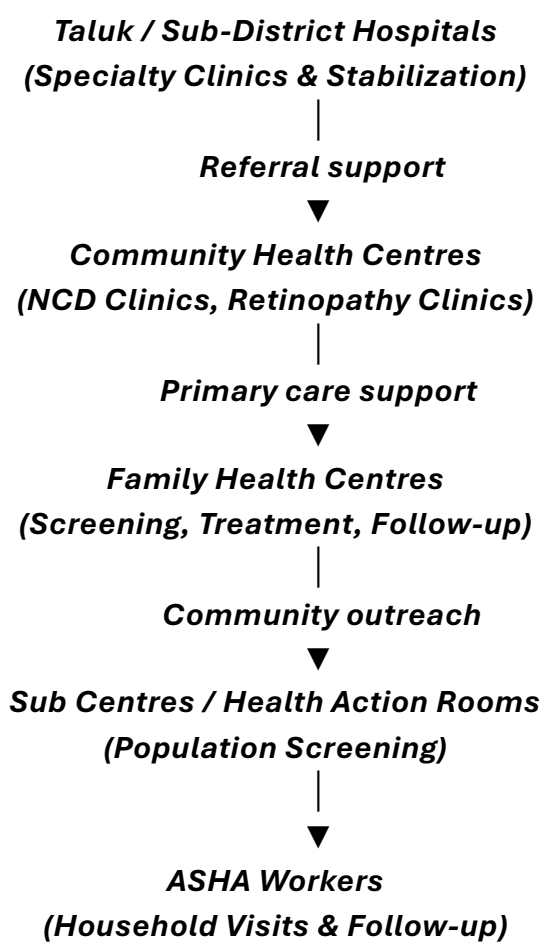
The district team maintains an epidemiological profile of NCDs, ensuring that local disease patterns are documented and used for planning interventions. It also ensures regular supply of drugs, diagnostics, and logistics required for NCD service delivery.

Figure 2.3

District NCD Service Delivery Network

This diagram illustrates the operational network of NCD service delivery within a district.





Description:

The district NCD service delivery network integrates healthcare facilities across multiple levels to ensure effective implementation of screening, diagnosis, treatment, and follow-up services for non-communicable diseases.

Monitoring of programme activities is conducted through routine reports generated from the National NCD Portal, Health Management Information System (HMIS), field visits, and review meetings. The district team also conducts health promotion and public awareness campaigns based on locally developed media plans.

Financial management is another major responsibility of the district unit. The District NCD Division prepares the District Programme Implementation Plan (PIP) for submission to the State NHM and ensures timely submission of expenditure statements and utilization certificates.

Training programmes are organized at the district level to strengthen the capacity of health personnel across all levels of the healthcare system. The district team also coordinates closely with other national and state health programmes to ensure integrated service delivery.

2.3 Peripheral Level (Implementation and Service Delivery)

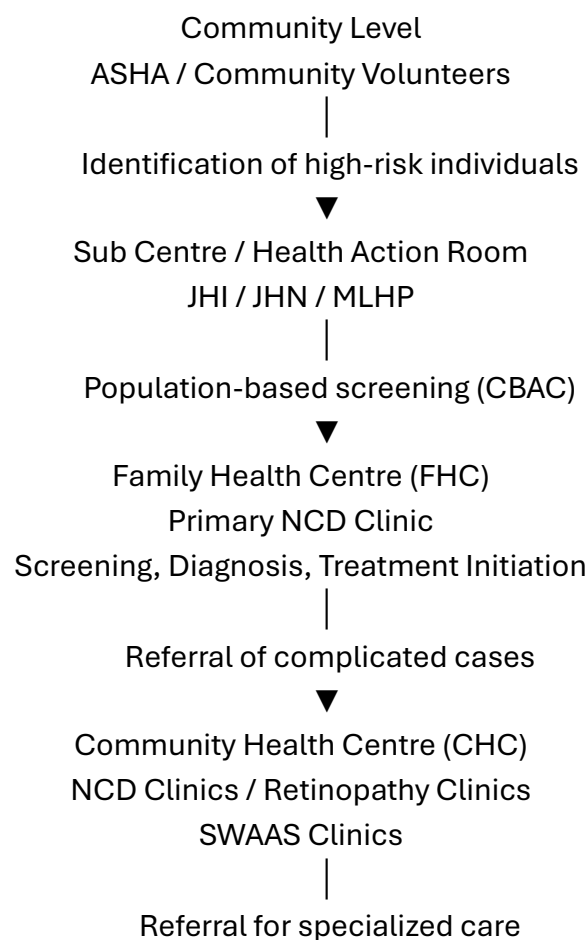
The peripheral level of the health system is responsible for direct delivery of NCD services to the population. This is the level at which programmes such as Amrutham Aarogyam, Kerala's flagship NCD initiative, are implemented.

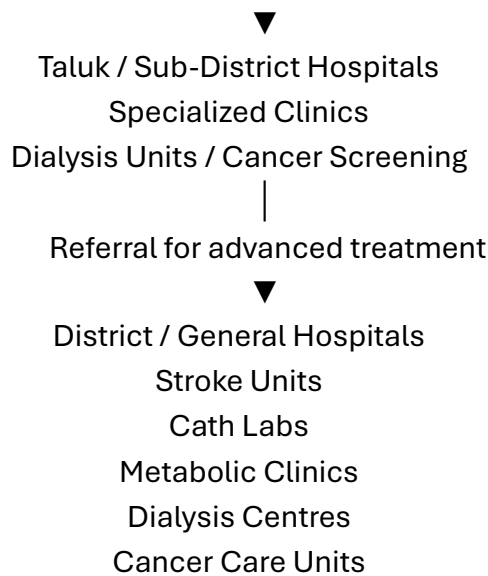
Healthcare services are delivered through a network of district hospitals, taluk hospitals, community health centres, family health centres, sub-centres, and community health workers. Each level performs specific functions related to screening, diagnosis, treatment, referral, and follow-up.

Figure 2.3

NCD Referral Pathway in Kerala Health System

This diagram explains the **continuum of care and referral linkages** for NCD patients.





Description:

The referral pathway ensures continuity of care across different levels of the healthcare system. Screening and early detection are conducted at the community and primary care levels, while specialized treatment services are available at secondary and tertiary healthcare institutions.

Table 2.3

Service Delivery Structure for NCD Programme

Level of Facility	Responsible Authority	Key NCD Functions
District / General Hospitals	Medical Superintendent / NCD Clinic Medical Officer	Tertiary care, specialized NCD clinics, metabolic centres, stroke units, SWAAS clinics, cath labs, dialysis units, diabetic foot clinics, cancer care units
Taluk / Sub-District Hospitals	Medical Superintendent	Secondary screening and stabilized treatment, dialysis units, diabetic foot clinics, cancer care units, SWAAS clinics
Community Health Centres	Medical Officer in Charge	Referral for complicated cases, NCD clinic management, SWAAS clinics, retinopathy clinics, cancer screening

Family Health Centres	Medical Officer	Primary screening, treatment initiation and follow-up, SWAAS clinics and cancer screening
Sub Centres / Health Action Rooms	JHI / JHN / MLHP	Population-based screening and household follow-up
Community Level	ASHA Volunteers	Identification of high-risk individuals and tracking treatment defaulters

The Aardram Mission and Family Health Centres

The Aardram Mission is the key reform initiative through which comprehensive primary healthcare and NCD care are delivered in Kerala. Under this initiative, Primary Health Centres have been transformed into Family Health Centres (FHCs) to provide expanded services and improved patient care.

Family Health Centres serve as the primary entry point for NCD care in the health system. They conduct screening, initiate treatment, and provide long-term follow-up for patients with chronic diseases.

Characteristics of an FHC NCD Clinic

Family Health Centre NCD clinics are designed to provide patient-friendly and accessible services. Special afternoon clinics are conducted to accommodate daily wage workers and elderly individuals who may not be able to visit health facilities during regular hours.

Electronic health systems are integrated into the functioning of FHCs, where every patient is issued a unique health identification number. Clinical parameters such as blood pressure and blood sugar levels are recorded in a digital database, enabling longitudinal tracking of patient health records.

NCD care in FHCs follows a team-based approach in which the Medical Officer, Staff Nurse, and Laboratory Technician work in coordination to ensure same-day screening, diagnosis, and treatment initiation. NCD clinics function on all working days and include a dedicated pre-check area where patients undergo basic screening procedures before consultation.

Key Specialized Units and Programmes

In addition to routine NCD services, Kerala has implemented several specialized initiatives to strengthen management of specific conditions and complications associated with chronic diseases.

Table 2.4

Specialized NCD Initiatives in Kerala

Programme	Focus Area
SWAAS (step wise approach to airway diseases)	Chronic Obstructive Pulmonary Disease (COPD) management
Nayanamritham	Diabetic retinopathy screening
Padasparsham	Diabetic foot care
SIRAS (stroke identification resuscitation awareness and stabilisation)	Stroke management and rehabilitation
Abhayam	Decentralized cancer care services
Campaign Arogyam Anandam Akattam Arbudam	Cancer awareness and screening campaign
Campaign Hridayapoorvam	CPR training and cardiac emergency response
Campaign Vibe for wellness	Promotion of healthy lifestyle and wellness

These initiatives complement the broader NCD programme and help strengthen prevention, early detection, and management of complications associated with chronic diseases.

Table 2.5

Integration of Specialized NCD Initiatives

Programme	Objective	Service Level
SWAAS	COPD diagnosis and management	FHC / CHC
Nayanamritham	Diabetic retinopathy screening	CHC / DH
Padasparsham	Diabetic foot care	DH / THQH
SIRAS	Stroke management and rehabilitation	DH
Abhayam	Decentralized cancer care	DH / Taluk Hospital
Campaign Hridayapoorvam	CPR training for community	Community
Campaign Vibe for wellness	Lifestyle modification promotion	Community
Campaign Arogyam Anandam Akattam Arbudam	Cancer awareness	Community

2.6 Technical Support Groups and Committees

Effective implementation of the Non-Communicable Disease (NCD) programme requires strong technical guidance, interdepartmental coordination, and continuous monitoring. In Kerala, several technical support groups and committees function at the state level to guide programme planning, provide expert advice, develop clinical protocols, and monitor programme implementation.

These committees consist of public health specialists, clinicians from medical colleges, programme managers, and representatives from related national health programmes. Their recommendations support evidence-based decision-making and ensure that the NCD programme aligns with national guidelines while incorporating state-specific innovations.

State NCD Technical Advisory Group

The State NCD Technical Advisory Group functions as the primary expert body supporting the NCD division. The committee includes specialists from cardiology, endocrinology, pulmonology, oncology, nephrology, ophthalmology, and public health. Members are typically drawn from government medical colleges, specialized institutions, and professional associations.

The advisory group plays a crucial role in developing clinical management protocols for major NCDs such as diabetes mellitus, hypertension, chronic respiratory diseases, and cardiovascular diseases. It also reviews emerging research evidence and recommends updates to treatment guidelines, screening strategies, and service delivery models.

In addition, the committee provides technical inputs for programme design, evaluation studies, and pilot interventions implemented within the state.

State Programme Review Committee

The State Programme Review Committee is responsible for periodic review of programme implementation and progress across districts. The committee is chaired by senior health administrators and includes representatives from the Directorate of Health Services, the National Health Mission, and other relevant departments.

This committee reviews key programme indicators such as screening coverage, treatment adherence, availability of drugs and diagnostics, and performance of NCD clinics. Based on these reviews, the committee recommends corrective actions, operational improvements, and resource allocation adjustments.

Regular review meetings provide a platform for sharing district experiences, discussing implementation challenges, and identifying best practices.

State Multi-sectoral Coordination Committee

Prevention and control of non-communicable diseases require action beyond the health sector. The State Multi-sectoral Coordination Committee facilitates collaboration between the health department and other sectors such as education, local self-government institutions, social justice, women and child development, and sports.

The committee coordinates initiatives related to health promotion, physical activity promotion, tobacco control, alcohol harm reduction, and nutrition improvement. Through this platform, interdepartmental policies and community-based programmes are aligned with the overall goals of NCD prevention.

Programme-Specific Technical Committees

In addition to the core NCD advisory group, Kerala has established several programme-specific technical committees to guide specialized interventions within the NCD framework.

These committees provide technical guidance for disease-specific programmes such as:

- Chronic respiratory disease management initiatives

- Stroke care and rehabilitation programmes
- Diabetic retinopathy screening services
- Diabetic foot care programmes
- Cancer screening and early detection initiatives

Each committee reviews programme performance, develops service delivery protocols, and recommends improvements to strengthen disease management services across the state.

Research and Innovation Advisory Group

Kerala has also emphasized research and innovation in NCD control. A research advisory group supports the NCD division in promoting operational research, programme evaluation, and adoption of innovative technologies.

The group collaborates with academic institutions, public health research organizations, and medical colleges to generate evidence that informs policy decisions and programme improvements.

Table 2.6

State-Level Technical Committees Supporting the NCD Programme

Committee	Key Function
State NCD Technical Advisory Group	Develop clinical protocols and provide technical guidance
State Programme Review Committee	Monitor programme implementation and performance
Multi-sectoral Coordination Committee	Coordinate interdepartmental actions for NCD prevention
Disease-Specific Technical Committees	Guide specialized programmes such as stroke, COPD, and retinopathy
Research and Innovation Advisory Group	Promote operational research and innovation

2.7 Inter-Programme Convergence with Other Health Programmes

The prevention and control of non-communicable diseases requires coordinated action across multiple health programmes and sectors. In Kerala, the NCD programme is implemented through an integrated approach that promotes convergence with other national and state health initiatives. This integrated framework enables efficient utilization of resources, strengthens service delivery, and ensures comprehensive care for individuals affected by chronic diseases.

The NCD programme operates in close coordination with several national health programmes implemented through the Directorate of Health Services and the National Health Mission. Collaboration across programmes facilitates shared infrastructure, human resources, and data systems, thereby improving the overall effectiveness of public health interventions.

Integration with the **National Programme for Prevention and Control of Non-Communicable Diseases** provides the primary framework for screening, diagnosis, and management of chronic conditions such as diabetes mellitus, hypertension, cardiovascular diseases, cancers, and chronic respiratory diseases.

Table 2.7

Major National Programmes Converging with the NCD Programme

Programme	Area of Collaboration
National Tobacco Control Programme	Tobacco cessation services and awareness campaigns
National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke	Screening and management of major NCDs
National Mental Health Programme	Counselling and mental health support for chronic disease patients
National Tuberculosis Elimination Programme	Bidirectional screening for TB and diabetes
Aardram Mission	Strengthening primary healthcare and Family Health Centres
National AIDS control program	Management of chronic diseases for HIV patients
National program for Climate change and human health	Climate related NCD changes management
National Oral health program	Management of oral cancers

CHAPTER 3

OPERATIONAL STRATEGIES & SERVICE DELIVERY

3.1 Population-Based Screening for Non-Communicable Diseases

Population-based screening for non-communicable diseases (NCDs) is a cornerstone of public health strategies aimed at the early detection, prevention, and management of chronic diseases such as hypertension, diabetes mellitus, cardiovascular diseases, cancers, and chronic respiratory diseases.

This systematic approach involves identifying individuals within a defined population who may be at risk or affected by NCDs, irrespective of the presence of symptoms. Screening programs are designed to detect disease at an early stage when interventions are more effective and complications can be prevented.

The population-based screening process typically includes the following components:

- Identification of target population groups
- Selection of standardized screening tools
- Establishment of epidemiological screening criteria
- Community outreach and mobilization
- Screening assessments by trained personnel
- Digital data capture and management
- Interpretation of screening results
- Referral for confirmatory diagnosis and treatment
- Monitoring and evaluation of program outcomes

Through systematic early detection, population-based screening aims to:

- Reduce the burden of chronic diseases
- Improve treatment outcomes

- Prevent disease complications
- Strengthen evidence-based health planning
- Enhance community participation in health promotion

In Kerala, population-based screening is implemented through the public health system using the network of Family Health Centres (FHCs), Primary Health Centres (PHCs), Community Health Centres (CHCs), and Janakeeya Arogya Kendrams (JAKs) under the broader framework of the Aardram Mission.

3.1.1 Community Based Assessment Checklist (CBAC)

The Community-Based Assessment Checklist (CBAC) is a standardized tool used for identifying individuals at risk for NCDs at the community level.

The CBAC tool was developed through collaboration between public health experts and program implementers to capture critical information related to NCD risk factors.

Key Components of the CBAC Tool

Domain	Indicators
Demographic profile	Age, gender, occupation
Lifestyle risk factors	Tobacco use, alcohol consumption
Physical activity	Sedentary behaviour
Dietary habits	Low fruit/vegetable intake
Family history	Hypertension, diabetes, heart disease
Health access	Previous diagnosis or treatment

Individuals with a CBAC score greater than 4 are categorized as high-risk for NCDs and are referred for further screening.

The CBAC assessment is conducted by trained community health workers such as:

- ASHA workers
- Junior Public Health Nurses (JPHN)
- Multipurpose Health Workers

This standardized risk-assessment tool ensures consistency in screening across districts and enables the development of a community-level risk registry for NCDs.

3.1.2 Objectives of Annual Health Screening

Annual Health Screening is a key initiative under the second phase of the Aardram Mission aimed at strengthening preventive healthcare in Kerala.

Objectives

The major objectives of the Annual Health Screening Programme include:

- Conducting population-based screening for all individuals aged 30 years and above
- Early identification and management of NCDs
- Creation of a community-based NCD registry
- Ensuring affordable and comprehensive treatment
- Providing health education on lifestyle modification
- Generating data to inform public health policy and interventions

3.1.3 Annual Health Screening – Round 1

The first round of Annual Health Screening under Aardram Mission Phase 2 involved statewide household surveys conducted by ASHA workers using the digital platform SHAILI.

More than 1.5 crore individuals aged above 30 years were surveyed, covering 87% of the target population.

Key Findings

Indicator	Value
Total surveyed population	1.54 crore
Population coverage	87%
CBAC score > 4	27.9 lakh
Persons at cancer risk	9.1 lakh
High blood pressure detected	8 lakh
High blood sugar detected	68,000

Analysis of screening results revealed that 26% of individuals with CBAC score ≤ 4 also had elevated blood pressure, highlighting the limitation of risk-based screening alone.

Therefore, it was decided that blood pressure and blood sugar should be measured for all individuals irrespective of CBAC score in future screening rounds.

3.1.4 Digital Platform – SHAILI

The Annual Health Screening programme utilizes the SHAILI mobile application, developed by Kerala eHealth, for digital data collection.

Key advantages of the SHAILI system include:

- Real-time monitoring of survey activities
- Digital line listing of screened individuals
- Reduction in manual reporting errors
- Creation of a statewide NCD registry
- Improved transparency and accountability

The platform also enables follow-up tracking of individuals identified as high-risk.

3.1.5 Annual Health Screening – Round 2

The second round of the Annual Health Screening program incorporated several modifications based on insights from the first round.

Major Improvements

- Revision of the CBAC questionnaire
- Additional screening questions for:
 - Leprosy
 - Visual impairment
 - Hearing impairment
 - Mental health issues
 - Elderly health problems

These modifications improved the comprehensiveness of community health assessment.

3.1.6 Annual Health Screening – Round 3

The third round of screening introduced further digital and operational improvements.

Key Process Changes

1. Aadhaar number made mandatory for survey identification
2. New enrolments only through the Public Health (PH) App or UHID system
3. Screening and follow-up conducted through PH App and Web Portal
4. Universal screening for hypertension and diabetes irrespective of CBAC score
5. GPS capture of survey locations for GIS-based health planning

3.1.7 Dissemination workshops shall be held at the district level as the first step in initiating the BPL population targeted Annual health screening.

DMO, DPM and all district-level program officers shall be sensitised to the program and its monitoring.

The same resource group for the second round of Annual health screening (led by district NCD Nodal officers and include Aardram Nodal Officers, JC – HWCs and all district level trainers) will be carrying out all the preparatory activities, implementation ,review and monitoring .

Responsibility of the District NCD nodal officer to organise all training sessions and to ensure that there are enough district trainers to complete the training in time. Once all the JAK team members (JHI<JPHN , MLSP, ASHA) and Supervisors (HS,HI,PHN) in a block are trained, they shall be deployed to start this targeted Annual Health Screening activity. Training will be on PH survey , NCD screening using PH app, review and monitoring framework.

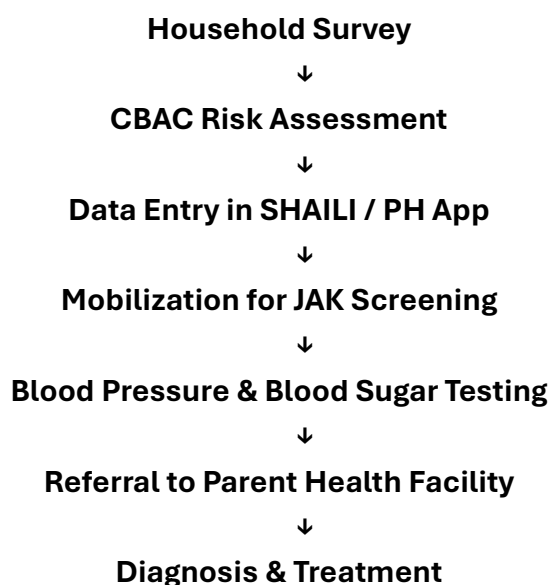
District NCD Nodal Officers, Aardram District Nodal Officers and eHealth District Admins shall be the master trainers for the district. NCD Nodal Officers shall also identify and train enough trainers so that training is conducted as per the calendar. The support of District Project Engineers and other eHealth staff may also be sought for technical support.

3.1.8 Implementation

As soon as ASHA workers are trained, they shall be deployed to start the individual surveys. ASHA blocks should be mapped using the PH portal. Enumeration of new

members and houses shall also be done using the PH app. Health Inspectors shall also fix monthly targets for each ASHA worker based on the target population in such a way that the survey is completed quickly . ASHA workers shall plan the survey in such a way that it is conducted in tandem with routine house visits and not as a separate activity. They shall also plan the visits in such a way that sufficient time can be given to each person to collect the survey data in a detailed manner, clearing any queries or apprehensions that the person may have. They shall also ensure the quality of data being collected.

Table 3.1 Implementation Workflow



3.1.9 Mapping of wards & Asha blocks

The mapping of ASHAs and ASHA blocks (field area of ASHA) shall be conducted using the PH web portal before the commencement of the second-round survey. This ensures that all wards and ASHA blocks are accurately mapped, and that the population allocated for each ASHA is correct.

Activity	Application	Responsibility
Ward mapping	HMS	PH admin
Asha mapping – Relinking	HMS	JPHN, PH Admin

Asha Block creation	PH Web	JPHN
House mapping to Asha block	PH Web	JAK Team

3.1.10 Deploying Shaili App

Data regarding Annual Health Screening shall be recorded using the SHAILI application created by eHealth. The app is available on the [Google Play Store](#). All ASHA workers shall download and install the application only from the Google Play store on their Android devices. ASHA workers who already have the SHAILI 2 application installed on their phones must update the app to the latest version before starting round 3 surveys. Once the application is installed, they shall log in to their accounts using their ASHA code as username and password. Survey is only possible through the latest version of the app.

- **Device Compatibility:** The SHAILI 3 app is only compatible with devices running Android OS version 9 or later.
- **Internet Connection:** An active internet connection is required to use the app.
- **Permissions:** Allow the app permission to access the camera (for scanning QR codes) and Location (GPS for capturing survey location) of the phone for optimal functionality.

Process

. ASHA workers shall visit the residence of all persons aged 30 or above in their designated area and conduct in-person interviews to assess the risk. As far as possible, data shall be collected directly from the person whose survey is being conducted. If the person is not available at home even after two visits, then the questionnaire may be administered to an adult member residing in the same household, provided that the person has all the necessary information on the person being surveyed. Data collection shall not be done over the phone. In the case of NRIs or NRKs, the baseline data shall be collected, and the survey ended by marking occupation as “NRI/NRK” and residential status as “not available”. The JAK team shall verify the quality of surveys being conducted by the ASHAs by randomly verifying the information being collected.

All persons whose survey has been completed shall be mobilised to attend the NCD clinics at the JAK or the fixed site sessions to measure blood pressure and blood sugar values. This shall be done irrespective of the CBAC score. Any person found to be

at risk for other conditions shall be mobilised to attend the corresponding FHC/PHC/CHC. Follow-up of the survey shall be completed, as far as possible, within two weeks from the date of survey. It is the responsibility of the ASHA workers and the JAK team to ensure that all persons participating in the survey have completed the follow-up screening. In the case of persons attending private healthcare institutions for follow-up, the details of such screening shall also be recorded.

Indicator	SHAILI 1		SHAILI 2	
	Value	%	Value	%
NCD Population - based survey completed	1,54,26,178	87.4%	1,43,12,070	79%
CBAC Score > 4	27,91,063	18.1%	61,41,037	43%
Patients with known Hypertension alone	22,82,024	14.8%	18,25,640	12.9%
Patients with known Diabetes alone	13,37,420	8.7%	1236025	5.7%
Patients with known HTN & DM	6,26,569	4.1%	8,20,182	8%
Referred for cancer screening	9,13,485	5.9%	2,74,921	1.9%
Referred for Tuberculosis Screening	1,13,033	0.7%	2,91,580	2%
Referred for Respiratory Evaluation	4,38,469	2.8%	4,81,257	3.4%
High blood pressure value detected	8,05,413	30.1%	6,19,552	23%

High RBS value detected	68,302	2.6%	82,752	3%
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District level survey

District	Target Population	Survey completed	% Surveyed
Thiruvananthapuram	17,27,604	12,32,440	71%
Kollam	15,58,000	12,36,167	79%
Pathanamthitta	7,71,966	6,51,724	84%
Alappuzha	11,26,701	9,93,766	88%
Kottayam	11,06,506	8,05,327	73%
Idukki	6,10,777	4,43,633	73%
Ernakulam	13,57,325	10,47,664	77%
Thrissur	16,79,802	13,91,829	83%
Palakkad	16,00,748	12,23,176	76%
Malappuram	23,79,480	18,36,471	77%

Kozhikode	17,08,162	13,43,419	79%
Wayanad	4,22,884	4,03,427	95%
Kannur	13,75,533	11,51,707	84%
Kasaragod	6,86,287	5,51,320	80%
State	1,81,11,775	1,43,12,070	79%

3.1.11 JAK level screening

All persons who participated in the survey shall be mobilised to attend the NCD clinics at Janakeeya Arogya Kendram or field level clinics within two weeks from the date of the survey. The JAK team shall measure the Height, Weight, Waist circumference, Blood pressure and Blood sugar values of all persons attending the screening. If the person is found to have a high blood pressure (Systolic BP $\geq$ 140 mm Hg and/or Diastolic BP $\geq$ 90 mm Hg) or high Random Blood sugar values (RBS $\geq$ 200 mg%), then such persons shall be referred to the parent health facility (FHC/PHC/CHC) for detailed evaluation and management as per NCD protocol.

JAK team and ASHA workers shall ensure that JAK level screening of all persons is completed on time. Any person who has not turned up for JAK level screening within two weeks shall be contacted during house visits or over telephone and motivated to attend the screening. If any person attends private health facilities for follow up screening, the details of such screening shall be recorded and follow up ensured. All persons found to be at risk of Cancer, Tuberculosis, COPD, Leprosy, Hearing/Visual impairment or elderly with health issues shall be referred to the parent health facility for detailed evaluation and management as per guidelines.

The JAK team is also responsible for ensuring follow up care of all persons who are diagnosed to have NCDs on follow up. They shall also ensure that elderly with health issues, elderly living alone, bedridden and homebound persons are receiving necessary care and support.

Screening for Hypertension

District	Target for Screening	Total Screened	Screened %	Screened Positive	% Screened Positive
Thiruvananthapuram	9,82,688	2,69,084	27.4%	66,932	25%
Kollam	9,63,615	4,91,982	51.1%	1,14,613	23%
Pathanamthitta	4,97,550	1,55,067	31.2%	44,010	28%
Alappuzha	7,76,827	4,13,843	53.3%	89,267	22%
Kottayam	6,60,120	1,12,135	17.0%	30,275	27%
Idukki	3,80,377	1,56,373	41.1%	40,602	26%
Ernakulam	8,48,983	1,30,393	15.4%	27,903	21%
Thrissur	11,00,350	4,26,244	38.7%	93,751	22%
Palakkad	10,71,388	2,79,689	26.1%	68,743	25%
Malappuram	15,43,425	60,055	3.9%	18,975	32%
Kozhikode	11,13,260	4,60,998	41.4%	95,830	21%
Wayanad	3,34,602	2,22,738	66.6%	40,465	18%
Kannur	9,29,148	3,48,924	37.6%	71,037	20%
Kasaragod	4,62,625	74,976	16.2%	18,768	25%
State	1,16,64,958	36,02,501	30.9%	8,21,171	23%

Screening for Diabetes

District	Target for Screening	Total Screened	Screened %	Screened Positive	% Screened Positive
Thiruvananthapuram	10,44,805	2,84,551	27.2%	12,366	4.3%
Kollam	10,33,444	5,25,180	50.8%	14,856	2.8%
Pathanamthitta	5,28,846	1,64,285	31.1%	5,727	3.5%
Alappuzha	8,48,508	4,47,985	52.8%	8,409	1.9%
Kottayam	6,79,115	1,13,585	16.7%	5,309	4.7%
Idukki	3,89,991	1,57,479	40.4%	5,015	3.2%
Ernakulam	8,85,922	1,35,604	15.3%	3,430	2.5%
Thrissur	11,55,744	4,46,707	38.7%	14,214	3.2%
Palakkad	10,83,796	2,69,576	24.9%	7,808	2.9%
Malappuram	15,69,748	60,984	3.9%	2,457	4.0%
Kozhikode	11,81,473	4,79,532	40.6%	8,334	1.7%
Wayanad	3,60,977	2,39,914	66.5%	3,872	1.6%
Kannur	10,00,813	3,73,583	37.3%	5,440	1.5%
Kasaragod	4,91,368	78,722	16.0%	2,208	2.8%
State	1,22,54,550	37,77,687	30.8%	99,445	2.6%

Institution level management

The following persons shall be referred to parent health institutions for detailed evaluation and management.

Persons found to have High blood pressure (Systolic blood pressure $\geq$ 140 mm Hg or diastolic blood pressure $\geq$ 90 mm Hg) or a high Random blood sugar value (RBS $\geq$ 200 mg%) detected during JAK level screening

Persons identified to be at risk for breast, cervical or oral cancer

Persons with symptoms suggestive of Tuberculosis

Persons referred for respiratory evaluation

Persons with symptoms suggestive of leprosy

Persons having hearing/vision impairment

Persons with depression or other mental health issues

Elderly persons having health issues

All such persons shall be evaluated in detail by the medical officers in the parent health institution. Management of persons referred shall be as per the guidelines

3.1.12 Roles and Responsibilities

ASHA Workers

- Conduct household surveys
- Mobilize community members for screening
- Provide lifestyle education
- Assist in organizing NCD clinics

JPHN / JHI / MLSP

- Conduct screening using PH App
- Refer suspected cases
- Register diagnosed patients
- Ensure treatment adherence

Health Inspector / PHN

- Supervise screening activities

- Ensure screening infrastructure
- Conduct IEC campaigns

Medical Officers

- Supervise screening programs
- Conduct review meetings
- Ensure treatment protocols are followed

District NCD Nodal Officers

- Monitor district implementation
- Conduct training programs
- Review screening progress

3.1.13 Monitoring and Evaluation

Monitoring of screening activities occurs at multiple levels:

Level	Monitoring Mechanism
JAK level	Weekly review meetings
Health facility	Institutional monitoring
District level	District review meetings
State level	Integrated digital dashboard

Data from the Integrated Dashboard is used to monitor:

- Survey coverage
- Screening rates
- Follow-up compliance
- Treatment outcomes

3.1.14 Public Awareness and Community Mobilization

Community awareness campaigns are conducted to improve participation in screening programs.

Key strategies include:

- LSG-level meetings
- Community campaigns
- Ward-level awareness programs
- IEC materials and health education sessions

ASHA workers educate households on:

- Importance of early diagnosis
- Lifestyle modification
- Tobacco and alcohol cessation

3.2 Specialized Branded Initiatives – “**Amrutham Aarogyam**”

While universal screening identifies patients, Kerala’s NCD control strategy is strengthened through specialized initiatives under the Amrutham Aarogyam framework.

These initiatives focus on preventing major complications of chronic diseases such as:

- Stroke
- Respiratory failure
- Blindness
- Diabetic foot complications

3.3 Indian Hypertension Control Initiative (IHCI)

The India Hypertension Control Initiative is a multi-partner initiative designed to strengthen hypertension management within primary healthcare systems in India. The initiative focuses on improving the detection, treatment, and control of hypertension through standardized treatment protocols, improved drug availability, patient-centered care models, and robust monitoring systems.

The program adapts the WHO HEARTS Technical Package, a global strategy developed by the World Health Organization for improving cardiovascular disease prevention and management.

Partner Organizations

The IHCI is implemented through collaboration between several national and international institutions:

- Government of India – Ministry of Health & Family Welfare
- Indian Council of Medical Research
- Government of Kerala
- World Health Organization India
- Resolve to Save Lives (an initiative of Vital Strategies)

Phased Implementation of IHCI in Kerala

The implementation of IHCI in Kerala was conducted in a phased manner to ensure systematic scale-up across districts.

Phase	Year	Districts Covered
Phase 1	2017-2018	Thiruvananthapuram, Thrissur, Wayanad, Kannur
Phase 2	2020-2021	Kollam, Alappuzha, Ernakulam, Kozhikode, Kasaragod
Phase 3	2023-2024	Idukki, Pathanamthitta, Malappuram, Kottayam, Palakkad

Currently, the programme is operational across all public health facilities in these districts, ensuring standardized hypertension care at the primary care level.

Core Intervention Strategies of IHCI

The IHCI programme incorporates five key intervention strategies based on the WHO HEARTS framework.



Treatment protocol



Medication supply



**Task sharing and
team based care**



Information systems



Patient-centred care

Table: Core Components of IHCI Strategy

Component	Description
Standard Treatment Protocol	Simplified drug and dose specific hypertension treatment protocol
Drug Availability	Uninterrupted supply of antihypertensive medications
Decentralized Care	BP monitoring and medication refills at primary healthcare facilities
Patient-Centered Care	30-day prescription, counselling and treatment adherence
Monitoring Systems	Tracking patient progress using standardized indicators

Standard Drug Treatment Protocol

The IHCI treatment protocol recommends the use of three main classes of antihypertensive medications:

- Calcium Channel Blockers (CCB)

- Angiotensin II Receptor Blockers (ARB)
- Thiazide or Thiazide-like Diuretics

This simplified protocol ensures uniform treatment across facilities and improves clinical outcomes. Uninterrupted adequate availability and distribution of protocol drugs in all facilities. Community-based treatment and decentralization of care to lower-level facilities to enable blood pressure measurement and drug refills closer to the patient's home.

Patient-centered care approaches such as minimum 30-day drug prescription, counseling, and documentation of visits in a treatment card

Monitoring systems track individual patient and treatment cohort progress with medication lists and standard indicators such as quarterly blood pressure control. Monitoring systems include paper-based patient hypertension cards

Patient registration and follow-up

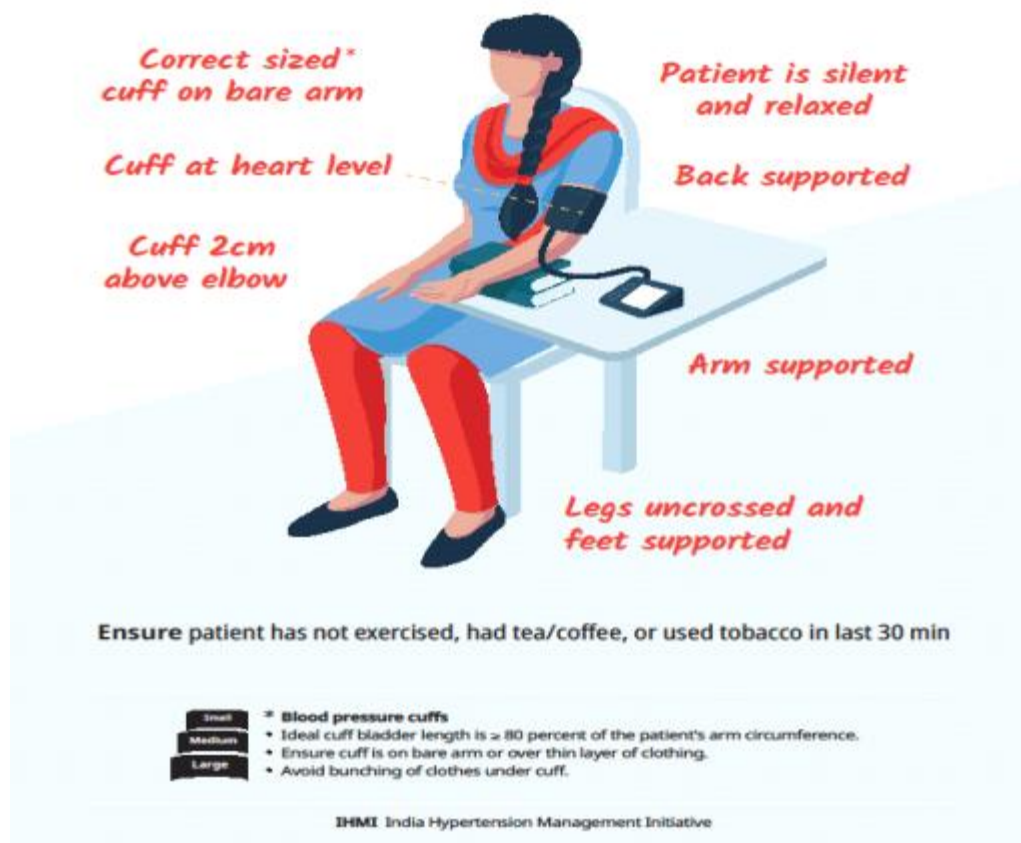
Patients were registered as per the IHCI protocol. In each facility, NCD nurses issued a blood pressure (BP) passport card to the patient. Patients carried their blood pressure passport cards every time they visited any of the public sector facilities for a follow-up visit to continue the treatment under the same registration and continuous monitoring.

The patient visited the nurse at regular appointments, during which time blood pressure was measured. On a patient's day of visit to the health facility, the nurse measured and entered the blood pressure reading in the paper-based treatment card to document the patient's blood pressure and medications to help monitor blood pressure control.

Nurses measured the blood pressure for all patients in the sitting position using one of the professional digital BP monitors provided by the project (A&D UM-211 or Omron -1320 BP monitors). A detailed checklist was displayed in all the clinics for easy understanding of the nurses

BP Measurement Checklist

Measure blood pressure of all adults ≥ 18 years



Subsequently, patients went to the medical officer who initiated, maintained, or intensified the prescription antihypertensive medication regimen, following which medications were dispensed for at least 30 days on-site at the health facility.

All the public sector health facilities included in the project provided medications free of cost. State governments have procurement agencies which do the bulk purchase of medications and distribute to the health facilities periodically.

Patients were advised to continue the treatment at the place where they were registered unless the patient wanted to take treatment elsewhere. Cross referrals from secondary to primary care facilities were not routinely done.

Operational definitions

Standardized operational definitions are used in IHCI monitoring and evaluation.

Table: Operational Definitions in IHCI

Indicator	Definition
Hypertension Diagnosis	BP $\geq$ 140/90 mmHg on two occasions OR current treatment with antihypertensive drugs
Severe Hypertension	BP $\geq$ 160/100 mmHg on a single day with two readings
BP Control	Latest BP reading <140/90 mmHg
Missed Visit	Patient absent for $\geq$ 3 consecutive months

These definitions are aligned with national programme guidelines under National Programme for Prevention and Control of Non-Communicable Diseases.

3.3.2 Standardized Hypertension Management (IHCI Protocol)

Kerala has adopted the India Hypertension Control Initiative (IHCI) protocol, which emphasizes simplicity and drug availability.

Standard Treatment Ladder

Treatment Step	Medication
Step 1	Amlodipine 5 mg
Step 2	Add Telmisartan 40 mg
Step 3	Increase Telmisartan 80 mg
Step 4	Increase Amlodipine 10mg
Step 5	Add Chlorthalidone 12.5 mg

This stepwise protocol ensures rational drug escalation while maintaining simplicity for frontline healthcare providers.



Government of Kerala

Hypertension Protocol

Screen all adults over 18 years.

High BP: SBP > 140 or DBP > 90 mmHg

- Step 1** If BP is high
Check S. Creatinine and Urine Protein
Start on lifestyle modifications for 3 months. Review every month.
If BP is high at monthly review, start on drug treatment
- Step 2** Review in 3 months. If BP is high
Start Amlodipine 5mg (CCB)
- Step 3** Review in 1 month. If BP is high
Add Telmisartan 40mg (ARB)
Along with Amlodipine 5mg
- Step 4** Review in 1 month. If BP is high
Intensify Telmisartan to 80mg
Along with Amlodipine 5mg
- Step 5** Review in 1 month. If BP is high
Intensify Amlodipine to 10mg
Along with Telmisartan 80mg
- Step 6** Review in 1 month. If BP is high
Add Chlorthalidone 12.5mg (diuretic)
Along with Amlodipine 10mg and Telmisartan 80mg
- ... Review in 1 month. If BP is high
Confirm compliance to treatment. If confirmed, refer to specialist.

Blood pressure measurements

At least 2 readings, at an interval of 2 minutes. If readings differ by more than 5mm Hg, take a third reading. The lower of the readings should be taken as the representative SBP and DBP.

If SBP $\geq$ 180 and/or DBP $\geq$ 110
Refer immediately to higher centre after starting treatment.

If SBP $\geq$ 160-179 and/or DBP $\geq$ 100-109
- Do basic investigations: ECG, S. creatinine.
- Start on lifestyle modifications.
- Start drug treatment.

If SBP $\geq$ 140-159 and/or DBP $\geq$ 90-99
Start on lifestyle modifications.

Measuring blood pressure

- Use a mercury sphygmomanometer or electronic digital oscillometric device that is validated using a standard protocol and calibrated regularly.
- Patient should relax for 5 minutes before measurement.
- Patient should not have had caffeine in the past hour or smoked in the past 30 minutes.
- Patient should be seated comfortably with back supported, arm at heart level, and legs uncrossed.
- Appropriate cuff size: length of bladder 80% of arm circumference, width 40% of arm circumference.

Lifestyle modification

All patients require lifetime lifestyle modification.


Change diet
Salt restricted (<5g/day)
Low-fat diet


Reduce weight
Target BMI
18.5 - 22.9 kg/m²


Regular exercise
Moderate intensity, 30 minutes, 5 days a week


Alcohol and Smoking
Avoid unhealthy intake of alcohol. Stop smoking.



India Hypertension Management Initiative: Kerala 1.00-6-7

3.3.3 Management of Diabetes Mellitus

Diabetes management under the Kerala NCD programme focuses on achieving optimal glycemic control while preventing long-term complications

Diagnostic Criteria for Diabetes Mellitus

Table: Diagnostic Thresholds

Test	Diagnostic Value
Fasting Blood Sugar (FBS)	≥126 mg/dL
Post-Prandial Blood Sugar (PPBS)	≥200 mg/dL
HbA1c	≥6.5%

Type 2 Diabetes Treatment protocol:





Department of Health & Family Welfare

TREATMENT PROTOCOL FOR TYPE 2 DIABETES MELLITUS

Screen all individuals above 30 years and if diagnosed

1. Advice Lifestyle Modifications (LSM) & Assess for complications
Start T. Metformin 500mg OD or BD
 Monitor FPG/PPFG monthly
2. Review in 1 month, if FPG, PPBG values are high,
Intensify T. Metformin 1000mg BD
 Along with LSM
3. Review in 1 month, if FPG, PPBG values are high
Add T. Glimepiride 1 mg OD
 (½ hour before breakfast and reduce to 0.5 mg/day depending if there is hypoglycemia.)
 Along with LSM, T. Metformin 1000mg BID. Give hypoglycemia training.
4. Give hypoglycemia training.
Intensify T. Glimepiride 1 mg BD up to 2mg BID
 (½ hour before meals)
 Along with LSM, T. Metformin 1000 mg/day BID.
5. If plasma glucose not under control after second drug and if any complications present, Refer to District hospital
6. If there is no complications, Continue LSM, Metformin 1 gm BD, Tab. Glimepiride 2mg BD,
Add T. Pioglitazone 7.5 mg OD
 (to a maximum 15 mg once daily)
 Avoid in cardiac failure, fluid overload patients
7. If plasma glucose not under control after third drug,
Start Insulin
8. If plasma glucose not under control
Refer to District hospital

If patient is under control by any of the above steps, continue same treatments if no complications is identified and follow up shall be done every month with FPG and 2hour PPBG

Base Line Lab Investigations
 Urine Albumin
 Blood Urea
 Serum Creatinine

Target mg/dL
 FPG: 80-130
 PPFG: <180



STATE NCD DIVISION

Diagnosed diabetes with symptoms & FPG ≥ 250 mg/dL at presentation.

Repeat testing once a week and start combination therapy with Tab. Metformin 500 mg BD & Tab Glimepiride 1mg daily, up titrate , monitor weekly and to start Insulin if not getting controlled. Refer if not controlled

Hypoglycemia

Symptoms
 Cold sweat, trembling of hands, hunger, palpitation, confusion etc

Treatment
 Ingestion of glucose or carbohydrate containing foods. Consume 15 gms of glucose i.e. 1 tablespoon sugar, fruits, next meal & recheck blood glucose after 15 minutes, repeat if hypoglycemia continues

If any of the following complications are present, **refer** to higher centre.

- Uncontrolled plasma glucose with symptoms
- Visual symptoms
- Foot ulcer
- Nephropathy/ frothing of urine
- Painful neuropathy
- Infections/sepsis

LIFESTYLE MODIFICATIONS

- Restrict sugar & sweets
- Restrict fried and oily foods
- Increase fiber in diet (green leafy vegetables, lentils or peas, whole grains, apple, banana)
- Regular consumption of seasonal vegetables
- Brisk walking for 30 minutes daily
- 5 minutes warm up
- 5 minutes cool down
- Avoid Tobacco and Alcohol

Drug Availability under the “Amrutham Aarogyam” Programme

The state ensures the availability of essential anti-diabetic medications through the Amrutham Aarogyam initiative.

Essential Anti-Diabetic Drugs Available

Drug	Strength
Metformin	500 mg / 1000 mg
Glimepiride	1 mg / 2 mg
Human Insulin	Rapid acting
Human Insulin	Intermediate acting
Human Insulin	Premixed formulations

These medications are made available free of cost at Family Health Centres (FHCs) and Community Health Centres (CHCs).

Outcome Monitoring

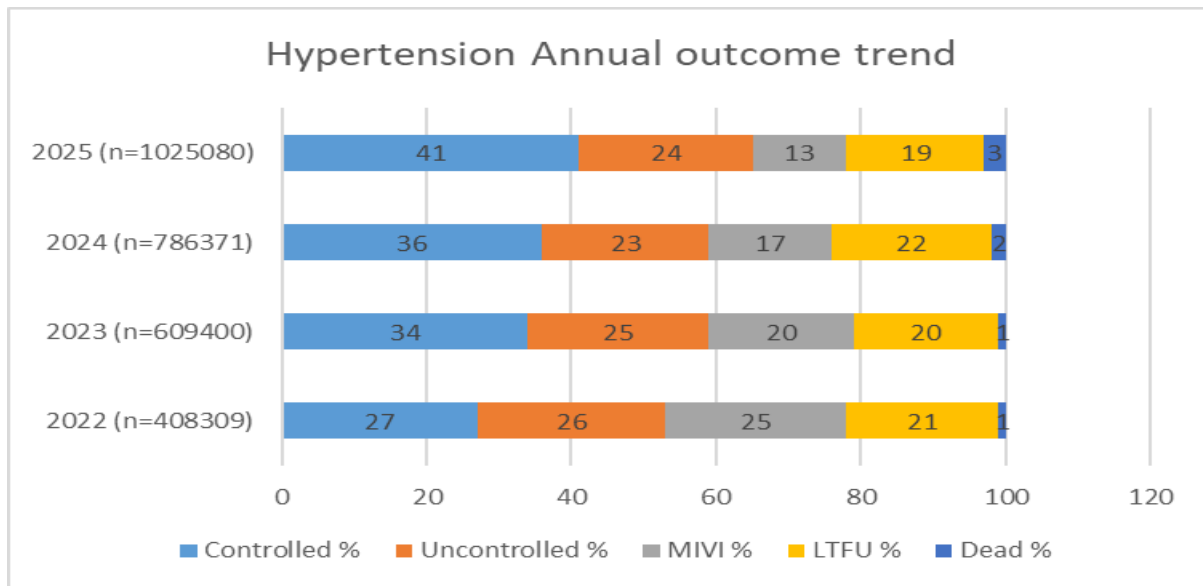
Annual programme reports track treatment outcomes and disease trends among registered patients.

Indicators Monitored

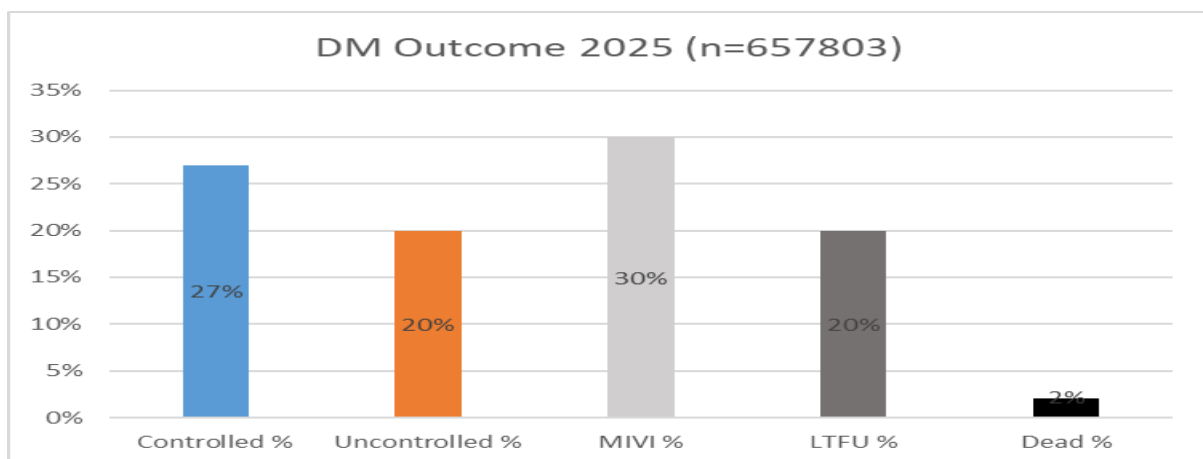
- Number of registered hypertension patients
- Hypertension control rate
- Number of registered diabetes patients
- Glycemic control status
- Treatment adherence rates
- Follow-up compliance

These indicators help guide policy decisions and programme improvements.

Annual report outcome trend of Hypertension patients :



Annual report of Diabetes mellitus type 2 Patients:



3.4.1 Project SIRAS (Stroke Intervention, Rehabilitation, Awareness and Stabilization)

Stroke is the most debilitating complication of uncontrolled hypertension. In Kerala, the SIRAS program was launched to bridge the gap between symptom onset and specialized treatment.

The "Golden Hour" Protocol:

The "Golden Hour" is defined as the first 4.5 hours following the onset of stroke symptoms. During this window, ischemic strokes can be reversed using thrombolytic agents.

1. **Identification:** Community awareness focuses on the "BE-FAST" criteria (Balance, Eyes, Face, Arms, Speech, Time).
2. **Stabilization:** Taluk-level hospitals are trained to stabilize patients and immediately refer them to a SIRAS-designated District Hospital.
3. **Thrombolysis:** Designated hospitals are equipped with 24/7 CT scan facilities and Tele-radiology. The state provides **Tissue Plasminogen Activator (TPA)** or **Tenecteplase** free of cost—a medication that otherwise costs upwards of ₹50,000.

List of Stroke Units in various District Hospitals in Kerala under NCD Control Programme

Sl. No.	District	Institution
1	Thiruvananthapuram	GH Trivandrum
2	Kollam	DH Kollam
3	Pathanamthitta	GH Pathanamthitta
4	Alappuzha	GH Alappuzha
5	Kottayam	GH Kottayam
6	Idukki	DH Thodupuzha
7	Ernakulam	GH Ernakulam

8	Thrissur	GH Thrissur
9	Palakkad	DH Palakkad
10	Kozhikode	GH Kozhikode
11	Kannur	DH Kannur
12	Kasargode	GH Kanhangad

3.5.1 Project SWAAS (Step-Wise Approach to Airway Diseases)

Chronic Obstructive Pulmonary Disease (COPD) and Asthma are major drivers of morbidity in Kerala. Project SWAAS decentralizes respiratory care to the primary level.

(STEP WISE APPROACH to AIRWAY DISEASES)

COPD is one of the leading causes of mortality and morbidity worldwide. As per the Global Burden of Diseases estimates for India, COPD is the second leading cause of mortality in India. Kerala has taken the bold step of formulating a COPD prevention and control program in the country for the first time and the official declaration of the program was done by the honorable minister for health and family welfare on February 7th 2017.

The objectives of the Kerala COPD prevention and control program

1. Identification of COPD in the early stages of the diseases
2. Develop a structured program for COPD diagnosis and treatment, starting from the primary care level up to the tertiary care level, including the Medical Colleges
3. Develop a system for generating information on disease burden of COPD, health seeking behavior and health system needs which will aid in further planning and strategizing for COPD management in Kerala.

In the first phase, the programme has been implemented in 179 primary health centers (2018-20) covering a population of 4,000,000 and 39 secondary and tertiary care hospitals. About four hundred doctors, 400 staff nurses and multipurpose workers were trained on diagnosis and treatment of COPD. Training & capacity building focused on Tobacco cessation, prevention of indoor and outdoor air pollution, use of clean fuel,

occupational health, performing spirometry inhaler technique, pulmonary rehabilitation and medication compliance. Diagnosed patients were registered and followed up at regular intervals. The program has now been expanded to 685 FHCs and 49 SDH/DH.

Services

The programme aims at diagnosing COPD at FHC level by doing pulmonary function test (PFT) using Spirometers supplied to all Family Health Centres. The staff nurses and Medical Officers were trained in doing Spirometer based diagnosis and treatment was initiated only after making proper diagnosis. Expensive medicines like Aerosols, supporting equipment like Oxygen Concentrator, Pulse Oxymeter and metered dose devices were procured and supplied to all FHCs. The district and Sub district level SWAAS clinics provided Spirometry and specialized management services like non-invasive ventilators and other equipment as per the SWAAS guidelines.

Chest Disease Hospital, Pulayanarkottah, Thiruvananthapuram was designated and upgraded as State COPD Centre where a comprehensive service package for COPD is delivered. These include curative services, ICU Care, Rehabilitative services and smoking cessation. This unit is functioning as the state monitoring cell of COPD Programme

Operational Workflow:

Case Finding: Patients presenting with chronic cough or breathlessness at the FHC are prioritized.

Spirometry: Every FHC is equipped with a digital spirometer. Staff Nurses are trained to conduct the test, and the Medical Officer interprets the results based on GOLD (Global Initiative for Chronic Obstructive Lung Disease) guidelines.

Pharmacotherapy: The state provides free Metered Dose Inhalers (MDIs) and Spacers, ensuring that patients are not reliant on expensive oral medications that have higher systemic side effects.

Pulmonary Rehabilitation: Chronic patients are enrolled in "Breath Clubs" where they are taught diaphragmatic breathing and energy conservation techniques.

Year	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26 (till Nov 30)	Total
SWAAS Clinic FHC	89	90	91	108	96	106	105	3	685
SWAAS Clinic DH/GH/THQH	14	25	10	0	0	0	0	0	49
Symptomatic Screening	47601	63206	45444	3750	35244	26076	110235	204149	535705
Spirometry Screening	9147	18428	1952	299	7017	5978	24715	22429	89965
COPD Diagnosed	4677	11557	3709	737	4764	3338	14526	21839	65147
Asthma Diagnosed	4145	7081	4371	359	3036	2244	12738	16207	50181

3.6 Project Nayanamritham (Diabetic Retinopathy Screening)

Nayanamritham was designed to address Kerala's growing burden of diabetic retinopathy (DR) by embedding technology-enabled DR screening into primary care. The pilot at Family Health Centres (FHCs), Thiruvananthapuram, demonstrated feasibility through hand held fundus cameras, digital image transfer (PACS→RIO), and rapid grading (<30 min). Pilot outcomes reflected population risk: any DR – 17.4%, STDR – 3.3%. With diabetes prevalence in Kerala (~23.6%) well above the national average, the program was scaled state-wide.

Nayanamritham 2nd phase (April 2024 to present): Introduced offline, on-device AI for instant triage, relocated devices to CHCs (optometrist-led), and expanded training,

maintenance, and tele-ophthalmology support. Screening scope expanded to 3-in-1 AI (DR/AMD/Glaucoma) at point of care.

Basic Factsheet (Key Output & Outcome Indicators)

Nayanamritham – Factsheet (Nov 2024 – May 2025; 30 AI-piloted institutions)

Metric	Value
Total Fundus Images Taken	2,665
Gradable Images	1,870
DR AI Used	1,458
AMD AI Used	791
DR/AMD Cases Detected	313
DR/AMD Cases Treated	214
Glaucoma AI Used	1,080
Glaucoma Cases Detected	118
Glaucoma Cases Treated	40

Innovation / Special Aspects

- World's first government-backed, comprehensive, offline AI eye-screening programme at scale.
- Instant triage (<10 sec): AI detects DR, AMD, and Glaucoma directly on device, with no internet dependence.
- Optimized ophthalmologist workload: Only AI-positive/suspected cases escalated.
- Universal usability: Operable by optometrists, nurses, and ASHAs/MLSPs with structured training.

- State capacity building: Make-in-Kerala *Drishti AI* by K-DISC & C-DAC; integration with E-Health for dashboards and closed-loop care.

Service Delivery (Current Modality)

- Sites & Frequency:
- THQH/DH: daily
- CHCs: ≥ 3 days/week
- FHCs: 1–2 days/month
- Community camps & mobile units

Workflow:

ASHAs/MLSPs & NCD staff identify diabetics → Optometrist-led fundus imaging → Offline AI triage (DR/AMD/Glaucoma, <10 s) → Telesophthalmology/online confirmation → Referral for treatment (laser, anti-VEGF, OCT).

Photographs



Conclusion

Nayanamritham 2.0 is Kerala's pioneering model for AI-enabled population eye health, unifying public-health service delivery, digital governance, and capacity building to prevent avoidable blindness. Through offline AI, tele-ophthalmology, and strong maintenance systems, Nayanamritham 2.0 has created a scalable and cost-effective model that got replicated across various states.

Extending beyond eye health, this cutting-edge technology aims to address other chronic conditions by leveraging the retina as a biomarker for systemic diseases such as CKD and CVD, thereby enabling convergence with broader NCD control.

3.7 Project Padasprasham (Diabetic Foot Care)

Diabetic foot ulcers lead to thousands of amputations annually. Project Padasprasham focuses on the "at-risk" foot.

Clinical Guidelines:

1. Annual Foot Exam: Every diabetic patient registered at an FHC must undergo an annual foot examination involving Monofilament testing (for sensation) and Handheld Doppler (for circulation).
2. Risk Grading: Patients are graded from 0 to 3 based on risk.
3. Intervention: High-risk patients are provided with Micro-Cellular Polymer (MCP) footwear to prevent pressure ulcers. District hospitals feature specialised dressing rooms for advanced wound debridement and vacuum-assisted closure (VAC) therapy.

360-Degree Metabolic Center

1. Key Features of the Program

The "360-degree" branding refers to the complete circle of care provided to a patient in a single visit.

Single-Window System: A patient can undergo all necessary specialty tests (eyes, kidneys, nerves, heart) in one location without being referred to multiple departments.

Early Detection: The focus is on finding complications (like silent kidney damage or nerve loss) even before the patient develops physical symptoms.

Lifestyle-First Approach: The centers emphasize diet counseling and physical activity as primary treatments alongside pharmacological intervention.

2. Services Offered

The centers are divided into specific "cabins" or cubicles that a patient moves through sequentially:

Basic Screening: BMI (Height/Weight), Blood Pressure, and Blood Glucose (GRBS/HbA1c).

Diabetic Retinopathy Clinic: Eye screening using Non-Mydriatic Cameras to check for retinal damage.

Diabetic Neuropathy & Foot Clinic: Uses Biothesiometers and hand-held Doppler machines to check for nerve sensitivity and blood flow in the legs.

Nephropathy Screening: Urine tests for microalbumin to check early kidney function.
Pulmonary Function Test (SWAAS): Spirometry tests for COPD and asthma.
Support Services: Expert diet counseling, tobacco cessation help, and physiotherapy.

3. Organizational Research

Originally piloted at General Hospital, Ernakulam in 2018, the program is being expanded across the state.

Locations: These centers are typically established at General Hospitals and District Hospitals. Recently, they have expanded to select Taluk (Sub-district) Hospitals (e.g., Chavakkad and Muvattupuzha).

Funding: Supported by the 15th Finance Commission grants and the National Health Mission (NHM).

Digital Integration: All patient data is stored on the e-Health server, allowing for long-term tracking and follow-up through the Shaili App.

FUTURE DIRECTIVES (2025–2030)

3.8 Geriatric Integration and the Aging Population Strategy

Kerala is currently experiencing a significant demographic transition characterised by a rapidly ageing population. Projections indicate that by the year 2030 nearly **20 percent of the population will be above the age of 60 years**. This demographic shift has important implications for the management of non-communicable diseases, as elderly individuals often present with multiple chronic conditions requiring long-term care.

In response to this emerging challenge, the NCD programme in Kerala is gradually transitioning toward a **geriatric-centric model of care**. While hospital-based services continue to play an important role, there is increasing emphasis on **decentralized, community-based care models** that ensure accessibility and continuity of care for elderly patients. These models aim to integrate preventive care, chronic disease management, rehabilitation services, and palliative care within the primary healthcare system.

3.8.1 Comprehensive Geriatric Assessment (CGA)

To strengthen the management of chronic diseases among the elderly population, senior health professionals are mandated to implement **Comprehensive Geriatric Assessment (CGA)** at Taluk and District level institutions. CGA is a multidimensional assessment approach that evaluates the medical, functional, and psychological status of elderly individuals.

The medical assessment component focuses on reviewing existing chronic diseases such as diabetes, hypertension, cardiovascular disease, and chronic respiratory

illnesses. Particular attention is given to **polypharmacy**, as elderly patients frequently receive multiple medications that may interact with each other and increase the risk of adverse drug reactions.

The functional assessment evaluates the patient's ability to perform **Activities of Daily Living (ADL)**, including mobility, self-care, and routine household activities. This assessment helps determine whether the patient requires physical rehabilitation or supportive care.

The psychological assessment involves screening elderly patients for **geriatric depression, cognitive impairment, dementia, and Alzheimer's disease**. These conditions frequently coexist with chronic NCDs and may significantly affect treatment adherence and quality of life. Through comprehensive evaluation, CGA enables early identification of these issues and facilitates appropriate interventions.

3.8.2 Home-Based NCD Care for Bedbound Patients

A substantial proportion of Kerala's elderly population includes individuals who are **bedbound or have limited mobility**. For such patients, routine travel to health facilities can be extremely difficult. Recognizing this challenge, the state has introduced a **Home-Based Care Protocol for NCD patients**, which ensures continuity of care at the household level.

Under this protocol, community health workers and primary healthcare staff conduct periodic home visits to monitor the health status of bedridden patients and provide essential services. The system is designed to integrate clinical care with community-based support systems, thereby improving access to treatment and reducing the burden on caregivers.

The JPHN/JHI Doorstep Delivery Model

The operational framework for home-based NCD care is implemented through the **JPHN/JHI Doorstep Delivery Model**. In the first stage, Accredited Social Health Activists (ASHAs) identify bedbound patients during routine household enumeration using digital tools such as the **Shaili application**.

Following identification, **Junior Public Health Nurses (JPHNs)** and **Junior Health Inspectors (JHIs)** conduct home visits to perform screening and basic clinical assessments. They are equipped with portable **NCD kits containing digital blood pressure monitors and glucometers**, enabling them to measure key health indicators at the patient's residence.

For patients whose conditions are clinically stable, the programme provides **doorstep delivery of medications** monthly. This approach eliminates the need for elderly

patients or their caregivers to travel frequently to Family Health Centres for medication refills.

In cases where patients suffer from **advanced complications of non-communicable diseases**, such as chronic heart failure or advanced cancer, home-based NCD care is integrated with Kerala's well-established **community palliative care network**. This integration ensures that patients receive both medical management and supportive care within their homes.

3.9 SERVICE PACKAGES BY LEVEL OF CARE

Effective implementation of the NCD programme requires clear delineation of services available at different levels of the healthcare system. Such differentiation helps ensure efficient referral mechanisms, optimal resource utilization, and timely access to appropriate levels of care.

The Kerala NCD programme operates through a **three-tier service delivery framework consisting of primary, secondary, and tertiary care institutions**. Each level provides specific service packages designed to address varying levels of clinical complexity.

3.9.1 Primary Level (Sub-Centres and Health & Wellness Centres)

At the primary level, Sub-Centres and Health and Wellness Centres (HWCs) serve as the first point of contact between the community and the health system. These facilities are primarily responsible for **population-based screening and early identification of individuals at risk of non-communicable diseases**.

Screening activities are conducted using standardized tools such as the **Community Based Assessment Checklist (CBAC)** and digital platforms including the **Shaili application**. These tools help identify individuals with risk factors for conditions such as diabetes and hypertension.

Primary care institutions also play a key role in **follow-up monitoring of patients**, including regular blood pressure measurements and random blood sugar testing. Health workers provide **basic lifestyle counselling**, encouraging individuals to adopt healthier dietary practices, increase physical activity, and avoid tobacco and alcohol use.

For patients whose conditions are clinically stable, primary care facilities also provide **prescription refills for essential medications**, including commonly used drugs such as Amlodipine for hypertension and Metformin for diabetes.

3.9.2 Secondary Level (Family Health Centres and Community Health Centres)

Secondary-level institutions, including **Family Health Centres (FHCs)** and **Community Health Centres (CHCs)**, provide more advanced diagnostic and clinical management services for NCD patients.

At this level, healthcare professionals confirm the diagnosis of diabetes and hypertension using standard diagnostic procedures such as **fasting blood sugar (FBS)**, **post-prandial blood sugar (PPBS)**, and **standardized blood pressure measurements**.

Secondary care facilities also conduct **specialized NCD clinics**, including SWAAS clinics for chronic respiratory diseases and Nayanamritham clinics for diabetic retinopathy screening. These services strengthen early detection and management of complications associated with chronic diseases.

Diagnostic facilities available at this level include **HbA1c testing**, **lipid profile analysis**, and **basic kidney function tests (KFT)**. Healthcare providers also perform **initial screening for complications**, including diabetic foot ulcers and sensory loss associated with peripheral neuropathy.

3.9.3 Tertiary Level (District and General Hospitals)

Tertiary care institutions such as **District Hospitals** and **General Hospitals** provide advanced diagnostic and treatment services for complicated cases of non-communicable diseases.

These institutions are equipped to manage **acute emergencies such as stroke and myocardial infarction**, with many facilities operating **24-hour stroke units under the SIRAS programme**. Early management of cardiovascular emergencies significantly reduces mortality and long-term disability.

Advanced diagnostic services available at tertiary care facilities include **computed tomography (CT) scans**, **echocardiography**, and **treadmill tests (TMT)**, which enable detailed evaluation of cardiovascular and neurological conditions.

Tertiary hospitals also provide specialized interventions such as **day-care chemotherapy services under the Abhayam programme** and **dialysis services for patients with chronic kidney failure**.

Rehabilitation services form an important component of tertiary care. Physiotherapy-led rehabilitation programmes support patients recovering from **stroke, cardiac surgery, or other major complications**, thereby improving functional recovery and quality of life.

3.10 TECHNICAL GUIDANCE ON PRIORITY COMORBIDITIES

Non-communicable diseases frequently occur alongside other chronic conditions, leading to complex clinical presentations. Effective management of these **comorbidities** is essential to reduce complications, prevent disability, and improve long-term patient outcomes.

3.10.1 chronic kidney disease (CKD) in NCD Patients

Chronic Kidney Disease (CKD) represents one of the most serious complications associated with uncontrolled diabetes and hypertension. In Kerala, these two conditions are the **leading causes of CKD**, making early detection and management a critical component of the NCD programme.

To facilitate early detection, the programme mandates **annual screening for renal function among all registered NCD patients**. This includes measurement of **serum creatinine levels and urine albumin-creatinine ratio (UACR)** to identify early kidney damage.

When early signs of kidney disease are detected, treatment is initiated at the **Family Health Centre level under the supervision of Medical Officers**. Medications such as **ACE inhibitors or angiotensin receptor blockers (ARBs)** are prescribed to provide reno-protective benefits and slow disease progression.

Patients with advanced CKD, particularly those reaching **Stage 4 or Stage 5**, are referred to the state's decentralized dialysis network for renal replacement therapy. Kerala has developed an extensive dialysis infrastructure that enables patients to receive life-saving treatment closer to their homes.

3.10.2 cardiovascular disease and Acute Myocardial Infarction Management

Cardiovascular disease remains the **leading cause of premature mortality due to non-communicable diseases in Kerala**. Effective management of acute cardiac emergencies is therefore a key priority within the NCD programme.

The programme has implemented standardized protocols for the management of **ST-Elevation Myocardial Infarction (STEMI)**, focusing on reducing the critical **“door-to-needle time”** required for thrombolytic therapy.

Designated Taluk hospitals are equipped with **Tenecteplase**, a thrombolytic agent used to dissolve blood clots in patients experiencing acute myocardial infarction. The availability of this medication at secondary-level facilities ensures early intervention

before referral to tertiary care centres equipped with cardiac catheterization laboratories.

Following acute treatment, patients are enrolled in structured **follow-up programmes** at Community Health Centres. Initiatives such as “**Cardiac Clubs**” provide a platform for long-term medication management, lifestyle modification counselling, and peer support for individuals recovering from cardiac procedures such as **angioplasty or coronary artery bypass grafting (CABG)**.

CHAPTER 4

HUMAN RESOURCES AND TRAINING

4.1 Human Resource Structure

The effective implementation of the Non-Communicable Disease (NCD) programme in Kerala relies on a **multidisciplinary health workforce** operating across different levels of the public health system. The programme integrates clinical services, preventive care, community outreach, and digital monitoring systems, all of which require coordinated efforts from various cadres of healthcare personnel.

The workforce involved in NCD programme implementation includes **Medical Officers, Staff Nurses, Laboratory Technicians, Public Health staff, Mid-Level Service Providers, and community-level health workers such as ASHAs**. These personnel collectively contribute to screening, diagnosis, treatment, follow-up care, health promotion, and programme monitoring activities.

Family Health Centres (FHCs), which represent the strengthened primary healthcare institutions under the Aardram Mission, function as the **primary service delivery points for NCD care in Kerala**. At these facilities, integrated NCD clinics provide services including risk assessment, screening, treatment initiation, and follow-up of chronic disease patients.

At the community level, frontline workers such as **ASHA workers, Junior Public Health Nurses (JPHN), Junior Health Inspectors (JHI), and Mid-Level Service Providers (MLSP)** play a crucial role in identifying at-risk populations and ensuring linkage with health facilities. At higher levels of care, specialists and trained healthcare professionals provide advanced diagnostics and management for complicated cases.

The overall human resource structure ensures a **continuum of care from community-based screening to tertiary-level management**, thereby strengthening the state's capacity to respond effectively to the increasing burden of non-communicable diseases.

Table 6 summarises the key human resource categories involved in the NCD programme and their primary roles.

Table 6: Human Resource Categories in NCD Programme

Cadre	Role
Medical Officer	Diagnosis and treatment
Staff Nurse	Screening and follow-up

Cadre	Role
Laboratory Technician	Diagnostic tests
ASHA Worker	Community outreach

Medical Officers are responsible for clinical evaluation, diagnosis, treatment initiation, and supervision of NCD-related services within health facilities. Staff Nurses support screening activities, maintain patient records, conduct follow-up visits, and provide counselling on lifestyle modification and treatment adherence. Laboratory Technicians perform diagnostic investigations required for confirmation and monitoring of NCDs, including blood glucose testing and other laboratory procedures.

ASHA workers serve as the **key link between the community and the health system**. They facilitate household surveys, mobilise community members for screening programmes, and support follow-up care for individuals diagnosed with chronic diseases.

4.2 Roles and Responsibilities of Key Health Workforce

The success of the NCD programme depends on clearly defined roles and responsibilities of each cadre involved in programme implementation. These roles are structured to ensure efficient service delivery, effective coordination, and continuous patient follow-up.

ASHA Workers

Accredited Social Health Activists (ASHAs) play a crucial role in community-level implementation of the NCD programme. They conduct household surveys to identify individuals eligible for screening and encourage them to participate in NCD clinics and screening programmes. ASHA workers also provide health education related to lifestyle modification, including the promotion of healthy diets, physical activity, and cessation of tobacco and alcohol use.

In addition, ASHAs assist healthcare staff in organising NCD clinics and wellness sessions at the community level. They help track patients diagnosed with chronic diseases and ensure adherence to treatment and follow-up visits. Through regular community interaction, ASHA workers play a key role in increasing awareness and improving early detection of non-communicable diseases.

Junior Public Health Nurse / Junior Health Inspector / Mid-Level Service Provider

Junior Public Health Nurses (JPHN), Junior Health Inspectors (JHI), and Mid-Level Service Providers (MLSP) are responsible for conducting screening activities using the

Public Health (PH) application and other digital tools. They identify individuals at risk of developing NCDs and refer suspected cases to appropriate health facilities for further evaluation and treatment.

These healthcare workers also ensure registration of diagnosed patients within the NCD programme database and monitor treatment adherence among patients receiving long-term therapy. They provide counselling to patients and their families regarding lifestyle modifications, medication adherence, and prevention of complications.

Health Inspector / Public Health Nurse

Health Inspectors (HI) and Public Health Nurses (PHN) play a supervisory role in the implementation of NCD screening and prevention activities. They oversee field-level screening conducted by JPHNs, JHIs, and MLSPs and ensure that adequate infrastructure and equipment are available for screening at health facilities.

These officers also coordinate Information, Education, and Communication (IEC) campaigns aimed at increasing public awareness about NCD prevention and control. They work closely with Local Self Government Institutions and community organisations to promote health education and community participation in screening programmes.

NCD Staff Nurse at Service Delivery Points

Staff Nurses play a critical role in the effective implementation of the Non-Communicable Disease (NCD) programme at health facilities. They serve as the primary operational link between the medical officer, diagnostic services, and the community, ensuring that screening, diagnosis, treatment, and follow-up services for NCD patients are delivered efficiently. At service delivery points such as Family Health Centres (FHCs), Community Health Centres (CHCs), and Taluk Hospitals, NCD Staff Nurses contribute significantly to improving patient outcomes through early detection, continuous monitoring, and patient education.

One of the primary responsibilities of the NCD Staff Nurse is to **conduct screening and early identification of non-communicable diseases** among individuals attending health facilities. Nurses measure and record key clinical parameters including blood pressure, blood glucose levels, body mass index, and waist circumference. These measurements are essential for identifying individuals who may be at risk of developing conditions such as hypertension, diabetes, and cardiovascular diseases. The staff nurse ensures that these screenings are conducted systematically for all eligible individuals, particularly those aged 30 years and above, as part of the population-based screening strategy of the NCD programme.

NCD Staff Nurses are also responsible for **maintaining patient records and updating digital health platforms** used in the programme. Data related to screening, diagnosis, and treatment are recorded in systems such as the Public Health (PH) portal or other electronic health record systems used in the state. Accurate documentation is essential for monitoring disease trends, tracking patient follow-up, and evaluating programme performance.

Another important function of the staff nurse is to **assist the Medical Officer in clinical evaluation and management of NCD patients**. Nurses prepare patients for consultation, review previous records, and ensure that necessary investigations are completed prior to medical evaluation. They help implement standardized treatment protocols for diseases such as hypertension and diabetes and assist in medication dispensing and dosage verification.

Staff Nurses also play a major role in **patient counselling and lifestyle modification education**, which is a cornerstone of NCD prevention and management. They provide guidance to patients on healthy dietary habits, weight management, regular physical activity, and avoidance of tobacco and alcohol use. Nurses educate patients about the importance of medication adherence and regular follow-up visits to prevent complications associated with chronic diseases.

In addition, NCD Staff Nurses are responsible for **monitoring patients during follow-up visits**. During follow-up consultations, they reassess blood pressure levels, blood glucose values, and other relevant clinical parameters to evaluate treatment effectiveness. They identify patients whose conditions remain uncontrolled and ensure that such patients are referred to the Medical Officer for further evaluation and modification of treatment plans.

Staff Nurses also support the **implementation of specialized NCD clinics and screening programmes** conducted at health facilities. These may include clinics for chronic respiratory diseases under the SWAAS programme, diabetic retinopathy screening under the Nayanamritham initiative, and diabetic foot examination under the Padasprasham programme. In these clinics, nurses assist with diagnostic procedures such as spirometry testing, retinal imaging, and foot risk assessment.

Coordination with community-level health workers is another important responsibility of the NCD Staff Nurse. Nurses work closely with ASHA workers, Junior Public Health Nurses, and Health Inspectors to ensure that individuals identified during community screening programmes receive timely follow-up and treatment. They also help track patients who miss scheduled appointments and facilitate their return to care.

NCD Staff Nurses are further responsible for **organizing and supporting health promotion activities within the community**. They participate in Information, Education, and Communication (IEC) campaigns aimed at increasing awareness about

NCD prevention and early detection. These activities may include health education sessions, community meetings, and wellness programmes conducted in collaboration with Local Self Government Institutions.

Another key responsibility involves **monitoring availability of medicines and diagnostic supplies required for NCD management**. Staff Nurses ensure that essential drugs such as antihypertensive medications, oral hypoglycaemic agents, and insulin are available at health facilities. They also coordinate with pharmacists and facility administrators to maintain adequate stock levels and prevent treatment interruptions.

In facilities where home-based care services are implemented, NCD Staff Nurses may also assist in **planning and coordinating home visits for elderly or bedridden patients**. They guide community health workers on monitoring clinical parameters and ensure that such patients continue to receive appropriate treatment and supportive care.

Through these responsibilities, NCD Staff Nurses contribute significantly to the **effective functioning of NCD clinics, improvement of treatment adherence, and reduction of complications associated with chronic diseases**. Their role is essential for strengthening primary healthcare services and achieving the long-term goals of the NCD control programme in Kerala.

Dietician Counsellors

Dietician Counsellors are appointed under the NCD Control Programme from 2010 onwards through NP-NCD human recourses. There are 821 Dietician Counsellors appointed in various hospitals across the state. Their main responsibility is to give diet counselling for the NCD patients and for following up the patients on an individual basis. They are also designated for hospital diet monitoring and ensuring diet stock in the absence of a regular dietician. They also must conduct outreach nutrition classes at schools, educational institutions, offices, camps etc. They are also involved in preparing the diet guidelines for various age groups and different diseases.

Medical Officers

Medical Officers are responsible for clinical supervision and management of NCD services at healthcare facilities. They ensure that screening programmes are conducted according to standard guidelines and that diagnosed patients receive appropriate treatment based on established clinical protocols.

Medical Officers conduct periodic review meetings with healthcare teams to monitor the progress of screening activities and treatment outcomes. They also provide technical guidance to frontline health workers and ensure proper documentation and reporting of programme data.

District NCD Nodal Officers

District NCD Nodal Officers are responsible for overseeing the implementation of the NCD programme at the district level. They monitor screening coverage, treatment initiation, and follow-up activities across health facilities. These officers organise training programmes for healthcare workers and coordinate with district health authorities to ensure smooth programme implementation.

District NCD Nodal Officers also review programme progress through periodic meetings and analyse data from digital monitoring systems to identify gaps in service delivery. Based on these findings, they recommend corrective actions and strengthen programme performance at the district level.

4.3 Training and Capacity Building

Training and capacity building form a critical component of the NCD control programme in Kerala. Continuous training ensures that healthcare personnel remain updated with the latest guidelines and best practices for prevention, screening, diagnosis, and management of non-communicable diseases.

Training programmes are organised at multiple levels, including **state, district, and facility levels**, to build competencies among healthcare workers. These programmes focus on strengthening technical skills related to screening techniques, patient counselling, clinical management, and the use of digital health platforms.

Healthcare workers receive training on the use of digital applications such as the **Public Health (PH) application and SHAILI platform**, which facilitate real-time data entry, patient tracking, and programme monitoring. Training also emphasises patient-centred care, communication skills, and strategies for promoting behavioural change within communities.

Capacity-building initiatives are designed to ensure standardisation of service delivery across health facilities and to improve the quality of care provided to patients with chronic diseases.

4.4 Advanced Training Modalities

In addition to routine training programmes, specialised training initiatives are conducted to strengthen advanced clinical and diagnostic services related to NCD care. These programmes focus on specific technical areas that require specialised knowledge and skills.

Advanced training programmes include capacity building in **spirometry testing for the diagnosis and management of chronic respiratory diseases such as COPD and asthma, retinopathy screening using digital retinal imaging devices, emergency**

management of stroke under the SIRAS programme, and diabetic foot care including risk assessment and ulcer management under the Padasprasham initiative.

Healthcare professionals trained in these specialised areas contribute to strengthening the overall healthcare system's capacity to manage complications associated with non-communicable diseases. These training initiatives also enable early detection of complications and improve the quality of care delivered at various levels of the health system.

4.5 Training Cascade Model

The NCD programme follows a **training cascade model** to ensure that knowledge and skills are effectively transferred across all levels of the health system. At the state level, master trainers and technical experts develop training materials and conduct training sessions for district-level trainers. These district trainers subsequently conduct training programmes for healthcare workers at block and facility levels.

This cascade approach enables rapid dissemination of updated guidelines and ensures that all healthcare personnel involved in the programme receive consistent training. Regular refresher training sessions are also organised to update staff on new protocols, digital tools, and emerging best practices in NCD prevention and management.

4.6 Strengthening Human Resource Capacity

Strengthening human resource capacity remains an important priority for improving NCD programme implementation in Kerala. Continuous efforts are made to enhance workforce competencies, expand training opportunities, and improve coordination among different cadres of healthcare workers.

Investments in training infrastructure, digital learning platforms, and supportive supervision mechanisms are essential to ensure that healthcare workers are equipped to manage the increasing burden of chronic diseases. Strengthening the human resource component of the NCD programme will contribute significantly to improving early detection, treatment adherence, and long-term management of non-communicable diseases in the state.

4.7 Focus on the Marginalized Population

The focus of the NCD Control Programme has now been shifted towards the welfare of the marginalized population to ensure that the neediest segment of the population receive the quality health management. To attain this goal the data regarding the existing BPL population is

being collected through e-health networks from PDS database. The exact number of BPL persons and families residing in each ward and each Panchayath was given to the concerned Janakeeya Arogya Kendrams who must enrol the entire families through PH application.

The NCD disease status of this population will be measured through screening and the list of patients eligible for management will be shared to the concerned FHCs. Treatment will be ensured to all BPL patients and the follow up will be ensured through the IHCI network. All quality medicines including insulin will be ensured for the BPL population before opening the stoke for the general population. The activities are ongoing in the districts, and it's expected to be completed by May 2026.

CHAPTER 5

STRATEGIC COMMUNICATION AND HEALTH PROMOTION

5.1 State's Strategic and Integrated Communication Approach for NCDs

Strategic communication and health promotion play a critical role in the prevention and control of non-communicable diseases (NCDs) in Kerala. Although the state has achieved high levels of health literacy, behavioural risk factors such as unhealthy diet, physical inactivity, tobacco use, and harmful alcohol consumption continue to contribute significantly to the burden of chronic diseases. Traditional awareness campaigns alone have proven insufficient to translate knowledge into sustainable lifestyle changes.

To address this challenge, the state has adopted an integrated **Information, Education and Communication (IEC) and Behavioural Change Communication (BCC) framework** that emphasizes actionable health messages and community participation. This approach combines health education, advocacy, community mobilisation, and supportive environmental changes to encourage healthier behaviours among individuals and communities.

The strategic communication model adopted in Kerala focuses on **precision-based behavioural change communication**, where health messages are tailored to the specific needs and socio-cultural context of the population. Rather than delivering generic messages about the dangers of NCDs, the programme promotes practical lifestyle interventions that individuals can incorporate into their daily routines. The approach integrates multiple communication channels, including community-based interactions, mass media campaigns, digital platforms, and partnerships with Local Self Government Institutions (LSGIs).

5.2 Key Communication Objectives

The strategic communication framework for NCD control in Kerala is guided by several key objectives that aim to strengthen prevention and early detection efforts.

The first objective is to **increase public awareness about major non-communicable diseases and their risk factors**. Awareness campaigns focus on educating the public about conditions such as diabetes, hypertension, cardiovascular diseases, and chronic respiratory illnesses, as well as the lifestyle behaviours that contribute to their development.

The second objective is to promote **behavioural change communication (BCC)** that encourages individuals to adopt healthier lifestyle practices. This includes promoting

balanced nutrition, increasing physical activity, reducing salt and sugar consumption, and discouraging tobacco and alcohol use.

Another important objective is **demand generation for screening and early diagnosis**. Through community awareness campaigns and outreach activities, the programme encourages individuals aged 30 years and above to participate in population-based screening programmes conducted at health facilities and community centres.

The communication strategy also aims to strengthen **community engagement and participation**, ensuring that individuals, families, and local communities actively contribute to health promotion activities.

5.3 Behavioural Change Communication Framework

Recognizing that high health literacy alone does not guarantee behavioural change, Kerala has adopted a **Precision Behavioural Change Communication (BCC) approach**. This strategy moves beyond general awareness campaigns and focuses on providing culturally relevant and practical guidance that individuals can easily adopt.

The BCC framework emphasizes lifestyle interventions that are simple, measurable, and achievable. Health messages are designed to encourage gradual changes in everyday habits, such as reducing salt intake in daily cooking, incorporating regular physical activity into daily routines, and maintaining healthy sleep patterns.

Healthcare providers, community health workers, and public health staff play an important role in delivering these messages during clinic visits, community meetings, and household interactions. By combining health education with supportive community initiatives, the programme aims to create an environment that encourages healthy living.

5.4 Healthy Life Campaign and “Vibe for Wellness”

One of the key initiatives under Kerala’s strategic communication framework is the **Healthy Life Campaign**, which is implemented through the “Vibe for Wellness” initiative. This campaign promotes a holistic approach to healthy living based on four core pillars: eating well, acting well, sleeping well, and caring well.

The campaign encourages individuals to adopt healthier dietary practices by reducing the consumption of salt, sugar, and oil while promoting balanced diets that include fruits, vegetables, and whole grains. Physical activity is promoted as an essential component of healthy living, with recommendations for at least **30 minutes of daily exercise** through activities such as walking, yoga, cycling, or recreational sports.

Adequate and quality sleep is highlighted as an important factor in maintaining physical and mental health. The campaign also emphasizes responsible health behaviour, including regular medical check-ups, avoidance of tobacco and alcohol use, and attention to mental well-being.

Through community events, social media outreach, and local health campaigns, the Healthy Life Campaign aims to create widespread awareness and encourage long-term behavioural change.

5.5 Advocacy Strategies

Advocacy forms an essential component of Kerala's NCD communication strategy. Advocacy efforts focus on strengthening policy support, mobilizing resources, and building partnerships with various sectors involved in health promotion.

At the policy level, advocacy initiatives aim to integrate NCD prevention strategies into broader development programmes and public health policies. Health authorities collaborate with government departments, educational institutions, and civil society organizations to promote policies that support healthy environments.

Media advocacy also plays a crucial role in amplifying health messages. Through partnerships with print media, television, radio, and digital platforms, the programme disseminates information about NCD prevention and encourages public participation in health promotion activities.

5.6 Communication Channels

Kerala utilizes multiple communication channels to ensure that health messages reach diverse segments of the population.

Mass media platforms such as television, radio, newspapers, and public campaigns are used to disseminate large-scale awareness messages regarding NCD prevention and healthy lifestyles. Social media platforms and digital communication channels are increasingly used to engage younger populations and promote interactive health campaigns.

Interpersonal communication remains one of the most effective strategies for behavioural change. Community health workers, including ASHA workers and public health staff, deliver health messages during household visits, community meetings, and clinic consultations. These direct interactions help build trust and allow individuals to ask questions and receive personalized guidance.

5.7 Social Mobilization and Community Engagement

Community participation is essential for sustaining behavioural changes related to health. Kerala's NCD programme encourages social mobilization through patient support groups, community clubs, and wellness programmes.

Lifestyle clubs and community-based wellness groups provide platforms where individuals can participate in group exercise sessions, health education activities, and peer support programmes. These groups help reinforce healthy behaviours and provide motivation for individuals managing chronic diseases.

Local Self Government Institutions play a key role in supporting these initiatives by providing infrastructure, organizing community events, and integrating health promotion activities into local development plans.

5.8 Physical Activity Promotion: The LSGI Link

Under the Aardram Mission, physical activity promotion has been expanded beyond clinical advice to become a **community-level infrastructure initiative**. Local Self Government Institutions support the development of public facilities that encourage active lifestyles.

Many Panchayats across Kerala have established **open gyms, walking tracks, and lifestyle clubs**, funded through local government health grants. These facilities provide accessible spaces where community members can engage in regular physical activity.

Family Health Centres also organize **weekly yoga and wellness sessions**, particularly for elderly individuals attending NCD follow-up clinics. These activities help promote physical fitness and social interaction among participants.

5.9 Setting-Based Approach for Health Promotion

Recognizing that health behaviours are influenced by social environments, Kerala's NCD programme adopts a **setting-based approach for health promotion**. Interventions are implemented in schools, workplaces, and community settings to encourage healthy practices within everyday environments.

5.9.1 Health Promoting Schools

School-based interventions play an important role in preventing early onset of lifestyle-related diseases. To address rising concerns about childhood obesity and Type 2 diabetes, Kerala has implemented health promotion initiatives within educational institutions.

School Health Nurses conduct **annual Body Mass Index (BMI) screening for students from Class 1 to Class 12**, allowing early identification of overweight and obese children. Schools also implement nutrition policies that discourage the sale of ultra-processed foods and sugary beverages near school premises.

Health education programmes encourage students to adopt healthy eating habits and engage in regular physical activity, helping establish lifelong healthy behaviours.

5.9.2 Health Promoting Workplaces

The working-age population often faces challenges in accessing routine health screening due to work commitments. To address this issue, Kerala has introduced workplace-based health promotion initiatives.

Mobile NCD screening units periodically visit government offices and large private workplaces to conduct **on-site screening for blood pressure and random blood sugar levels**. These services enable early detection of NCD risk factors among working adults.

Workplace wellness programmes also include ergonomic counselling sessions conducted by physiotherapists to reduce musculoskeletal problems associated with sedentary work environments.

5.10 Innovative Strategies for NCD Communication

Kerala continues to explore innovative approaches to strengthen NCD communication and health promotion efforts. Digital technologies, community-based wellness initiatives, and partnerships with local institutions are increasingly being utilized to expand the reach of health messages.

Emerging strategies include digital health campaigns, interactive mobile applications for lifestyle monitoring, and artificial intelligence-based health screening programmes. These innovations support the state's efforts to build a sustainable and comprehensive health promotion ecosystem.

TRAINING AND CAPACITY BUILDING MODULES

5.11 Medical Officer (MO) Training Framework

Medical Officers play a central role in the implementation of the Non-Communicable Disease (NCD) programme in Kerala. They are responsible for clinical management of patients, supervision of screening activities, implementation of standardized treatment protocols, and coordination with district and state-level programme units. To ensure that all Medical Officers involved in NCD service delivery possess the required

competencies, the state has introduced a **mandatory three-day certificate training programme** for all Medical Officers joining the NCD wing.

The training programme is designed to strengthen clinical, digital, and communication competencies required for effective NCD programme implementation. The training is conducted through a combination of classroom lectures, case-based discussions, practical demonstrations, and digital system orientation sessions. The programme is coordinated by the **State NCD Cell in collaboration with District NCD Cells, eHealth teams, and technical experts from medical colleges.**

Day 1: Clinical Protocols and Programme Guidelines

The first day of the training focuses on strengthening clinical knowledge and familiarizing Medical Officers with standardized treatment protocols adopted in Kerala for the management of priority non-communicable diseases.

Participants are oriented on the **India Hypertension Control Initiative (IHCI) protocol**, which provides a simplified stepwise approach to the diagnosis and treatment of hypertension. The training includes practical sessions on accurate blood pressure measurement techniques, identification of high-risk patients, initiation of antihypertensive therapy, and monitoring of blood pressure control rates.

The training also covers **diabetes management protocols**, including diagnostic criteria, treatment algorithms, and monitoring indicators such as HbA1c levels. Medical Officers are trained to provide individualized treatment plans based on patient risk profiles and comorbid conditions.

Another important component of the first-day training is the **SWAAS programme**, which focuses on the prevention and management of chronic respiratory diseases such as Chronic Obstructive Pulmonary Disease (COPD) and asthma. Medical Officers are trained in interpreting spirometry results, initiating inhalation therapy, and providing patient education on inhaler techniques.

In addition, the training includes sessions on **screening and management of NCD complications**, including diabetic retinopathy under the Nayanamritham programme, diabetic foot management under the Padasprasham initiative, and stroke management protocols under the SIRAS programme.

Day 2: Digital Health Systems and Data Management

The second day of the training programme focuses on **digital health literacy**, which is an essential component of NCD programme implementation in Kerala. Medical Officers are trained on the use of various digital platforms used in the state's public health system.

Training includes orientation to the **eHealth system**, which integrates patient records, diagnostic reports, and treatment data across healthcare facilities. Participants are trained on how to access patient records, update clinical data, and monitor treatment outcomes using the eHealth platform.

Medical Officers are also trained on the **National NCD Portal**, which is used for reporting programme indicators, monitoring patient cohorts, and tracking treatment outcomes. Training sessions include practical demonstrations on data entry, generation of reports, and interpretation of programme indicators.

Another important component of the digital training module is the **Ayushman Bharat Health Account (ABHA) ID system**. Medical Officers are trained on generating ABHA IDs for patients and linking them with digital health records to facilitate continuity of care across different healthcare facilities.

Participants are also introduced to the **SHAILI application and Public Health (PH) portal**, which are used for population-based screening and tracking of high-risk individuals identified during community surveys.

Day 3: Communication and Counselling Skills

The third day of the training programme focuses on strengthening **communication and counselling skills** among Medical Officers. Behavioural risk factors such as poor diet, physical inactivity, tobacco use, and alcohol consumption are major contributors to NCDs in Kerala. Effective counselling is therefore essential for promoting lifestyle modification and improving treatment adherence.

Training sessions include techniques for **patient-centred communication**, motivational interviewing, and counselling strategies for behaviour change. Medical Officers are trained to provide practical advice on diet modification, physical activity, tobacco cessation, and stress management.

The training also covers strategies for engaging with community health workers, conducting health education sessions, and supporting community-based health promotion initiatives such as the **Healthy Life Campaign and Vibe for Wellness programme**.

Case studies and role-play exercises are used to enhance practical communication skills and enable Medical Officers to effectively interact with patients and caregivers.

Training Framework for NCD Staff Nurses in Kerala

NCD Staff Nurses play a crucial role in the prevention, early detection, treatment, and follow-up of patients with non-communicable diseases across healthcare facilities in Kerala. Their responsibilities include conducting screening activities, supporting clinical

management, monitoring treatment adherence, providing patient counselling, and maintaining programme data through digital health systems. To strengthen these competencies, the Government of Kerala has developed a comprehensive training programme for NCD Staff Nurses working at Family Health Centres, Community Health Centres, and other health institutions.

The training programme is designed to equip nurses with both theoretical knowledge and practical skills required for the effective implementation of the NCD programme. Training sessions are conducted at state, district, and facility levels using a combination of classroom instruction, clinical demonstrations, simulation exercises, and supervised field practice.

Objectives of the Training Programme

The primary objective of the NCD Staff Nurse training programme is to strengthen the capacity of nurses to provide high-quality care for individuals affected by non-communicable diseases. The training programme aims to enhance knowledge on NCD risk factors, screening protocols, diagnosis and management pathways, and patient counselling strategies.

Another important objective is to ensure that nurses are proficient in the use of **digital health platforms**, including the Public Health (PH) portal, SHAILI application, and NCD reporting systems. The training also focuses on improving nurses' skills in health education and behavioural change communication to promote healthy lifestyle practices among patients and communities.

Structure of the Training Programme

The NCD Staff Nurse training programme typically consists of **five to seven days of intensive training**, followed by periodic refresher sessions and supportive supervision at the facility level.

The training programme is divided into several modules covering clinical management, diagnostic procedures, patient counselling, digital data management, and specialized NCD services.

Module 1: Introduction to Non-Communicable Diseases

The first module provides an overview of the epidemiology and burden of non-communicable diseases in Kerala. Nurses are introduced to major NCDs including diabetes mellitus, hypertension, cardiovascular diseases, chronic respiratory diseases, and cancers.

The training covers risk factors associated with NCDs such as unhealthy diet, physical inactivity, tobacco use, alcohol consumption, and obesity. Nurses are also trained to understand the concept of the **continuum of care**, which includes prevention, early detection, treatment, and long-term management of chronic diseases.

Module 2: Screening and Early Detection of NCDs

Early detection of non-communicable diseases is a key component of the NCD programme in Kerala. In this module, nurses are trained in standardized screening procedures conducted at NCD clinics and Janakeeya Arogya Kendrams.

The training includes practical demonstrations on measuring blood pressure using digital BP apparatus, conducting random blood sugar testing using glucometers, calculating body mass index, and measuring waist circumference. Nurses are trained to identify abnormal findings and refer patients for further clinical evaluation.

Participants also learn how to use the **Community-Based Assessment Checklist (CBAC)** to identify individuals at risk of developing NCDs. This risk assessment tool is widely used in population-based screening programmes.

Module 3: Clinical Management of Hypertension and Diabetes

This module focuses on the clinical management of two of the most common non-communicable diseases in Kerala: hypertension and diabetes.

Nurses are trained on the **India Hypertension Control Initiative (IHCI) treatment protocol**, which includes standardized steps for diagnosing hypertension, initiating treatment, and monitoring blood pressure control. Practical training is provided on accurate blood pressure measurement techniques and proper patient positioning.

For diabetes management, nurses are trained to monitor blood glucose levels, assist in interpreting laboratory reports such as fasting blood sugar and HbA1c, and support the Medical Officer in implementing treatment plans. Nurses also learn about insulin administration techniques and safe handling of insulin devices.

Module 4: Screening and Management of NCD Complications

This module focuses on early detection of complications associated with chronic diseases. Nurses are trained to identify warning signs of complications such as diabetic neuropathy, diabetic retinopathy, chronic kidney disease, and cardiovascular disease.

Training includes the **Padasprasham diabetic foot care protocol**, where nurses learn to conduct foot examinations using monofilament testing to assess nerve sensation. They are also trained to identify foot ulcers and refer high-risk patients for specialized care.

Under the **Nayanamritham programme**, nurses are trained to assist in retinal screening procedures and coordinate referrals for patients with suspected diabetic retinopathy.

Module 5: Chronic Respiratory Disease Management (SWAAS Programme)

The SWAAS programme addresses chronic respiratory diseases such as Chronic Obstructive Pulmonary Disease (COPD) and asthma. In this module, nurses receive training in performing and assisting with spirometry tests used to diagnose respiratory conditions.

Participants learn how to educate patients on proper inhaler techniques, monitor respiratory symptoms, and support pulmonary rehabilitation programmes. Nurses also provide counselling on tobacco cessation and environmental risk reduction.

Module 6: Patient Counselling and Behavioural Change Communication

Behavioural risk factors are major contributors to non-communicable diseases. This module focuses on strengthening nurses' skills in patient education and counselling.

Nurses are trained to provide practical guidance on lifestyle modification, including healthy dietary practices, regular physical activity, weight management, and avoidance of tobacco and alcohol use. The training also includes motivational interviewing techniques that help patients adopt healthier behaviours.

Counselling sessions also address mental health aspects such as stress management and emotional well-being, which are important for long-term disease management.

Module 7: Digital Health Systems and Data Reporting

Digital data management is an essential component of the NCD programme in Kerala. Nurses are trained to use digital platforms such as the **Public Health (PH) portal, SHAILI application, and National NCD Portal** for recording screening data, registering patients, and tracking follow-up visits.

The training includes practical sessions on data entry, patient registration, and generating reports through digital dashboards. Proper documentation ensures accurate monitoring of programme indicators and improves continuity of care.

Module 8: Palliative Care and Home-Based Care

As the burden of chronic diseases increases, many patients require long-term supportive care. In this module, nurses receive training in **palliative care principles**, including pain management, symptom control, and psychosocial support.

Nurses are also trained to coordinate with Kerala's community-based palliative care network to provide home-based care for elderly or bedridden patients with advanced NCD complications.

Training Methodology

The NCD Staff Nurse training programme uses a variety of teaching methods to ensure effective learning. These include classroom lectures, practical demonstrations, case-based discussions, and supervised clinical practice. Simulation-based training is also used to improve skills in procedures such as blood pressure measurement, insulin administration, and spirometry testing.

Participants are evaluated through written assessments and practical examinations to ensure competency in key clinical skills.

Refresher Training and Supportive Supervision

To maintain high standards of care, NCD Staff Nurses participate in periodic refresher training programmes organized at the district level. These refresher sessions focus on updates in clinical guidelines, digital health tools, and programme implementation strategies.

Supportive supervision by Medical Officers and District NCD teams ensures that nurses receive ongoing guidance and feedback in their day-to-day work.

Training schedule table for staff nurses:

Day	Module	Training Topic
Day 1	NCD Basics	Epidemiology, risk factors
Day 2	Screening	BP, RBS, CBAC
Day 3	Clinical Management	HTN, DM
Day 4	Complication Screening	Foot care, retinopathy
Day 5	Digital Systems	PH portal, SHAILI

CHAPTER 6

MONITORING, SUPERVISION, AND EVALUATION (M&E)

Monitoring, supervision, and evaluation form a critical component of the Non-Communicable Disease (NCD) control programme in Kerala. Effective monitoring systems ensure that programme activities are implemented according to established guidelines, while evaluation mechanisms assess the impact of interventions and guide future policy decisions. Kerala has developed a robust monitoring framework that integrates **digital health systems, standardized reporting formats, regular supervisory reviews, and data-driven decision-making mechanisms.**

The monitoring framework emphasizes the use of real-time digital data to track screening coverage, treatment initiation, follow-up adherence, and disease control outcomes. By linking community-level screening data with institutional electronic health records, the state has created a comprehensive monitoring ecosystem that enables efficient programme management.

6.1 Digital Health Systems and Data Integration

Kerala has developed a strong digital health infrastructure to support NCD programme monitoring. The integration of community-level data with institutional electronic health records enables continuous tracking of patients across the healthcare system.

6.1.1 The Digital Backbone: Shaili and eHealth Integration

Kerala is one of the first states in India to successfully integrate **community-level screening data with institutional electronic health records (EHR)**. This integration is achieved through the combined use of the **SHAILI application, the Public Health portal, and the eHealth system.**

The SHAILI application is used by ASHA workers to conduct household surveys and record screening data. Information collected through the app is automatically synchronized with the state's Public Health portal, which is accessible to healthcare providers and programme administrators.

The eHealth system functions as the institutional electronic health record platform, allowing healthcare providers to access patient histories, laboratory reports, and treatment records. By linking SHAILI data with eHealth records, the system enables continuous monitoring of patient care from community screening to facility-based treatment.

6.2 The Shaili App Dashboard

The SHAILI application serves not only as a data collection tool but also as an advanced monitoring dashboard for programme administrators. District NCD Nodal Officers and senior health officials use the dashboard to analyse screening trends, identify high-risk areas, and monitor programme performance.

One of the key features of the dashboard is the **heat map visualization system**, which identifies geographical clusters with high prevalence of risk factors or abnormal screening results. If a particular ward or locality reports a high number of individuals with elevated CBAC scores, programme administrators can deploy mobile medical teams to conduct targeted screening camps and follow-up interventions.

Another important monitoring feature is the **Target versus Achievement analysis**, which compares the number of individuals screened with the number of confirmed cases identified through clinical evaluation. This metric, known as the **screening yield**, helps programme managers assess the effectiveness and accuracy of field-level screening activities.

6.3 Unique Health Identification (UHID) and Patient Tracking

Kerala has implemented a **Unique Health Identification Number (UHID)** system to ensure continuity of care for patients across different healthcare facilities. Each individual screened under the NCD programme is assigned a unique digital health identity that links their screening data, diagnostic records, and treatment history.

The UHID system allows healthcare providers to track patient visits, monitor treatment adherence, and coordinate care across primary, secondary, and tertiary institutions. This digital tracking mechanism significantly reduces duplication of records and improves the efficiency of patient management.

6.4 Data Flow Mechanism and Reporting

The NCD monitoring system follows a structured data flow mechanism that ensures timely reporting and data validation across different administrative levels.

At the community level, ASHA workers collect screening data using the SHAILI application during household visits. This data is transmitted to the **Public Health portal**, where it becomes accessible to field-level health staff including Junior Public Health Nurses (JPHN), Junior Health Inspectors (JHI), and Medical Officers.

Health facilities validate the screening data and update diagnostic and treatment information in the eHealth system. District NCD Cells compile data from health institutions and submit consolidated reports to the State NCD Cell through the National NCD Portal.

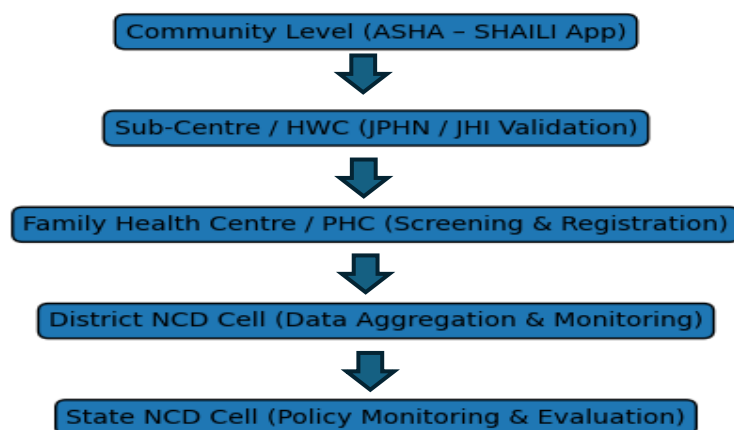
This structured data flow ensures that programme performance can be monitored continuously from the **community level to the state level**.

6.5 Standardized Reporting Formats

To maintain uniformity in data reporting across all districts, Kerala follows standardized reporting formats aligned with the **National Programme for Prevention and Control of Non-Communicable Diseases (NP-NCD) 2023–2030 guidelines**.

The data reporting mechanism for the NCD programme follows a structured pathway from community-level screening to state-level monitoring, as illustrated in Figure.

NCD Programme Data Flow Mechanism (Kerala)



6.5.1 Form 4: Monthly Screening Report

Form 4 captures data related to population-based screening activities and provides an overview of the inflow of individuals into the NCD care system. The report includes information on the total population registered under the programme, the number of Community-Based Assessment Checklists completed, and the number of individuals referred for institutional screening.

This report helps programme managers assess the coverage and effectiveness of community-level screening activities.

6.5.2 Form 5: Cohort Monitoring Report

Form 5 is one of the most important tools used for monitoring programme outcomes. Unlike screening reports that focus on coverage, the cohort monitoring report evaluates treatment outcomes and patient retention within the programme.

Key indicators included in this report are the **retention rate**, which measures the proportion of patients who continue attending follow-up clinics, and the **control rate**, which indicates the percentage of patients whose blood pressure or blood glucose levels are within the recommended target range.

The report also identifies patients who have been **lost to follow-up**. This information is automatically transmitted to ASHA workers through the SHAILI application, enabling them to conduct home visits and bring these patients back into the treatment system.

6.6 Key Performance Indicators (KPIs) for NCD Programme

Monitoring programme performance requires a set of well-defined indicators that capture various aspects of service delivery. The NCD monitoring framework in Kerala uses key performance indicators categorized into **input indicators, process indicators, and outcome indicators**.

Input indicators measure the availability of essential resources such as trained healthcare personnel, screening equipment, and medicines required for NCD management.

Process indicators assess the implementation of programme activities, including the proportion of the eligible population screened, the number of NCD clinics conducted, and the number of patients receiving treatment.

Outcome indicators evaluate the effectiveness of the programme in improving patient health outcomes. These indicators include blood pressure control rates, glycaemic control rates, reduction in complications, and improvement in treatment adherence.

Key Performance Indicators (KPIs) for NCD Monitoring

Category	Indicator
Input Indicator	Availability of trained NCD staff
Input Indicator	Availability of essential drugs & diagnostics
Process Indicator	Population screened for NCDs
Process Indicator	Number of NCD clinics conducted
Outcome Indicator	BP control rate among registered patients
Outcome Indicator	Glycaemic control rate among diabetic patients

table/Figure: Key Performance Indicators for NCD Monitoring

6.7 Clinical Decision Support Systems (CDSS)

To improve the quality of clinical care, Kerala is gradually integrating **Clinical Decision Support Systems (CDSS)** within its digital health platforms. These systems provide healthcare providers with automated alerts and treatment recommendations based on patient data.

CDSS tools assist Medical Officers in identifying high-risk patients, selecting appropriate treatment protocols, and monitoring clinical outcomes. By integrating evidence-based guidelines into the digital health system, CDSS enhances the accuracy and consistency of clinical decision-making.

6.8 Supervision and Review Mechanisms

Regular supervision and review meetings are essential for maintaining programme quality and ensuring accountability at different administrative levels.

Health facilities conduct **monthly review meetings** to assess screening coverage, treatment adherence, and follow-up status of patients. District-level review meetings are conducted quarterly to evaluate programme performance across health institutions.

At the state level, programme performance is reviewed through periodic monitoring visits, data analysis, and coordination meetings involving the State NCD Cell, district officials, and technical partners.

6.9 Quality Assurance in NCD Services

Quality assurance mechanisms are implemented to ensure that NCD services are delivered according to established clinical and programme standards. These mechanisms include supportive supervision visits, periodic facility audits, and verification of data accuracy.

Healthcare providers are regularly trained and updated on clinical protocols and digital reporting systems to maintain consistency in service delivery. Quality assurance activities also involve patient feedback mechanisms that help identify gaps in service provision and improve patient satisfaction.

6.10 Evaluation and Impact Assessment

Evaluation activities are conducted periodically to assess the overall impact of the NCD programme on population health outcomes. These evaluations examine trends in disease prevalence, screening coverage, treatment outcomes, and complication rates.

Programme evaluation studies also analyse the effectiveness of behavioural change communication strategies, community engagement initiatives, and digital health interventions. Findings from these evaluations are used to refine programme strategies and guide future planning.

6.11 Administrative Monitoring for Senior Management

Senior health administrators require clear operational tools to monitor programme implementation across districts. Administrative monitoring frameworks include checklists that assess facility readiness, availability of trained staff, supply of medicines and diagnostics, and adherence to treatment protocols.

These administrative tools help senior officials quickly identify gaps in service delivery and implement corrective actions.

6.12 Emergency Protocols and NCD Stabilization

Healthcare facilities must be prepared to manage acute complications associated with non-communicable diseases. Emergency stabilization protocols are established for conditions such as **stroke, myocardial infarction, hypertensive crisis, and diabetic emergencies**.

Medical staff are trained to provide initial stabilization at primary and secondary healthcare facilities before referring patients to higher-level institutions when necessary. These protocols ensure timely management of life-threatening complications and reduce mortality associated with NCD emergencies.

CHAPTER 7

FINANCES AND PROGRAMME IMPLEMENTATION PLAN

Adequate financial allocation and efficient utilization of resources are essential for the successful implementation of the Non-Communicable Disease (NCD) control programme in Kerala. The programme is implemented through financial support from the **National Health Mission (NHM)** under the **National Programme for Prevention and Control of Non-Communicable Diseases (NP-NCD)**. Funding is provided through a combination of **central government assistance and state government contributions**, supplemented by additional allocations through state health programmes and local government institutions.

The financial framework of the NCD programme focuses on strengthening service delivery infrastructure, improving diagnostic capacity, ensuring the availability of medicines, supporting human resources, and promoting preventive and awareness activities.

7.1 Funding Mechanism of NP-NCD

The NP-NCD programme in India operates under the **NCD Flexi-Pool of the National Health Mission**. Under this mechanism, financial resources are allocated to states based on their Programme Implementation Plans (PIP), which outline proposed activities, infrastructure needs, and human resource requirements.

The Government of India provides financial assistance to states through a **cost-sharing arrangement**, where the central government contributes 60 percent of programme funding while the state government contributes 40 percent.

Funds are released in phases after approval of the state's Programme Implementation Plan. Once funds are released, the State Health Society manages implementation, monitoring expenditure, and submitting utilization certificates to the central government.

This flexible funding mechanism allows states to allocate resources across various programme components based on local health priorities.

7.2 Financial Flow and Fund Management Structure

The financial management structure for the NCD programme in Kerala follows a multi-tier system.

At the national level, the Ministry of Health and Family Welfare allocates funds under the NCD flexi-pool of NHM. These funds are transferred to the **State Health Society (NHM Kerala)** following approval of the Programme Implementation Plan.

At the state level, the Directorate of Health Services and the State NCD Cell coordinate programme planning and financial allocation. The State Health Society releases funds to district health societies for programme implementation.

At the district level, District Health Societies manage funds for NCD clinics, screening activities, training programmes, and public health interventions. Health institutions such as District Hospitals, Taluk Hospitals, and Family Health Centres utilize these funds for service delivery.

7.3 Major Components of NP-NCD Funding

Funding under the NCD programme in Kerala is allocated across several major programme components.

Table: Major Components of NP-NCD Funding

Component	Key Activities
Infrastructure	Establishment of NCD clinics, procurement of diagnostic equipment
Human Resources	Recruitment and training of healthcare personnel
Medicines	Procurement of antihypertensive and anti-diabetic drugs
Screening	Population-based screening using CBAC
IEC Activities	Awareness campaigns and health promotion

Table: Financial Flow of NP-NCD Programme

Level	Responsibility
Central Government	Approves PIP and releases funds
State Health Society	Allocates funds to districts
District Health Society	Implements programme activities
Health Facilities	Deliver screening, treatment, and follow-up services

7.3.1 Infrastructure Development

A significant portion of programme funding is used for strengthening healthcare infrastructure. This includes the establishment and upgrading of NCD clinics at district hospitals, community health centres, and primary health centres.

Infrastructure funding supports procurement of equipment such as digital blood pressure monitors, glucometers, spirometers, fundus cameras for retinopathy screening, and diagnostic laboratory equipment.

These investments enable early detection and management of NCDs at primary and secondary healthcare levels.

7.3.2 Human Resources and Capacity Building

Financial resources are allocated for recruitment and training of healthcare personnel involved in NCD service delivery. This includes medical officers, staff nurses, counsellors, laboratory technicians, and data entry operators.

Funds are also used to conduct training programmes on screening protocols, disease management guidelines, and digital health platforms such as SHAILI and the Public Health portal.

Capacity building is a continuous component of the programme, ensuring that healthcare workers remain updated on evolving clinical protocols and programme strategies.

7.3.3 Medicines and Diagnostic Services

The NCD programme ensures uninterrupted availability of essential medicines required for managing chronic diseases such as hypertension, diabetes, and cardiovascular conditions.

Funding supports procurement and distribution of antihypertensive drugs, oral hypoglycaemic agents, insulin, inhalers for respiratory diseases, and other essential medications.

Diagnostic services funded under the programme include laboratory tests such as blood glucose estimation, lipid profile testing, kidney function tests, and HbA1c testing.

7.3.4 Screening and Early Detection

A key focus of NP-NCD funding is population-based screening for common NCDs. Financial resources support household surveys, risk assessment using the Community Based Assessment Checklist (CBAC), and screening camps conducted at Janakeeya Arogya Kendrams and health facilities.

Screening activities are supported by community health workers such as ASHA workers and public health nurses, who play a vital role in identifying individuals at risk and facilitating early diagnosis.

7.3.5 Information, Education, and Communication (IEC)

Financial resources are also allocated for health promotion and awareness campaigns aimed at reducing risk factors associated with NCDs.

These activities include community awareness programmes, school health campaigns, workplace wellness initiatives, and mass media campaigns promoting healthy lifestyle behaviours such as balanced diet, physical activity, and tobacco cessation.

IEC activities form a critical component of the programme's preventive strategy.

7.4 Programme Implementation Plan in Kerala

The implementation of NP-NCD in Kerala is integrated with several state initiatives, including the **Aardram Mission and the Amrutham Aarogyam programme**, which aim to strengthen primary healthcare services.

The programme operates through a decentralized service delivery network consisting of district hospitals, taluk hospitals, community health centres, family health centres, and sub-centres.

Population-based screening programmes identify individuals at risk of NCDs, while specialized clinics at higher-level facilities provide diagnostic and treatment services for patients with confirmed conditions.

Digital health systems such as SHAILI and the Public Health portal enable real-time monitoring of programme activities and financial utilization.

7.5 Year-wise Financial Trends and Utilization

Financial trends indicate a steady increase in funding allocation for NCD programmes in Kerala as the burden of chronic diseases continues to rise. Increased funding has

supported expansion of screening activities, strengthening of diagnostic services, and establishment of specialized clinics for managing NCD complications.

Annual Programme Implementation Plans submitted by the state include detailed financial projections covering infrastructure, human resources, medicines, and awareness campaigns.

Monitoring of fund utilization is conducted through regular financial audits, review meetings, and submission of utilization certificates to the central government.

NHM Budget:

Fund Approved & Expenditure as per ROP under NHM (NP - NCD) 2021 - 26

Rupees in Lakhs

S.No.	Financial year	Approved	Expenditure	%	Remarks
1	2021 - 22	4250.92	1574.99	37	The fund allocation under NP - NCD Programme is for the management of major non communicable diseases like Diabetes, Hypertension, Cardiovascular Disease, Cancer, COPD and Stroke. The drug, Diagnostics, Equipment procurement, Awareness Activities, Training, Human Resources and management activities. HR positions supported under NHM are pooled for overall facility and system strengthening, and therefore no programme-wise HR component exists.
2	2022 - 23	7580.51	2400.31	32	
3	2023 - 24	5249.09	1224.32	23	
4	2024 - 25	5464.00	334.88	6	
5	2025 - 26	5391.56	2245.53	42	

State Planned Budget:

2020-21

Name of Scheme	Budget Out lay(lakhs)	Allotment(lakhs)	Expenditure(lakhs)
Prevention of Non Communicable Disease 2210-06-101-45	100	52.47	52.47
Cancer Care 2210-06-101-41	116.96	70.25	69.39
Pain& Palliative 2210-01-110-52	100	85.54	83.39

2021-22

Name of Scheme	Budget Out lay(lakhs)	Allotment(lakhs)	Expenditure(lakhs)
Prevention of Non-Communicable Disease 2210-06-101-45	400	392.14	392.14
Cancer Care 2210-06-101-41	160	151.73	151.73
Pain& Palliative 2210-01-110-52	60	56.77	56.74

2022-23

Name of Scheme	Budget Out lay(lakhs)	Allotment(lakhs)	Expenditure(lakhs)
Prevention of Non-Communicable Disease 2210-06-101-45	1000	307.53	294.33
Cancer Care 2210-06-101-41	250	76.52	76.4
Pain& Palliative 2210-01-110-52	100	32.69	32.65

2023-24

Name of Scheme	Budget Out lay(lakhs)	Allotment(lakhs)	Expenditure(lakhs)
Prevention of Non-Communicable Disease 2210-06-101-45	1000	651.45	630.87
Cancer Care 2210-06-101-41	250	138.75	107.22
Pain& Palliative 2210-01-110-52	100	46.96	41.73

2024-25

Name of Scheme	Budget Out lay(lakhs)	Allotment(lakhs)	Expenditure(lakhs)
Prevention of Non-Communicable Disease 2210-06-101-45	1193	472.04	471.21
Cancer Care 2210-06-101-41	250	99.55	99.19
Pain& Palliative 2210-01-110-52	200	94.43	93.96

2025-26

Name of Scheme	Budget Out lay(lakhs)	Allotment(lakhs)	Expenditure(lakhs)
Prevention of Non-Communicable Disease 2210-06-101-45	1293	436.88	435.25
Cancer Care 2210-06-101-41	250	85.24	84.64
Pain& Palliative 2210-01-110-52	400	132.43	131.94

7.6 Financial Accountability and Monitoring

Financial accountability is ensured through a structured monitoring system that tracks fund allocation, expenditure, and programme outputs.

The State Health Society maintains financial records and periodically reviews fund utilization across districts. District health societies submit expenditure reports and statements of expenditure to the state level.

Independent financial audits are conducted periodically to ensure transparency and efficient use of public resources.

7.7 Role of Local Self-Government Institutions

Local Self-Government Institutions (LSGIs) play an important role in supporting the NCD programme in Kerala. Panchayats and municipalities allocate funds for community health promotion activities, infrastructure improvements, and wellness initiatives such as open gyms and walking tracks.

The integration of local government funding with state and national programme resources strengthens the sustainability of NCD interventions at the community level.

CHAPTER 8

LINKAGES AND CONVERGENCE

The effective prevention and control of non-communicable diseases requires coordinated action across multiple sectors and programmes. In Kerala, the NCD programme operates through an integrated health system that brings together several departments, health programmes, and digital health platforms. The NCD Division within the Directorate of Health Services collaborates with national health programmes, state health initiatives, and external partners to ensure comprehensive service delivery.

The concept of convergence is based on the understanding that health outcomes are influenced by a wide range of social, behavioural, and environmental determinants. Therefore, the NCD programme in Kerala adopts a multi-sectoral approach that involves partnerships with departments responsible for education, local self-governance, social welfare, and digital governance. These collaborations enable the programme to address risk factors such as unhealthy diets, tobacco use, sedentary lifestyles, and environmental exposures.

Through coordinated planning and implementation, these linkages help strengthen prevention strategies, improve early detection of diseases, and enhance access to treatment services.

8.1 Multi-Sectoral Coordination

Kerala's health system emphasizes the importance of multi-sectoral collaboration for addressing the growing burden of non-communicable diseases. While the Health Department plays the central coordinating role, the programme relies heavily on the support of other sectors to implement preventive and promotive interventions.

Local Self-Government Institutions play an important role in supporting health promotion activities at the community level. Panchayats and municipalities allocate resources for wellness programmes, including the establishment of walking tracks, open gyms, and community exercise spaces. These initiatives are implemented under the broader framework of the Aardram Mission and contribute to promoting physical activity among the population.

The education sector is also actively involved in health promotion through school-based programmes that address risk factors such as childhood obesity and unhealthy dietary habits. Schools participate in health awareness campaigns and support regular health screening programmes for students.

The cooperation of these sectors strengthens the capacity of the health system to address the social determinants of health and ensures that preventive strategies reach the population effectively.

The NCD programme in Kerala operates through strong inter-programme and multi-sectoral convergence involving maternal health services, tuberculosis control programmes, digital health systems, local self-government institutions, and centralized procurement systems. The overall convergence framework is illustrated in Figure below.

What the diagram shows

The figure illustrates how the **Kerala NCD Programme connects with:**

- **National TB Elimination Programme** (TB–Diabetes screening)
- **Maternal Health Programme** (GDM screening and follow-up)
- **Ayushman Bharat Digital Mission / eHealth** (ABHA and digital records)
- **Local Self Government Institutions** (community health promotion)
- **KMSCL Procurement System** (drug and equipment supply)

8.2 TB–Diabetes Collaborative Activities

Tuberculosis and diabetes are closely linked diseases that pose significant public health challenges. Individuals with poorly controlled diabetes have a higher risk of developing tuberculosis, and diabetes can also worsen the outcomes of TB treatment.

Recognizing this relationship, Kerala has implemented a **bi-directional screening strategy** that integrates the activities of the NCD programme with the National Tuberculosis Elimination Programme.

Under this collaborative framework, all patients diagnosed with tuberculosis are screened for diabetes using blood glucose testing. Similarly, individuals attending NCD clinics who present with symptoms suggestive of tuberculosis, such as chronic cough, are screened for TB.

This integrated screening approach improves early detection of both diseases and helps prevent complications associated with delayed diagnosis. It also ensures better treatment outcomes by identifying patients who require additional clinical monitoring.

8.3 Maternal Health and NCD Linkage

Maternal health services provide an important opportunity to identify women at risk of developing non-communicable diseases later in life. Gestational Diabetes Mellitus is one of the most significant predictors of future Type 2 Diabetes among women.

In Kerala, screening for gestational diabetes is an integral component of antenatal care services. All pregnant women undergo an Oral Glucose Tolerance Test during the 24th to 28th week of pregnancy as part of routine maternal health screening.

Women diagnosed with gestational diabetes are closely monitored throughout pregnancy to ensure safe maternal and fetal outcomes. Following delivery, these women are enrolled in follow-up screening programmes through the state's e-health system. Regular monitoring allows early detection of progression to chronic diabetes and enables timely intervention through lifestyle modification and medical management.

This linkage between maternal health services and the NCD programme helps reduce the long-term risk of diabetes among women and contributes to the overall prevention strategy.

8.4 Ayushman Bharat Digital Mission and ABHA Integration

Digital health technologies play a central role in strengthening the integration of healthcare services in Kerala. The state has adopted the Ayushman Bharat Digital Mission framework to promote paperless and interoperable health records.

Under this system, every patient receiving NCD services is issued a **14-digit Ayushman Bharat Health Account (ABHA) identification number**. This unique digital identity enables healthcare providers to access patient records across different healthcare facilities.

The integration of ABHA with the state's eHealth platform allows seamless sharing of diagnostic reports, treatment records, and follow-up information. For example, laboratory reports generated by private diagnostic centres can be accessed by medical officers at government health facilities, ensuring continuity of care and reducing duplication of tests.

The adoption of digital health systems also supports better programme monitoring and facilitates the development of data-driven public health strategies.

8.5 The NCD Procurement and Supply Chain

An efficient procurement and supply chain system is essential to ensure uninterrupted availability of medicines and diagnostic supplies required for NCD management. The Government of Kerala has established a centralized procurement mechanism through the **Kerala Medical Services Corporation Limited (KMSCL)** to streamline the purchase and distribution of essential drugs and medical equipment.

All health institutions participating in the NCD programme place their medicine and equipment requests through the KMSCL online portal. Procurement planning is based on the previous year's consumption data, with an additional buffer stock maintained to prevent shortages.

KMSCL manages the procurement of essential medicines used in the treatment of hypertension, diabetes, cardiovascular diseases, and chronic respiratory diseases. Once procured, medicines are distributed to district warehouses and subsequently supplied to health facilities across the state.

For temperature-sensitive medicines such as insulin, strict cold chain protocols are maintained at health facilities. Storage units are equipped with temperature monitoring systems, and daily temperature logs are maintained to ensure drug stability and safety.

This centralized procurement system improves transparency, reduces procurement delays, and ensures consistent availability of essential medicines for patients receiving NCD treatment.

8.6 Role of External Partners and Technical Agencies

Kerala's NCD programme also benefits from the technical support of several national and international partners. Organizations such as the World Health Organization, academic institutions, and public health research agencies provide technical guidance on programme design, monitoring, and evaluation.

These partnerships support the introduction of innovative interventions such as digital health tools, artificial intelligence-based screening technologies, and advanced training programmes for healthcare workers.

Collaboration with these partners strengthens the state's capacity to implement evidence-based strategies for NCD prevention and control.

8.7 Convergence for Comprehensive Health Care

The convergence of multiple programmes and sectors enables Kerala to deliver integrated healthcare services that address both communicable and non-

communicable diseases. By linking NCD services with maternal health programmes, tuberculosis control activities, digital health initiatives, and community health programmes, the state ensures continuity of care across different stages of life.

This integrated approach not only improves health outcomes but also enhances the efficiency and sustainability of the healthcare system.

Annexure 1:

IHCI Hypertension Coverage :

District-wise performance		
District	Total DM Registrations	Proportion of estimated Diabetes patients registered (%)
Phase I districts		
Trivandrum	2,33,049	41.3
Thrissur	2,06,500	43.5
Kannur	1,45,285	47.4
Wayanad	60,852	46.2
Phase II districts		
Kollam	1,13,861	36
Allepey	1,23,348	40.9
Ernakulam	1,12,818	18.3
Kozhikode	65,028	16.7
Kasaragod	50,392	14.2
Pathanamthitta	39,022	13.3
Phase III districts		
Palakkad	67,064	12.1
Malappuram	50,230	8.9
Kotayyam	83,755	19.5
Idukki	4,308	2.1
Total	13,70,798	24.9

Annexure 2:

IHCI Diabetes Coverage :

District-wise performance		
District	Total DM Registrations	Proportion of estimated Diabetes patients registered (%)
Phase I districts		
Trivandrum	1,74,308	30.6
Thrissur	1,63,416	32.6
Kannur	94,132	28
Wayanad	33,605	44
Phase II districts		
Kollam	86,152	19.1
Allepey	83,707	27.1
Ernakulam	89,558	16.9
Kozhikode	36,528	15.9
Kasaragod	32,713	12.2
Pathanamthitta	33,199	14.2
Phase III districts		
Palakkad	55,426	15.2
Malappuram	36,832	8.5
Kotayyam	61,582	18
Idukki	3,788	2.7
Total	9,84,946	20.6

Annexure 3:

Annual Hypertension Outcome:

Annual report Hypertension, Kerala, 2025						
District	Total Registration	Controlled	Uncontrolled	MIVI	LTFU	Dead
Kasaragod	40720	17704	12079	4593	5880	464
Kannur	130779	50687	23208	14791	38295	3798
Wayanad	55205	19121	11289	4087	18951	1757
Kozhikode	52404	22617	16200	7498	5807	281
Malappuram	6936	2846	2706	1374	0	8
Thrissur	185745	61899	32701	23264	62122	5703
Palakkad	32814	14076	13988	4743	0	7
Ernakulam	42784	16382	15218	8927	1737	388
Kottayam	53875	24364	19729	9707	0	26
Idukki	1497	657	612	228	0	0
Alappuzha	131709	82839	22816	7893	14672	3489
Pathanamthitta	18015	8866	6919	2003	178	49
Kollam	72442	30207	22377	9868	8819	1388
Thiruvananthapuram	200155	63145	53116	39715	33541	6820
Total Kerala	1025080	415410	252958	138691	190002	24178

Annual report Hypertension, Kerala, 2025					
District	Controlled %	Uncontrolled %	MIVI %	LTFU %	Dead %
Kasaragod	43%	30%	11%	14%	1%
Kannur	39%	18%	11%	29%	3%
Wayanad	35%	20%	7%	34%	3%
Kozhikode	43%	31%	14%	11%	1%
Malappuram	41%	39%	20%	0%	0%
Thrissur	33%	18%	13%	33%	3%
Palakkad	43%	43%	14%	0%	0%
Ernakulam	38%	36%	21%	4%	1%
Kottayam	45%	37%	18%	0%	0%
Idukki	44%	41%	15%	0%	0%
Alappuzha	63%	17%	6%	11%	3%

Pathanamthitta	49%	38%	11%	1%	0%
Kollam	42%	31%	14%	12%	2%
Thiruvananthapuram	32%	27%	20%	17%	3%
Total Kerala	41%	25%	14%	19%	2%

Annexure 4:

Annual Diabetes Outcome:

Annual report Diabetes , Kerala, 2025						
District	Total Registration	Controlled	Uncontrolled	MIVI	LTFU	Dead
Kasaragod	24306	6950	6467	5982	4600	307
Kannur	79212	17454	16203	18205	25438	1912
Wayanad	31062	8265	5658	5559	10688	892
Kozhikode	21551	7975	5988	4092	3368	128
Malappuram	4366	850	985	2381	0	3
Thrissur	117489	25712	19970	23364	45698	2745
Palakkad	21350	7787	7604	5487	0	5
Ernakulam	31794	5972	6643	17010	1394	70
Kottayam	37085	12058	9123	14953		20
Idukki	1304	768	262	274	0	0
Alappuzha	72414	32913	12973	14010	7747	1880
Pathanamthitta	13529	5378	4829	3141	146	35
Kollam	52946	12766	12577	19426	7101	1075
Thiruvananthapuram	149395	30209	24955	61541	22719	5656
Total Kerala	657803	175057	134237	195425	128899	14728

Annual report Diabetes , Kerala, 2025					
District	Controlled %	Uncontrolled %	MIVI %	LTFU %	Dead %
Kasaragod	29%	27%	25%	19%	1%
Kannur	22%	20%	23%	32%	2%
Wayanad	27%	18%	18%	34%	3%
Kozhikode	37%	28%	19%	16%	1%
Malappuram	19%	23%	55%	0%	0%
Thrissur	22%	17%	20%	39%	2%
Palakkad	36%	36%	26%	0%	0%
Ernakulam	19%	21%	54%	4%	0%
Kottayam	33%	25%	40%	0%	0%
Idukki	59%	20%	21%	0%	0%

Alappuzha	45%	18%	19%	11%	3%
Pathanamthitta	40%	36%	23%	1%	0%
Kollam	24%	24%	37%	13%	2%
Thiruvananthapuram	20%	17%	41%	15%	4%
Total Kerala	27%	20%	30%	20%	2%

WHO NCD Consultants & WHO field Consultants in Kerala		
District	WHO NCD Consultants (2)	STS (8)
Trivandrum	1 WHO NCD State Consultant (Trivandrum) 1 WHO NCD Consultant (Thrissur)	1
Kollam		
Allepey		1
Pathanamthitta		
Thrissur		1
Ernakulam		1
kottayam		
Idukki		
Kannur		1
Kasaragod		
Palakkad		1
Wayanad		
Kozhikode		1
Malappuram		1

Annexure 5:

List of Chemotherapy Centres

District	Sl.No.	Name of Hospital
Thiruvananthapuram	1	GH Thiruvananthapuram
	2	DH Nedumangadu
Kollam	3	DH Kollam
	4	THQH, Punalur
	5	TH Karunagappally
Pathanamthitta	6	DH Kozhenchery
Alappuzha	7	GH Alappuzha
	8	DH Mavelikkara
Kottayam	9	GH Pala
	10	DH Kottayam
Idukki	11	DH Thodupuzha
Ernakulam	12	GH Ernakulam
	13	GH Muvattupuzha
Thrissur	14	GH Thrissur
	15	THQH Irinjalakkuda
	16	THQH Kodungallur
Palakkad	17	DH Palakkad
	18	THQH Ottapalam
Malappuram	19	DH Tirur
	20	DH Nilambur

	21	Seethi Haji Cancer Care Unit, Edavanna
Kozhikode	22	Beach Hospital
Wayanad	23	Tribal Hospital, Nalloornadu,
	24	THQH Sulthan Bathery
Kannur	25	DH Kannur
	26	GH Thalassery
	27	W & C Mangattuparamba
Kasargode	28	DH Kanhangad

Annexure 6:

List of Stroke units in various District Hospitals in Kerala

Sl No	District	Institution
1	Thiruvananthapuram	GH Trivandrum
2	Kollam	DH Kollam
3	Pathanamthitta	GH Pathanamthitta
4	Kottayam	GH Kottayam
5	Idukki	DH Thodupuzha
6	Ernakulam	GH Ernakulam
7	Thrissur	GH Thrissur
8	Palakkad	DH Palakkad
9	Malappuram	DH Tirur
10	Kozhikode	GH Kozhikode
11	Kannur	DH Kannur
12	Kasaragod	GH Kanjangad

CATH LAB

Sl. No	District	Institution
1	Trivandrum	GH Trivandrum
2	Kollam	DH Kollam
3	Pathanamthitta	GH Pathanamthitta
4	Kottayam	DH Kottayam
5	Eranakulam	GH Eranakulam
6	Thrissur	GH Thrissur
7	Palakkad	DH Palakkad
8	Malappuram	DH Nilambur
9	Kozhikode	DH Vadakara
10	Wayanad	DH Mananthavady
11	Kannur	DH Kannur
12	Kasargod	DH Kanhangad

Annexure 7:

Dialysis Centres

Name of Districts	Total No. of functional Dialysis centres	Total No. of functional Dialysis Machines
Trivandrum	11	110
Kollam	9	120
Pathanamthitta	5	42
Alappuzha	6	71
Kottayam	5	38
Idukki	4	46
Ernakulam	11	174
Thrissur	11	111
Palakkad	9	80
Malappuram	11	130
Kozhikode	8	126
Wayanad	5	44
Kannur	11	133
Kasargod	8	72
14	114	1297

Annexure 8:

Institution wise Dialysis

District	SI No	Name of Institution	Total No of Dialysis Machine - Functional
Trivandrum	1	GH Neyyattinkara	25
	2	TH Fort	7
	3	GH Trivandrum	10
	4	TH Parassala	6
	5	THQH Chirayinkeezhu	8
	6	DH Nedumangadu	10
	7	THQH Attingal	14
	8	TH Varkala	10
	9	DMH Peroorkada	7
	10	THQH Malayinkeezhu	7
	11	MCH Trivandrum	
	12	TH Vithura	5
Kollam	12	DH Kollam	32
	13	THQH Punalur	29
	14	THQH Karunagappally	6
	15	TH Neendakara	5
	16	THQH Kottarakara	12
	17	THQH Kadakkal	13
	18	THQH Sasthamkotta	7
	20	TH Nedungolam	11
	21	TH Kundara	7

		MCH Parippally	
Pathanamthitta	21	GH Pathanamthitta	6
	22	DH Kozhencherry	11
	23	GH Adoor	6
	24	THQH Ranni	14
	25	THQH Thiruvalla	5
Alappuzha	26	GH Alappuzha	11
	27	TH Thuravoor	14
	28	THQH Harippad	
	29	THQH Kayamkulam	15
	30	THQH Cherthala	11
	31	DH Mavelikara	13
	32	DH Chengannur	
		MCH Alappuzha	
Kottayam	34	DH Kottayam	9
	35	PHC Erattupetta	5
	36	THQH Vaikom	7
	37	GH Pala	9
	38	KRNMS Hospital Uzhavoor	8
	39	MCH Kottayam	
Idukki	40	DH Thodupuzha	15
	41	DH Idukki	12
	42	THQH Kattappana	11
		THQH Adimali	5
Ernakulam	43	GH Ernakulam	54

	44	DH Aluva	25
	45	THQH Perumbavoor	10
	46	THQH Fortkochi	12
	47	THQH North paravoor	13
	48	THQH Piravom	8
	49	GH Muvattupuzha	6
	50	MCH Ernakulam	19
	51	THQH.Tripunithura	6
	52	TH Angamaly	7
	53	TH Palluruthy	10
Thrissur	54	THQH Kodungallur	16
	55	GH Thrissur	5
	56	THQH Chalakkudy	12
	57	THQH Chavakkad	10
	58	TH Kunnankulam	11
	59	TH Pudukkad	8
	60	DH Wadakkanchery	6
	61	CHC Mala	8
	62	TH Chelakkara	4
	63	CHC Tholur	8
	64	MCH Thrissur	20
Palakkad	65	DH Palakad	20
	66	THQH Ottappalam	20
	67	CHC Chalissery	4
	68	THQH Mannarkad	11

	69	GTSH Kottathara	4
	70	THQH Chittoor	4
	71	THQH Alathur	5
	72	CHC Shornur	4
	73	THQH Pattambi	8
Malappuram	74	DH Nilambur	14
	75	DH Tirur	20
	76	THQH Tirurangadi	16
	77	THQH Ponnani	25
	78	TH Wandoor	3
	79	CHC Maranchery	7
	80	CHC Chungathara	16
	81	CHC valavannur	6
	82	PHC Tanalur	7
	83	MCH Manjery	8
	84	DH Perinthalmanna	8
Kozhikode	85	GGH Kozhikode	11
	86	TH Perambra	19
	87	DH Vadakara	40
	88	Th Thamarassery	13
	89	TH Ferokke	8
	90	TH Balussery	13
	91	THQH Koyilandy	10
	92	TH Kuttiady	12
	93	MCH Kozhikkode	

Wayanad	94	DH Mananthavady	17
	95	THQH Vythiri	4
	96	CHC Panamaram	6
	97	THQH Sulthanbathery	10
	98	CHC Nallooradu	7
Kannur	99	DH Kannur	20
	100	GH Thalassery	16
	101	Urban Dialysis Centre Mattannur	11
	102	TH Kuthuparamba	10
	103	TH Payangadi	8
	104	THQH Thaliparamba	10
	105	TH Peravoor	7
	106	TH Iritty	10
	107	MCH Pariyaram	21
	108	Urban Dialysis Centre Edakkad	6
	109	TH Payyannur	11
Kasaragod	110	GH Kasargode	14
	111	DH Kanhangad	14
	112	TH Trikkaripur	7
	113	TH Mangalpady	12
	114	CHC Periya	8
	115	TH Nileshtar	6
	116	Taluk Hospital Poodamkallu	10
	117	CHC MuliyaF	9

Annexure 9:

CAPD services

District	Total number of CAPD Patients
Trivandrum	85
Kollam	46
Pathanamthitta	28
Alappuzha	32
Kottayam	173
Idukki	15
Eranakulam	207
Thrissur	45
Palakkad	14
Malappuram	128
Kozhikode	29
Wayanad	38
Kannur	7
Kasaragod	10
Total	857

Annexure 10:

Haemodialysis Services Report			
S.No.	Name of Districts	Cumulative No. of Patients registered (from Jan 2020)	Cumulative No. of Dialysis sessions held (from Jan 2020)
1	Trivandrum	19193	235920
2	Kollam	31892	390763
3	Pathanamthitta	12197	172481
4	Alappuzha	19874	227277
5	Kottayam	5009	74204
6	Idukki	3660	62924
7	Ernakulam	28354	391600
8	Thrissur	12695	217636
9	Palakkad	16346	261168
10	Malappuram	23232	396594
11	Kozhikkode	17044	324922
12	Wayanad	11046	148006
13	Kannur	34075	479266
14	Kasargode	8972	132372
	Total	243589	3515133