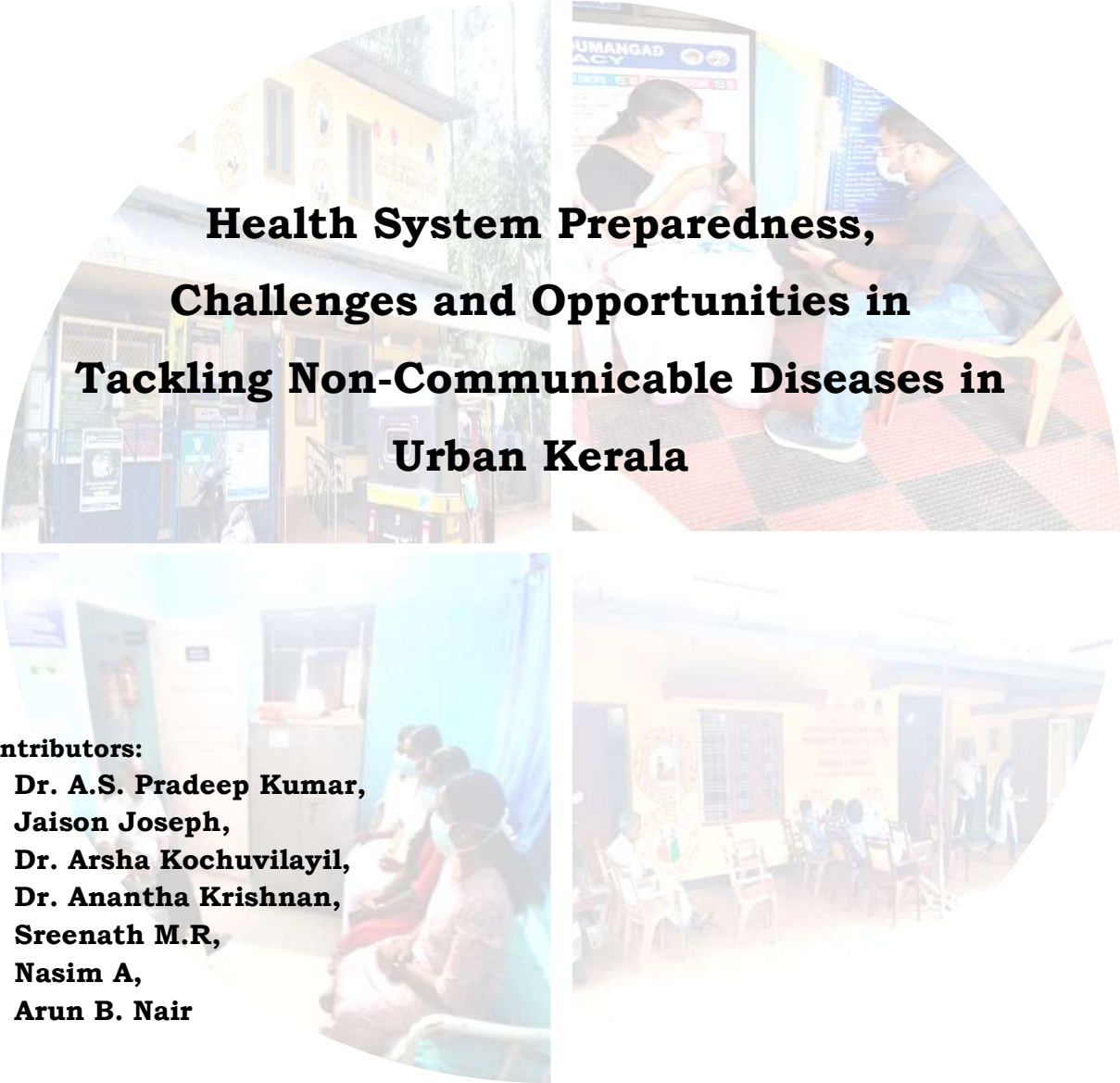




Health System Preparedness, Challenges and Opportunities in Tackling Non-Communicable Diseases in Urban Kerala

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List of Abbreviations

AAAQ	Availability, Accessibility, Acceptability, and Quality
AIIMS	All India Institute of Medical Sciences
ANMOL	Android-based mobile application for Auxiliary Nurse Midwives
APL	Above Poverty Line
ASHA	Accredited Social Health Activist
ASWAAS	Assurance (Mental health support)
BP	Blood Pressure
BPL	Below Poverty Line
BMI	Body Mass Index
CAD	Coronary Artery Disease
CAPD	Continuous Ambulatory Peritoneal Dialysis
CBAC	Community-Based Assessment Checklist
CHC	Community Health Centre
CHE	Catastrophic Health Expenditure
CI	Confidence Interval
CKD	Chronic Kidney Disease
CMC	Christian Medical College
COPD	Chronic Obstructive Pulmonary Disease
COTPA	Cigarette and Tobacco Product Act 2003
CRD	Chronic Respiratory Disease
CT	Computed Tomography
CVD	Cardiovascular Disease
DALY	Disability Adjusted Life Years
DH	District Hospital
DMO	District Medical Officer
DMHP	District Mental Health Programme
DMS	Drug Management System
DVDMS	Drug and Vaccine Distribution Management System
ECG	Electrocardiogram
e-health	Electronic Health
EIU	Economist Intelligence Unit
EKL	Ernakulam (district)
ESR	Erythrocyte Sedimentation Rate

FBS	Fasting Blood Sugar
FC	Financial commission
FHC	Family Health Centre
GCT	Glucose Challenge Test
GH	General Hospital
Hb	Haemoglobin
HbA1c	Glycated Haemoglobin
HDI	Human Development Index
HDL	High-Density Lipoprotein
HMC	Health Management Committee
HWC	Health and Wellness Centre
ICMR INDIAD	Indian Council of Medical Research - India Diabetes Study
ICU	Intensive Care Unit
IDK	Idukki (district)
IDSP	Integrated Disease Surveillance Programme
IEC	Information, Education, and Communication
IHCI	India Hypertension Control Initiative
INR	Indian Rupee
IPHS	Indian Public Health Standards
JPHN	Junior Public Health Nurse
KNR	Kannur (district)
KMSCL	Kerala Medical Services Corporation Ltd
LFT	Liver Function Test
LHV	Lady Health Visitor
LSGD	Local Self-Government Department
MAS	Mahila Arogya Samiti
M&E	Monitoring and Evaluation
MO	Medical Officer
NFHS	National Family Health Survey
NHM	National Health Mission
NUHM	National Urban Health Mission
OP	Outpatient
OPD	Outpatient Department
OOPE	Out-Of-Pocket Expenditure
OTP	One-Time Password

PA SYSTEM	Public Address System
PCV	Packed Cell Volume
PHC	Primary Health Centre
PHQ9	Patient Health Questionnaire-9
PM	Post Meridian (afternoon time)
PPBS	Postprandial Blood Sugar
PTA	Pathanamthitta (district)
RBS	Random Blood Sugar
RFT	Renal Function Test
RMNCH+A	Reproductive, Maternal, Newborn, Child and Adolescent Health
SDG	Sustainable Development Goals
SIRAS	Stroke Identification, Rehabilitation Awareness and Stabilization Programme
SN	Staff Nurse
SWAAS	Stepwise Approach to Airway Syndromes
TVM	Thiruvananthapuram (district)
UHID	Unique Health Identification
UHC	Urban Health and Wellness Centre
UN	United Nations
UPHC	Urban Primary Health Centre
ULBs	Urban Local Bodies
US	United States
WYD	Wayanad (district)
X-ray	X-ray (Radiography)

Executive Summary

Kerala, the most urbanised state in India, with nearly 48% of its population residing in urban areas, is undergoing a significant epidemiologic and socio-demographic transition. While urbanisation has facilitated economic advancement and infrastructure development, it has also precipitated a range of complex, systemic challenges. These include unplanned urban expansion, overcrowding, environmental degradation, inadequate housing, and overstretched public health infrastructure, particularly in marginalised communities such as slum dwellers and migrant populations. These groups frequently experience poor living conditions, limited access to clean water and sanitation, and restricted availability of quality healthcare services, placing them at heightened risk of disease and poor health outcomes.

One of the most critical consequences of rapid urbanisation is the escalating burden of non-communicable diseases (NCDs), driven by an interplay of behavioural, environmental, and socio-economic risk factors. Urban lifestyles characterised by physical inactivity, unhealthy diets, tobacco and alcohol consumption, chronic stress, and exposure to pollution have resulted in a marked increase in hypertension, diabetes, cardiovascular disease, obesity, and other chronic conditions. Kerala now bears one of the highest burdens of NCDs in the country, with urban population disproportionately affected due to greater exposure to these risks. Although rural areas are increasingly exhibiting similar patterns of disease due to lifestyle convergence, the prevalence and impact of NCDs remain significantly higher in urban settings. A notable disparity exists between rural and urban health governance in Kerala. Rural areas primarily benefit from the active involvement of Local Self-Governments (LSGs) in health planning and service delivery. In contrast, Urban Local Bodies (ULBs) often play a minimal role in urban health, leading to fragmented service provision and weaker community engagement. Moreover, disparities in access, affordability, and continuity of care exacerbate these outcomes among urban vulnerable population.

Under the framework of the National Urban Health Mission (NUHM), Kerala has made notable strides in strengthening its urban primary healthcare system to address the needs of its rapidly urbanising population. The state currently operates a network of 104 Urban Primary Health Centres (UPHCs), supported by 9 Urban Community Health Centres (UCHCs) and 142 Urban Health and Wellness Centres (UHCs), which serve as critical nodes in the delivery of comprehensive primary care. These facilities are staffed by a multidisciplinary team, including medical officers, nurses, pharmacists, laboratory technicians, public health nurses, and community health workers, ensuring essential service provision at the primary level. The service package delivered through UPHCs and UHCs has been significantly expanded to include NCD screening and management, reproductive and child health services, mental health support, elderly care, and communicable disease control. Kerala has been a frontrunner in rolling out public health interventions targeting NCDs, notably the India Hypertension Control Initiative (IHCI), opportunistic cancer screening (including breast, cervical, and oral cancers), the Shaili screening programme for early detection of lifestyle diseases, and community-based mental health screening initiatives. These services are increasingly integrated within the routine functions of UPHCs, contributing to early diagnosis, treatment adherence, and long-term disease management. Utilisation of UPHC services in Kerala has steadily increased post-pandemic, with significant engagement observed among women, the elderly, and economically vulnerable populations.

One of the core program areas under the NUHM is the strengthening of service delivery systems to address the growing burden of NCDs. As part of this effort, UPHCs and UHCs have been expanded to ensure the provision of essential NCD services. While an expanded package of NCD services have been introduced under urban healthcare system, there remains limited evidence regarding their effectiveness, utilisation, and community perception, especially within urban settings in Kerala. Our research study aimed at systematically assessing the role of UPHCs in the delivery of NCD care in urban Kerala, evaluated their operational readiness, and identified

opportunities for strengthening urban health systems in alignment with Universal Health Coverage (UHC) and the Sustainable Development Goals (SDGs).

A mixed-method explanatory sequential design was adopted, beginning with a quantitative cross-sectional survey of 491 NCD patients attending OPD services across 12 randomly selected UPHCs in six districts representing Kerala's southern, central, and northern regions. Simultaneously, facility assessments were conducted using a structured checklist to evaluate infrastructure, human resources, and service readiness. In the second phase, 47 In-depth Interviews (IDIs) and 17 Focus Group Discussions (FGDs) were conducted with healthcare providers, ASHAs, local self-government representatives, and NUHM district officials to explore perceptions, implementation challenges, and service delivery enablers. This study aimed to: (1) evaluate the role of UPHCs in delivering NCD services; (2) assess the availability of infrastructure, medicines, and human resources; (3) examine patterns of service utilisation and equity; (4) assess provider readiness and training; (5) understand patient experiences and satisfaction; and (6) explore the perspectives of elected representatives on the governance and delivery of urban NCD care. Data analysis was guided by the Availability, Accessibility, Acceptability, and Quality (AAAQ) framework, which enabled a systematic examination of service utilisation factors. Quantitative data were analysed using Jamovi (v2.3.28) for descriptive statistics, while qualitative transcripts were coded inductively using ATLAS.ti (v25.0.1), with themes developed through collaborative consensus. Findings from both data sources were triangulated to enhance validity and provide a comprehensive understanding of NCD service delivery in Kerala's urban primary health system

The findings revealed that UPHCs were physically accessible to most of the urban population, particularly benefiting women (65%), elderly individuals (66.8%), those from low-income groups (54%), and individuals engaged in the informal sector and unemployed, including homemakers and the self-employed. However, utilisation was notably lower among working men,

younger populations, and middle-income groups. In geographically vulnerable districts and where UPHCs located on the periphery of urban catchment areas, physical access was further limited due to inadequate public transportation and challenging terrain.

In terms of availability, most UPHCs were adequately staffed and equipped with essential infrastructure and basic diagnostic services. The presence of specialist clinics and outreach services in selected centres contributed to enhanced service utilisation. However, the intermittent availability of NCD medicines, notably insulin, antihypertensives, and respiratory drugs, undermined continuity of care. These shortages were attributed to issues in procurement planning, supply chain inefficiencies, and an unexpected surge in demand for NCD medicines post-COVID-19, emphasising the need for improved forecasting and buffer stock mechanisms. Select UPHCs offering additional services such as dietetics, physiotherapy, dental, and optometry care saw higher engagement, indicating the value of integrated service packages in addressing the broader needs of NCD patients.

On acceptability, overall, users reported positive perceptions of UPHCs. A high proportion rated staff behaviour (96.1%), laboratory services (85.9%), facility amenities (81.3%), and medicine availability (95.1%) as good. Free services were a major driver of utilisation across genders, with more women than men citing free medicines (95.1%) treatment (92.6%), and testing (95.1%) as key reasons for choosing UPHCs. However, stigma, privacy concerns, and cultural beliefs around diet and disease impacted service acceptability among certain population groups. Additionally, mistrust in the quality and effectiveness of government-supplied medicines, especially among the educated and middle-class segments, influenced their preference for private sector care, thereby disrupting long-term treatment adherence from the public sector.

Regarding quality, while some facilities maintained good practices, many lacked advanced diagnostics, structured follow-up, and regular NCD capacity building. Weak referral systems limited digital health use, and slow roll-out of Shaili contributed to care gaps and loss to follow-up. Perceived

poor medicine quality in the public system was common, often linked to lower initial doses per treatment protocols compared to private providers.

Medicine shortages were often managed through local procurement using funds allocated by the National Health Mission (NHM) to Hospital Management Committees (HMCs), which approved and oversaw purchases when items were unavailable through the Kerala Medical Services Corporation Ltd. (KMSCL). HMCs met at least three times a year to address facility-level issues and support minor hospital improvements, including sanitation. The role of Urban Local Bodies (ULBs) in supporting NCD care remained minimal, with most activities limited to administrative functions such as public events or inaugurations, and only a few facilities reporting consistent operational support. A notable gap was weak community engagement in urban areas with UPHCs largely functioning as stand-alone clinics without public health outreach or field activities, unlike rural sub-centres. Urban ASHAs in Kerala were linked to urban PHCs, but their integration into NCD follow-up and continuity of care was limited, contributing to weaker urban community linkages compared to rural settings.

Findings from the study indicate that enhancing NCD care through Urban Primary Health Centres (UPHCs) in Kerala will require a comprehensive and coordinated approach addressing various dimensions of service delivery.

- Improving access and availability of essential health services remains a priority in addressing urban health needs. This can be achieved through mapping underserved urban areas and redrawing the urban health landscape based on population norms, can help better target interventions.
- Expanding community linkages and non-health center-based initiatives, including engaging the private sector and leveraging public health insurance mechanisms, could enhance service coverage and equity.

- Ensuring consistent availability of essential medicines is critical. Strengthening and streamlining the procurement system through reinforcing centralized supply chains, while allocating dedicated tied funds at the start of each financial year, may enable timely local purchases by Urban Local Bodies (ULBs) or Hospital Management Committees (HMCs).
- Establishing standing or framework contracts could further improve transparency and responsiveness, particularly during stockouts.
- Updating clinical treatment protocols and expanding the essential medicines list in line with the latest evidence for conditions such as diabetes, hypertension, and chronic respiratory diseases may enhance treatment outcomes. This process can benefit from state-level clinical expert panels to ensure consistency and quality of care.
- Addressing workforce challenges is key to building a resilient health system. Bridging human resource gaps through performance-linked incentives, flexible staff deployment, and engaging retired medical professionals especially in hard-to-reach urban areas may improve service delivery.
- Supporting capacity-building through structured, role-specific training, use of digital learning platforms like Learning Management Systems (LMS) and institutionalizing regular in-house development sessions at urban primary health centers (UPHCs) will foster continuous professional growth.
- Improving patient follow-up and retention could be supported by digital platforms such as the e-Health system and the Shaili app, alongside proactive phone-based outreach and community-level engagement, particularly for high-risk groups.
- Promoting greater inter-sectoral collaboration can support health promotion and prevention efforts. ULBs have a potential role in health planning, public awareness campaigns, and enforcement of public health regulations such as tobacco control. They might also facilitate

access by supporting transport solutions for elderly and mobility-impaired individuals.

- Expanding the Aardram Mission to fully integrate urban health services is important for delivering equitable, people-centered care. Prioritizing comprehensive prevention, screening, and long-term management of non-communicable diseases within this framework would help align efforts with Universal Health Coverage (UHC) and Sustainable Development Goals (SDGs).

In conclusion, UPHCs in Kerala play a pivotal role in delivering essential NCD care to diverse urban populations, particularly vulnerable groups. Despite notable achievements in accessibility and patient satisfaction, challenges remain in ensuring uninterrupted medicine supply, updating treatment protocols, expanding outreach, and strengthening workforce capacity. Addressing these gaps through streamlined procurement, enhanced training, digital innovations, and robust inter-sectoral collaboration is crucial. ULBs have an important role to play in facilitating community engagement and actively participating in health planning and public health initiatives. Furthermore, fully realising the potential of the Aardram Mission in urban areas will be instrumental in advancing equitable, high-quality NCD services. These strategic interventions are vital to achieving Kerala's commitment to UHC and SDGs, ultimately improving health outcomes for its rapidly urbanising population.

Chapter 1: Background

Non -Communicable Diseases (NCDs) are chronic medical conditions that have multiple etiology, prolonged course and slow progress leading to functional impairment, disability, or death. Modifiable behaviours, such as tobacco use, physical inactivity, unhealthy diet and the harmful use of alcohol, air pollution, all increase the risk of NCDs. In global health agenda, NCDs have relatively high priority.

Global Burden of Non -Communicable Diseases (NCDs)

NCDs encompassing a broader spectrum of condition such as cancers, cardiovascular illnesses, and metabolic disorders, have emerged as the leading contributors to global morbidity and mortality. In 2021, NCDs caused nearly 18 million premature deaths worldwide (<70 years), of which , 82 % of these deaths were in Low and Middle Income Countries (LMICs)[1]. Cardiovascular diseases, cancer, chronic respiratory diseases, and diabetes accounted for most of these deaths. Together, they contributed to 80% of all premature mortality. These figures underscore the urgent global and national need for action.

Burden of NCDs in India

Like many other developing countries, India is undergoing an epidemiological shift, marked by rising burden of NCDs (see Table 1), due to rapid urbanization, lifestyle changes, and an aging population. The major NCDs in India include cardiovascular diseases, chronic respiratory diseases, cancers, and diabetes, accounting for most NCD-related illness and death[2]. Cardiovascular diseases lead with about 45% of NCD deaths, followed by chronic respiratory diseases, cancers, and diabetes. Other common conditions include dementia, hypertension, obesity, and overweight. The burden of CVD risk factors in India is high, comparable to that of High Income Countries (HMICs) and disproportionately affects younger adults and urban population [3]. In 2017-18, urban areas reported higher rates of NCD-related co-morbidities than rural areas, with 10.9% vs.

8% for two NCDs and 3.4% vs. 2.4% for three NCDs. Data from the Longitudinal Aging Study in India (LASI) , also shows that multimorbidity among adults aged 45 and above is more prevalent in urban settings[4], highlighting the urgent need to strengthen NCD services in urban areas.

Table 1: Prevalence and Burden of Top NCD Conditions in India

No.	Condition	Prevalence/Rate
1	Diabetes	11.4 % [5]
2	Hypertension	35.5 % [5]
3	Hypercholesterolemia	24.0 % [5]
4	Dyslipidaemia	81.2 % [5]
5	Chronic Kidney Diseases (CKD)	140.2 million adults living with CKD [6]
6	Cancer burden	1908 Disability-Adjusted Life Year (DALY)s (Adjusted) (2016)[7]
7	Cancer burden projected	29.8 DALYs (Adjusted) (2025)[7]
8	Stroke incidence rate	88 per 100,000 population [8]
9	Stroke death rate	55 per 100,000 population [8]
10	Stroke DALY rate	1374 per 100,000 population [8]

In India, the rising burden of NCDs not only strains the health system but also drives many households into financial hardship. Around 34.9% of Indian households experience catastrophic health expenses due to NCD-related treatment, affecting the economically disadvantaged segments[9]. These high out-of-pocket expenditures often push vulnerable households into deeper poverty, especially in urban areas where healthcare services are more expensive. If the current trend continues, the economic impact of NCDs (excluding mental health conditions) is projected to reach a \$ 3.55 trillion USD (INR ~311) in India by 20230 [10].

Understanding the NCD Landscape in Kerala

The South Indian state of Kerala stands out in India's health landscape with a higher burden of NCDs compared to many other states. While Kerala has

made notable strides in improving key health indicators such as life expectancy and maternal and child health, it now faces a steep rise in NCDs like diabetes, cardiovascular diseases, cancer, and hypertension (see Table 2). This elevated NCD burden is partly due to Kerala's aging population, urbanization, and lifestyle changes, which are more advanced compared to other states. Thus, Kerala is at the forefront of India's epidemiological transition. Kerala faces a growing burden of NCDs, with significant risk factors contributing to their prevalence. According to NFHS-5, hypertension is more common among men aged 15–49 than women in the same group. Additionally, 18% of men use tobacco and 26% consume alcohol, compared to minimal use among women [11]. The National Cancer Registry Report 2020 shows that Kerala accounts for 11.1% of all cancers in India, with lung cancer most common among men, and breast cancer among women [13,14]. The incidence of thyroid cancer also rose sharply between 2012–2016, particularly in Thiruvananthapuram and Kollam districts [11].

Table 2: Burden of NCDs in Kerala

Condition	Statistic
Diabetes prevalence (self-reported, age 15–49)	Women: 4,081 per 100,000, Men: 3,987 per 100,000 [11]
Heart disease prevalence (age 15–49)	Women: 777 per 100,000, Men: 516 per 100,000[11]
Cancer prevalence (age 15–49)	Women: 192 per 100,000, Men: 277 per 100,000[11]
Mean CVD risk prevalence	19.50%[12]
Stroke incidence (2021)	145 per 100,000[8]
Stroke mortality (2021)	98 per 100,000[8]
DALY rate for stroke (2021)	2,037 per 100,000[8]

The NCD burden is exacerbated by high fasting plasma glucose, elevated blood pressure, and abdominal obesity, along with unhealthy behaviours such as smoking, alcohol use, and excessive salt intake [15]. Among adolescents and young adults, lifestyle risk factors include physical inactivity, junk food consumption, low fruit and vegetable intake, and tobacco use [16,17]. The ICMR–INDIAB 2017 study revealed a high prevalence of cardiometabolic risk factors (see Table 3) in Kerala, with a

diabetic-to-prediabetic ratio of 1:0.7, indicating widespread poor glycaemic control and a substantial burden of undiagnosed prediabetes [18].

Table 3: Prevalence of Cardio metabolic Risk Factors in Kerala

No.	Condition	Prevalence
1	Diabetes	25.5 (17.4–33.7)
2	Prediabetes	18.3 (10.4–26.2)
3	Hypertension	47.6 (38.2–56.9)
4	Generalized obesity	45.6 (35.4–55.9)
5	Abdominal Obesity	58.9(49.5-69.3)
6	Low high-density lipoprotein (HDL) cholesterol	67.6 (48.4–85.6)
7	High low-density lipoprotein (LDL) cholesterol	52.1 (31.9–72.7)

NCD Service Delivery and Utilization in Kerala

Beyond the regular health care service UPHCs in Kerala are actively implementing state-specific initiatives like Amrutham Arogyam initiative under the National Program for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases & Stroke (NPCDCS), providing comprehensive NCD screening and care for individuals aged 30 and above. As of June 2025, around 1.8 crore people have been screened, with 43.5% showing high risk based on the Community-Based Assessment Checklist (CBAC)[25]. Specialized programs such as SWAAS for COPD, ASWAAS for depression screening, and Continuous Ambulatory Peritoneal Dialysis (CAPD) clinics are being rolled out in phased manner through the UPHCs. Cancer screening clinics focus on early detection of breast, oral, and cervical cancers, while the Stroke Identification, Rehabilitation Awareness and Stabilization Programme (SIRAS) improves stroke care with dedicated ICUs and tele-radiology support. Additionally, initiatives like Padasparsam (foot care), Nayanamrutham (retinopathy screening), and Mittayi (insulin supply) are also being operationalized through the UPHCs. ASHAs use the Shaili app for population-based risk assessments, enabling early detection and timely referrals. The Integrated Hypertension and Diabetes Control Initiative (IHCI) complements these efforts by in few of the districts ensuring continuous

follow-up, significantly improving hypertension control rates from 13% to 38.1%, thus strengthening Kerala's overall NCD management framework.

Despite Kerala's robust public health infrastructure, there remains a strong preference for private healthcare services for NCD management [26]. A cross-sectional study in North Kerala by Mathew and Olickal (2023) found that only 55.3% of individuals utilized NCD services at Family Health Centres (FHCs), with higher use for hypertension (54%), followed by diabetes (37.5%), and cardiovascular diseases (7.2%) [27]. Limited awareness of services, distance, and preference for private care were key reasons for low utilization. Another qualitative study identified enabling factors like staff attitude, evening clinics, and good infrastructure, while barriers included staff shortages, medicine unavailability, and poor awareness of services [28]. Control rates for diabetes and hypertension remain low at 15% and 12% respectively [15], largely due to poor monitoring, inadequate follow-up, and delayed treatment adjustments despite the presence of NCD control cells in all districts. Additionally, financial burden from NCD care is significant. Kerala reported the highest levels of economic hardship from NCD-related treatment costs: 17.4% of households fell into poverty in 2014, rising to 20.7% in 2017–18, and 47% faced catastrophic expenses from NCD hospitalizations in 2019. The share of households incurring catastrophic health expenditure in 2017–18 was 61.22% [9].

Urban Health Mission and NCD Services in Urban Areas

Kerala is witnessing rapid urbanization, with nearly 48% of the population living in urban areas [19]. The state's unique urban–rural continuum and growing cities bring challenges, especially for migrants and slum dwellers, who face increased NCD risks due to poor living conditions, limited services, and socioeconomic vulnerabilities. Studies in the state have shown that despite a relatively strong health infrastructure, urban poor populations often delay seeking care for NCDs due to out-of-pocket costs, lack of awareness, fear of diagnosis, and low trust in public facilities [20,21].

To address these challenges, the National Urban Health Mission (NUHM) was launched in 2013 following the national guidelines to strengthen the urban primary healthcare system, reduce health inequities, and ensure universal access to essential services for the urban disadvantaged, focusing on preventive, promotive, and curative care [22]. UPHCs are designed to serve populations of 50,000–60,000 and offer comprehensive primary care service packages, with operating hours tailored to local needs. Currently, in the state there are 104 UPHCs functional (see Figure 1). Each UPHC is staffed by at least one MBBS medical officer, nurses, pharmacist, lab technician, public health staff, community health workers, and administrative personnel to ensure comprehensive and coordinated service delivery. Further to enhance access and continuity of care, the government has mandated the establishment of at least two specialist polyclinics in each UPHC, offering weekly services. Specialties not available onsite will be covered through teleconsultations. Recommended specialties include General Medicine, Paediatrics, Obstetrics & Gynaecology, Ophthalmology, Dermatology, Psychiatry, Palliative Care, ENT, Dentistry, Physiotherapy, Optometry, and Nutrition [23]. Recently, using the 15th Union Finance Commission health grants, state have rolled out program to strengthen public health system in the urban areas by establishing Urban Health and Wellness Centres linked to UPHCs , with INR 7,737 crores specifically earmarked for this [24]. Each UPHC caters to a population of 15,000-20,000 shall be connected to three UHWCs, which serve as extension centres to improve geographic accessibility and ease patient access. These HWCs offer evening OPD services staffed by one Medical Officer, one staff nurse, and one pharmacist, and they also handle medicine distribution. However, laboratory services are currently not available at these centres.

Figure 1: District Wise Number of Functional UPHCs in Kerala



There are limited studies conducted in the state assessing the utilization of UPHCs for NCD services in Kerala. However, the administrative data in 2016–17, showed that approximately 31% of the population (1.6 million people) accessed OPD services at UPHCs [29], with utilization increasing from 314 to 396 per 1,000 population in 2017–18. District-level trends varied, with Kannur, Malappuram, and Pathanamthitta showing the highest increases, while Alappuzha and Thiruvananthapuram saw minimal growth. Between 2016–17 and 2018–19, overall OPD utilization rose from 581 to 747 per 1,000 ward population [30], with a 27% rise in new cases. Pathanamthitta and Idukki reported the highest increases, while Thrissur and Kollam recorded declines.

NCD-specific OPD visits also rose significantly, with Idukki (77.5%), Malappuram (72%), and Ernakulam (49.3%) showing major increases between 2016–17 and 2017–18 [29]. However, some districts, such as Kollam and Kasargod, showed declines. From 2016–17 to 2018–19, NCD

utilization increased by 42%, with Pathanamthitta leading at 83.2% [31]. Utilization was higher among females, the elderly, and those from lower socioeconomic strata. Patients favoured UPHCs for their affordability and shorter wait times, but challenges included limited paediatric care, medicine and diagnostic shortages, and inadequate human resources, especially inexperienced staff [29].

Rationale of the Study

The upward trend in service utilization through UPHCs aligns with the broader goal of achieving Universal Health Coverage (UHC), as outlined in SDG 3.8, which emphasizes reducing NCD-related morbidity, mortality, and financial hardship [32]. Specifically, SDG 3.4 aims to reduce premature deaths from NCDs by one-third by 2030 [33]. Kerala has taken proactive steps toward these global targets through initiatives such as Mission Aardram and Amrutham Arogyam, which aim to strengthen the public healthcare system. Within this framework, UPHCs play a critical role by delivering equitable, continuous NCD care especially for vulnerable urban populations through services including screening, diagnosis, treatment, and referral [34].

However, COVID-19 disrupted service delivery, reduced OPD visits, and halted outreach efforts, impacting NCD care and slowing progress toward SDG targets [35]. Despite improvements post-pandemic, urban areas in Kerala continue to face gaps in service access, rising private sector dominance, and economic barriers. With NCDs requiring long-term, affordable care, assessing UPHC performance, utilization, and equity in service delivery is critical. Identifying gaps and strengthening urban health systems is essential for Kerala to effectively manage the NCD burden and achieve UHC and SDG goals.

Through this study we aim to fill this gap by comprehensively assessing the provisions of NCD care in UPHCs across selected districts in Kerala. This study aims to understand the role of UPHCs offering NCD services and

evaluate the adequacy and quality of their facilities, medicines, and human resources. Further we explore the patterns of service delivery and utilization, while also examining the readiness of service providers and the perceptions of elected representatives regarding NCD care provision through UPHCs. Additionally, it seeks to capture the experiences and satisfaction levels of patients receiving NCD services, providing a holistic view of the effectiveness and challenges within the urban primary healthcare system.

Chapter 2: Methodology

Research Design

The study employed a mixed-method design using an explanatory sequential study approach. The study was conducted in two distinct phases (see Table 4): an initial quantitative phase followed by a qualitative phase. The first phase had a cross-sectional survey that aimed at examining the service delivery utilization pattern among the beneficiaries of the NCD services in selected UPHCs. Additionally, a structured checklist was used to assess the infrastructure and facilities available for NCD service delivery in these centres. This phase was followed by the qualitative phase, exploring the perceptions of the Health Care Providers (HCPs) regarding NCD service delivery, the perceived challenges, and enablers in service delivery.

Table 4: Phases of Study

Si. No	Phases	Methods	Sample Size	Participants
1	Quantitative	Cross Sectional Survey	480 NCD patients	Beneficiaries of the NCD services under the catchment area of UPHCs
		Facility Survey	12 UPHCs	All UPHCs sampled for the study
2	Qualitative	IDIs & FGDs	Minimum of 03 IDIs and 01 FGD per facility 03 to 05 IDI and 01 to 03 FGDs	IDIs with Medical Officers, Staff Nurse, Pharmacist, Lab Technician, LSG members and FGDs with mixed or non-mixed group of MLSP/JPHN/JHI/Hi and ASHAs (7-13 participants? / FGD)

Study Setting

The study was conducted in six randomly selected districts across the state, representing the southern, central, and northern regions of Kerala. The districts include Thiruvananthapuram and Pathanamthitta (South); Idukki and Ernakulam (Central); Wayanad and Kannur (North). From these districts, a total of 12 UPHCs were randomly selected for the study.

Study Population and Sampling

Study population: NCD service providers, beneficiaries of UPHC, elected members of ULB and district coordinators of NHM

Quantitative Cross-sectional Survey: We adopted convenience sampling for recruiting the participants for the study. For the quantitative cross-sectional survey, 40 patients with NCDs were selected from each health facility after completing their OPD consultation and for the facility survey all the selected UPHCs were included.

For the qualitative interviews, NCD service providers were chosen from the same UPHCs selected for quantitative study. This included medical officers, staff nurses, pharmacists, lab technicians. Also interviewed elected local self-government representatives of the concerned UPHC, and district coordinators of the NHM of the concerned district.

For the focus group discussions (FGDs), participants such as Junior Public Health Nurses (JPHNs), Junior Health Inspectors (JHIs), Health Inspectors (HIs), Mid-Level Service Providers (MLSPs), and Accredited Social Health Activists (ASHAs) were recruited for FGDs. FGDs of ASHAs were done as a homogeneous group, and for others, the FGDs included heterogeneous mix of other Community Health Workers (CHW).

Sample Size Calculation

For the quantitative phase, based on the expected service utilization of 74.7 % in UPHC [17], with a design effect of 1.5 and a non-response rate of 10%, the estimated sample size calculated was 480. Accordingly, 40 beneficiaries were randomly selected from each of the 12 selected UPHCs.

Inclusion criteria: Beneficiaries of the NCD programme who were aged 18 and above and listed in the NCD OPD registers who attended the UPHC on the day of data collection were included in the study.

Exclusion criteria: NCD beneficiaries who were new patients or critically ill or has physical or cognitive impairments that limited their participation were excluded from the study.

For the qualitative phase, IDIs and FGDs were conducted with HCPs and Local Self-Government Department (LSGD) members, and were continued until thematic saturation was achieved.

Inclusion criteria: All healthcare providers with at least 1 year of experience in NCD service delivery and members of LSGDs, who were at least serving the community for more than 2 years, were included in the study.

Exclusion criteria: There were no specific exclusion criteria for recruiting these participants.

Data Collection

Prior to commencing data collection, the research team obtained approval from the Research Committee of the Department of Health and Family Welfare, Government of Kerala. A formal Government Order was issued, granting permission to conduct the study across the state. Additionally, the team sought support from the National Urban Health Mission (NUHM) state office, whose inputs and guidance were instrumental in facilitating the implementation of the study.

Further quantitative data were collected between August 2024 and January 2025 using the Open Data Kit (ODK) platform to ensure accuracy, efficiency, and real-time monitoring during fieldwork. The ODK tool, which included both patient survey forms and the facility assessment checklist, was pre-tested in a non-study UPHC to evaluate clarity, technical functionality, and data flow. Based on the pilot test feedback, necessary revisions were made, and the tool was finalized before the actual data collection began.

Prior to visiting each district, the study team met with the respective District Program Manager (DPM) of the NHM to seek formal approval for conducting

the quantitative and qualitative part of the study. Once approval was granted, the data collection team coordinated with the NUHM district coordinators, who facilitated access to the sampled facilities. Permissions were also obtained from the facility heads before commencing data collection.

Both patient-level and facility-level data were gathered through the ODK platform. Facility-level data were collected using a structured checklist integrated into the ODK form. This checklist was developed in alignment with current government guidelines on service delivery and infrastructure standards at UPHCs, enabling a systematic assessment of available NCD services and infrastructural readiness.

Data collection was conducted by two trained health system researchers; SMA, with a background in public health, and NA, trained in development studies. They underwent comprehensive training covering the study tools, data collection protocols, ODK usage, ethical considerations, and field-level procedures to ensure consistency and data quality throughout the process. A total of 491 patients were interviewed across the 12 selected UPHCs. The participant characteristics are given in Table 5.

Table 5: Participant Characteristics Cross Sectional Survey

No.	Demographic characteristics	
1	Age (Mean, SD)	63.4 (SD -9.67) min- 37 max- 90
2	Age group	
2.1	Less than 45	17 (3.5 %)
2.2	45-59	146 (29.7 %)
2.3	60 and above	328 (66.8 %)
3	Gender	
3.1	Male	172 (35.0 %)
3.2	Female	319 (65.0 %)
4	Education	
4.1	No formal education	50 (10.2 %)
4.2	Upper primary	165 (33.6 %)
4.3	High school level	197 (40.1 %)

No.	Demographic characteristics	
4.4	Higher secondary and above	79 (16.1 %)
5	Occupation	
5.1	Unemployed	145 (29.5 %)
5.2	Formally employed/retired	47 (9.6 %)
5.3	Housewife/not working	152 (31.0 %)
5.4	Self-employed/other	147 (29.9 %)
6	Priority groups	
6.1	BPL/Priority Group	265 (54.0 %)
6.2	APL/non-priority group	226 (46.0 %)
7	Marital status	
7.1	Married	325 (66.2 %)
7.2	Widowed/Widower	140 (28.5 %)
7.3	Unmarried/Separated/divorced	26 (5.3 %)
8	Insurance Coverage	
8.1	Yes	254(51.7 %)
8.2	No	238(48.3 %)
9	Category of Insurance	
9.1	- KASP-PMJAY	209(82.3 %)
9.2	- Central government	2(0.8 %)
9.3	- MEDISEP	25 (9.8 %)
9.4	- Private	13 (5.1 %)
9.5	- Community Health Insurance	4(1.6 %)

Following data collection, the research team conducted thorough data cleaning to ensure accuracy and completeness. This process involved multiple team meetings where any inconsistencies, missing values, or errors were carefully reviewed. Issues were discussed collaboratively with the data collectors, Principal Investigator (PI), and Co-Principal Investigator (Co-PI) to resolve discrepancies and finalize the dataset for analysis. All data were anonymized and securely stored in password-protected electronic files to ensure the confidentiality of the participants. Access to the data was strictly limited to the research team.

Qualitative data collection commenced after the completion of the quantitative phase, from January 2025 to March 2025. The data were collected by two trained researchers with expertise in qualitative methods

and health systems science: ASP, an MBBS and PhD holder, and JJ, with a master's degree in development studies. The qualitative component involved both IDIs and FGDs using open-ended probes guided by semi-structured interview guides. These guides were carefully developed based on NCD guidelines and relevant policy recommendations (see Annexure 4 for IDI and FGD guides tailored for different stakeholder groups). The research team had extensive experience in conducting IDIs and FGDs. Data collection continued until thematic saturation was reached, culminating in a total of 47 IDIs and 17 FGDs. These interactions were conducted to capture diverse perspectives from health service providers regarding NCD service delivery and the overall readiness of the health system. The participant characteristics are given in Table 6.

Table 6: Participant Characteristics of Qualitative interviews

No.	Designation	TVM	PTA	EKM	IDK	KNR	WYD	Total
I	In-Depth Interviews							
1	Medical Officer	3	2	2	2	2	2	13
2	Staff Nurse	2	2	2	2	2	0	10
3	Pharmacist	2	2	2	2	2	1	11
4	Lab Technician	2	2	2	2	2	0	10
5	Others	0	03	0	0	0	0	03
	Sub Total	9	11	08	08	08	03	47
II	Focus Group Discussion							
7	JPHNs	2	2	2	0	1	0	07
8	ASHAs	2	2	2	2	2	0	10
	Sub Total	04	04	04	02	03	0	17
	Total (I+II)	13	15	12	10	11	03	64
<i>Note: Data saturation was achieved by the time we did field work in the last district, however we did interviews with the medical officers to capture the NCD service readiness in those districts, Others include LSG members and coordinators of mission</i>								

Before each interview and discussion, participants were briefed about the study's background, objectives, and the benefits of their participation. Written informed consent was obtained from all participants for both participation and audio recording of the sessions. The medium of communication was Malayalam.

The interviews began with broad open-ended questions, followed by probing to explore emerging themes in depth. Each in-depth interview lasted between 30 minutes to 1 hour, while FGDs typically lasted between 40 to 50 minutes.

All IDIs and FGDs were audio recorded, with recordings and accompanying field notes securely stored in a password-protected database accessible only to the research team. The recordings were then translated into English, by the research team member, AV and each transcript was reviewed by two team members to ensure accuracy and quality.

Data Analysis

We adopted the Availability, Accessibility, Acceptability, and Quality (AAAQ) framework [36] to guide the analysis of both quantitative and qualitative data. This analytical framework systematically examines the factors influencing the utilization of NCD services at UPHCs.

We conducted data anonymization prior to the analysis to ensure the confidentiality and privacy of all participants. Personally identifiable information's were removed or replaced with coded identifiers across both qualitative and quantitative datasets. For qualitative data, transcripts were reviewed and edited to remove names, locations, and any contextual details that could lead to identification. In the quantitative data, sensitive variables were masked or aggregated as needed. This process was completed before any data analysis began, aligning with ethical research practices and Institutional Review Board (IRB) guidelines.

Quantitative survey and facility data were analysed statistically using Jamovi software version 2.3.28 [37]. Descriptive statistics summarized key variables such as participant demographics, accessibility, availability, and quality of services, treatment adherence, participant satisfaction, and facility infrastructure.

For the qualitative data, transcripts were independently coded by two researchers (JJ and AK) using an inductive approach with ATLAS.ti (v25.0.1) software. The codes were organized into sub-themes and overarching themes. The coding process was regularly reviewed by other team members, and any disagreements were discussed and resolved through consensus. Finally, the findings from both quantitative and qualitative data were triangulated to provide a comprehensive understanding and to strengthen the validity of the study results.

Ethical Considerations

Ethical approval for this study was granted by the Health System Research India Initiative Trust Ethical Committee (Project No -01/HSRII/IEC/2024). In addition, appropriate administrative permissions were obtained from the Directorate of Health Services (DHS) under Order No. MC4-10425/2024/DHS, dated 28-06-2024.

Chapter 3: Readiness of UPHCs to Deliver NCD Services

This chapter presents the key findings from the study and examines the readiness and capacity of the urban primary health care system to deliver NCD services. The analysis is structured using the Availability, Accessibility, Acceptability, and Quality (AAAQ) framework [36]. Here we present the findings from the quantitative and qualitative methods on availability of infrastructure, human resources, medicines, diagnostic services and NCD services. The demographic characteristics of participants are reflected in Table 5.

Our study found considerable variation in population coverage across facilities. The highest coverage was reported at one UPHC serving 68,406 people, while the lowest was at another UPHC with a coverage of only 8,978 people covering 17% of the total population (52,045) in that municipality. Among individuals aged 30 years and above, the gender distribution was nearly balanced, with a slight predominance of females (51.5% overall). However, a few facilities reported a slightly higher proportion of males compared to females. Table 7 below describes the demographic profile of the sampled UPHCs

Table 7: Population Served by the UPHCs

District	UPHC	Total Population	Total > 30 Years	> 30years	
				Male	Female
TVM	F1	43886	34864 (79.4%)	16996 (48.7%)	17868 (51.3%)
	F2	68406	35939 (52.5%)	17701 (49.2%)	18238 (50.8%)
PTA	F3	28200	15596 (55.3%)	6724 (43.1%)	8839 (56.7%)
	F4	22800	8218 (36.0%)	4048 (49.3%)	4170 (50.7%)
IDK	F5	8978	4639 (51.7%)	2230 (48.1%)	2409 (51.9%)
	F6	52932	17131 (32.4%)	8402 (49.0%)	8729 (51.0%)
EKM	F7	56842	34272 (60.3%)	17306 (50.5%)	16966 (49.5%)

District	UPHC	Total Population	Total > 30 Years	> 30years	
				Male	Female
	F8	64576	45126 (69.9%)	20970 (46.5%)	24156 (53.5%)
KNR	F9	27986	11224 (40.0%)	5840 (52.0%)	5384 (48.0%)
	F10	39078	19750 (50.5%)	9632 (48.8%)	10118 (51.2%)
WYD	F11	14630	7829 (53.5%)	4029 (51.5%)	3800 (48.5%)
	F12	13776	7010 (43.4%)	3800 (54.2%)	3210 (45.8%)
Overall		442090	241598 (54.7%)	117678 (48.7%)	120087 (49.7%)
<i>Source: Facility Survey data</i>					

3.1. Availability

3.1. 1. Availability of Physical Infrastructure

The availability of adequate health infrastructure is a foundational requirement for delivering effective NCDs services at the primary care level. Table 8 below highlights the extent to which these facilities are equipped to meet the service needs of the urban population, particularly in managing the growing burden of NCDs.

Table 8: Availability of Physical Infrastructure under UPHCs

Sl. No.	Indicators	TVM		PTA		EKM		KNR		WYD		IDK		UPHCs Overall
		1	2	3	4	5	6	7	8	9	10	11	12	
1	Chairs available in the waiting area	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
2	Safe drinking water facility	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
3	Separate OPD consultation rooms	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
4	OP registration counter	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	92%
5	Signages	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	92%
6	Patient's waiting area	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	92%

Sl. No.	Indicators	TVM		PTA		EKM		KNR		WYD		IDK		UPHCs Overall
		1	2	3	4	5	6	7	8	9	10	11	12	
7	NCD related IEC materials displayed	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	92%
8	At least one recreation facility	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N	Y	83%
9	Designated pre-check area	Y	Y	N	Y	N	Y	Y	Y	Y	Y	Y	Y	83%
10	Token system in OPD	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	83%
11	Breastfeeding area for mothers with privacy	Y	Y	N	Y	N	Y	Y	Y	Y	Y	Y	Y	83%
12	PA System & Display boards	Y	Y	N	Y	N	Y	Y	Y	Y	Y	N	Y	75%
13	Adequate fans in the waiting area	Y	Y	Y	Y	N	Y	Y	Y	Y	N	N	Y	75%
14	Examination table with a screen/curtain in consultation rooms	N	Y	Y	Y	N	Y	Y	Y	Y	Y	N	Y	75%
15	Sinks with running water and elbow taps in consultation rooms.	N	Y	N	Y	Y	Y	Y	Y	Y	Y	N	Y	75%
16	Operational E-Health platform	Y	Y	N	Y	N	Y	Y	Y	Y	N	N	Y	67%
17	Separate toilets for males and females	Y	Y	N	Y	N	N	Y	Y	Y	Y	Y	N	67%
18	Enquiry and information counter	Y	Y	N	N	N	Y	Y	Y	Y	N	N	Y	58%

Source: Facility Survey data, Colour code based on availability of pharmacy infrastructure, green- high, yellow-medium, and red- low

Most facilities were found to have adequate OPDs infrastructure and basic patient amenities. We found that majority of the Urban UPHCs are currently operating from premises provided rent-free by the ULBs. However, there existed a gap in ensuring availability of public address (PA) systems and display boards, token systems, examination tables with screens or curtains, hand washing areas, breastfeeding spaces, gender-segregated toilets, and fans in waiting areas. The placement of Information, Education, and

Communication (IEC) materials related to NCDs was observed to be inconsistent or overcrowded, with significant gaps noted in pharmacy areas, laboratories, consultation rooms, and facility exteriors. Another gap identified was that overall, 67% of the facilities had a functional e-health platform. The same gap existed in ensuring separate toilets for male and female.

Through the qualitative assessments we observed the physical condition, space availability, and adequacy of facilities vary widely across centres. While many UPHCs benefit from rent-free premises provided by ULBs, challenges related to space constraints, maintenance, and adherence to Indian Public Health Standards (IPHS) often impact service delivery. This is more severe in the UPHCs that caters the maximum population. A Medical Officer (MO) noted. *“...We have Infrastructure and space constraints, limiting our services. Despite these challenges, we are managing with available resources and trying our best to serve the community”*.

Another MO, corroborated this, comparing the infrastructure of the UPHC with an upgraded PHC, he said

“The delivery of NCD services is improving, but the location remains a major challenge. Our UPHC has fewer resources compared to an upgraded PHC, but the utilisation of services here is much lower because people are unaware of what we offer. Wellness centers or upgraded PHCs should ideally be located near highways or central areas. Accessibility would lead to four to five times higher utilisation rates.....We have adequate staff, including physicians who are ready to provide consultations. However, infrastructure is a major issue.”

3.1.2. Availability of Pharmacy Services

The evaluation of pharmacy services in different facilities showed a high availability of all the necessary services and infrastructure (see Table 09). All

the facilities had a dedicated room for the pharmacy, 92% possessed an air-conditioned store, except one UPHC.

Table 9: Pharmacy Infrastructure in UPHCs

#	Indictors	TVM		PTA		EKM		KNR		WYD		IDK		UPHCs Overall
		1	2	3	4	5	6	7	8	9	10	11	12	
1	Separate room for pharmacy	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
2	Separate pharmacy store with air conditioning	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	92%
3	Board in front of pharmacy with the list of medicines	Y	Y	N	Y	N	Y	Y	Y	Y	Y	N	Y	75%
<i>Note: Colour code based on availability of pharmacy infrastructure, green- high, yellow-medium, and red- low</i> <i>Source: Facility Survey data</i>														

While most facilities maintain separate pharmacy store with air conditioning, the absence of AC in the pharmacy poses a potential risk to medicine quality due to seasonal temperature variations. Although temperature records are maintained in both areas. A pharmacist noted.

“We have a store with proper facilities, including an AC. However, there is no AC in the pharmacy. We maintain temperature records in both the pharmacy and the store. We have requested an AC for the pharmacy due to temperature variations, that may affect the quality of medicines”.

Table 10 shows the availability of medicines at the UPHCs in the past year. Findings from the facility survey report that NCD medicine stockouts existed, while some facilities had inconsistencies in the continuous availability of basic drugs including oral hypoglycaemic drugs (25%), insulin (25%), and anti-hypertensive drugs 17%.

Table 10: Availability of Medicines in Past Year

#	Indicators	TVM		PTA		EKM		KNR		WYD		IDK		UPHCs Overall
		1	2	3	4	5	6	7	8	9	10	11	12	
1	Diabetic medicine stockout	N	Y	Y	N	Y	N	N	N	N	N	N	N	25%
3	Insulin stockout	N	N	Y	N	Y	N	N	N	N	N	N	Y	25%
2	Hypertension medicine stockout	N	N	N	N	Y	N	N	N	N	N	Y	N	17%
4	Gastro medicine stockout	N	N	Y	N	Y	N	N	N	N	N	N	N	17%
5	Pain/analgesic stockout	N	N	Y	N	N	N	N	N	N	N	N	N	8%
<i>Note: Medicine availability last year: green- lowest stockout, yellow- medium stockout, red- highest stockout, "N"- No Stockout, "Y"- reporting stockout</i> <i>Source: Facility Survey data</i>														

While the qualitative findings affirm that, in general there was no severe or prolonged medicine shortage that occurred, however, challenges exist especially for high-cost and specialized drugs. The availability of essential medicines for NCD care varies widely across facilities and districts. Insulin availability is a major concern. Most facilities provide only two vials of human insulin per patient, which is often insufficient. This leads to frequent out-of-pocket expenses for patients. Shortages are especially common towards the end of the month, and in some centres, insulin is often completely out of stock. According to a MO.

“Insulin is the major issue we are facing. So whichever hospital we go to, we will provide two vials of insulin to the patients. That is a major challenge. All patients are complaining about that. So, the patient will be saying like 2 bottles are not enough for them. They are then forced to buy it from outside.... We are providing Human insulin, for others we are providing is oral metformin and Glymin. Most often patients need more medicine than these two. Other drugs we do not have. So, we are forced to prescribe these medicines from outside and making people convince them to buy these from this outside is quite challenging.”

Similar was the opinion from a staff nurse. In her perspective

“Medicine supply is a big issue. Insulin was unavailable for six months and only came back two months ago. Medicines are often out of stock, so people find it hard to get them from outside. When they stop taking medicines for a month or more, their sugar or BP levels are much higher when they come back”.

Contrary to this, facilities from the central zone reported adequate availability of insulin, while they have challenges with intending and supply of medicines. A pharmacist said

“For insulin, we manage the stock carefully. If a patient requires more than 40 ml, we provide three bottles to ensure everyone gets their required dose. Recently, CHCs have been referring their NCD patients to us for insulin, as they are from our area, which has increased the patient load significantly. This also increases our medicine requirements. Because of this, we increased our indent from ₹10 lakhs to ₹18 lakhs. However, if KMSCL is short, it affects us too. But the major challenge is that even when we send indents, we don’t get supplies on time”.

Qualitative assessments informed us that common oral medications like Metformin and Glimepiride (or Glymin) are generally available. However, newer and more advanced medications for diabetes management are not supplied. Due to this limited availability, doctors often ask patients to purchase medicines from outside, which creates financial strain and dissatisfaction. From the perspective of a MO.

“We have only Metformin and Glimepiride. It is difficult to manage all diabetic patients with just these two medicines. If the patient cannot be controlled with these tablets, insulin is the next option. However, many patients are reluctant to start insulin due to financial reasons. If we cannot manage them

here, we refer them to a Medical College. But most patients do not prefer referral. When they go to a higher center, they complain about long waiting times and lack of personalized care. Here, we have built a family doctor-patient relationship with them, including the staff, nurses, and lab technicians. Patients feel comfortable here. The major issue is adherence to treatment after referral”.

For hypertension, drug availability is relatively better. Medicines such as Amlodipine, Losartan, Telmisartan, and Metoprolol are regularly stocked, and no major shortages were reported in most facilities. As noted by a MO.

“Insulin metformin, glymin. Metformin and glymin will be there. Insulin, we have shortage, mostly during month end. Here it is like that. But other institutions I worked mostly the insulin will be out of stock. And the remaining drugs are costlier. So, when we prescribe that from outside, that make an issue with the patient and for hypertension, we do have most common drugs available here. Amlodipine is there. Losartan, Telmisartan, and Metoprolol. is there. These are available. There is no shortage for that”.

For respiratory conditions Salbutamol inhalers are usually the only option available, while other essential inhalers like Formoterol and Budesonide (e.g., Budecort) are either frequently out of stock or not procured at all. Most centres also lack spirometry facilities to assess and differentiate between asthma and COPD. While nebulizers are available, the lack of essential inhalers limits effective management of respiratory diseases. A MO informed.

“This year we have shortage for inhalers. We had inhalers like Salbutamol and Budecort but now we have only salbutamol in stock. Nebulization is done here, but we don’t have a spirometer yet. We’ve ordered it and expected it by December. Training for spirometer usage has been provided to staff Now

our intent amount has been increased now we plan to buy Deriphyllin also”.

Another challenge that we found across the state was the lack of a unified tracking system across healthcare facilities, leading to patients using the same prescription to collect duplicate medications from multiple centres even when their existed manual record keeping like IHCI cards and NCD books. A pharmacist explained this.

“We cannot understand this, patients are getting medicines from multiple facilities because some facilities, the e-health is not that well implemented. Some facilities don’t have e-health. And here we have e-health. we cannot understand whether the patients received medicine or not. So, there is a tendency among patients. They use the same prescription to get medicines from multiple places at multiple times. So, they will be taking more of same medicines at a time”.

To prevent the issue of multiple dispensing of NCD medicines another MO shared effective procedures they follow. It was described that.

“Patients sometimes try to collect medicines from multiple centers. However, we strictly check their NCD book before issuing medicines. If they already collected medicines elsewhere, we do not provide additional supply. It will be written in the NCD book that which medicine were given which was not given. So, we check that before prescribing the medicine”.

3.1.3. Availability of Laboratory Services

We found that all the facilities had essential tests such as routine blood tests, FBS/PPBS/RBS, platelets, ESR, PCV, urine testing, and blood smear tests for malaria (see Table 11). All UPHCs provide free testing with results delivered within 30 minutes, which significantly boosts patient satisfaction

and trust. However, some tests varied in their availability; HbA1c was available in 75% of the facilities, but it was not available in three facilities. Similarly, the Glucose Challenge Test (GCT) was lacking in four facilities. Sputum testing and lipid profile services were available in 92% of facilities, except one. A few facilities from three districts have implemented the hub-and-spoke model to address the unavailability of certain tests at the UPHC level. Under this approach, UPHCs have established tie-ups with external government laboratories that offer these specialized tests at 50% of the standard rate, ensuring continued access to diagnostic services for patients.

Table 11: Availability of Laboratory Test at the UPHCs

Indicators	TVM		PTA		EKM		KNR		WYD		IDK		Overall
	1	2	3	4	5	6	7	8	9	10	11	12	
Blood test- routine	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
Blood test- FBS/PPBS/RBS	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
Platelet Count	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
ESR	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
PCV	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
Creatine	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
Urine test routine	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
Blood Smear thick & thin for malaria	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
Sputum	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	92%
Lipid profile	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	92%
HB1AC	N	Y	Y	Y	Y	Y	Y	N	N	Y	Y	Y	75%
GCT	N	Y	Y	Y	Y	N	Y	Y	N	Y	Y	N	67%
Thyroid function	N	N	N	H	H	N	H	N	N	N	N	N	0%
<i>Note: Overall utilization and availability heat map green shows the highest availability, and pale pink shows the lowest availability. "Y" – Test available, "N" – Test not Available, "H" – Test not available at the facility but available through Hub and Spoke Model</i> <i>Source: Facility Survey Data</i>													

Reflecting on the laboratory services provided through UPHCs, a lab technician informed us that

“We perform tests like sugar, LFT, RFT, and others. All reagents and equipment are available, and most tests here are free. The lab functions from 8 AM to 3 PM. For thyroid testing, we collect samples and send them to the CFC center, where they have the necessary machines. We send samples every Thursday. If a test isn’t available here, we refer patients to the PH lab or General Hospital.”

It was reported through the qualitative interviews that the majority of the UPHCs have semi-automated instruments and biosensors, but issues like reagent shelf life and supply gaps lead to intermittent service availability for certain tests like HbA1c. Infrastructure problems, such as ear thing issues in the building, lack of power backup further limit the full utilization of existing equipment. While reflecting on the infrastructure challenge, a lab technician informed us about the challenges faced. It was described that.

“One thing is the location of the lab. The lab is on the 1st floor. People find it difficult to climb all the steps, especially elderly people.... I must come down multiple times to collect the sample.... There are also many patients complain about climbing the stairs. Another is to upgrade from the semi-automatic to fully automatic. Other centres are running in fully automatically.... So, during NCD OP Days, it is challenging to manage the lab facility alone. It is good to have one more staff in the lab”.

Another lab technician reflecting on the infrastructural challenge told us

“We don’t have power backup. If there is a power loss, the testing incubator will stop, and we cannot read it further. If power goes, we cannot do anything. The main issue is that reagents will be lost. Sample may not be an issue, but we need to redo the test, and reagent will be wasted”.

We found that most facilities manage reagent supply well, with pre-emptive ordering and use of multiple funding sources. No major consumable shortages were reported, although limited storage space was found to be an operational constraint. However, geographic variations were reported on the shortage of reagents, resulting in the denial of lab services. A lab technician informed us that.

“We handle sugar, blood pressure, cholesterol, and total cholesterol tests. We used to do a lipid profile, but currently, we are not doing it because we don’t have the reagents right now. However, we are performing liver function tests (LFT) and renal function tests (RFT)”.

We were informed that all the laboratories follow a robust internal and external quality control protocol, collaborating with institutions like CMC Vellore, AIIMS, and GH for validation to ensure a high standard of diagnostic reliability. Another lab technician told us that.

“For biochemistry, we conduct external quality testing every month. The samples are sent on the 20th of each month. For haematology, we conduct it through AIIMS Delhi. We have QS grade A, and there have been no quality issues so far. If there is any doubt, we send the sample to the taluk hospital for confirmation”.

Our study found that there is a system in place for equipment maintenance and calibration, supported by tie-ups with external organizations, and there are backup instruments stored for replacement when needed. Despite this, technical issues with lab equipment, especially during NCD clinic days, hinder seamless service delivery. Though staff attempt basic troubleshooting, breakdowns often disrupt care, forcing patients to return later for tests. Although machine maintenance and calibration are maintained and calibrated regularly through service contracts, but timing of

these failures, especially during patient visits, continues to remain problematic. As noted by a lab technician,

“If there are complaints, we report them to xx (name of the company), it operates through NHM, and they handle it internally. It is not outsourced. Maintenance services come as per schedule”.

3.1.4. Availability of Diagnostic Services

We found that about 75% of the facilities had an Electrocardiogram (ECG), but only 25% had a separate room for ECG services. X-ray services were absent in all the facilities (see Table 12).

Table 12: Availability of Diagnostics Services at the UPHCs

Indicators	TVM		PTA		EKM		KNR		WYD		IDK		Overall
	1	2	3	4	5	6	7	8	9	10	11	12	
ECG facility	N	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	75%
Separate room for ECG	N	N	N	N	N	Y	Y	N	N	N	Y	N	25%
X-ray Facility	N	N	N	N	N	N	N	N	N	N	N	N	0%
“Y” – Diagnostics available, “N” – Diagnostics not Available Source: Facility Survey Data													

Like the findings from the facility survey, through the qualitative interviews we found that ECG services are technically available at the facility but are limited to emergency use and are not part of routine care. We also found that there existed a gap in formal training for the staff responsible for conducting ECGs. AMO informed us

“We do have ECG, but we don’t take it routinely but for emergency cases when they come here. We will take ECG. Our staff nurse will take ECG. She did not receive any specific training to read or take the ECG. That person learned it by looking somewhere”.

While in some facilities, ECG services are not available, leading to reliance on external diagnostic centers or referrals to higher-level facilities such as the government hospital or district hospital. Patients often undergo ECG testing elsewhere before returning for follow-up, which may delay timely diagnosis and management. ASN noted that

“We do not have ECG. Those are coming for review. They will do an ECG from outside, and they will come here. Our nearest reference centre is GH, we will refer them there and for DM we will ask them to the diabetic clinic at the district hospital”.

3.1.5. Availability of Consumables

Reflections from the interviews found availability of consumables across all UPHCs for NCD care, but geographic variations exist. While blood pressure monitoring is consistently available across facilities, diabetes screening is limited in some centers due to a shortage of glucose test strips, affecting routine screening for individuals above 30 years of age in a few districts. A SN informed us that.

“We can, for BP monitoring. We do have the monitor device, and we can do that. But for diabetics, we do not have a shortage of strips. So, we need to do a screening for those who above 30. But we are not able to do that. DM screening for everyone because of the shortage of the strips we have inadequacy of that diagnostic kits”.

A PHN informed us on the shortage of HB strips and the challenges related to that. According to her

“We have them, but sometimes we face shortages. During shortages, we don’t do but somehow, we manage that. We have issues with HB strips, most often, we don’t consider those values that will show discrepancy. If there is a severe variation,

we refer them to the district hospital. We also inform the block authorities”.

Interestingly, only a small proportion of the survey participants reported challenges with the availability of medicines (<1%) and Laboratory services (<3%), further citing the free-of-cost medicines (92.9%) and treatment (95.3%) were the major influencing factors for seeking health care from the government UPHCs.

3.1.6. Availability of Human Resources

The staffing pattern across UPHCs showed that most sanctioned posts are filled, particularly for Medical Officers, Pharmacists, Lab Technicians, and Staff Nurses, indicating adequate human resource availability for NCD service delivery. However, there are minor gaps, such as one UPHC with no Lab Technician in position despite a sanctioned post and slight variations in Staff Nurse and JPHN positions across facilities. Mid-Level Service Providers (MLSPs) and support roles like Nursing Assistants and Part-Time Sweepers are sanctioned in only a few UPHCs, reflecting inconsistency in auxiliary staffing. The number of ASHAs is generally in line with sanctioned posts, supporting community-level engagement, though one or two centers have slight shortfalls. Overall, while key clinical roles are largely filled, there are noticeable variations in support staff availability and deployment.

Table 13: Availability of Human Resources in UPHCs
(Figures in parenthesis are sanctioned positions)

Designation P(S)	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12
Medical Officer	2 (2)	2 (2)	2 (2)	2 (3)	2 (2)	2 (2)	2 (2)	2 (2)	2 (2)	1 (1)	2 (2)	1 (1)
Pharmacist	2 (2)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)
Mid-Level Provider	N/A	1 (1)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lab Technician	2 (2)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	1 (1)	0 (1)	1 (1)	1 (1)	1 (1)	1 (1)
Staff Nurse	3 (3)	2 (2)	2 (2)	3 (3)	3 (3)	2 (2)	2 (2)	2 (2)	2 (2)	2 (2)	3 (3)	2 (2)
Nursing Assistant	N/A	N/A	N/A	N/A	1 (1)	N/A	N/A	N/A	N/A	1 (1)	N/A	N/A

Designation P(S)	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12
Hospital Attendant	2 (2)	2 (2)	2 (2)	2 (3)	1 (1)	N/A	N/A	N/A	1 (1)	2 (2)	2 (2)	N/A
Part Time Sweeper	N/A	N/A	N/A	N/A	N/A	N/A	1 (1)	1 (1)	1 (1)	N/A	N/A	2 (2)
Health Inspector	1 (1)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lady Health Inspector	1 (1)	N/A	N/A	N/A	N/A	N/A	1 (1)	1 (1)	1 (1)	1 (1)	N/A	N/A
Junior Health Inspector	1 (1)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Junior Public Health Nurse	5 (5)	7 (7)	6 (6)	4 (5)	4 (4)	6 (5)	5 (4)	5 (2)	7 (4)	6 (5)	3 (3)	3 (3)
ASHA	16 (16)	39 (39)	22 (22)	15 (15)	7 (7)	26 (24)	19 (19)	22 (21)	18 (18)	19 (17)	9 (9)	9 (9)

Source: Facility Survey Data

The healthcare staff interviewed had varying levels of experience, mostly under the NHM, and were actively involved in NCD service delivery. Medical Officers with less than 6 months to 9 years of experience across different health settings, consistently managing diagnostics, medication, and follow-ups. Pharmacists and lab technicians had 1 to 5 years of experience, primarily handling medication dispensing and NCD-related tests. Staff nurses, with 2 to 3 years of experience, played a key role in patient care and program implementation, often bridging clinical and administrative functions.

Our qualitative interactions found that staff attrition poses a significant challenge to the continuity and quality of NCD care at UPHCs. MOs often view their positions as temporary, with many leaving for postgraduate studies, while contractual appointments result in frequent turnover. Attrition is even higher among staff nurses, many of whom use their short tenure to gain experience before migrating abroad. Responses from the HCPs clearly indicate that current staffing levels for laboratory and pharmacy services at UPHCs are inadequate to manage the NCD program.

Speaking about the challenges with human resource management and recruitment, one of the implementation officers reflected. It was informed that

“Staff attrition is a major problem. Many MOs see this as temporary, some on a contract basis keep changing. MOs will come and stay for some time then they will get PG, and they will leave. We frequently call for interviews and conduct tests. Other than MO category, the attrition is higher among staff nurses. They will come here and have some experience so that they can migrate abroad. It is happening, even if the bonded staff, they will work for two years. So even though they are not getting better a patient experience, they help see the portal, how to manage the information, documentation, everything. They get that exposure. They can study everything within a short duration. Then they will join for their experience and after 6 months, they will leave”.

Describing how attrition of medical officers affects the utilization of NCD services, an ASHA shared.

“Yes, that is affecting people’s utilization of services. When they come, they build a rapport with the doctor, and then the doctor leaves. The next doctor comes, and they need to build rapport again. Doctors will change frequently; in one year, at least three doctors will come and go. Then they may go for higher studies like PG, and no doctor will replace them immediately. So, we need to start over and teach the new doctor all the processes”.

Another challenge identified through the interviews was that the majority of facilities operate with only one lab technician and pharmacist. This makes the labs services and pharmacy services vulnerable to staff absence. If the technician is absent, the lab does not function on that day, causing patient inconvenience, especially for those come fasting for tests. Single technicians are expected to perform multiple manual processes, including blood

collection, test processing, timing, and documentation. This concern was raised by a MO. It was noted that

“Now, the Cooperation wanted an afternoon OP. We got a medical officer in that way from LSG. We have now staff nurse and MO, but we don’t have pharmacist. In afternoon, the staff nurse is dispensing the medicine. Now we have a pharmacist in the morning, after 8 hours, the pharmacist will leave. After that, the nurse will provide the medicine”.

Corroborating this challenge a, pharmacist, raised their concerns. It was reflected that

“There is only one pharmacist here. If I need to take leave, I must inform another facility so they can send someone to cover. This is a major difficulty. In Urban PHCs, we get Sunday off, which is helpful. On other days, I have to manage everything alone”.

Depicting an example of the situation faced while the pharmacist was on leave and how the facility managed medicine dispensation, a MO described.

“We have only one pharmacist here, and he is managing everything stock, procurement for both the UPHC and the is separate for UHWCs. It’s too much for one person. If the pharmacist on leave, we have staff nurses to manage that. There is an order that staff nurses shouldn’t be involved in dispensing, but sometimes we must coordinate with them when the pharmacist is on leave. We can’t expect the doctor to manage both OP and medicine dispensing. Last time the pharmacist took a 2-week leave, I raised the issue in HMC, but nothing changed”.

Beyond this, lack of availability of specialists remains a barrier. Attempts to set up polyclinics failed due to poor specialist availability and incentives

especially in the hard-to-reach districts like Idukki and Wayanad. As noted by a MO

“Specialist availability is a major issue. We tried to start a polyclinic, but specialists do not come due to low payments. Patients prefer public hospitals for general care but visit private hospitals for specialized services”.

Similar was the opinion of another MO regarding the remuneration. He said *“we do have a surgeon and a specialist, but the salary is very low, only Rs. 2,000 for them”.*

3.1.7. Availability of NCD Services and specialist clinics

We found that all facilities provided morning OPD services, and around 83% of the facilities provided evening OPD services. NCD services are available in all facilities. Except for one facility all others have IHCI, RMNCH+A and geriatric care services. However, specialty clinics had limited availability, SWAAS (33%), ASWAASAM (33%), Nayanamritham (42%) and padasparsham (17%). Community outreach activities also varied in these facilities as Health camps (92%) were widely conducted but health awareness was promoted only by 58% of the facilities (see Table 14).

Table 14: Availability of NCD Services and Specialist Clinics

No.	Indicators	TVM		PTA		EKM		KNR		WYD		IDK		Overall
		1	2	3	4	5	6	7	8	9	10	11	12	
1	Morning OPD	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
2	NCD OPD	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	100%
3	RMNCH+A	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	92%
4	IHCI	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	92%
5	Geriatric	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	92%
6	Camps	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	92%
7	Evening OPD	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	83%
8	IEC activities	Y	Y	N	N	Y	Y	Y	N	Y	N	N	Y	58%
9	Nayanamritham	N	Y	Y	N	N	N	N	N	Y	N	Y	Y	42%

No.	Indicators	TVM		PTA		EKM		KNR		WYD		IDK		Overall
		1	2	3	4	5	6	7	8	9	10	11	12	
10	SWAAS	N	Y	Y	Y	Y	N	N	N	N	N	N	N	33%
11	ASWAASAM	N	Y	Y	Y	N	N	N	N	N	N	Y	N	33%
12	Padasparsham	N	N	Y	N	N	N	N	N	N	N	Y	N	17%
Note: Green shows the highest availability, red lowest availability														
Source: Facility Survey Data														

While the qualitative interview revealed the committed but resource-constrained health system striving to deliver comprehensive care to a growing NCD patient population. The UPHC follows a structured pre-check and consultation flow across all the districts, beginning with token issuance, followed by vitals monitoring at the pre-check area (BP, pulse, weight, Body Mass Index (BMI), oxygen saturation, etc.), then medical consultation, diagnostics, and finally, medicine dispensation. As described by a MO

“The patient...first, they will get the token and come to the pre-check area. There, their vitals, like BP, pulse, weight, etc., are monitored. Then they will come to the doctor for the NCD medicines. They will get their IHCI card. On that, their vitals and other values will be entered. Then they will be sent to the doctor. The doctor will ask about their symptoms and difficulties. We will check their values and tested reports. Then we will provide them with medicines based on that. They have a card and their notebook. We will enter in e-Health and the notebook. So, we will enter both because if anything happens, like if e-Health is down, we will not, you know, impair the patient service. So, we can refer to the book and provide them with the service”.

Though majority of the UPHCs have dedicated NCD clinic days, patients are welcomed any day, and OPD operates from 9 AM to 2:30 PM. Evening OPDs are intended but not fully functional due to staff shortages and other geographical challenges. A MO explained that

“We have an NCD OPD day on Monday, but patients come all days. OPD runs from 9:00 AM to 2:30 PM. We also have an evening OPD, but there is no staff for that, so both doctors are available only in the morning. Ideally, OPD should run till 6:00 PM, but since we have only two doctors, it ends earlier”.

We found geographic variations in the availability of speciality clinics such as ENT, psychiatry, dental, and optometry on specific days of the week, indicating an intermittent availability of expert care. According to a MO

“We offer several specialty services on specific days. The schedule: ENT: Fridays, Psychiatry: First and third Saturdays, Dental: Wednesdays, and Optometric (Eye Testing) Clinic: Tuesdays. We also have a part-time doctor who works three days a week. She splits her time between xx UPHC and YY UPHC, spending three days in each location. I’m the only full-time doctor here. Additionally, although we don’t have a dedicated PFT - Pulmonary Function Test machine, we provide basic breathing exercises, physiotherapy, nebulization’s, and similar services. Soon, we are expecting an experimental setup that will include PFT equipment, which will significantly improve the services we offer”.

The JPHNs and ASHAs also conduct other outreach activities such as weekly camps and ward-based screenings by JPHNs, for blood pressure and blood sugar among individuals aged 30 and above. They play a critical role in mobilizing patients, particularly for NCD days, adolescent counselling, and outreach camps. Health education and lifestyle modification counselling is provided during this outreach. A PHN noted

“We are providing NCD screening camps every month. Each ward, we are conducting. We check the BP sugar and do GRBs screening. Also, we screen people above 30. There are cases in those categories, above 60. We are getting more cases in that

category below 40. BP and sugar screening are done. We are providing health education”.

In a few of the districts UPHCs have initiated mental health screening using PHQ-9, and services are referred to District Mental Health Programme (DMHP). An adolescent counsellor is available twice weekly. E-Sanjeevani is used for teleconsultations, but usage is inconsistent due to staff limitations. AMO explained that

“We have Ashwasam (state specific mental health screening program). We have all mental health medicine. We don’t have mental health service here. But we will do screening, and we will refer the patient to the district hospital. One benefit here e - sanjivini (name of tele-consultation platform). So, we can approach them for any doubts or if you want to, consult any patients through e- Sanjivini, we can approach. Then if you need further consultation, we will ask them to come after two days, and we will put a request over there (e-sanjeevini) and then they come on that day. I will ask them to meet the staff nurse and check for their consultation.”

Another MO shared his thoughts on increasing the service packages delivered through the UPHCs. Majority of the UPHCs provide specialist consultation beyond the essential care for NCDs but there exists geographic variation based on the availability of specialist. It was noted that

“We are currently providing all the essential services for diabetes and hypertension patients free of cost, including specialist consultations. In addition, we are planning to start SWAAS services (COPD clinic). We've already ordered a spirometer, and we're waiting for it to arrive. For that, we already have salbutamol and other essential medications. We see very few COPD cases in this area, but in case of exacerbations, patients usually go to the General Hospital (GH).

I believe that once we start the SWAS service, more patients will begin to come to us”.

Another MO reflected that when the community show a strong dependence on government services for NCD care, awareness about the full range of services available at UPHCs remains low. Most people come to know about services through word of mouth rather than structured outreach. As said.

“People here mainly depend on government services for NCD care. Many are unaware of the full range of services we provide. Some patients spread the word, and others come to know about it through them. But there’s still a lack of awareness among the community”.

However, majority of respondents (92.8% of females and 95.3% of males) in cross sectional survey reported that the services they needed were available at the UPHCs. Only a small proportion (7.2% of females and 4.7% of males) indicated that the required services were not available.

3.2. Accessibility

3.2.1. Geographic Location of UPHCs

While enquiring about the geographical accessibility of the UPHCs, we received mixed opinions, in most of the districts, either both or one of the UPHC is in a place which is accessible to the entire population to which it caters, while in few of the districts UPHCs are in the outskirts of the catchment area. The location of the UPHCs is highly dependent with the availability of buildings offered with the Urban Local Bodies. Highlighting the location of the facility, a MO said *“The PHC is in a good location. We have bus services and no accessibility issues. Good location. Our facility is functioning in the Municipality location.”*

While another MO from another district reflected that the geographical location of the facility is in one corner of the municipality, and about the beneficiaries accessing the facility. It was noted that

“Our center is located on the outskirts of the Municipality, so coverage is limited. Patients come from three nearby panchayats. Since Lab services are free, more patients come here rather than going to the Taluk hospital, where they must pay Rs. 250-300”

A Staff Nurse (SN) expressed her views on how the location of the facility and availability of public transport system is affecting to access to NCD care. As informed.

“One thing is fewer patients are coming here now because of the uphill travel. They need to come all the way, and it’s difficult for them. Mostly, people don’t prefer coming here now, especially elderly people. We also don’t have a bus route here. The accessibility is an issue”.

3.2.2. Public Transport Facilities

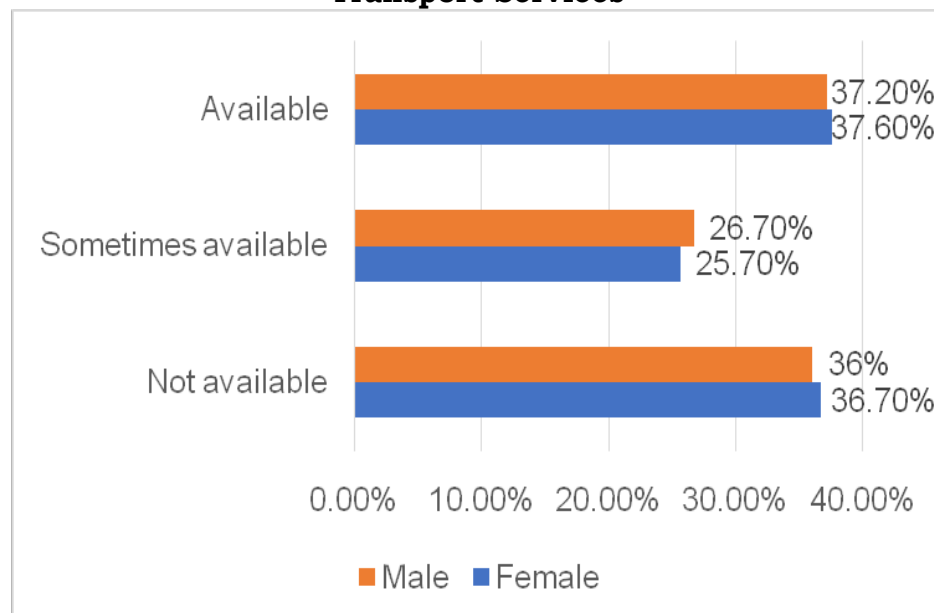
Speaking about the public transport system, another MO reflected why people are unable to fully utilize the services offered by the UPHC. It was told.

“Transportation is very less here. We have only buses till six O’clock. We have OP till 8:00 o’clock. And most often people will come in auto. And if they have a higher BP, if we ask them to wait for few minutes.....we cannot wait. We came in auto. Less buses in the route. That is a quiet day challenge. And another major issue that even you call it urban health centre, it’s a ‘pucca’ rural area. And the building is old, built in way back in 2003 and all”.

Reflecting on the location of the UPHC, a Community Health Worker (CHW) shared. *“Yes, the difficulty is that people need to take two buses to come here. It is difficult for people to spend that much money and time to get the medicine”.*

From the cross-sectional survey data on the availability of public transport system to UPHCs, it was reported that among 37.6% of female respondent’s transportation was available, 25.7% indicated it was available only sometimes, and 36.7% stated that transportation was not available (see Figure 2). Similarly, among male respondents, 37.2% had access to transportation, 26.7% reported occasional availability, and 36% did not have access to transportation.

Figure 2: Responses of Females and Males about availability of Public Transport Services



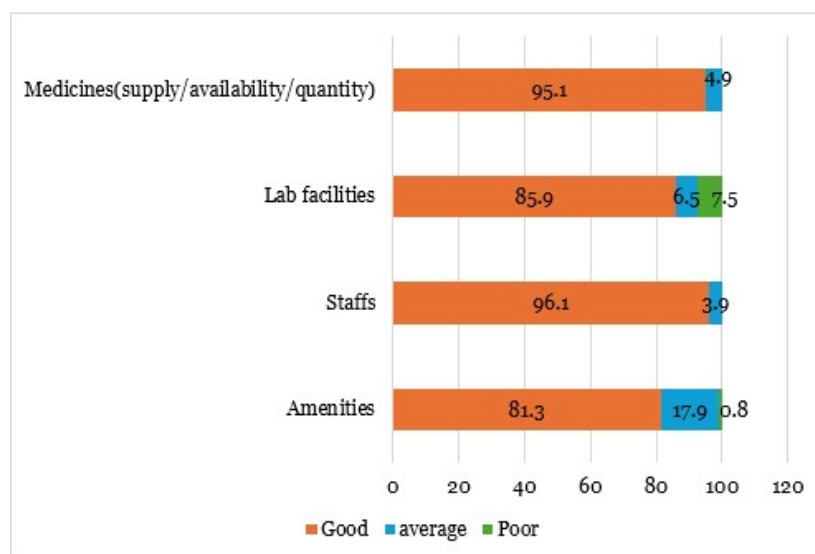
However, during the cross-sectional survey, all participants reported that government facilities were available, with UPHCs being the nearest for most (69.2%), followed by HWCs (21.6%). The nearest government facilities, on average, were located less than 2 km from their home, and 80% of them had no difficulty in reaching the facilities, suggesting good geographical accessibility of urban government facilities.

3.3. Acceptability

3.3.1 Patient Rating of UPHCs

The participants in general expressed favourable impressions of the facilities and staff of the UPHCs (see Figure 3). The majority rated the lab facilities (85.9%), amenities (81.3%), attitude of staff (96.1%), and medicines (95.1%) as good.

Figure 3: Overall UPHC Services Rating (%)



Speaking about the increased trust in government health facilities, a MO reported that patient-friendly human resource and free services attracts more people to seek care from the government health facilities. According to MO

“Yes, more people are now trusting government health facilities. Patients see us as reliable and trustworthy. One major factor is that our staff are very welcoming, and the services are free of cost. This approach has encouraged more people to use government facilities over private ones”.

Higher standards of cleanliness and patient friendly staff behaviour were found to be the major factor that influence patient preferences, even among

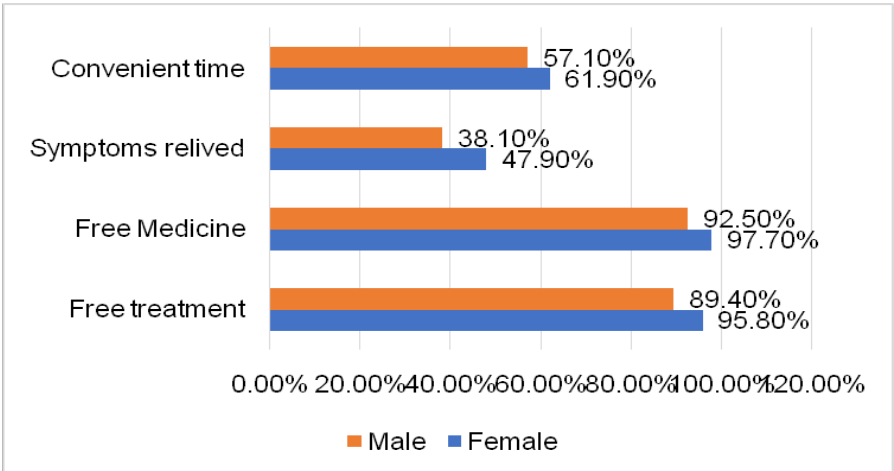
those who can typically afford private healthcare. According to a MO, about patient satisfaction

“When compared to other UPHCs, the cleanliness was much, much higher. So, when you see the XX UPHC (name of UPHC), most often we saw that the patients belong to all categories depend more on government service. Usually, those who can afford goes to private but in XX place, we do have some high-profile utilisation, which was increasing in the centre over my period. The most important factor, I should say, the hygiene of the hospital. Another thing was the attitude of the staff.....I believe the treatment part of all the UPHCs were same”.

3.3.2. Reason for UPHC preference

The data reveals that both male and female respondents prefer UPHCs primarily due to free and accessible services, but notable gender differences emerge in the extent of these preferences (see Figure 4). Free medicine and treatment are the top reasons for choosing UPHCs, reported by 305 females and 163 males (medicine), and 299 females and 157 males (treatment). Free testing availability was cited by 242 females and 126 males. Symptom relief and convenient service timings were reported less frequently but still show a gendered pattern: 147 females vs. 66 males (symptom relief) and 187 females vs. 106 males (convenient time).

Figure 4: Reasons for Preference of UPHCs



Chapter 4 - Utilization and Quality of NCD Services

This chapter explores the extent to which NCD services are utilized by the population and evaluates the quality of these services. It also highlights key enablers and barriers influencing service uptake and effectiveness.

4.1. Utilization of NCD Services

4.1.1. NCD Utilization by Age and Sex

The utilisation of UPHCs varied across gender and age (see Table 15). The data revealed that older adults (60 years and above) constitute the largest proportion (66.8%) of NCD service users at UPHCs, with a higher representation of females (63.4%) than males (36.5%) in this group. The 45–59 age group accounts for 29.7% of users, again with a greater share of females (66.4%) compared to males (34.2%). The youngest age group (<45 years) makes up only 3.5% of NCD users, though notably, 82.4% of them are female. Overall, women comprise 65% of all NCD service users, indicating stronger female utilization of public healthcare.

Table 15: Age and Sex wise Profile of Beneficiaries Accessing NCD Services

No.	Age Group	Male	Female	Total
1	Less than 45	3 (17.6%)	14 (82.4%)	17 (3.5%)
2	45- 59	50 (34.2%)	97 (66.4%)	146 (29.7)
3	60 and above	120 (36.5%)	208 (63.4%)	328 (66.8)
	Total	172 (35%)	319 (65%)	491 (100%)
<i>Source: CS survey</i>				

The qualitative assessments highlighted that elderly individual, particularly those above 60 years, form the majority of NCD service users at UPHCs. While younger adults and working-age populations, particularly males, are

significantly underrepresented in screening and follow-up services. This aligns with the findings of the cross-sectional survey. A MO told us.

“Most patients are above 60 years. Paediatric cases are here, and working-class patients are fewer. However, young adults with diabetes are increasing, though not significantly. They are not coming for follow-up”.

Similar was the reflection was from another MO who informed us that

“More male patients are present (visible at the OPDs), but when we check the register, we see more female patients. The reason is that this is a coastal area, and men leave early for work. Those above 30 are often resistant to starting medication. They believe that if they start taking medicine, they will need to continue for life, so there is hesitancy. Some patients do take and continue the medicines, but many hesitate”.

This was corroborated by a CHW from the same district. She said that

“Both men and women attend, but younger people are usually absent. Since they are working, they don’t prioritize health check-ups. It’s mostly older people who come, especially those who are already experiencing health issues”.

PHNs reported that male participation is particularly low in community-based screening camps. Despite targeted counselling, especially among high-risk groups like auto-rickshaw drivers’ compliance with referrals and follow-up remains poor. A PHN explained us.

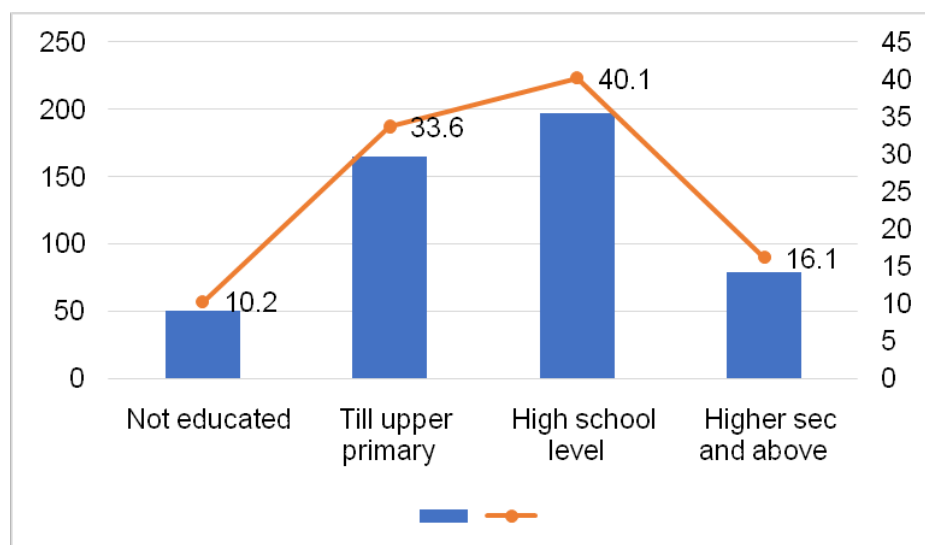
“We are not getting male patients for NCD screening camps. So, when we do the screening, some auto drivers will come. And if we tell them their BP is high, please go to hospitals. They won’t come Also, when we call them again, for the screening, they will be like, our machine is showing high value, it’s wrong like that

and they tell don't have any condition. Another perception is that, if you take medicine, they need to take it lifelong. So, they do not want to take lifelong medication, so they won't come".

4.1.2. Utilization of NCD Services by Education

We found that individuals with a high school education (40.1%) and those with upper primary schooling (33.6%) constitute the majority of service users and only 10.2% of users were from the non-educated group. Individuals with higher secondary education and above (16.1%) were comparatively fewer (see Figure 5).

Figure 5: Educational Status of Beneficiaries Utilizing NCD Services



Aligning with the findings of the cross-sectional survey, the qualitative assessments also reveal a clear preference for public healthcare services in urban areas by those who belong to a lower socio-economic gradient. Individuals from higher-income or more educated backgrounds tend to opt out of public services, even from NCD screening program like Shaili. PHN reported that:

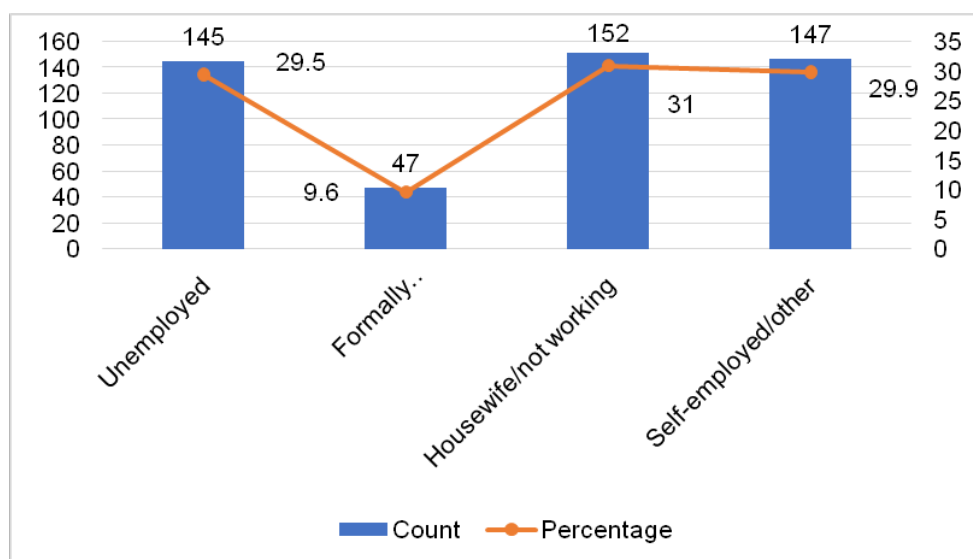
“More people go to private services if they are available in the locality. The educated ones tend to go to private clinics, while the poorer general population comes to our public facility. For

example, people from areas like ISRO, who have ties with private healthcare, will choose to go there. Even for Shaili, they are reluctant. They're afraid to give us their Aadhar cards or any personal information. They'll say, "We don't need anything from you."

4.1.3. Utilization of NCD Services by Occupation

The data on occupation reveals that 90% NCD service utilization at UPHCs in urban Kerala is highest among individuals who are not in formal employment (see Figure 6), particularly: Housewives/not working (31.0%), Unemployed (29.5%), and Self-employed/others (29.9%). While only 9.6% of users were formally employed or retired are utilizing the NCD services from these facilities.

Figure 6: Occupation of Beneficiaries Utilizing NCD Services



About the type of beneficiaries that UPHCs utilize NCD services by Occupation, a PHN shared her experience. She told us

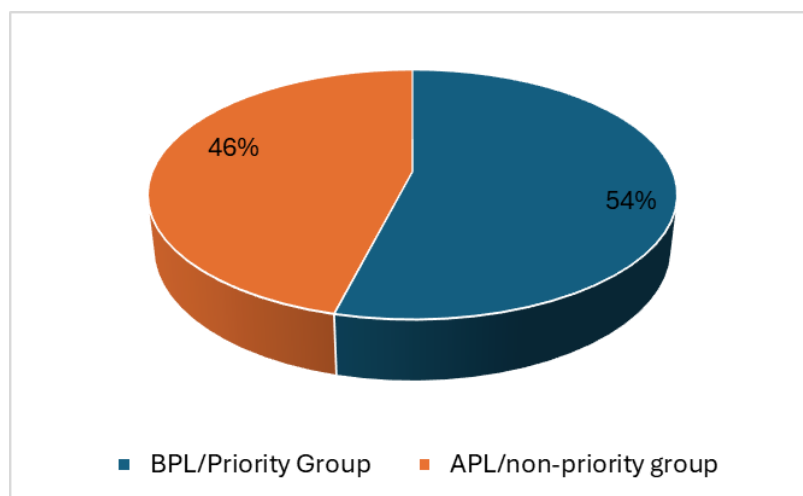
"We have farming communities here. They are physically active. They participate, but less so when it comes to NCD awareness. If we inform them, if 50 comes 25 will be under treatment 10-12 cases will be new, they usually won't accept they have a

problem. We try to encourage them to get tested at the clinics, but they don't always show up. People aged 50+ are more likely to attend, but those aged between 30-50 often won't attend. You will call them, but they usually won't turn up. If somebody above 30 come. That will be probably woman coming".

4.1.4. Utilization of NCD Services by Income Category

Our analysis showed that a higher proportion of NCD service users at UPHCs belong to the Below Poverty Line (BPL) or Priority Group category (54%), compared to 46% from the Above Poverty Line (APL) or Non-Priority Group (see Figure 7).

Figure 7: Income Category of Beneficiaries Utilizing NCD Services



Similar were the findings from the qualitative assessment which reflected that, in urban areas, utilization of NCD services were higher, among the lower-income population. ACHW told us, *“Both BPL and APL groups participate in our screenings. The free medicines and tests are a significant incentive”*.

Another CHW highlighted a three-tiered pattern of utilizing NCD services based on economic status. Higher-income groups predominantly prefer private healthcare, lower-income groups are heavily reliant on public

facilities, while the middle-class people often fall into a gap, they don't get special support like poorer groups, but private hospitals are too expensive for them. She noted

“Middle-class individuals face challenges accessing services. Higher-income groups prefer private healthcare, while lower income groups depend heavily on government facilities”.

Similar was the opinion from another CHW. Explaining the situation in her experience, she said.

“In my area, the rich people are much higher. These rich people go to private facilities. Patients from other PHC areas are coming here. Our patients are going there. So, staying in flats, they go to private; others middle class and lower, those are coming here”.

4.1.5. Utilization of NCD Services by Disease Conditions and Sex

The data from cross sectional survey showed that a majority of both female (56.7%) and male (53.5%) users attending UPHCs for NCD care are living with multiple conditions, such as a combination of diabetes, hypertension, and possibly other chronic illnesses (see Table 16). A closer look at gender differences reveals: A higher proportion of men (22.1%) have both diabetes and hypertension compared to women (17.2%). Hypertension only is more commonly reported among women (18.8%) than men (15.7%). Diabetes only remains relatively low across both sexes, with slightly higher rates among men (8.7%) than women (7.2%).

Reflecting on the burden of NCDs in the community. A MO explained

“Those with multimorbidity are more, with one condition, that is very less, with hypertension or diabetic alone. But people with more than one condition is coming to the clinic”.

Another MO highlighting on the NCD conditions said to us

“Diabetes is very common. COPD cases are relatively low. Among males, diabetes is more prevalent. Hypertension is also common, and we provide drugs like statins and amlodipine”.

Table 16: Conditions for which Beneficiaries Seek Care

No.	NCD Condition	Female n= 319	Male N=172	Total N=491
1.	Diabetes Only	23 (7.2%)	15 (8.7%)	38 (7.7%)
2.	Hypertension Only	60 (18.8%)	27 (15.7%)	87 (17.7%)
3.	Diabetes and Hypertension	55 (17.2%)	38 (22.1%)	93 (18.9%)
4.	Multiple Conditions	181 (56.7%)	92 (53.5%)	273 (55.6%)
	Total	319 (65%)	172 (35%)	491 (100%)
<i>Source: HH survey</i>				

A CHW raised her concern on the noticeable rise in serious chronic conditions such as cancer, hypertension, diabetes, and stroke within the community. While palliative care services offer some support, such as physiotherapy, it is often limited to monthly sessions, leading many patients to rely on private providers for continued care. According to her

“There are lot of people now with cancer. There are more people with BP, sugar and many other conditions. People have stroke, that also increased. Through palliative care, patients are receiving physiotherapy. But only monthly otherwise patients have physiotherapist visiting from private”.

Describing the shift in pattern of chronic diseases a CHW with 13 years of experience highlighted the increasing number of women now being affected, compared to earlier trends where men predominated. Categorizing the high-risk groups among men include auto drivers, construction workers, smokers, and those with sedentary lifestyles. While for women, the increase in NCD conditions was related to lifestyle changes and dietary patterns. She noted.

“Earlier, most cases were men. Now, we are seeing an increasing number of women with these conditions. Among

men, auto drivers, construction workers, and those with sedentary lifestyles, along with smokers, are at higher risk. For women, cases have risen due to lifestyle changes. Food habits are a major factor there has been a shift toward eating more outside food”.

Commenting on the reasons for the increase in NCDs, lifestyle choices was considered as the major contributor across all the facilities. The major gap in early detection occurs due to the reluctance of the younger population in attending the NCD screening processes. Above all, there was a common belief that conditions like diabetes were purely hereditary, which discourages proactive health behaviour. According to a CHW

“It’s because of lifestyle choices. Even though we advise people aged 30 and above to come for screenings, only elderly people turn up. Younger people, especially children, are eating fast food despite being told not to. Even patients with conditions like diabetes eat sweets and unhealthy food. Some believe it’s hereditary, if their parents had diabetes, they think they’ll get it no matter what they do”.

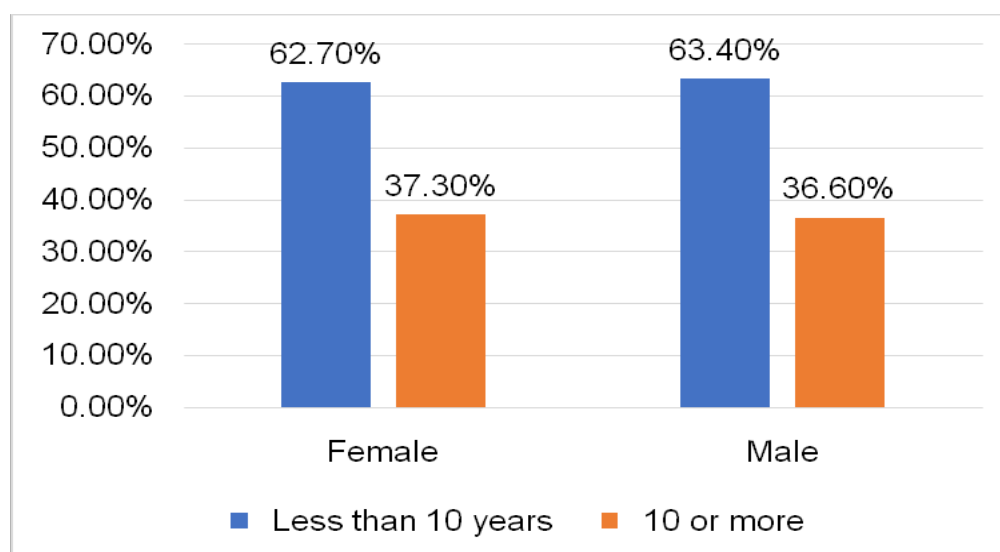
4.1.6. Utilization of NCD Services by Duration of the Condition

We found that majority of NCD service users at UPHCs have been living with their condition for less than 10 years, with 62.7% of female and 63.4% of male respondents falling into this category. While 37.3% of females and 36.6% of males reported having NCDs for 10 years or more (see Figure 8).

Reflecting on the reduced participation of men in NCD screening, a PHN described that, particularly those in the working population, face barriers to NCD screening and follow-up due to time constraints and work commitments. Health workers note that even when men visit PHCs, they are often in a rush, reducing opportunities for engagement. According to her

“I think men are going to work, and they are not sitting at home to come to the PHC. Even if they come to the PHC, they will be in a rush only. They need to go to work. During awareness classes, we will inform them we need to screen them. That’s why we are putting the screening here. We will ask people who come for the class to bring their family members, those who are 30 and above, for screening. We try to make them understand that this helps in early diagnosis of the condition so they can start the treatment”.

Figure 8: Duration NCD Diseases Among Patients Accessing Care at UPHCs



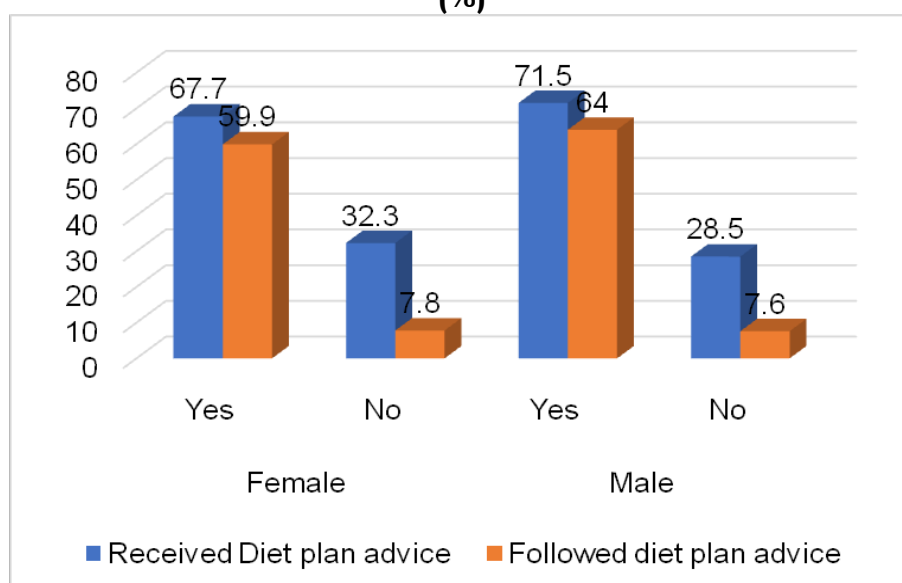
Another PHN shared her concern on reaching a segment of the population for screening even after several years of continuous NCD screening efforts. She noted that

“We have been screening for a few years, and many people have been covered. However, some people still remain untested, and we don’t know how to reach them. Some go to private hospitals instead of public facilities, and others don’t turn up for screening at all”.

4.1.7. Treatment and Medication Adherence among UPHC Service Users

Data from the study (see Figure 9) revealed that 69% of participants received diet plan advice from UPHCs, and among them, 61.3% followed the advice. However, 31% did not receive any dietary guidance, and 37.7% did not follow the advice even if provided. We used Medication Adherence Rating Scale (MARS) (see annexure 02), a validated ten-item tool that evaluates the patient's medication adherence. About 98% of the participants achieved an adherence score indicating a high level of compliance, shown by most of the participants.

Figure 9: Participants Received and Followed Diet Plan at the UPHCs (%)



Our participants noted that regular follow-up correlates with good disease control. However, many patients discontinue medication once their values normalize, indicating a poor understanding of the chronic nature of NCDs. Accessibility and time constraints are also barriers, especially for those coming from nearby areas. According to a MO

“Patients who come regularly have well-controlled values. However, some patients do not come regularly or stop taking medicines once their values become normal. They

keep the medicines for some time and then return with high values. Some patients from nearby areas come with uncontrolled BP. When we ask them why, they say they don't have time to buy medicines. In such cases, I refer them to the district hospital”.

Highlighting the gap in behaviour change communication, a MO reflected on the lack of dietician services hinders comprehensive NCD care. Even when dietary advice is given, patient adherence was low due to cultural dietary preferences and resistance to change, highlighting a gap in behaviour change communication. This gap existed in most of the UPHCs that we visited. It was told that

“There is another thing. Another difficulty we have is that the service of a dietitian is not available here. It is available only in one place. It is available only in the General Hospital and is not available anywhere else. No matter how much we tell them, they don't follow the diet and say that the common diet of Kerala is high in carbohydrates. They do not want to change that. everyone doesn't like it if we ask them to eat more green vegetables or fish instead of rice. If we tell them to eat more side dishes. They don't like it they are eating that for the last 40 years and now you are telling them this. Acceptance is an issue”.

Reflecting on the willingness of patients to improve treatment adherence through constant support by healthcare workers, a PHN highlighted issues with medication adherence, including incorrect dosage and inconsistent intake.

“Patients often don't take the medication as prescribed. For example, when they come for a follow-up after two months, we ask them if they've been taking their

medication as directed. They often admit that they haven't been following the prescribed dosage. If the doctor prescribes two doses per day, they may take just one per day. Some will take the medicine as prescribed but then skip a day or two if they encounter any difficulty and then restart. These issues are common, but whatever we suggest, they will try to follow it".

Underlining the need for structured follow-up mechanisms, another PHN noted that medication without clinical monitoring was common. She noted.

"They are taking medicines, but they don't have proper follow-up or testing. Whatever dose the doctor prescribes the first time; they keep taking it without follow-up. The doctor may ask them to come for tests, but they won't do it. We encourage them to visit the health center for proper reviews and testing".

Speaking about the positive impact of awareness activities on treatment adherence. A PHN informed.

"Some people come regularly for testing, while others stop after some time. But the number of people stopping is less now because we conduct many awareness sessions, and people know about lifestyle diseases".

Patients often lack understanding of the long-term nature of NCD treatment. Self-discontinuation of medication once symptoms improve is a recurring issue, and diet control remains a major challenge. According to a CHW

"Some do, but many don't. There are people who take medicine but still don't control their diet, and as a result, their sugar or BP levels remain high. Then there are those who take medication until they feel better and stop on their

own. They assume that since their values have come under control, they no longer need the medicine”.

4.2. Continuum of Care

4.2.1. Referral Pathways

We found that referral links to higher centers for tests and specialist care were in place, but many system-level challenges hinder the effective functioning of forward and backward referral mechanisms. effectively. AMO noted.

“For uncontrolled diabetic cases or complicated hypertensive cases, we refer patients to higher centers. We also refer CAD cases. Specialists prescribe medicines, and we handle the follow-ups. If we have those medicines in stock, we provide them here”.

Specialist support at the primary level was limited and inconsistent, often based on temporary contracts, which led to dependency on higher-level facilities for management. Sharing this gap, a MO said.

“We had an ENT specialist until December, but his contract hasn’t been renewed yet. We don’t have specialists for other NCDs or clinics like those for ulcers. For advanced cases, we refer patients to nearby facilities like the DH”.

Diagnostic referrals (like ECG and X-ray) are functioning, and linkages with secondary facilities are well-established. Patient choice was respected in referral decisions. Sharing the process of referral for diagnostics, a MO explained.

“Now we have referral facilities for ECG or Xray. We can refer the patient, mostly we do that. We have linkage to general hospital and DH. So, we will refer the patient to there. Refer to the hospital there. We will refer to either of these hospitals based on the patient's preference”.

4.2.2. Follow Up Practices

It was found that the follow-up of NCD patients at UPHCs remained largely dependent on manual tracking and individual staff effort, with limited integration and coordination across health facilities. Reflecting on the existing follow-up mechanisms and challenges a MO reported that follow-up system was in place using contact numbers and field staff, but it was not viable for patients from outside the UPHC's catchment area. It was told

“So, in the card, we have the patient contact number. If the patient is not turned up continuously for 3 months, the staff will contact the patient through that number, or else we will give that contact detail to the field nurse and ask them to enquire about the patient. One issue we have is like, there were the patients who comes but registered earlier not within our field limit. They are beyond our field. So, when those patients who are coming from outside of our field area, then they miss their follow up without any contact phone number. It is difficult to trace them without the field staff support”.

There was a structured defaulter register maintained by the PHN. However, the system excludes patients who take medicines privately, leading to incomplete follow-up data and potentially missed high-risk individuals. According to a MO

“We are calling them if they are two months default, we will call them. We will cheque with the Register and find the defaults. If two months they are not coming, we will call them. We have a separate register for the follow up. JPHN is maintaining that so these patients are work coming to this facility to get their medicines, even there are some patients who are utilising private facility. But those are coming here and getting medicines. There we have a

register for default. Those private utilisers are not included. Those taking private medicines. But we are doing a routine follow for our patients”.

Another MO described that the e-health capabilities in follow-up and the challenges related to it. The e-health system was good for prescribing and tracking, but its functionality for follow-up monitoring was unclear or underutilized. Also, the lack of uniform adoption across facilities weakens continuity of care. It was said that

“There’s a system, e-Health which is wonderful, but not all institutions have implemented it fully. Just because we’re doing it doesn’t mean others are. It’s an excellent system for prescribing NCD medicines quickly because it saves patient details and repeats the prescriptions. But for follow-ups, I’m not entirely sure how effective it is”.

Another challenge was medication shortages which led to non-compliance and worsening conditions, coupled with physical infrastructure limitations, further complicating the follow-up and re-engagement of defaulters. According to a MO

“We do face difficulties in follow-up. If patients become non-compliant due to medication shortages, their condition worsens and getting them back to controlled levels is a big challenge. When they stop medications, they become immune compromised and more prone to infections. Infrastructure is another challenge; our space is limited”.

The IHCI card initiative enabled detailed follow-up, including patients using private services. This approach demonstrates good documentation and tracking, but it appears episodic rather than routine. As informed by a Staff Nurse

“IHCI card, in the initial time. We need to do that. We called each and every patient to check their follow-up, we

mark if they are continuing their medicines, or consulting with private. We will write their private consultation, and the patient is continuing with the medication like that. So, we did that twice as part of the IHCL card. And mention that in the card”.

4.3. Quality

4.3.1. Skills of Human Resources

Our interviews revealed a mixed and inconsistent picture of training availability and adequacy related to NCD service delivery across staff cadres at UPHCs. While some senior staff have attended state or district-level training and utilize platforms like the LMS portal, a significant proportion of junior staff and newer recruits have not received formal or specific training for NCDs. A SN informed us.

“Yes, I attended IHCI training. It was helpful and gave us a better understanding of things. But we don’t have enough staff, another issues”.

A MO from the same district provided the same information. According to him

“No, I haven’t received any specific training in NCD programs. I’ve been working in the urban sector for six months. The other doctor is also new and hasn’t received training yet”.

A CHW shared their experience on how they are being trained for NCD care:

“We are going with the sister (PHN), so she will educate us if she gets the training. It is good. That’s all we prefer, in-person training. Online is so difficult We may not be able to enter that class due to difficulties”.

Even for those who received training, there is concern about lack of periodic updates despite frequent guideline changes, especially in NCD care. Another Staff Nurse told us

“Yes, training. If we get more training, it is good. We may not be trained or have knowledge in everything. So, we need training to deal with these cases. But based on what we know, we are doing so many things here”.

Similar was the reflection from a CHW who told us *“Yes, I have received training. I am not remembering”.*

Comparing the online trainings and offline training many staff prefer offline (in-person) training, citing better concentration and retention. Online sessions are often disrupted by routine work. From the view of a pharmacist

“If we receive offline training, which I believe is more effective. In online training, our concentration tends to decrease, but when we attend in person, we're more focused. Sometimes, when we must distribute medicine, it's hard to concentrate on training if it's online. Offline training allows us to multitask more efficiently and stay engaged”.

Reflecting on the interest in receiving more trainings sessions a CHW raised her concerns on workload, network issues and logistical challenges in attending the online sessions, it was told that.

“Many of us are interested in training, but our workload is too heavy to attend sessions during working hours. Additionally, network issues and logistical challenges make participation in online training difficult. Some people also face technical challenges, like linking their mobile numbers for OTP verification”.

During the interviews many staff expressed willingness and enthusiasm to undergo further training, recognizing that it would help improve efficiency, service quality, and patient outcomes. As noted by a Staff Nurse

“Yes, training. If we get more training, it is good. We may not be trained or have knowledge in everything. So, we need training to deal with these cases. But based on what we know, we are doing so many things here”.

4.3.2. Quality of Medicines

Our qualitative assessments showed a recurring theme across all districts on the perceived inferior quality of medicines provided through the public system. Medical officers and frontline workers acknowledged that some complaints may stem from clinical protocol differences. For instance, government facilities often initiate treatment at standard low doses (e.g., metformin 500 mg) and adjust gradually, which contrasts with private providers prescribing higher doses or combination pills upfront, leading to quicker symptomatic relief. As noted by a MO

“Most people come here because of affordability. Even if they visit private hospitals, they return here to get free medicines. Some patients complain about medicine quality. They feel that medicines from private sources work better, especially combination medicines. Some also reported that their blood sugar levels were uncontrolled when taking insulin from Janaushadhi but got better when switching to private insulin”.

Similar was the opinion of another, MO. It was informed that

“It is said that here everything is done for free, whether it is medicine or testing. However, that is not the case. There are also patients who go to private clinics. We can't say if they are going private because of quality issues. We follow

the NCD protocol here. We will start with. metformin 500 mg then we ask them to come for a review every two weeks. So, we adjust as per their values the people may find that difficult. That's why sometimes they have a chance to go private. But in private, they are getting the pill for a month directly the high-end pills, so that is an issue”.

This was corroborated by a CHW. She told us

The issue is those taking medicine from the private and then when they come here and get our medicines. The medicines are ineffective to them because they will be taking higher-dose medicines from private. So, when they are taking this medicine, they cannot take our medicine, it's difficult for them.

One Public Health Nurse (PHN), shared thoughts based on her field experience about the belief that free services equate to lower standards, despite the availability of essential drugs. She noted

“People have some mistrust about the quality of the medicine since it’s given free of charge. However, the poor people are generally happy because they’re getting free medicine. They are more satisfied with the service since it’s affordable for them”.

This was corroborated by a CHW from another district. According to her

“Many believe that if it’s free, something must be wrong with it. They wonder why private facilities are thriving if government healthcare is good. In emergencies, like breathlessness, people don’t want to wait. They prefer to borrow money and seek private treatment rather than wait in government hospitals. They associate private care with faster and better services”

While cost-free access drives high utilization, perceived quality concerns and trust issues especially in relation to medicine efficacy and treatment, pose significant challenges. Sharing an example from personal experience a CHW described.

“Many people have trust issues. For instance, my mother is diabetic, and she follows her medications and dietician’s advice, yet her BP is still 290/180. Initially, she used private facilities, and her sugar and BP were under control. However, due to financial issues, she switched to the government system. Since then, her BP is uncontrolled. Some people in the community also believe that the quality of medicines in the government system isn’t as good as in the private sector”.

Similar was the opinion from another CHW. According to her,

“When we go to the field, people often say that the medicines from here aren’t effective, especially the doses. Even when we tell them that we have medicines for BP, sugar, and other NCDs, they question the effectiveness of the medicines. If their condition doesn’t improve, they lose trust and may stop following up or taking medicines altogether”.

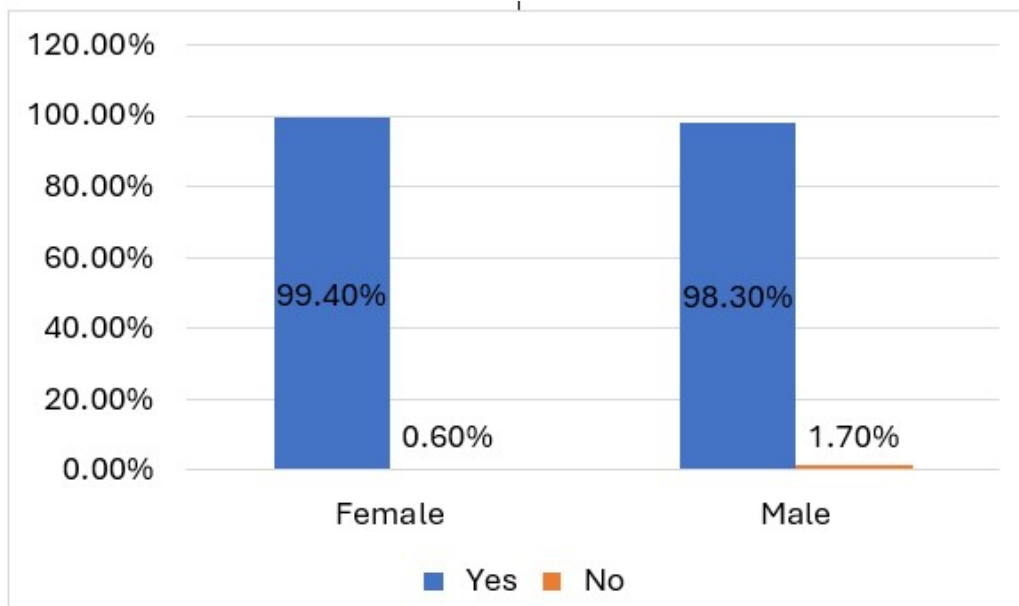
Additionally, storage and supply chain issues, such as the freezing of large quantity of tablets kept in the store, awaiting quality clearance result in a shortage of drugs. According to a pharmacist

“However, 40,000 tablets froze during storage, and we are waiting for re-release after quality testing. If they are not released, we will declare them as no stock and manage through local purchases. Other drugs like Telmisartan and Glimepiride are also available”.

4.3.3. Patient Satisfaction

The cross-sectional survey revealed that majority of both female (99.4%) and male (98.3%) respondents expressed satisfaction (see Figure 10) with the services provided at UPHCs.

Figure 10: Satisfaction of UPHC Service by Sex



Overall, the utilization of NCD services through UPHCs in urban Kerala reflects both progress and persistent gaps. While older adults, women, and economically disadvantaged groups are actively accessing services, younger populations and working-age men remain underrepresented. Factors such as medicine availability, staff support, and proximity contribute to improved access, but issues related to follow-up, health literacy, and service continuity exist as a challenge in delivering NCD services.

Chapter 5- Governance and Information System

This chapter presents the findings related to governance structures and information system capabilities at UPHCs, as part of a broader qualitative assessment of their readiness to deliver NCD services visa viz registration of NCD patients, drug intending process, reporting systems, local purchases and involvement of the urban local bodies. The study explores the extent to which existing administrative frameworks, decision-making processes, human resource management, and data recording/reporting mechanisms support or hinder the delivery of NCD-related services.

5.1. Identification and Registration of NCD patients

At the community level for the identification of individuals at risk of NCDs, UPHCs are assessing the CBAC score through the *Shaili* program. This is a comprehensive screening tool to assess the risk factors across multiple conditions, including diabetes, hypertension, cancer, mental health, tuberculosis, leprosy, and COPD. Based on responses and risk scores, individuals are referred to the UPHC for further screening. Automated messages are generated for individuals scoring above specific cut-offs (e.g., 4, 8, or 10), advising them to visit the UPHC regularly for follow-up testing and monitoring of blood sugar and blood pressure. According to a CHW

“Totally, we have around 62 questions. We are doing the second phase of Shaili now, we have so many to fill. sugar, pressure, cancer, cancer, mental health, TB, leprosy, COPD, adding all those nearly 60 to 62 questions when value goes above a certain value. They need to go to PHC for screening. But now, if they score 4 8 or 10 whatever, they score, they will get a message asking to visit the PHC regularly to check for their sugar, BP and for testing. Then they need to come for screening”.

At the facility level for the registration of NCD patients, we found that most of the UPHCs have transitioned from manual to digital (e-health) systems. However, all the facilities maintain physical notebooks acting as a safeguard in cases of technical issues or data loss. Patients are issued a Unique Health ID (UHID), which enables easy access to their visit history and medication records, improving continuity of care. A pharmacist described the process.

“If patients are coming for registration, we will ask them to bring the Adhaar card as well as the mobile linked to the Adhaar card. So, they have an OTP sent. OTP will be generated; they can be registered through that. They can be registered. Then they should have a notebook. They need to carry that every month when they come here. Values are being recorded in that notebook. So, if some mistake happened for the e-health portal, if that print gone missing, anything got missed if it is noted in the notebook also. So, they have a notebook in here. We give them their UHID, if we enter their UHID we will get all the details of their previous visits. So, before e-health, we had it check with the register. We have details of each patient in there. We have each patient’s name, date of dispensing the medicine, medicines list, all these in there. We could do follow up through that. But now it is better through, e-health it is easier”.

The CHW reported various challenges faced by them during the implementation of the *Shaili* survey, particularly in generating UHIDs due to server issues and slow Aadhaar verification processes. Another challenge reflected from them were use of their personal mobile phones, which frequently suffered from poor internet connectivity and limited functionality. According to a CHW.

“We started with the Shaili survey. Now, creating the UHID is difficult because of server issues. People are giving

Aadhaar and verifying it under the Aadhaar to generate UHI, which is taking a lot of time. So, for each home, for a single person, we are taking around half an hour. When Anganwadi teachers are getting phones, we are not. Yes, we face challenges with the systems. We don't have a dedicated system or a proper device. Since we are using our phones for the UHID work, the net is often slow, and it takes a long time to upload everything properly. Also, the connection issues sometimes delay the data entry process. This adds more time, and in the field, it's difficult to keep up with everything”.

CHWs reported that the process of generating UHIDs during the *Shaili* survey was time-consuming and resource-intensive due to the absence of offline functionality and poor internet connectivity. Although they received a small honorarium for mobile data usage, it was inadequate considering the repeated visits often required to complete UHID generation. The system depended on real-time Aadhaar OTP verification, which could not be performed offline, making a live internet connection essential for progress. In areas with poor connectivity, workers had to revisit households to complete data entry, further delaying the process. Additionally, the lengthy questionnaire comprising 60 to 62 questions and the need to upload geolocation data compounded the challenge. A CHW shared her concern

“We are getting a smaller amount as honorary, for net but that won't be enough because most of the work we don't get done in one go. We need to go for repeat visits to generate the UHID. The speed is also less. We need to ensure that we get the OTP, and we need to provide the OTP to generate the UHID. So, we cannot do it offline. If that is there, when the net comes, it will automatically upload, but there is no provision for offline mode. We need to have live internet. We have 65 questions. We need to go there, house by house, and do it because the location data

must be uploaded. If the place has no internet, we need to go again”.

It was reported that the implementation of the *Shaili* survey was often delayed due to resistance from some community members. Individuals were hesitant or unwilling to share their Aadhaar details and frequently questioned the purpose and relevance of the survey questions. According to a CHW

“Some are okay, some people resist providing Aadhaar details. they will ask why are you asking this? Why are you asking that? Why are asking these questions like that? They will ask. And some find it extremely difficult to give Aadhar which slows down the survey process. Connectivity issues in some areas are also a problem”.

Despite the technical improvements, challenges remained in specific communities. In few areas, some individuals were hesitant to share their Aadhaar details, and elderly participants often struggled to understand the purpose of data collection. As shared by a CHW.

“Earlier, there were issues with uploading and opening. The system showed record not found, it caused delays. However, after recent updates, it has improved. Now, I can fill 10 to 12 records per day. In Muslim-majority areas, some people hesitate to share their Aadhaar card details. Elderly patients especially find it difficult to understand why we need their information”.

5.2. Drug Intending Processes

There exists a structured process for the procurement and supply of NCD medicines at the UPHCs. The intending of medicines and consumables is done on a quarterly basis. Each facility has a purchase committee chaired by the medical officer, NCD Coordinator, and other relevant staff, which vets the requirement. Further, the information is uploaded to the Kerala Medical

Service Corporation Limited (KMSCL) portal for approval. The intend for a facility is estimated based on the OPD load including specific estimated for patients with NCD conditions. A buffer stock was also maintained to prevent shortages. Beyond the centralized supply through KMSCL, local purchases through ULBs are done to avoid a shortage of NCD medicines. A Pharmacist described the process.

“So, we have a quarterly supply, a year supply. Each hospital has a purchase committee. We will raise the issue in that. The chairman is the medical officer. Then NCD coordinators will be there. Then we have staff now. Then we collect the requirements from all the departments. Then we will present it in the purchase committee, and we will upload this in KMSCL. They will approve that. Then verification officer will approve that. We will, present that as an intent, nearly four times. So, every 3 months, we will get the medicine. For NCD patients, we calculate the total OPs. We will check for patients with COPD and all conditions. Then from that figure we will be calculating the need requirement, the required medicines and number needed. Also keep a buffer stock for additional stock so that we will not experience any shortage. We will get medicines through cooperation also. Local purchase through cooperation. That is a separate supply through cooperation for NCD and talent”.

Majority of the UPHCs operated under an annual indenting system with a financial cap of Rs. 10 lakhs, which guided the procurement of medicines. In cases of stock shortages, the issue was communicated to the KMSCL with attempts to provide additional stock when feasible. To manage medicine expiry effectively, the staff monitored the inventory six months in advance. When excess stocks were identified, redistribution to other institutions was carried out to minimize wastage and ensure optimal utilization of resources. According to a pharmacist

“Usually, we place a yearly indent with a ₹10 lakh limit. Quarterly, we receive the medicines. In case of a shortage, we inform KMSCL, and if possible, they provide additional stock. Otherwise, they adhere to the quarterly supply. For expiry management, we monitor six months in advance. If we identify high stock, we redistribute to other institutions”.

It was found that UPHCs across the state undertake local arrangements in managing medicine shortages, a pharmacist reported using the DVDMS portal to identify nearby health facilities that had surplus stock of required medicines. When a shortage arose, they typically contacted the pharmacists at neighbouring institutions to request supplies. After consulting with their respective medical officers, the supplying facility would issue a transfer note to facilitate the redistribution. As explained by the pharmacist.

“From the DMS portal, we know which institutes around our facility, the nearby institutes, have this stock with them. So first I called the pharmacist and ask there. They will give us an issue note, after consultation with their MO. We usually procure from our nearby institutes only, faraway institute, since we are in a corner, they won't provide us”.

5.3. Local Procurement of Medicines and Consumables

It was reported that UPHCs managed medicine shortages through local purchases supported by ULBs (15th FC Grant) and HMC funds (untied fund from NUHM). The municipality was described as highly supportive, allowing the use of their funds to procure medicines that were in short supply. In urgent situations, the facility accessed emergency funds from the HMC to ensure uninterrupted availability of essential medicines. According to a Medical Officer

“We have local purchase and municipality is very supporting. We will take their fund to buy medicine. Those shortage supply medicine we are taking from those HMC fund and if we need medicine, we will take from emergency. In case of emergency, we will get from there, HMC”.

It was informed that once an indent was placed, it could not be re-intended. If there was an existing indent balance, additional supplies were provided against that. In the absence of available stock through official channels, emergency requirements were met through local purchases. Medicines were also transferred from nearby UHWCs when there was no movement of a particular drug and bulk stock was available. Similarly, if the UPHC itself had medicines in excess, those were distributed to other UPHCs which had shortage of medicines. As informed by a pharmacist

“You cannot re-indent. If we have an indent balance, they will provide with that. If it’s not there, if it’s an emergency, we will get it through local purchase. UHWC, we will get transfer medicines from there. If that medicine has no movement, there. They will give us if there is bulk medicine. We will give that to the patients. If we have any medicine like that in bulk, we will give that also”.

Medicine shortages were addressed through local purchases when funds were available. NHM did not directly procure medicines but allocated funds to the HMC, which was responsible for approving and overseeing local procurement. When specific medicines were not available through the KMSCL, the facility relied on these NHM funds to procure the required drugs locally. It was noted by a pharmacist that

“If we have a shortage and have available funds, we do a local purchase. The NHM fund is sent to the Hospital Management Committee which then approves local purchases. The NHM does not buy directly; instead, they

allocate the fund, and we handle the purchase. If a specific medicine is unavailable in KMSCL we procure it through local purchases”.

Another pharmacist explained the process adopted while undertaking local purchase and resourcing slow-moving medicines from the nearby facilities. She told

“First, we need to get a non-availability certificate from KMSCL. Then, we get quotations from Janaushadhi. We take the lowest quotation and purchase the medicines through DVDMS. if any nearby facility has surplus stock, especially slow-moving medicines, we take them, so they don’t expire”.

The local purchase process for reagents and consumables for labs at the UPHCs was reported to be straightforward and systematically organized. Purchase requests were first prepared and signed by the medical officer. Following this, the data entry officer submitted the request to KMSCL via email to initiate procurement. Purchases were then made by HMC through approved local vendors. According to a lab technician.

“The process is straightforward. I submit a purchase request, which gets signed by the medical officer. Then, the data entry officer sends the request by email, and we proceed with local purchases through approved vendors. The purchases are logged, and we follow standard procedures”.

UPHCs had begun utilizing municipality funds to procure required lab reagents based on actual needs. In the interim, the reliance on KMSCL had diminished as the facility increasingly depended on municipality and NHM funds to meet its supply requirements. According to a lab technician

“Now we have municipality fund. We are using that to buy these agents. So now we are buying as per the need. We

have given a request for 1 year, but the fund has not been passed yet. So now we are giving for two months as per the need. There was a meeting for 1-year proposal has been done So I think they will give us so within a short duration we will get this for a year. KMSCL, we are not getting a supply, but now we are solely depending on the municipality. Then we have NHM fund also”.

5.4. Health Information Systems

UPHCs followed a dual reporting system, using both offline and online methods. Online reporting was primarily conducted through various portals like e-health, HWC portal, IDSP, etc, and using spreadsheets. Initially, reports were submitted directly to the district-level authorities. However, over time, the reporting structure was revised, and submissions were routed through the block level before reaching the district.

It was reported that the E-Health system significantly improved patient care by enabling seamless access to medical history and prescriptions across facilities. If patients forgot their medications, staff could retrieve previous records and issue refills. The system’s use of generic names and printed prescriptions also allowed patients to purchase medicines from external sources when needed. Additionally, interoperability between E-Health-enabled hospitals allowed tracking of patient visits and treatment details across institutions. Although the initial transition to E-Health was challenging—requiring staff to learn computer usage and build templates—over time, it became more user-friendly and efficient. According to a MO

“E-Health is very effective and should be adopted by more institutes. if a patient forgets their medications, we can check their history and refill prescriptions accordingly. If a patient visits another E-Health hospital, we can track their visit and prescribed medicines. The system uses generic names, and printed prescriptions allow patients to buy

medicines from outside if necessary. Earlier, adapting to E-Health was difficult because we had to learn how to use computers and create templates. But now, it is much easier. The only issue is that while we have a power backup for E-Health, we don't have backup for our lab, which creates problems when the power goes out.

Although the initial adaptation to the E-Health system was challenging, it became easy to use after proper training and familiarity for the existing users. However, recent instructions to maintain both digital records in E-Health and manual entries in a pre-check register added to their workload. As noted by a Staff Nurse

"Initially, when it came, it was difficult. But once we learned it, it was very easy to do. But now they are asking us to keep a pre-check register also and to enter in both. That is e-health and pre-check register. That is fine. We are finding, the precheck register difficult to do all".

Health staff reported that the integration of lab results into the E-Health system greatly improved efficiency and patient convenience. Test results were sent directly to the medical officer, eliminating the need to print and physically hand over reports to patients. This was particularly beneficial for facilities with challenges in infrastructure reported earlier. As shared by a lab technician

"It is very easy and beneficial. So, the result will directly go to the MO, since the lab is on the first floor, the patients cannot climb, most elderly patients. They find it difficult to climb. They don't have to climb to reach lab facility to get their result. And we do not have to take the print and give it to the patient. Now the result will automatically go to the MO. So, for those who are able, the patient will come up there for sample collection. But those who cannot climb the

steps, I'll come down and get their sample. We have a sample collection area in down also”.

In a few of the UPHCs it was reported that full implementation of the E-Health system had been delayed due to incomplete infrastructure at the facility. When services began, the necessary systems and equipment were not fully in place, which hindered the rollout. As a result, the E-Health platform remained only partially operational. Similar was the finding from the facility survey which reported that 67% of the UPHCs had operational e-health platform (see Table 8). Staff noted that implementation could proceed only after the remaining infrastructure was completed, and they were awaiting the necessary upgrades to move forward. According to a MO

“It hasn't been fully implemented due to incomplete infrastructure. when we started here, we didn't have the full infrastructure at that time. So, we are still, we need some more infrastructure to complete. Then only they could implement here. So, we are waiting for that to complete, to implement the E Health”.

Challenges persist in the implementation of e-health which include persistent network issues significantly delayed the receipt of digital prescriptions from medical officers, especially during peak patient hours. These delays disrupted medicine dispensing and made crowd management more difficult. While the system itself was viewed positively, its effectiveness was limited by poor internet connectivity and browsing delays. A pharmacist noted that.

“We have network issues, so we have internet issues. When the MO sends the prescription to us, it will take a lot of time to reach our computers there will be browse or issues. So, it is a difficulty. And when the patient load is high, and if this network issues happens, and we couldn't timely disperse with the medicine or manage the crowd.

But overall, this e-health is good. Because even if the patient didn't bring their previous prescription, the doctor could see what they have been prescribed during in the previous visit. In that way, that is good. If we also give them the print while we are dispersing the medicine. I give them the print, I can explain to them which medicines, when to take, how they need to take their medicines like that also”.

In some facilities, staff were assigned to manage E-Health responsibilities despite not having received formal training. One staff member reported that while PHC-level administrative training had been conducted, she had not personally participated in it. After the previously trained staff member left, they are assumed the E-Health duties and began learning the system independently. All staff had received basic orientation alongside ASHA workers, primarily focused on the reporting structure. A PHN said to us.

“I haven't received any training, but there was a PHC admin level training. People got some training, but I didn't. Now that sister left and I'm doing e health. I am learning that. I got training along with ASHA for reporting structure. Mainly we do maternal and child health. Early registration, antenatal visit delivery, and immunization of the child. Vaccination, screening camp at field levels”.

Reflecting on the dual system of online and manual reporting, a PHN highlighted the significant increase in administrative burden on health workers. She spoke

“We need to do monthly reporting. This includes reporting new cases, how many people we screened, how many have hypertension, how many are diabetic, and the mental health cases. All these reports need to be sent monthly to the DMO. The field staff give the monthly report to us, and

then the staff nurse at the facility enter it into the HWC portal. Field-level data is provided to them for entry, and they handle the online data input. We also have RCH Amma Manas, and HMIS online now. We enter antenatal, postnatal, family planning, immunization, IDSP, TB, Nikshay, and other schemes. For Nikshay, reporting is real time after distributing medicines. We also maintain a physical register for all of this”.

Speaking about the supportive supervision for UPHCs, a MO explained the various levels of reporting. It was reported that the disease surveillance was actively carried out through the Integrated Disease Surveillance Programme (IDSP), with daily reporting of conditions such as diabetes and hypertension. In addition to real-time updates, monthly reports were submitted to the District Medical Officer (DMO), detailing new cases by gender and condition. These data were reviewed in regular block-level meetings, where all facilities, including UHWCs, participated and in monthly DMO-level conferences, which included rural and other primary facilities but excluded UHWCs. As informed.

“Cases are reported daily via IDSP and monthly to the DMO. Number of diabetics, hypertension cases. We are updating that on daily bases. We are reporting through IDSP, providing the monthly report to DMO. New cases, males and females. And we go to DMO conference. Block meeting also we submit. We need to inform that..... Also report there also, how many new cases came for which condition. IDSP, we are doing it daily. And in the DMO office, we are reporting it monthly. We have block meeting. All facilities including rural and all facilities will be there for block and DMO meeting. UHWCs won't be there. For Block meeting UHWCs are there, but not for DMO meeting. We are reviewing the cases”.

5.5. Involvement of Urban Local Bodies

It was reported that the HMCs were convened at least three times annually, fulfilling its mandate for regular meetings. The HMC functioned as a local committee addressing complaints related to medical officers and the facility. Previously, NHM funds were paid directly to the facility, but the current system allocated funds to the HMC, which managed and utilized them. Efforts were underway to channel these funds towards hospital development activities, including sanitation improvements. As informed by an MO

“We do have an HMC, and it meets on every 3 months. Minimum 3 at least three HMCs should be conducted in a year. So, we are doing that. Usually, it’s a local committee. We receive complaint about the MO, the facility. Earlier, NHM made direct payment to the now we are receiving some fund to HMC. They will put the money into the utilizing it. Now we are trying to make them, now, to spend that money for hospital development, sanitation and all”.

UPHCs reported receiving support primarily for local medicine procurement, which facilitated addressing shortages beyond regular supply channels. A staff nurse noted.

“Yes, for the medicine, we do have their support. They help us with the local purchase, other than that there is nothing. We do have a counsellor’s room in the building”

While Urban Local Bodies (ULBs) were actively involved in administrative activities such as inaugurations, their ongoing support for NCD management was limited across most facilities, with only a few providing sustained assistance. As noted by a MO

“They are supportive. We have If you call for some inauguration or something, some minor things they do come. But other than that, there is no major support from

them. The district hospital is 8 kilometres. And government hospital is around 34 kilometres. So, if you need from here, it is quite easy for patients to reach these facilities for some specialist, some even go to medical College”.

It was reported receiving substantial support from the (LSGD), with funds allocated through various development projects for medicine procurement. A pharmacist noted that

“We have very good support from LSGD. Funds are allocated through their projects. Along with the Taluk Hospital, we received Rs. 18,00,000. For medicines not supplied through KMCL, we request procurement through local purchase.

Participants reflected that support from local authorities was generally limited, except for medicine procurement. While assistance was provided for emergency medicine procurement, there was minimal involvement in organizing health camps. An MO told.

“Their support is limited. They help us with medicine procurement in emergencies but don’t actively help with conducting camps. Compared to panchayats, municipalities are less supportive”.

Chapter 6 – Discussion

This study sought to examine how UPHCs in selected districts of Kerala are delivering NCD care, how these services are accessed by the population, and what systemic and socio-demographic factors shape both delivery and utilization. The study also captured the perspectives of frontline health workers and elected representatives regarding their preparedness and strategies to address emerging challenges in NCD management in the urban areas. Our study found that UPHCs play a vital role in this context, offering decentralized and affordable care to urban populations. Our findings reveal both strengths and persistent challenges in the availability, accessibility, acceptability, and quality of these services, particularly when viewed through the lens of health equity and the Sustainable Development Goals (SDGs).

6.1. Availability of Services

The findings indicate that UPHCs in Kerala have made commendable progress in the delivery of essential NCD services. All facilities studied provided free consultations, medicines, laboratory diagnostics, and periodic specialist clinics. NCD services were integrated into daily outpatient care in most centres, with some maintaining dedicated NCD clinic days. These services were supported by core infrastructure and a functioning clinical cadre of medical officers, nurses, and pharmacists, with many centres also offering dietitian, physiotherapy, dental, and optometry services. There are ongoing efforts to expand the specialist services further, including the introduction of diagnostic services like pulmonary function testing. This reflects a progressive step towards strengthening diagnostic capacity, improving the clinic decision-making, as well as reducing the burden of undiagnosed chronic conditions.

As Kerala continues to undergo an advanced epidemiological transition marked by rising life expectancy and aging populations, the health system must adapt to the growing and complex burden of NCDs[38]. However, the

availability of key inputs like human resources, diagnostics, infrastructure, and medications varied significantly across facilities. Although all centres technically offered NCD services, staff shortages, high turnover rates, and insufficient replacement mechanisms often disrupted continuity of care. These systematic gaps pose risks for patients with chronic conditions who require regular monitoring and sustained follow-up.

While essential medicines are provided free of cost, the periodic medicine stock-outs were identified as a major challenge. Critical drugs, including insulin, combination anti hypertensives, and respiratory medications, were frequently unavailable at some of the study facilities. The growing reliance on public facilities, driven by escalating out-of-pocket costs in the private sector, has significantly increased the demand in UPHCs, but this demand has not been met with a commensurate strengthening of procurement systems or supply chain responsiveness. Moreover, the recurrent medicine shortages undermine treatment adherence and compromise the state's efforts to deliver uninterrupted, equitable NCD care.

Physical infrastructure remains uneven across the facilities, as many facilities operating in constrained space, lack of basic amenities or delays in the procurement of consumables essential for community-based screening (e.g., glucometer strips). These constraints not only negatively affect the patient experience and service efficiency but also impede the key components of early diagnosis and management of the NCD program. Inadequate temperature control in pharmacy areas, particularly the absence of air conditioning, raises concerns about the efficacy and safety of heat-sensitive medicines, including insulin. Furthermore, only about two-thirds of UPHCs had functional e-health systems in place, limiting digital documentation, real-time medicine tracking, and care coordination.

Addressing and strengthening these infrastructure gaps, optimizing supply chains, and ensuring full-scale digitization are not just operational requirements but are foundational to achieving Universal Health Coverage

(UHC) and meeting SDG Target 3.4, which aims to reduce premature NCD mortality through prevention, treatment, and integrated care.

6.2. Accessibility

The accessibility of NCD care at UPHCs in Kerala shows mixed outcomes. It was found to be influenced not only by geographical and infrastructural factors but also by socio-demographic patterns of utilization.

The utilization of services showed a strong age and gender gradient. Older adults made up the largest group of users, and women were significantly overrepresented across all age groups comprising 65% of total users. Among those under 45, only 3.5% accessed NCD services, suggesting limited uptake of early screening and preventive care in younger populations, particularly among men. This aligns with previous findings from urban primary care studies in Kerala, which show that working-aged men underutilize government health facilities due to work commitments, stigma, or the belief that chronic disease care leads to lifelong treatment obligations [39,40].

The utilization was also shaped by educational and occupational status. Individuals with upper primary to high school education made up the majority of users, while those with higher education or no formal education were less represented. This reflects both trust in public health among middle-educated groups and a potential disconnect with more educated groups who may prefer private providers due to perceived service quality differentials. And among those who have no formal education, this may reflect poor health literacy or constraints in navigating the system. Occupational data showed that nearly 90% of users were not in formal employment, including housewives, the unemployed, and the self-employed. Only 9.6% of users were formally employed or retired, indicating time and flexibility as major determinants of service access.

Economic background was another key factor in utilization. Over half of users belonged to the Below Poverty Line (BPL) or priority category, reaffirming the role of UPHCs as critical providers of free and accessible care

for low-income populations. However, the middle-income group possesses unique vulnerability; those ineligible for welfare benefits but unable to afford private care and consistently appear to fall into a service gap category, facing both financial and personal barriers (e.g. loss of work) that limit consistent utilization.

While UPHCs were generally physically accessible, several systemic constraints reduced their functional accessibility. Overcrowding in pre-check areas, long waiting times, and a lack of public transport systems in some centres to reach the facilities discouraged some users. Medicine shortages, particularly for insulin, newer diabetic drugs, antihypertensive, and inhalers, led to referrals to private pharmacies, resulting in out-of-pocket expenses and undermining the principle of free public care.

Despite these gaps, field-level workers and ASHAs played a pivotal role in enabling access for hard-to-reach groups, particularly BPL households and elderly patients.

6.3. Acceptability

Acceptability of NCD services at UPHCs was generally high among service users, especially women, older adults, and those from lower socioeconomic backgrounds. This reflects a positive alignment with the equity goals of SDG 3.8 (Universal Health Coverage) and SDG 10 (Reducing Inequality) [41]. Many users appreciated the friendly behaviour of staff, the cleanliness of facilities, and the free availability of medicines and diagnostics.

However, barriers to full acceptability remain, particularly around health literacy, social stigma, and perceived quality of services. Many patients reported doubts about the effectiveness of government-supplied generic medicines, especially when transitioning from higher-dose private prescriptions. This mistrust, combined with inconsistent availability of medicines, reduced confidence in public sector care. Such perceptions not only undermine adherence but also reinforce class-based divides in

healthcare usage, challenging Kerala's commitment to equitable health access [42–44].

Cultural and behavioural resistance also plays a role in limiting acceptability. Patients often discontinued treatment once symptoms subsided or failed to adopt dietary advice due to entrenched food habits. This is consistent with the findings from other studies conducted in the state [45,46]. While some degree of counselling was provided, weak behaviour changes, communication and insufficient follow-up contributed to low compliance. Additionally, stigma around conditions like diabetes and hypertension led certain individuals, particularly younger men, to avoid registration, fearing social labelling or work-related discrimination. These findings are consistent with previous research showing that NCD stigma in India deters early diagnosis and continuous care [39,47].

On a positive note, patient experiences varied with the strength of provider-patient interaction. Centres where providers explained treatment regimens clearly, and where respect and dignity were ensured, saw better trust and engagement. This underscores the need to invest not only in infrastructure but also in soft skills training and patient communication.

6.4. Quality

The quality of NCD care in UPHCs across the state showed both progress and challenges. While most centres had essential services in place and staff committed to service delivery, quality remained uneven due to systemic and operational gaps. The key constraints include inadequacies in infrastructure, human resources, medicine logistics, and continuity of care. Despite Kerala's policy-level commitment to strengthening primary care, implementation on the ground has not fully kept pace with the rising burden of chronic diseases [48–50].

A key quality concern relates to the availability and perceived efficacy of essential medicines. Even when medicines were stocked, patients frequently reported supply interruptions and questioned the potency of generic drugs.

This perception directly affects medicine adherence and is especially important in managing conditions like hypertension and diabetes, which require lifelong and uninterrupted treatment. A recent report by the Comptroller and Auditor General (CAG) has uncovered major problems in the drug procurement and quality assurance systems of government hospitals in Kerala. The findings point to frequent medicine shortages, delays in supply, and insufficient quality control measures, all of which have affected the timely and reliable availability of essential drugs in the public health system [51].

Quality of human resources also emerged as a central issue. While most facilities had designated medical staff, the attrition of doctors, lack of trained replacements, and absence of updated protocols significantly affected continuity and consistency of care. Training was found to be irregular, and many providers lacked updated knowledge on NCD protocols or digital health systems. These gaps undermine clinical quality, delay diagnosis and treatment, and contribute to professional demotivation.

Despite these challenges, some facilities demonstrated positive quality mechanisms. Several laboratories maintained internal and external quality control protocols, equipment calibration logs, and hygiene standards. These efforts should be scaled up and replicated across facilities. Similarly, the presence of a multidisciplinary team (dietitian, optometrist, physiotherapist) in some centres offered a more holistic care experience, although such services were inconsistently available.

The fragmented nature of follow-up care was another major limitation. Facilities lacked robust systems to monitor patient adherence or detect defaulters. In facilities where follow-up existed (e.g., ASHA-led follow-up calls or default registers), outcomes were better. However, in most cases, digital platforms like eHealth were underutilized for long-term patient tracking, despite their potential to enhance the continuity of care and inter-facility coordination.

From the governance perspective, decentralized structures such as LSGDs and HMCs, were instrumental in funding and basic oversight, but were minimally involved in quality assurance or accountability mechanisms. Strengthening these local institutions through capacity building could ensure more responsive and efficient service delivery at the community level [52,53].

6.5. Governance and information

Although registration in the Shaili app is steadily advancing, several operational challenges persist particularly in reporting. A dual system of online and offline reporting remains in place, leading to redundancy that consumes significant time and effort. Additionally, the simultaneous requirement for both e-health data entry and paper-based documentation further complicates the process, placing an increased administrative burden on health staff and diverting their attention from core clinical and public health responsibilities. Streamlining these systems is essential to improve efficiency and reduce staff workload.

6.6. Conclusion

Kerala's UPHCs show strong potential to advance NCD care through accessible services, trusted providers, and growing patient engagement. Despite robust patient satisfaction about availability, accessibility, acceptability and quality of services among the beneficiaries, sporadic gaps in medicine availability, infrastructure, digital systems, and workforce capacity hinder equitable and continuous care, especially for underserved and middle-income populations. To align with the goals of UHC and SDG 3.4, “reducing premature NCD deaths” and SDG 3.8, “access to quality health services”, Kerala must invest more in integrated digital platforms, resilient supply chains, inclusive communication, and targeted outreach services to the most vulnerable population. Strengthening these areas is key to building a more equitable and responsive primary health system that leaves no one behind.

Chapter 7: Recommendations

For improving the quality and reach of NCD services through UPHCs in Kerala, both systemic and operational reforms are essential. These reforms should aim to strengthen infrastructure, human resources, service delivery, and coordination mechanisms while ensuring patient-centered, equitable care.

Recommendation 1: Ensuring Regular and Uninterrupted Medicine Supply

Strengthen the central procurement system for smooth and uninterrupted supply of medicines as per the requirement. In addition, allocate a tied fund in the beginning of the financial year itself for local purchase of medicines to make quick local purchase through ULBs or HMCs when essential medicines are out of stock. May keep a running contract for easy and transparent procurement.

Recommendation 2: Update Treatment Protocols and Expand Essential Drug List for NCDs

Introduce updated treatment protocols with new essential drugs for diabetes, hypertension, and COPD, and ensure they are included in the medicine supply chain. This will improve treatment outcomes and reduce the burden of complications associated with outdated therapies. It will also help to reduce the insulin requirement. A committee of clinical experts in the field may be formed to revise the protocols.

Recommendation 3: Strengthen Access, Outreach, and Public Health Workforce for NCD Care

Improve access and awareness by mapping underserved areas and implementing targeted outreach, including home-based care for bedridden patients by trained nurses. Conduct community campaigns, distribute IEC materials, and provide counselling on lifestyle changes to reduce NCD risk factors. Address staff shortages by introducing performance-based incentives, flexible transfers, and clear career pathways. Create a reserve

pool of trained personnel and consider part-time engagement of retired local doctors, especially in hard-to-reach areas. Strengthen the public health workforce at UPHCs to support outreach, follow-up, monitoring, and inter-sectoral coordination, ensuring more effective and sustained NCD care.

Recommendation 4: Strengthen Role-Specific Training for NCD Care Across all Staff Categories

Implement structured, ongoing training programs tailored to the specific roles of healthcare staff involved in NCD service delivery. Development of modules through Learning Management System (LMS) platform to all categories can be considered and introducing a weekly Learning & Development Session at the UPHCs are also recommended

Recommendation 5: Use Digital Tools for Tracking and Follow-Up

Use the e-Health platform and phone calls to follow up with patients who miss appointments. Assign outreach workers to follow up with them in-person and motivating for treatment compliance. Establish structured follow-up mechanisms using a mix of e-Health, field outreach, and community volunteers. Prioritize high-risk patients for regular monitoring.

Recommendation 6: Strengthen Inter-Sectoral Collaboration through ULBs

Encourage and strengthen active involvement of Urban Local Bodies (ULBs) in planning, monitoring, and linking with other departments for stronger enforcement of COTPA sections to prevent tobacco use, better promotion of healthy dietary practices, creation of public spaces for physical activity etc. The line departments and ULB also can involve in awareness creation for healthy lifestyle. Also, ULBs can collaborate with UPHCs to strengthen access to UPHCs This can include enhancing public transport connectivity to health facilities or arranging dedicated vehicles to transport patients, especially the elderly and those with mobility challenges.

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Annexure1: Summary of Findings on NCD Service Delivery through UPHCs

Domain & Sub domain	Findings	
	Quantitative (CSS & FS)	Qualitative (IDIs & FGDs)
1. Availability		
Population Coverage and Demographics	- Considerable variation in population coverage across study facilities. - Highest at 68,406 people, lowest at 8,978 covering 17% of the total population of the municipality. - Gender distribution in those aged 30 and above was nearly balanced (females 51.5%), though few UPHCs had a slightly higher proportion of males.	- Majority of NCD service users were older adults (60+) and women. - Limited engagement from younger adults, particularly those under 45 years.
Health Infrastructure	- Most UPHCs had adequate OPD infrastructure and basic patient amenities. - The majority operated from rent-free ULB buildings. - Common gaps as per the Indian Public Health Standards for UPHCs: lack of public address (PA) systems and display boards, token systems, examination tables with screens or curtains, hand washing areas, breastfeeding spaces, gender-segregated toilets, and fans in waiting areas. - IEC materials are often poorly placed or missing, especially in pharmacies, labs, consultation areas, and facility exteriors. - Only 67% had a functional e-health platform.	Most UPHCs had basic infrastructure but few lacked: - Dedicated NCD screening spaces. - Patient-friendly waiting areas (e.g., with fans). - Labs were often located in non-strategic areas (e.g., upstairs), making access difficult for elderly or mobility-impaired patients.
Pharmacy Services	- All UPHCs had a dedicated pharmacy room. 92% had air-conditioned stores (except one). - Medicine stockouts were	- All medicines provided free of cost - Frequent medicine stock-outs, particularly for chronic NCDs like

Domain & Sub domain	Findings	
	Quantitative (CSS & FS)	Qualitative (IDIs & FGDs)
	reported- 25% (oral diabetes drugs, insulin) and 17% (hypertension drugs).	diabetes and asthma. Medicine storage conditions were uneven with few lacked air-conditioning despite store-level availability.
Laboratory Services	- Essential tests (routine blood tests, FBS/PPBS/RBS, platelets, ESR, PCV, urine testing, and blood smear tests for malaria) are available at all centres. - HbA1c is available in 75% of facilities. - GCT for urea and lipid profiles was unavailable in four facilities.	Basic tests were available; however: - Advanced diagnostics like spirometry were mostly absent. - Lab functioning varied based on staff availability and space constraints.
Diagnostic Services	75% of facilities had ECG machines, and only 25% had a dedicated ECG room. - No X-ray services are available at any facility.	- ECG services were available at most UPHCs and conducted as per clinical need. - X-ray and other advanced imaging services were not available on-site; patients were typically referred to higher centres for these diagnostics.
Consumables	Only less than 1% reported issues with medicine availability; less than 3% with lab services.	Health workers reported periodic shortages of essential consumables, e.g. Hb testing strips
Human Resources	- Most positions filled included: Medical Officers, Pharmacists, Lab Technicians, Staff Nurses. - one UPHC had no Lab Technician despite a sanctioned post. - MLPs, Nursing Assistants, Sweepers present in a few centers. - ASHA worker numbers generally met sanctioned posts. - Healthcare workers had varied experience under NHM (Medical Officers: less than 6 months to 9 years; Nurses: 2 to 3 years).	Staff shortages (e.g. lab technicians and pharmacist) and high attrition, particularly among doctors, impacted service continuity.

Domain & Sub domain	Findings	
	Quantitative (CSS & FS)	Qualitative (IDIs & FGDs)
NCD Services	• Morning OPD services at all UPHCs; only 83% offered evening OPD. • All provided NCD services; all but except one offered IHCI, RMNCH+A, and geriatric care. • Limited specialty clinics: SWAAS and ASWAASAM (33%), Nayanamritham (42%), Padaparsparsham (17%). • Health camps were widely conducted (92%), health awareness efforts less consistent (58%).	• Free services for NCD care are present but not consistently utilized, especially among younger adults.
2. Accessibility		
Geographic Accessibility	• 69.2% reported UPHCs as nearest facilities. • 80% found them easy to reach (average distance less than 2 km).	• Accessibility was a challenge in hilly and peri-urban areas. • Several UPHCs were located far from public transport routes or in the outskirts of the municipality, impacting utilization.
NCD Utilization by Age and Gender	• Elderly (60+): 66.8% • Gender: Females 63.4%, males 36.5%. • Age 45-59: 29.7% of users • Under 45: 3.5%	• Older adults were the primary users of NCD, while the utilisation of younger and working age males were limited
Utilization by Education	• High school: 40.1%; upper primary: 33.6%; higher secondary & above: 16.1%; non-educated: 10.2%.	• More educated individuals disengage from public services
Utilization by Occupation	• Highest among non-formally employed: Housewives (31%), Unemployed (29.5%), Self-employed or others (29.9%). • Formally employed or retired: only 9.6%.	
Utilization by Income Category	• Below Poverty Line (BPL) or Priority Group: 54%. • Above Poverty Line (APL) or Non-Priority Group: 46%.	• Lower socio-economic groups prefer public services

Domain & Sub domain	Findings	
	Quantitative (CSS & FS)	Qualitative (IDIs & FGDs)
Public Transport	37.6% of female respondents' transportation was available, 25.7% indicated it was available only sometimes, and 36.7% stated that transportation was not available - Among males: 37.2% transportation was available, 26.7% available only sometimes, 36% transportation was not available 69.2% reported UPHC as the nearest government health facility; 80% had no difficulty reaching it.	
3. Acceptability		
Facility ratings	- Amenities: 81.3% - Staff attitude: 96.1% - Medicine availability: 95.1% - Laboratory facilities had the lowest satisfaction (14% rated average or poor).	There was an increase in trust among the public due to patient-friendly free services and cleanliness
Reason for UPHC Preference	- Free medicines (92.9%) and treatment (95.3%) were major reasons for using UPHCs. - Other factors: symptom relief, convenient timings	
4. Quality		
NCD training		Training of staff on NCD service delivery was uneven, junior and newly recruited staff lack formal training
Quality of Medicines		Perceived poor quality of medicines is partially influenced by differences in clinical protocol in public rather than actual efficacy.
Patient Satisfaction	High satisfaction levels: 99.4% females, 98.3% males.	

Annexure 2: Questionnaire Cross Sectional Survey

Block 1 Sample Participant Details

1	Schedule No (for office use):	01
2	Data Collector Initials	
3	Supervisor's name	
4	Interviewer Code	
5	Date of Interview (dd/mm/yyyy)	
6	Time of Interview (HH:MM)	
7	District Code	01 Thiruvananthapuram 02 Pathanamthitta 03 Idukki 04 Ernakulam 05 Wayanad
8	Ward no	
9	Participant UID	
	After explaining about the survey, seek approval	
10	Respondent Approval	Respondent agrees to be interviewed 01 Begin interview 02 go to block 2 Respondent does agrees to be interviewed 02 End interview
11	Response code (to appear at the end of the questionnaire)	Informant: 01 co-operative and capable 02 co-operative but not capable 03 busy 04 reluctant 88 others

Block-2 Participant Characteristics

1	Age of the participants (in years)	
2	Number of Household Members	
3	Sex of the participants	01 Male 02 Female 03 Other
4	Highest Education of the participants	01 Not educated 02 Primary level (1 -4 classes) 03 Upper primary level (5-7 classes) 04 High school (8-10 classes) 05 Higher Secondary level (plus one and plus two) 06 Graduation and above level...6
5	Current Occupation of the participants	01 Unemployed 02 Government/Private employed 03 Retired 04 Housewife/Not working 05 Self-employed 06 Daily wage labour 07 Others
6	What is the colour of your ration card?	01 Yellow 02 Pink 03 Blue 04 White 05 No Card
Yellow card : Most economically backward section of society (Antyodaya Anna Yojana Beneficiaries), Pink card : Priority or Below Poverty Line (BPL), Blue card : Non – Priority Subsidy or Above Poverty Line (APL), White card : non priority		
7	Marital status of the participants	01 Never Married 02 Married 03 Divorced 04 Separated 05 Widowed
8	Are you covered under any health insurance?	01 Yes 02 No
8.1	If Yes	01 Government health insurance schemes (KASP-PMJAY), 02 Central government insurance schemes for employees (CGHS,ESIS,ECHS etc) 03 State government health insurance scheme for employees (MEDISEP) 04 Community Health Insurance 05 Health Insurance provided by a micro

		finance institution 06 HI provided by private employer 07 Private health insurance 08 Donated money from foundations etc 88 Others..... (specify))
9	Do you smoke or consume smokeless products like gutka or khaini?	00 Never 01 Used to consume in the past/sometimes 02 Daily
9.1	If Daily, Type of Product	01 Smoker 02 Smokeless User 03 Both
If the participant consumes any kind of tobacco move to Block 8 questions, complete that block and navigate back to block-2 question number 10		
10	Ever consumed Alcohol	01 Yes 02 No
10.1	If Yes	01 Current User 02 Former User
11	Physical Activity	01 Physically active (30 minutes activities at least 5 days in a week) 02 Physically active but less than 30 minutes activities and/less than 5 days 03 Not active
12	Which is the nearest functional health care provider to the household (Code)	
Codes		
Government: 09 Sub centre/ASHA/AWW etc 10 PHC 11 FHC 12 CHC 13 Sub District/Taluk Hospital 14 District Hospital 15 Medical College Hospital 16 ESI/ECHS Hospital 17 CGHS 18 General Hospital 19 Women and Child Hospital Private: 21 Private doctor/clinic 22 Private nursing home 23 Private hospital 24 Charitable/Trust Hospital 25 Private multi/super specialty hospital 26 Private medical college-		Informal: 31 Registered Medical Practitioner 32 Traditional healer Government AYUSH: 41 Public Ayurveda facility 42 Public Homeopathy facility Private AYUSH: 51 Private Ayurveda doctor 52 Private Ayurveda facility 53 Private Homeopathic doctor 54 Private Homeopathic facility 99 Don't know- 99
13	What is the distance of the provider mentioned above from the household (in km)	_____ km

Block- 3 Participant Disease Condition

1.	Health condition (may be multiple)	01 Diabetes 02 Hypertension 03 Stroke 04 Heart disease 05 Chronic Respiratory Conditions 06 Others Specify
2	How long have you been diagnosed with your disease? Mention the disease and duration in years	
3	How long have you been taking medicines for your disease Mention the disease and duration of medication in years	
4	Do you receive any support for your NCD treatment and management?	01 Yes 02 No
4.1	If yes from whom?	01 Family 02 Friends 03 Neighbours 04 Others, specify
5	Did you receive advice to follow the Diet Plan from health care provider	01 Yes 02 No
5.1	If yes, are you following the advice	01 Yes 02 No
6	Expenditure incurred for most recent hospital (UPHC) visit (during last 6 months) (amount in Rs.)	INR
6.1	Type of service/kind	01 Medicine 02 Diagnostics 03 Others, Specify

Block- 4 Utilization of NCD Services

1.	Which health institution you commonly visit for NCD care? Reason for preferring this institution	01 UPHC 02 Others, specify
2	Do you face any difficulty in utilising UPHC facility?	01 No difficulty 02 Long distance 03 Service needed to me is not available 04 No doctor available regularly 05 Attitude of the staff 06 No medicine available 07 Lack of Transportation 08 Long Waiting time 09 Inconvenient timing of services 10 Need to depend on someone else 11 Others, specify

3	How often you visited the healthcare facility in the past 6 months?	01 1-2 times 02 3-4 times 03 5 or More times 04 Not visited in past 6 months
4	What was the reason for your visit?	01 Immunization 02 Regular checkup/review for medication refill 03 Worsening of the condition 04 For testing 05 Others , specify
5	What is the major reason for availing treatment from this health care facility	01 No cost 02 Free medicine 03 Symptoms relived 04 Convenient timings 05 Others, specify

Block- 5 Satisfaction with UPHC Services

1.	Are you satisfied with the services available in the UPHC?	01 Yes 02 No.
2	Are the NCD OP service timings in UPHC convenient to you	01 Yes 02 No
3	Have you visited any other health institution during the last 6 months? If yes, which institution? why?	01 Yes 02 No
4	Whether ASHAs/JPHN visited your home during the last 6 months?	01 Yes 02 No
5	If yes, ASHAs/JPHN asked about your health condition?	01 Yes 02 No
6	Did your health care center conduct periodic medical camps for NCD?	01 Yes 02 No
7	Did your ASHAs/JPHN inform you about the health camps/awareness programs in your locality?	01 Yes 02 No
8	Did you participate in camps/awareness classes	01 Yes 02 No
Quality of NCD Services		
9	How do you rate the services rendered by Staff of the health care facility?	01 High 02 Moderate 03 Low
10	How do you rate the Amenities – waiting area, drinking water, environment?	01 High 02 Moderate 03 Low
11	How do you rate the Lab facilities?	01 High 02 Moderate 03 Low
12	How do you rate the Medicines (availability/regularity in supply/ quantity)	01 High 02 Moderate 03 Low

Block- 6 Access and Availability of Health Services

1.	What is the distance from your house to the health care facility (UPHC)?	
2	Which government health care facility is closest to your location?	
3	Is the public transportation available to the institution (UPHC) at convenient time?	01 Not Available 02 Always Available 03 Sometimes Available
4	Are the services you needed available at the health center? If No, mention the service/s	01 Yes 02 No
5	Are the facilities at the health center considered adequate to your requirement?	01 Yes 02 No

Block- 7 Medication Adherence Rating Scale (MARS)

1	Do you ever forget to take your medicine?	01 Yes 02 No
2	Are you careless at times about taking your medicines?	01 Yes 02 No
3	When you feel better, do you sometimes stop taking your medicines?	01 Yes 02 No
4	Sometimes if you feel worse when you take your medicine, do you stop taking it?	01 Yes 02 No
5	I take my medication when I am sick only.	01 Yes 02 No
6	It is unnatural for my mind and body to be controlled by medication.	01 Yes 02 No
7	My thoughts are clearer on medication.	01 Yes 02 No
8	By taking medication regularly I can prevent getting sick.	01 Yes 02 No
9	I feel weird, like a 'zombie', on medication.	01 Yes 02 No
10	Medication makes me feel tired and sluggish.	01 Yes 02 No

Block- 8 Additional Questions on Tobacco Use

A	Have you ever used any of the following during the lifetime?	01 Cigarette 02 Beedi 03 Pan masala 04 Pan chewing 05 Nasal snuff
B	If yes, have you used any of the following during the last 30 days? (Current use)	01 Cigarette 02 Beedi 03 Pan masala 04 Pan chewing 05 Nasal snuff
C	If yes, mention the tobacco product use daily	01 Cigarette 02 Beedi 03 Pan masala 04 Pan chewing 05 Nasal snuff
Addiction level of smokers		
a.	If C1, how many cigarettes smoke in a day	Number of cigarettes.....
b.	If C2, how many bidis smoke in a day	Number of Bidi's
a	If C1 or 2, What is the time interval between waking up and first smoking?	01 Within 5 min 02 Between 5 to 30 min 03 Between 31 to 60 min 04 After 60 min
b	Is it difficult to refrain from smoking in prohibited places	01 Yes 02 No
c	Is smoke more frequently in the morning	01 Yes 02 No
d	Is smoke even if sick in bed most of the day	01 Yes 02 No
e	Which cig/beedi, is difficult to give up	01 First in the morning 02 Any other
Addiction level of chewing and snuff use		
a	If C3 or 4 or 5, How many cans/pouches per week do you use	
b	What is the time interval between waking up and first chew or dip?	01 Within 5 min 02 Between 5 to 30 min 03 Between 31 to 60 min 04 After 60 min
c	How often do you intentionally swallow tobacco juice	01 Always 02 Sometimes 03 Never
d	Which chew or dip is difficult to give up	01 First in the morning 02 Any other
e	Is chew or dip more frequently in the morning	01 Yes 02 No

f	Is chew or dip even if sick in bed most of the day	01 Yes 02 No
Level of Motivation to Quit Tobacco		
A	Are you willing to stop smoking/ chewing now.	01 Yes 02 No
B	If yes, when do you like to quit	01 At once 02 Within 1 week 03 Within 1 month 04 Within 1-3 month 05 After 3 months
1	If B1, 2 or 3, ask Have you made any preparation to stop	01 Yes 02 No
2	If yes, have you tried to quit at least once in last 3 months	01 Yes 02 No
3	If yes, how many times tried to quit in last 3 months	
4	When tried, what was the longest quit period	months days and ... hours
5	Are you still using tobacco	01 Yes 02 No
6	If yes, are you still willing to quit now	01 Yes 02 No
7	What withdrawal symptoms felt when stopped/ tried to stop	
Navigate back to question number 10 in Block-2		

Remarks by the Interviewer: Remarks by the supervisor

Annexure 3: Facility Assessment checklist for UPHC

Instructions to the field surveyors:

- *Inform the facility in advance of data collection process.*
- *Try to avoid Field Immunization days/NCD clinic days for your data collection*
- *Carry letter from the Government of Kerala during health facility visit and seek permission from the Medical Superintendent or supervising medical officer*
- *Introduce yourself to the Public Relations Officer or other staff nominated by the aforementioned person and explain the purpose of your visit*
- *Person to be contacted for data collection in each section is marked along with, kindly coordinate with them and consult other appropriate persons if required*
- *Observe the facility area and mark your responses carefully.*

Block 1: Survey Information

1	Surveyor team code:	
2	Data collection period	FY 2022-23
3	Facility group /type	UPHC
4	Name of the investigator:	Signature:
5	Name of the supervisor:	Signature:

Block 2: Facility Information

1	Name of facility			
2	District			
3	Name of Municipality			
4	Name of Constituency			
5	Taluk			
6	Revenue Block			
7	Area Covered by Facility (Sq. Km.)			
8	Health Block			
9	Since when the facility is functioning as UPHC	Indicate number of months or 0 if not FHC		
10	Population covered by the facility in the past year	i. Population category	ii. Number	iii. MM/YY when last updated
		Male		MM/YY
		Female		MM/YY
		Children		MM/YY
		Transgender		MM/YY
		Tribal (ST) Population		MM/YY
		Coastal Population		MM/YY
		SC Population		MM/YY
		Migrant		MM/YY
		Live births (annual)		MM/YY
11	Population: Age wise Classification	I. Male	II. Female	III. Others
	0 to 1 month			
	9 months to 11 months			
	0 to 2 years (0 month to 23 months)			
	1 to 5 yrs			
	5 to 10 yrs			
	1 to 15 yrs			
	10 to 18 yrs			
	18 to 30 yrs			
	30 to 60 yrs			
	Above 60 yrs			
12	Number of institutions in the area (where outreach activities are	Anganwadis : Primary schools :		

	carried out by Staff Nurse and JPHN)	Secondary schools : Senior secondary schools : Old age homes : Mental health institutions : Factories : Other 1 : Other 2 :		
13	Number of sub-centres under UPHC			
14	Presence of higher-level facilities inside 10Km radius (public) (tick as many as appropriate)	Facility	Yes	No
		FHC	1	2
		CHC Area/Sub District/ Taluk Hospital	1	2
		District Hospital	1	2
		Medical College Hospital	1	2
		ESI Hospital	1	2
		CGHS	1	2
		Others	1	2
15	Presence higher level facilities inside 10km radius (private) (tick as many as appropriate)	Private doctor/clinic	1	2
		Private nursing home	1	2
		Private hospital	1	2
		Charitable/Trust Hospital	1	2
		Private multi/super specialty hospital	1	2
		Private medical college	1	2
		Others (specify)	1	2
16	Distance (In km) between facility and the nearest Public higher level health facility			
17	Distance (In km) between facility and the nearest Private health facility			
18	Is the UPHC NQAS/Kayakalp Certified	04 Yes 05 No		
19	UPHC building Ownership	01 Own 02 Rented 03 Provider by Municipality/corporation free of cost		
20	UPHC building type (to be observed by the data collector)	01 Well maintained 02 Average 03 Poor		

Block 3: Facility Infrastructure Method: Observation of facility

1	Is OP registration counter available in the facility?	01 Yes 02 No	
2	Is there an Enquiry and information counter?	01 Yes 02 No	
	Is there Signages - PA System & Display boards	01 Yes 02 No	
3	Is there a patient's waiting area near Consultation area?	01 Yes 02 No	
4	Are chairs available in the waiting area?	01 Yes 02 No	
5	Is there a drinking water facility available for Outpatients?	01 Yes 02 No	
6	Is at least one recreation facility available for outpatients? (eg. TV/News Papers, Magazines etc)	01 Yes 02 No	
7	Is there a designated pre-check area for Nurse?	01 Yes 02 No	
8	Are there adequate fans in the waiting area?	01 Yes 02 No	
9	Are there separate consultation rooms in the facility?	01 Yes 02 No	
10	Is there a token system for OP consultation?	01 Yes 02 No	
11	Is the E- Health facility module operational in the facility with at least one module operational?	01 Yes 02 No	
12	Is the E -Health field module operational?	01 Yes 02 No	
13	Do all consultation rooms have an examination table with a screen/curtain?	01 Yes 02 No	
14	Do all consultation rooms have sinks with running water and elbow taps?	01 Yes 02 No	
15	Is there a breastfeeding area for mothers?	01 Yes 02 No	
16	Are there separate toilets for males and females?	01 Yes 02 No	
17	Does the facility have a functional Lab	01 Yes 02 No	
18	Does the facility have a functional pharmacy	01 Yes 02 No	

Block 4: Human Resources

	Category	a) sancti oned posts	b) in posit ion	c) contra ctual	d) supporte d by	Number of who have completed core “Aardram” training		
						f). Aardram Concept	g). ASWAAS (COPD)	h) Depress ion
1	Medical Officer				LSG/ NHM			
2	Pharmacist						NA	NA
3	Mid-level Service Provider (MLSP)							
4	Lab technician						NA	NA
5	Staff Nurse							
6	Nursing Assistant						NA	NA
7	Hospital Attendant						NA	NA
8	Clerk						NA	NA
9	Part time sweeper						NA	NA
10	Health Inspector						NA	NA
11	Lady Health Inspector						NA	NA
12	Junior Health Inspector						NA	NA
13	Junior Public Health Nurse						NA	NA
14	Driver						NA	NA
15	Office attendant						NA	NA

Block 5: Basic Laboratory Services, Person to be contacted: Lab technician

1	Mention the number of people who utilized the lab in 2022-23	
2	Please mention the average turnover of Lab in 2022-23 in Rs	
3	Are the following tests available?	
a	Blood test- routine	01 Yes 02 No
b	Blood test- FBS/PPBS/RBS	01 Yes 02 No
c	Platelet Count	01 Yes 02 No
d	ESR	01 Yes 02 No
e	PCV	01 Yes 02 No
f	HB1 AC	01 Yes 02 No

g	GCT Urea	01 Yes 02 No
h	Urine test routine	01 Yes 02 No
i	Sputum	01 Yes 02 No
j	Cholesterol	01 Yes 02 No
k	Blood Smear thick and thin for malaria	01 Yes 02 No
5	Funds received for the lab (eg. reagents, machines, etc.) in the past year (2018-19) from various sources .(enter the amount to nearest rupee, enter 0 if none received)	a – NHM funds..... b – Facility funds..... c – PRI/MLA funds..... d – RKS funds..... e – Other.....

Block 6: Pharmacy - Person to be contacted : Pharmacist

1	Is there a separate room for pharmacy available?	01 Yes 02 No
2	Is there display board in front of pharmacy with the list of medicines available?	01 Yes 02 No
3	Is there separate pharmacy store with air conditioning?	01 Yes 02 No
4	Were there any stockouts of these medicines from the KMSCL list in the past year	
	DM Add medicine name	Enter number, 0 if no stockouts
	HT Add medicine name	Enter number, 0 if no stockouts
	Insulin Add medicine name	Enter number, 0 if no stockouts
	Antipyretic Add medicine name	Enter number, 0 if no stockouts
	Add medicine name	Enter number, 0 if no stockouts
	Gastro Add medicine name	Enter number, 0 if no stockouts
	Pain/analgesic Add medicine name	Enter number, 0 if no stockouts
	Add medicine name	Enter number, 0 if no stockouts
	Add medicine name	Enter number, 0 if no stockouts
	Add medicine name	Enter number, 0 if no stockouts
5	Funds received for the Pharmacy (eg. reagents, machines, etc.) in the past year (2018-19) from various sources (enter the amount to nearest rupee enter 0 if none received)	A – NHM funds..... B – Facility funds..... C – PRI/MLA funds..... D – RKS funds..... E – Other.....

Block 7: UPHC Services

1	Outpatient department timings Morning Evening	 am to pm -----pm to -----pm
2	NCD Outpatient Services timings	 Per week timings
3	RMNCH+A	01 Yes 02 No
4	India Hypertension Control Initiative	01 Yes 02 No
5	SWAAS	01 Yes 02 No
6	ASWAASAM	01 Yes 02 No
7	Geriatric	01 Yes 02 No
8	Nayanamritham	01 Yes 02 No
9	Padasparsham	01 Yes 02 No
10	Outreach services for NCD	Camps Home visits IEC activities
11	Others Specify	

Block 8: UPHC Service Utilization

Sl. No.	Utilization	Male	Female
1	Total number of Outpatients morning (OP registration register)		
2	Total number of Outpatients evening (OP registration register)		
3	Number of patients attending staff nurse's Pre-check clinic (Pre-check register)		
4	COPD clinic (SWAAS)- Number of COPD cases diagnosed		
5	COPD clinic (SWAAS)- Number screened for COPD		
6	COPD clinic (SWAAS)- Referral care to higher centers (Referral register)		
7	Number of people screened for Hypertension (NCD Clinic register)		
8	Number of patients with hypertension detected (NCD Clinic register)		
9	Number of persons put on HTN treatment whose BP within target range after 6 months treatment		
10	Number of people screened for diabetes (NCD Clinic register)		

11	Number of people detected with diabetes (NCD Clinic register)		
12	Number of persons put on DM management whose FPG level was within target range after 6 months year of treatment. (NCD Clinic register)		
13	Number of patients with both Diabetes and Hypertension (NCD Clinic register)		
14	Number of Patients receiving care Palliative care (Palliative care register)		

Block 9: Community Outreach Activities by UPHC

1	No of ward health and sanitation committee meetings held last year in UPHC (check minutes book)	
2	No of outreach camps conducted for NCDs	
3	No of awareness sessions conducted by UPHCs on NCDs	

Field Notes (for Investigator)

Annexure 4: Qualitative Assessment Interview Guides

I. In-depth interview guideline - MO/Staff nurse

1. How long have you been working as an MO/Staff nurse?
2. How long have you been involved in the non-communicable disease control program? Please tell me briefly about your roles and responsibilities and what are the activities you are involved in the program? (IEC activities, camps, Outreach activities, different committees)
3. Can you describe the current facilities and ability of this Health Center to provide NCD services?
(Probe about available facilities like lab, pharmacy, equipment, medicine availability and infrastructure, adequacy, stock shortage, procurement, challenges, different types of NCD testing kits - regulation, adequacy, challenges) What are the challenges you encounter in implementing the NCD services, especially in your setting, and how do you overcome these challenges?)
4. Could you list the specific NCD services provided here, apart from NCD OPDs?
(probes: SWAAS, ASWAS, Nayanamritham, Padasparsham, IHCI, current status of these initiatives).
5. Could you please mention about the adequacy of number of staffs, trained staffs, in your Health centre?
6. In your opinion, which private or public facilities are commonly utilised by the community for NCD care? Why? (reasons) Can you briefly tell me the private NCD services available in your area?
7. In your opinion, is the current training provided for the NCD service providers adequate? If yes, why? If not, why not? (adequate number of trained staff, any knowledge or skill gaps)
8. Can you tell me how you do follow up for the NCD patients? Can you tell me the status of e health and reporting in your PHC? What is your role in that and how you are using that for NCD service management? (monitoring, entry check, follow up)

9. Could you describe any innovative or best practices that are implemented in your facility to provide NCD services? From your experience can you please give me some suggestions that help us to improve the program?
10. Do you like to add anything else?

Thanks for participating in this interview today. We appreciate your time.

II. In-depth interview guideline - Pharmacist

1. How long have you been working as a pharmacist? (Contract or Permanent)
2. How long have you been involved in the non-communicable disease control program? Please tell me briefly about your roles and responsibilities and what are the activities you are involved in the program?
(Probe about IEC activities, camps, Outreach activities)
3. Can you describe the current facilities and ability of this Health Centre to provide NCD services?
(Probe about available facilities like lab, pharmacy, equipment, and infrastructure in general and pharmacy specific, e health, NCD testing kits available, adequacy, challenges)
4. Can you describe about how you are reporting and replenishment of medicines?
(KMSCL intending, availability of medication -adequacy, stock shortage, procurement, challenges, prescription pattern of the doctors)
5. What are the challenges you encounter in implementing the NCD services, especially in your setting, and how do you overcome these challenges? In your opinion, is the current training provided for the NCD service providers adequate? If yes, why? If not, why not?
6. In your opinion, which private or public facilities are commonly utilised by the community for NCD care? Why? (reasons) Can you briefly tell me the private NCD services available in your area?
7. Could you describe any innovative or best practices that are implemented in your facility to provide NCD services? From your

experience can you please give me some suggestions that help us to improve the program?

8. Do you like to add anything else?

Thanks for participating in this interview today. We appreciate your time.

III. In-depth interview guideline – Elected representatives

1. According to you, what are facilities available in the UPHC and what are the challenges in NCD service delivery?

(infrastructure, medicines, lab facilities, service delivery, staff adequacy, funds, e- health)

2. Please tell me briefly about the responsibilities of the LSGD in NCD control programme and what are the activities you are involved in the program?

(Probe about IEC activities, camps, Outreach activities)

3. How the LSGD is supporting current NCD services delivery in the UPHC? (fund, conducting camps, projects, challenges)

4. In your opinion, which private or public facilities are commonly utilised by the community for NCD care? Why? (reasons – availability of services, timings of doctors, cost, attitude) Can you briefly tell me the private NCD services available in your area?

5. In your opinion, what additional NCD related services can be provided through the UPHC? And how LSGD can support further in improving the NCD service delivery in the UPHC? Do you like to add anything further?

Thanks for participating in this interview today. We appreciate your time.

IV. Focus group discussion guideline - MLSP/JPHN/JHI/PHN/HI/PHNS/HS and ASHA

1. Can you provide an overview of the Non-Communicable Disease program activities in your ward and your roles and responsibilities in that?

2. What is the training that you received regarding NCDs and can you describe the specific targeted initiatives of the program? (e-health

training, NCD screening training, mental health, training adequate, skill gap)

3. What are the resources and equipment available for you? Are there any challenges in terms of resource availability for effective program implementation?
4. Can you describe your role in awareness and prevention? (community-based initiatives and strategies used to ensure community participation, different committees)
5. As a field staff, what support are you receiving from the other healthcare providers? (communication, coordination, challenges)
6. Do you face any challenges in data collection or reporting? (e-health application, screening, specific challenges related to the setting tribal/costal/urban)
7. In your opinion, which private or public facilities are commonly utilised by the community for NCD care? Why? (reasons – availability of services, timings of doctors, cost, attitude) Can you briefly tell me the private NCD services available in your area?
8. Can you describe the specific awareness programs/camps conducted in your ward?
9. What challenges do you face in implementing the program? How are these challenges addressed by you?
10. From your experience can you please give me some suggestions that help us to improve the program?
11. Do you like to add anything else?

Thanks for participating in this interview today. We appreciate your time



