

India  
Health and Family Welfare Department,  
Government of Tamil Nadu

**DATA COLLECTION SURVEY  
ON  
THE PREVENTION AND CONTROL OF NCDs  
IN  
TAMIL NADU  
FINAL REPORT**

**MAY 2017**

**JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)  
GLOBAL LINK MANAGEMENT, INC.**

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## **Executive Summary**

Tamil Nadu's health system has been recognized as one of the most successful models in India, with significant progress in improving maternal and child health as well as communicable disease control and increases in access to health care services over the last few decades. On the other hand, the aging population is among the highest in India, with over 60s comprising approximately 10% of the total population (2011, Census of India). It is also one of the most urbanised states in India, with a high poverty rate of 20.3% among the urban population and approximately 8.64 million population living in the slum (2011). There has been a corresponding increases in the burden of Non-communicable Diseases (NCDs) accompanied by high levels of morbidity and mortality. Thus, the needs to strengthen the prevention and control of NCDs are high in Tamil Nadu.

India launched the National Program for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases (CVD) and Stroke (NPCDCS) in 2010 to respond the increasing burden of NCDs. Tamil Nadu initiated the programme on NCD prevention and control before the NPCDCS was launched

Tamil Nadu has established a structure to deliver basic services for NCD prevention, and early detection and treatment in line with national policies and strategies. NCD screening for hypertension, diabetes and common cancers (Cervical and breast) is available at all public primary health centres (PHC) and higher level health facilities, expect for some urban PHCs. The Tamil Nadu Government showed a strong commitment by setting a goal to reduce premature deaths from NCDs by one third by 2030 and initiated a state policy development process on major NCDs. However, a more comprehensive health system response, including increases in coverage and improvement in the quality of services, is required to address the increasing burden of NCDs.

One of the challenges is insufficient understanding of the current disease burden and effects and impacts of NCD programmes. While some level of situation analysis of burden of major NCDs has been undertaken in the process of the state's NCD policy development, further in-depth analysis such as age or regional wise disaggregation or economic cost analysis should be conducted. Monitoring and evaluation (M&E) of outcomes level achievements or impacts of the intervention remains partial and needs to be strengthened. With state NCD policies tending to focus more on treatment and infrastructure development, policy direction and responses to initiatives for the prevention and early detection, in particular, can be reviewed and enhanced based on the evidence. At the same time, skill development for health care personnel and quality improvement of health services also needs to be strengthened.

The survey team proposes undertaking a technical cooperation project aimed at strengthening NCD prevention and control in Tamil Nadu through the improvement of policy planning and

operationalisation of prevention and early detection, strengthening of M&E and data management, capacity development for quality improvement, and information, education and communication (IEC)/behaviour change communication (BCC) enhancement.

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# Project Site Map



 Facility study sites

## Photographs



Primary Health Centre



District Headquarters Hospital



Patients waiting in the secondary health facility



NCD screening by NCD nurses



Cervical cancer screening room



Discussion with Tamil Nadu Government

## **Abbreviations and Acronyms**

BBC	Behaviour Change Communication
BMI	Body Mass Index
BPHC	Block Public Health Centre
CDC	Centers for Disease Control and Prevention
CHC	Community Health Centre
CMC	Christian Medical Collage
CMCHIS	Chief Minister's Comprehensive Health Insurance Scheme
CMC	College Management System
CVD	Cardiovascular Diseases
DALYs	Disability –Adjusted Life Years
DDHS	Deputy Director of Health Services
DHM	District Health Mission
DHQH	District Headquarters Hospital
DME	Directorate of Medical Education
DMRHS	Directorate of Medical and Rural Health Services
DPHL	District Public Health Laboratory
DPHPM	Directorate of Public Health and Preventive Medicine
ECG	Electrocardiogram
EQAS	External Quality Assurance Service
FBS	Fasting Blood Sugar
GoI	Government of India
HFWD	Health and Family Welfare Department
HIV	Human Immunodeficiency Virus
HMIS	Health Management Information System
HMS	Hospital Management System
HSC	Health Sub Centre
ICCU	Intensive Coronary Care Unit
ICD	International Classification of Disease
ICT	Information and Communication Technology
ICU	Intensive Care Unit
IEC	Information Education and Communication
IP	Inpatient
IPHS	Indian Public Health Standards
IQAS	Internal Quality Assurance Service
JDHS	Joint Director of Health Services



JICA	Japan International Cooperation Agency
M&E	Monitoring and Evaluation
N/A	Not Available
NABH	National Accreditation Board for Hospitals and Healthcare Providers
NIE	National Institute of Epidemiology
MBBS	Bachelor of Medicine and Bachelor of Surgery
NFHS	National Family Health Survey
MCH	Medical College Hospital
MIS	Management Information System
MRI	Magnetic Resonance Imaging
NCD	Non-Communicable Disease
NGO	Non-Governmental Organization
NHM	National Health Mission
NPCDCS	National Program for Prevention and Control of Cancer, Diabetes, CVD and Stroke
OP	Outpatient
OPD	Out-patient Department
PDM	Project Design Matrix
PHC	Primary Health Centre
PHFI	Public Health Foundation of India
PIN	Personal Identification Number
PIPs	Program Implementation Plans
PO	Plan of Operation
PPBS	Post Prandial Blood Sugar
PPP	Public-Private-Partnership
PT	Proficiency Testing
QC	Quality Control
RBS	Random Blood Sugar
SDGs	Sustainable Development Goals
SHDRC	State Health Data Resource Centre
SHM	State Health Mission
STEPS	STEPwise Approach to Surveillance
TB	Tuberculosis
TC	Technical Cooperation
TNHSP	Tamil Nadu Health System Project
TNMSC	Tamil Nadu Medical Services Corporation

TOT	Training of Trainers
UAS	University Automation System
UHC	Universal Health Coverage
UHN	Urban Health Nurse
UNICEF	United Nations Children's Fund
UPHC	Urban Primary Health Centre
VHN	Village Health Nurse
Via/Vili	Visual Inspection with Acetic Acid and with Lugo's Iodine
WHO	World Health Organization

## **Chapter 1 Introduction**

### **1-1 Background**

India has been experiencing rapid economic growth. However, due to the growth in life expectancy and the epidemiological transition, it has also been facing increasing risks from non-communicable diseases (NCDs). Causes of death related to NCDs account for nearly 60% of total deaths, much higher than that of communicable diseases, at 30% (WHO, 2014). Globally, NCDs tend to pose large financial burdens on patients and their families due to the health care costs of long-term care and treatment and also decreases in household incomes. This creates a negative chain of poverty (WHO, 2011) and the United Nations General Assembly adopted the political declaration on the prevention and control of NCDs in 2011. India is experiencing such a situation and it is reported that the risk of having catastrophic health expenditure for families with cancer and cardiovascular disease patients is higher by 2.6 times and 1.3 times, respectively, than for communicable diseases. In response to this situation, India has emphasised the importance of NCD prevention and control as a prioritised health area under the Twelfth Five Year Plan (2012-2017). Moreover, the National Urban Health Mission (NUHM), launched in 2013, recognises the importance of improving the health status of the urban population – particularly for the urban poor – who are more vulnerable to NCDs than other demographics.

Tamil Nadu's health system has been recognised as one of the most successful models in India, having made significant progress in improving maternal and child health, as well as communicable disease control and increasing access to health care services over the last few decades. On the other hand, the aging population is among the highest in India, with 10% of the total population over 60. It is also one of the most urbanised states in India, with a high poverty rate of 20.3% among the urban population.<sup>1</sup> There has been a corresponding increase in the burden of NCDs, accompanied by high levels of morbidity and mortality. Therefore, the needs to strengthen the prevention and control of NCDs with less economic burden for the population are high.

In Tamil Nadu, four major intervention programmes for NCD prevention and control have been introduced in a phased manner, including a clinic-based NCD intervention, opportunistic screening, school and workplace-based interventions, and awareness-creation activities. Meanwhile, the reported major challenges of their efforts include improvement/upgradation of medical equipment and facilities at secondary and tertiary hospitals, and the quality and capacity of early detection and treatment, including screening and laboratory services at the primary and secondary levels. The former has been addressed by the Yen Loan “Tamil Nadu Urban Health Care Project,” signed in March 2016.

The Japan International Cooperation Agency (JICA) has been planning a cooperation project for

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<sup>1</sup> Census of India 2011

strengthening the prevention and control of NCDs with a particular focus on early detection and treatment in Tamil Nadu, and as part of this, decided to carry out this survey to identify the possible future cooperation plans.

## **1-2 Objectives**

This survey aims to understand the current status and identify the gaps in the implementation of NCD<sup>2</sup> prevention and control as well as laboratory services in Tamil Nadu State. The aim is to formulate a possible technical cooperation for JICA to contribute to the improvement of NCD prevention and early detection and treatment at the primary and secondary levels. Future technical cooperation is expected to produce synergistic effects with the Yen Loan “Tamil Nadu Urban Health Care Project.”

## **1-3 Methodology**

### **1-3-1 Survey Area**

The survey reviewed the overall status of NCD prevention and control efforts in Tamil Nadu. In particular, a detailed study at primary and secondary health facilities was conducted in three districts, namely Chennai, Madurai and Cuddalore, which were selected out of 17 districts targeted in the above-mentioned Yen Loan Project. The selection criteria are summarised below.

<Basic selection criteria>

- Within the referral zone of the secondary and tertiary health facilities supported by the Yen Loan “Tamil Nadu Urban Health Care Project”
- Large population size
- Availability of tertiary hospital
- Availability and capacity of secondary hospital, and
- Accessibility from Chennai

Each district represents one of the following groups.

- (1) Highly populated and rapid population growth with urbanisation,
- (2) Relatively high population with advanced tertiary hospital and middle-size secondary hospital (District Headquarters Hospital: DHQH),
- (3) Relatively high population with large-size DHQH without a tertiary hospital. Other selection criteria are also described below.

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<sup>2</sup> This survey focuses on cardiovascular disease, stroke, and cancers (cervical, breast and oral) as NCDs

**Table 1-1: Selection of detailed study districts**

<b>Representative group</b>	<b>Candidate districts</b>	<b>Selected District</b>
1	Chennai	Chennai
2	Coimbatore, Madurai, Vellore, Salem, Tirunelveli, Trichy, Thanjavur, Kanyakumari, Thoothukudi	Madurai
3	Cuddalore, Tiruppur, Erode, Dindigul, Krishnagiri, Pudukkottai, Theni	Cuddalore

### 1-3-2 Survey Scope

#### (1) NCD profile

- ✧ National and State NCD policy and guidelines/protocols
- ✧ Health statistics
- ✧ Health facility information at primary and secondary levels
- ✧ Measurements for NCD primary, secondary and tertiary prevention including health promotion, screening, diagnosis and treatment, referral, quality, and cost
- ✧ Human resource and capacity development
- ✧ Health information system including surveillance

#### (2) Laboratory services

- ✧ National and State policy and guidelines/protocols
- ✧ Function and network of medical laboratory
- ✧ Function and network of public health/sanitary laboratory
- ✧ Quality control

#### (3) Other development assistance

#### (4) Formulation of JICA technical cooperation

### 1-3-3 Survey Period

The survey was conducted from October 2016 to June 2017. Refer to Annex 1 and 2 for the detailed schedule.

### 1-3-4 Survey Team

The survey was conducted by the following members. In addition, the Public Health Foundation of India (PHFI) was re-commissioned to conduct the study on the health facilities at the primary and secondary levels in the three survey districts mentioned above.

**Table 1-2: List of JICA survey team**

<b>Name</b>	<b>Expertise and responsibility</b>	<b>Affiliation</b>
Ms. Akiko Hirano	Team Leader/NCD prevention and control	Global Link Management, Inc.
Prof. Toshihiko Hasegawa	NCD prevention and control (2)/laboratory services	Future Health Research Institute
Dr. Rei Kansaku	NCD prevention and control (3)/laboratory services (2)	Institute for Multicultural Health
Mr. Gaku Masuda	Public Health/Health information	Juntendo University
Ms. Makiko Sugishita	Data Management/Project Formulation	Global Link Management, Inc.

## Chapter 2 Responses to NCD prevention and control

### 2-1 NCD policy

#### 2-1-1 National level

The National Health Policy has been revised in 2017 to respond to changing health priorities in India. One of the highlighted changes was the growing burden of NCDs. The policy identifies NCD response as a prioritised national health programmes and recognises that the need to halt and reverse the growing incidence of NCDs through promotion of evidence-based cost-effective approaches, strengthening of secondary prevention incorporated into the comprehensive primary health care network, and culturally appropriate community centred solution etc.

Before the National Health Policy was revised, in response to the increasing burdens of NCDs, the Government of India (GoI) launched the National Program for Prevention and Control of Cancer, Diabetes, CVD and Stroke (NPCDCS) in 2010. States had already initiated some activities for prevention and control of NCDs. The Central Government (GoI) proposed to supplement their efforts by providing technical and financial support through NPCDCS and subsequently launched the “Operational Guidelines – Prevention, Screening and Control of Common Non-Communicable Diseases: Hypertension, Diabetes and Common Cancers (Oral, Breast, Cervical)” in 2016 to further accelerate the implementation of NPCDCS at the primary health level. Operational guidelines of NPCDCS have been revised in 2013 (NPCDCS 2013-2017).

Major objectives of NPCDCS are summarised below.

#### **Objectives of NPCDCS**

- (1) Health promotion through behaviour change with involvement of community, civil society, community based organization, media etc;
- (2) Opportunistic screening at all levels in the health care delivery system for early detection of diabetes, hypertension and common cancers;
- (3) Prevention and control of chronic NCDs especially cancer, diabetes, Cardiovascular Diseases (CVDs), and stroke;
- (4) Building capacity at various levels of health care for prevention, early diagnosis, treatment, IEC (information education and communication)/BCC (behaviour change communication), operational research and rehabilitation;
- (5) Support for diagnosis and cost effective treatment at primary, secondary and tertiary levels of health care; and

(6) Support for development of a database of NCDs through surveillance system and monitoring of NCD morbidity and mortality and risk factors.

India was one of the first countries to adopt the global targets for NCDs recommended in the WHO Global Action Plan 2013-2020, with the addition of one unique national target of reducing household use of solid fuels (Table 2-1). According to the National Centre for Disease Control in 2015 May, progress on NCD indicators had not been assessed in a systematic manner. Also, while NPCDCS (2013-2017) has proposed several expected outcomes, namely improved quality of life, reduction in the prevalence of physical disabilities, reduction in deaths and disability, etc., no baseline data and targets have been documented. As yet, only structure-related indicators and targets (e.g. no. of NCD clinics set up, no. of state cancer institute established) have been provided.

**Table 2-1: National Targets on NCDs**

No	Targets
1	A 25% relative reduction in the overall mortality from cardiovascular diseases, cancer, diabetes, or chronic respiratory diseases
2	At least 10% relative reduction in the harmful use of alcohol, as appropriate, within the national context
3	A 10% relative reduction in prevalence of insufficient physical activity
4	A 30% relative reduction in mean population intake of salt/sodium
5	A 30% relative reduction in prevalence of current tobacco use in persons aged 15+ years
6	A 25% relative reduction in the prevalence of raised blood pressure or contain the prevalence of raised blood pressure, according to national circumstances
7	Halt the rise in diabetes and obesity
8	At least 50% of eligible people receive drug therapy and counselling (including glycaemic control) to prevent heart attacks and strokes
9	An 80% availability of the affordable basic technologies and essential medicines, including generics, required to treat major noncommunicable diseases in both public and private facilities
<b>10</b>	<b>50% relative reduction in household use of solid fuels as a primary source of energy for cooking</b>

(Source: Centre for Non-Communicable Diseases, National Centre for Disease Control, GoI)

GoI initiated Integrated Disease Surveillance Project with the assistance of World Bank in 2004. The NCD risk factor surveillance was conducted in seven states, including Tamil Nadu in 2007-2008 by utilising WHO STEPS<sup>3</sup> methodology. It was expected that the NCD division in the Ministry of Health and Family Welfare would continue undertaking the NCD survey, however, an inbuilt surveillance system has not been incorporated into the national programme.

<sup>3</sup> WHO STEPS (STEPwise approach to Surveillance) is a simple, standardized method for collecting, analysing and disseminating data.



Meanwhile, the latest version of the District Level Household and Facility Survey 4 (2012-2013) and National Family Health Survey 4 (2015-2016) started to include biochemical data such as blood sugar levels and hypertension status in addition to tobacco use and alcohol consumption.

#### 2-1-2 State-level

Health services are delivered through the Health and Family Welfare Department (HFWD), Government of Tamil Nadu.

HFWD set the Sustainable Development Goals (SDGs) related goals and implementation strategies for NCD in a policy note in 2016-2017 as shown in Table 2-2.

**Table 2-2: State Health Goals - SDG-3 in relation to NCDs**

No	SDG	Implementation strategy
3.4	By 2030, reduce by one third premature mortality from NCD through prevention and treatment and promote mental health and well-being	<ul style="list-style-type: none"> <li>➤ Implementation of NCD control programme</li> <li>➤ Establishment of NCD clinics in all health facilities</li> <li>➤ Coverage of NCD complications under Chief Minister Comprehensive Health Insurance Scheme (CMCHIS<sup>4</sup>)</li> <li>➤ Implementation of national mental health programme</li> </ul>
3.a	Strengthen implementation of framework convention on tobacco control	<ul style="list-style-type: none"> <li>➤ Implementation of national tobacco control programme</li> <li>➤ Establishment of state &amp; district tobacco control cell</li> </ul>

(Source: Tamil Nadu Health and Family Welfare Department Policy Note 2016-2017)

In 2017, the development of the State Policy on Cardiovascular Diseases, Cancer, Trauma and Mental Health has been initiated. The policy includes the vision, mission, objectives, strategies and outcome indicators. It is planned to be finalised after the reviews and dialogues with the state and national experts. Meanwhile, the State Policy is developed by each disease. Though the objectives include reduction of risk factors and incidence rate, the strategies seem to focus more on the clinical treatment and infrastructure development but less on the prevention and early detection.

#### **Challenges identified by the survey**

- ✓ Policy efforts on prevention and early detection can be strengthened.

<sup>4</sup> CMCHIS is a health insurance program for families with less than Rs. 72,000 of annual income. It provides free health services for a total value of Rs. 100,000 per year for public and private facilities. The scheme tends to cover costly services at secondary and tertiary hospitals.

## 2-2 Health statistics

### 2-2-1 India national mortality trend

The top 10 causes of death in India from 2007 – 2009 and 2010 – 2013 are summarised below. The death rate from cardiovascular diseases has increased, whereas the rates for infectious diseases, such as diarrhoea and tuberculosis, as well as perinatal conditions, have been steadily declining.

**Table 2-3: Top 10 causes of death in India - 2007-2009**

Rank	Causes of Death	Deaths (%)		
		Male	Female	Person
1	Cardiovascular diseases	22.2	18.9	20.8
2	Ill-defined/ All other symptoms, signs and abnormal clinical and laboratory findings	6.6	10.7	8.4
3	Respiratory diseases	8.6	7.6	8.2
4	Perinatal conditions	6.8	6.7	6.8
5	Diarrheal diseases	5.0	7.5	6.1
6	Malignant and other Neoplasms	5.7	6.4	6.0
7	Digestive diseases	6.2	3.9	5.2
8	Unintentional injuries: Other Than Motor Vehicle Accidents	4.9	4.9	4.9
9	Respiratory infections	4.3	5.4	4.8
10	Tuberculosis	5.3	3.2	4.4
	All Other Remaining Causes	24.2	24.7	24.4
	Total	100.0	100.0	100.0

(Source: Causes of death statistics 2007-2009, GoI)

**Table 2-4: Top 10 causes of death in India – 2010-2013**

Rank	Causes of Death	Deaths (%)		
		Male	Female	Person
1	Cardiovascular diseases	25.1	20.8	23.3
2	Ill-defined/ All other symptoms, signs and abnormal clinical and laboratory findings	10.0	15.4	12.4
3	Respiratory diseases	7.8	7.5	7.6
4	Malignant and other Neoplasms	5.8	6.6	6.1
5	Perinatal conditions	5.5	5.8	5.6
6	Diarrheal diseases	4.2	6.3	5.1
7	Digestive diseases	6.0	3.5	4.9
8	Unintentional injuries: Other Than Motor Vehicle Accidents	4.8	4.6	4.7
9	Respiratory infections	3.7	4.2	3.9
10	Tuberculosis	4.5	2.8	3.7
	All Other Remaining Causes	22.7	22.4	22.6
	Total	100.0	100.0	100.0

(Source: Causes of death statistics 2010-2013, GoI)

### 2-2-2 Tamil Nadu

The proportion of the population over 65 years of age is around 6.6% in Tamil Nadu (2011),

higher than the national average, equivalent to the figure from Japan around 1970<sup>5</sup>. According to WHO<sup>6</sup>, this figure lies at the point of change when the major cause of disease burden (calculated by disability-adjusted life years: DALYs) shifts from communicable diseases to NCDs.

#### (1) Mortality trends

Death registration is submitted to the registration unit in the municipal corporation, municipality, town or village panchayat where the death occurs. Around 40% of the total registrations are certified by the medical officers out of which, 70% are submitted by the health facilities. Top 10 causes of death among medically certified cases based on ICD 10 (International Classification of Disease: ICD) from 2011 -2015 are shown below.

**Table 2-5: Top 10 causes of death among medically certified cases in Tamil Nadu**

Ranking in 2015	Name	2011	2012	2013	2014	2015 (provisional)
1	Diseases of the Circulatory System	40.3%	41.4%	37.7%	48.8%	50.9%
2	Congenital malformations deformations and Chromosomal abnormalities	20.4%	22.5%	28.5%	21.1%	16.0%
3	Disease of the Respiratory System	7.6%	6.5%	3.6%	2.8%	6.1%
4	Endocrine, Nutritional and Metabolic Disease	4.2%	3.6%	1.0%	3.3%	4.8%
5	Certain Infectious and Parasitic Disease	4.6%	6.1%	6.4%	5.1%	4.4%
6	Diseases of Musculoskeletal System and Connective tissue	2.9%	2.6%	1.7%	2.3%	3.4%
7	Pregnancy, Child Birth and the Puerperium	5.0%	3.6%	8.1%	4.6%	3.0%
8	Neoplasms	3.2%	2.8%	2.6%	2.5%	2.9%
9	Symptoms, Signs and abnormal clinical and laboratory findings not elsewhere classified	6.5%	7.2%	7.0%	6.0%	2.2%
10	Diseases of the Digestive System	2.1%	1.8%	2.5%	1.7%	2.0%

(Source: HFWD)

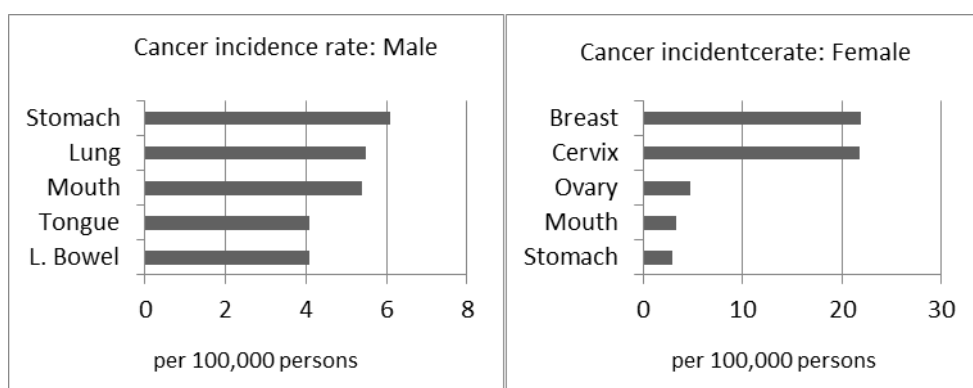
These figures may not provide an accurate summary as there is a likely bias towards cases where there was access to medical facilities and deaths that occurred in hospitals. Moreover, it was reported by a state officer that the ICD 10 was not taught in medical colleges until recently and the quality of medical death certificates varied between health facilities and doctors.

<sup>5</sup> Toshihiko Hasegawa, Presentation “We share common challenge”, 2017

<sup>6</sup> WHO 2012, Burden of disease vs Age over 65 % in 192 countries cited in presentation “We share common challenge” by Prof. Toshihiko Hasegawa

## (2) Morbidity trends

The Cancer Registry is overseen by the Adyar Cancer Institute, also known as the Women's India Association (WIA), which is authorised to manage the official cancer registry by the GoI as part of the national cancer registry programme. While the national registry programme only covers Chennai in Tamil Nadu, they have collected cancer incidence rates from all institutions that treat cancer patients in the state since 2012. The results are shared with the national and state government and were used as part of the evidence base for initiating oral cancer screening. According to Adyar Cancer Institute, the preliminary results of the entire state from 2012 to 2015 show that, for men, cancer of the stomach (with an incidence rate of 6.1 per 100,000 population) is the most common cancer, followed by lung and mouth cancers. Whereas, for women, breast cancer is the most common (21.9/100,000 population) followed by cervical (21.8/100,000 population). The data also show that breast cancer is more common in urban areas, while cervical cancer is more common in rural areas.



**Figure 2-1: Cancer incidence rates for males and females in Tamil Nadu – 2012-2015**

(Source: Adyar Cancer Institute)

An NCD risk factor survey was conducted in 2007-08, as mentioned above. Some of the major results are summarised below. Compared with the other seven states, Tamil Nadu showed the second highest rate of raised blood sugar levels after Kerala, whereas there was no significant difference in hypertension.

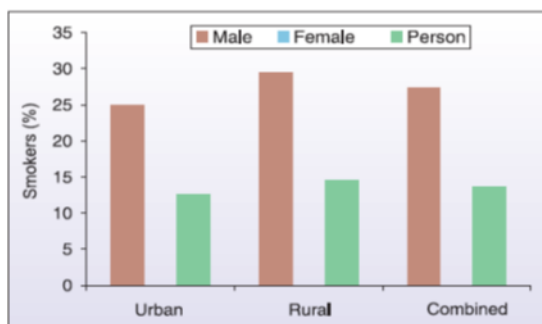


Figure 2-2: Current smokers (%)

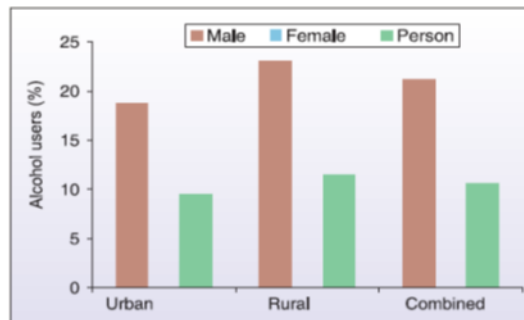


Figure 2-3: Alcohol consumption (%)

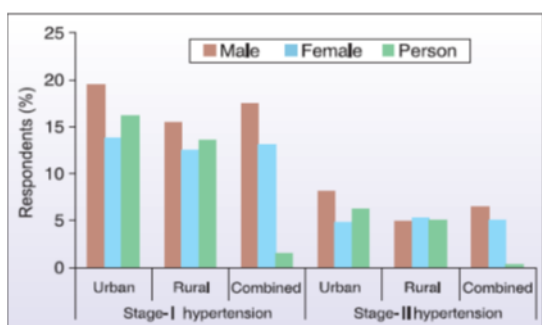


Figure 2-4: Stage I & II hypertension (%) \*1

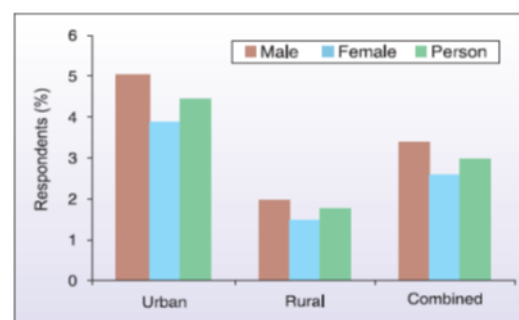


Figure 2-5: History of raised blood sugar (%)

Note \*1: Stage I is 140-159 mmHg systolic or 90-99 mmHg for diastolic. Stage II is  $\geq 160$  mmHg systolic or  $\geq 100$  mmHg for diastolic.

(Source: Integrated Disease Surveillance Project NCD Risk Factor Survey 2007-08 Tamil Nadu)

While an NCD risk-factor surveillance survey has not been conducted since then, the National Family Health Survey (NFHS) 4 (2015-2016), implemented by the Ministry of Health and Family Welfare, GoI, started to include biochemical data such as blood sugar levels and hypertension status in addition to tobacco use and alcohol consumption. Although it is difficult to compare the biochemical data of these two surveys, as the target ages and definitions of blood sugar level are different, the male and urban populations tended to show a higher percentage of hypertension and higher blood sugar levels compared to females and rural areas, respectively, in both surveys. In terms of tobacco use, the rate for both men and women has declined compared to NFHS 3 in 2005-06; however, alcohol consumption for both has increased since 2005-06.

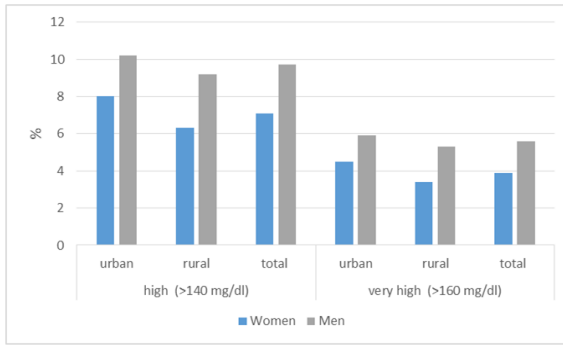


Figure 2-6: Blood sugar level (%)

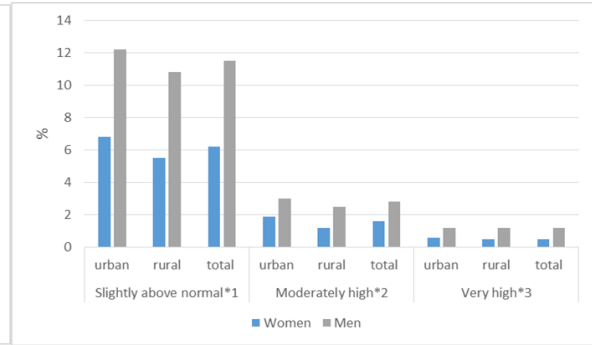


Figure 2-7: Hypertension (%)

\*1: Systolic 140-159 mm Hg/ Diastolic 90-99 mm Hg  
 \*2: Systolic 160-179 mm Hg/ Diastolic 100-109 mm Hg  
 \*3 Systolic  $\geq$ 180 mm Hg/ Diastolic  $\geq$ 110 mm Hg

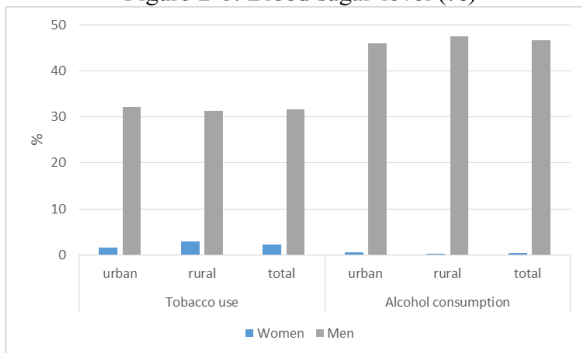


Figure 2-8: Tobacco use and Alcohol consumption (%)

(Source: National family health survey 4: 2015-2016, State Fact Sheet Tamil Nadu)

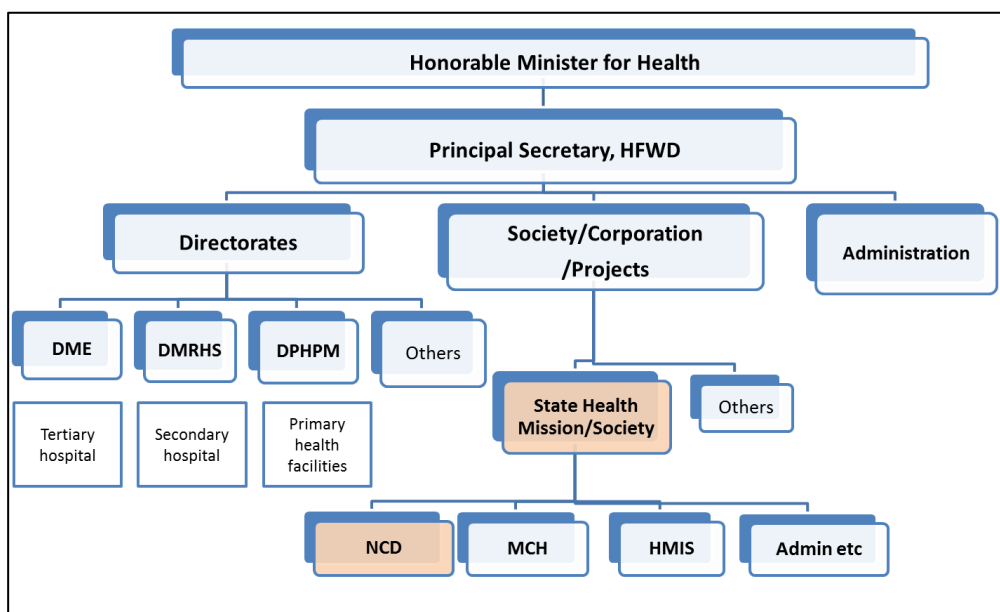
DMRHS officers stated that efforts to analyse the morbidity by diseases other than cancers had just begun. While it is not easy to obtain reliable morbidity and mortality data, it is desirable to improve the availability of such data to promote effective NCD policy planning and implementation.

**Challenges identified by the survey**

- ✓ Availability of reliable data on mortality and morbidity for NCDs needs to be improved.

**2-3 Tamil Nadu health system**

Organogram of HFWD is shown in Figure 2-9.



**Figure 2-9: Organogram of Tamil Nadu Health and Family Welfare Department**

(Source: HFWD)

There are a number of directorates and societies established within HFWD for the provision of relevant public health services. The Directorate of Public Health and Preventive Medicine (DPHPM) takes care of prevention and primary care services, while the Directorate of Medical and Rural Health Services (DMRHS) is in charge of providing secondary-level medical care. The Directorate of Medical Education (DME) is responsible for creating adequate human resources and ensuring effective and accessible tertiary care. NCD-related activities were managed by the Tamil Nadu Health System Project (TNHSP), funded by World Bank, until the Project was completed in September 2015. Responsibility was then shifted to the NCD Cell under State Health Mission (SHM), the state implementation body of the National Health Mission (NHM), in collaboration with related directorates including DPHPM, DMRHS and DME.

At the district level, the Deputy Director of Health Services (DDHS) is responsible for providing primary health care services and public health programmes and monitoring the performance of each facility in rural areas and in all municipalities. For the secondary level, the Joint Director of Health Services (JDHS) is responsible for secondary public health facilities, such as District Headquarters Hospitals, Taluk Hospitals and Non-Taluk Hospitals.

NCD-related programmes are funded by the NHM, which provides the central budget, with the state counterpart funds. An annual plan is included in the National Health Mission Programme Implementation Plan (PIP), mainly comprised of details on activities, physical targets and budgets.

The total amount for NCD-related programmes<sup>7</sup> in 2016-2017 was around Rs. 545 million. The state also covers the budgets as part of its regular clinical services.

NCD related programmes are funded by the NHM which is the central budget with the state counterpart funds. Annual plan is included in the National Health Mission Programme Implementation Plan (PIP) mainly with activities, physical targets and budgets. Total amount for NCD related programmes<sup>8</sup> in 2016-2017 was around Rs. 545 million. The state also covers the budgets as part of the regular clinical services.

The health services have been traditionally provided and managed separately by primary, secondary and tertiary directorates. Monthly meetings have been conducted at the state level by different directorates reviewing the progress of main programmes and overall facility performance. Since NCD programmes are relatively new, some HFWD officers stated that the monitoring of NCD-related activities was still focused on performance but was yet to reach the outcome level. Monitoring and evaluation (M&E) mechanisms for SDG and the above-mentioned policies will have to be established/strengthened for effective policy planning and implementation.

#### **Challenges identified by the survey**

- ✓ M&E system needs to be strengthened for effective policy planning and implementation

#### **2-4 Health facility information at primary and secondary health facilities in the selected districts**

The study was conducted for all secondary facilities and selected primary health facilities in three districts in terms of the available resources and services and performance status (refer to Annex 5 for the details of health facility study).

The basic structure of public health facilities in Tamil Nadu is explained in Table 2-6.

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<sup>7</sup> NCD-related programmes include programmes for tobacco control, elderly, mental health and blindness in addition to NPCDCS.

<sup>8</sup> NCD related programmes include programmes for tobacco control, elderly, mental health and blindness in addition to NPCDCS.



**Table 2-6: List of public health facilities (excluding special facilities such as TB clinics)**

Level	Description	
Primary care	<u>Rural</u> Block Primary Health Centre (BPHC) – 30 beds, 24/7 services, Maternal and child health and General outpatient department (OPD) Primary Health Centre (PHC) – Maternal/child health and general OPD Health Sub Centre (HSC) – no doctors stationed <u>Urban</u> Urban Primary Health Centre (UPHC) – Maternal/child health and general OPD Average number of outpatient (OP)/day for PHC: 200-400  1,765 BPHCs/PHCs, 554 UPHCs, 8,706 HSCs	
Secondary care	District Headquarters Hospital – 50-600 beds Average OP/day: 500-2850 Taluk Hospital – 20-250 beds Non-Taluk Hospital – 6-140 beds Average OP/day: 200-1700  29 District Headquarters Hospitals, 239 Taluk and Non-Taluk Hospital	Primary services + general physicians/surgeons, paediatrics, obstetrics and gynaecology ophthalmology, orthopaedics, physiotherapy, dentistry, psychiatrics
Tertiary care	Medical college hospital (MCH) Average OP/day: 1000-7500  21 MCHs and 1 Multi Super Specialty Hospital in 19 districts	Secondary services + super specialities

(Source: Compiled by JICA survey team based on information from HFWD and HFWD Policy Note 2016-2017)

Major information on secondary and primary health facilities is summarised in Table 2-7 and 2-8. Detailed information on NCD screening-related services, human resources, and laboratory services is described in the respective sections below.

**Table 2-7: Major information on secondary health facilities in three districts**

	Chennai <sup>9</sup>		Cuddalore		Madurai	
	DHQH	TK/NTK <sup>*1</sup>	DHQH	TK/NTK	DHQH	TK/NTK
NCD screening (hypertension, diabetes, cervical/breast cancer)	✓*2		✓		✓	
Diagnosis						
ECG (Electrocardiogram)	✓	✓	✓	✓	✓	±
Lipid profile	✓	×	✓	±	✓	±
Thyroid profile/Vitamin D/C-peptide/HbA1c, C-reactive protein	±	×	×	×	✓	±

<sup>9</sup> Secondary hospitals in Chennai include those in areas surrounding Chennai.

	Chennai <sup>9</sup>		Cuddalore		Madurai	
	DHQH	TK/NTK <sup>*1</sup>	DHQH	TK/NTK	DHQH	TK/NTK
X-ray	✓	×	✓	✓	✓	±
Cardiac ultra sound	±	×	✓	±	✓	×
No. of outpatient (OP) (monthly average.)						
Cancer	70	0	44	175	174	245
Diabetes	667	0	2781	500	1160	452
Cardiovascular disease	697	0	167	200	1179	773
Stroke	20	0	15	0	279	6
No. of inpatient (IP) (monthly average.)						
Cancer	57	0	1	0	38	0
Diabetes	38	0	25	0	42	4
Cardiovascular disease	39	0	29	0	23	6
Stroke	29	0	17	0	55	0
No. of surgery (monthly average.)						
Cancer	14	0	0	0	15	0
Diabetes	12	0	1	0	13	0
Cardiovascular disease	19	0	0	0	5	0
Stroke	1	0	0	0	1	0
ICU/CCU (coronary care unit)	±	×	✓	±	✓	±
Lab examination (monthly average.)						
No. of biochemistry tests	3750	650	4640	697	5833	938
No. of haematology tests	7957	844	6350	975	4750	2122
No. of pathology tests	210	0	947	0	220	0
No. of microbiology tests	1188	0	548	341 <sup>*3</sup>	875	151 <sup>*3</sup>
Human resources						
Specialists for NCDs (Diabetologist/Oncologist/Cardiologist)	±	×	±	×	±	×
MD physician	±	×	✓	±	✓	×
NCD nurses	±	✓	✓	✓	✓	±
Physiotherapist	±	×	✓	×	✓	×
Lab technician	✓	✓	✓	✓	✓	✓
Histopathologist	×	×	×	×	×	×
Statistical assistant	±	✓	✓	±	✓	±
Finance						

	Chennai <sup>9</sup>		Cuddalore		Madurai	
	DHQH	TK/NTK <sup>*1</sup>	DHQH	TK/NTK	DHQH	TK/NTK
Avg. annual budget (Rs)	15 mil	8.0 mil	8.2 mil	6.0 mil	15 mil	6.0 mil
Avg. NCD annual budget (Rs)	6.0 mil	2.0 mil	4.8 mil	0.7 mil	3.0 mil	2.0 mil

Note: \*1 TK/NTK: Taluk/Non-Taluk hospital

\*2 ✓ : available, ±:available in few facilities/partially available, ×:not available

\*3: Acid-fast bacilli microscopy test

(Source: Compiled based on the PHFI report and HFWD)

**Table 2-8: Major information on selected primary health facilities in three districts**

	Chennai	Cuddalore	Madurai
NCD screening (hypertension, diabetes, cervical/breast cancer)	✓*1	✓	✓
Diagnosis			
ECG	±	✓	±
Lipid profile	×	×	±
Thyroid profile/Vitamin D/C-peptide/HbA1c, C-reactive protein	×	×	×
X-ray	×	±	×
Cardiac ultra sound	×	×	×
No. of OPD (monthly average)			
Cancer	38	80	139
Diabetes	281	337	227
Cardiovascular disease	419	417	186
Stroke	114	1	1
Lab examination (monthly average)			
No. of biochemistry tests	472	990	354
No. of haematology tests	94	288	149
No. of pathology tests	0	0	0
No. of microbiology tests	0	222*2	27*2
Human resources			
Specialists for NCDs (Diabetologist/Oncologist/Cardiologist)	±	×	×
MD physician	×	×	×
NCD nurses	±	±	±
Physiotherapist	×	×	×
Lab technician	✓	±	±

	Chennai	Cuddalore	Madurai
Histopathologist	×	×	×
Statistical assistant	×	±	×
Finance			
Avg. annual budget (Rs)	0.5 mil	0.3 mil	0.5 mil
Avg. annual budget for NCD (Rs)	0.2 mil	0.1 mil	0.1 mil

Note: \*1 ✓: available, ±:available in few facilities, ×:not available,

\*2: Acid-fast bacilli microscopy test

(Source: Compiled based on the PHFI report and HFWD)

## 2-5 NCD prevention and control measurements

HFWD initiated the programme on the NCD prevention and control before NPCDCS was launched under the Tamil Nadu Health Systems Project (TNHSP) with the support of World Bank.

TNHSP started the pilot programme for NCD prevention, screening and treatment in 2007 and the programme was rolled out to the entire state between 2011-2013. It included four approaches – clinical-based, school-based, workplace-based and community-based NCD interventions. Oral cancer screening was also initiated in 2016.

The packages of services suggested by NPCDCS are summarised below. In Tamil Nadu, while opportunistic screening is currently not available at health sub-centre level, the services provided are reportedly more or less in line with NPCDCS.

**Table 2-9: Packages of services by NPCDCS**

Health facility	Major services
Sub-centre	Health promotion/awareness generation, opportunistic screening of diabetes & blood pressure, referral
PHC	All of above, plus; Clinical diagnosis and treatment of common CVDs including hypertension and diabetes, identification of common cancer
CHC/First referral unit	All of above, plus; Opportunistic screening of common cancers (oral, breast, cervical), management of common CVDs, diabetes, stroke, Lab investigations and diagnosis
District hospital	All of above, plus; Diagnosis and management of CVDs, diabetes, stroke and cancers including emergency services, Follow up chemotherapy in cancer cases, Rehabilitation and physiotherapy services, advanced exam (ECHO, CT scan etc)
Medical college	Mentoring of district hospitals, diagnosis and management of cancer, diabetes and CVDs, training of health personnel, operational research
Tertiary cancer centre	Mentoring of district hospitals and outreach activities, comprehensive cancer care, training of health personnel, operational research

(Source: NPCDCS operational guidelines 2013)

## 2-5-1 Service delivery

### (1) Primary prevention (health promotion)

Posters, flyers, videos and radio/TV programmes for awareness-raising of risk factors against NCDs have been produced by the TNHSP and presented at health facilities and public places. IEC development is part of the NCD cell's responsibility.

A tobacco control programme has been recently initiated with the establishment of the State and District tobacco control cells under the oversight of DPHPM. Tobacco smoking in public places and sales within 100 yards of schools has been banned. At the district level, the team under each block<sup>10</sup> has been formed, with each team made up of a health inspector, health educator, sanitation officer and sometimes a police officer, and regularly going out for patrols. Poster displays in public spaces and the rallies on awareness-raising are also being conducted.



Poster in PHC



Video showing at waiting room of PHC

Lifestyle modification counselling for people who have received NCD screening at health facilities is also being conducted, as explained below.

Meanwhile, it has been reported by various officers and experts that the level of health promotion or BCC for the prevention of NCDs is still limited for community members.

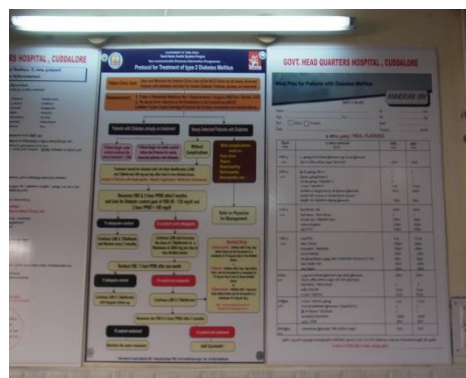
### (2) Secondary and tertiary prevention – Screening, early detection and treatment

NCD screening for hypertension, diabetes, cervical cancer and breast cancer is being conducted based on the “Clinical Manual on NCD interventions for Medical and Paramedical Staff”.

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<sup>10</sup> Administrative unit under taluk

- Screening is conducted by NCD staff nurses<sup>11</sup> in NCD clinics at all primary health centres (PHCs), as well as secondary and tertiary health facilities, except for some urban primary health centres (UPHCs).
- All individuals above 30 years of age that visit health facilities are advised to receive screening for hypertension and diabetes every year. For women, in addition to these two diseases, all those over 30 years of age receive cervical cancer screening and those over 40 years of age receive breast cancer screening every two years. Women between the ages of 30 to 39 years are screened for breast cancer only if they are symptomatic or among high-risk groups.
- Basic drugs<sup>12</sup> for hypertension and diabetes are available at all facilities from the NCD clinic. The necessary diagnosis and treatment are provided at the same facility or higher facility as required.



NCD screening protocol displayed at the health facility

The available services at different health facilities in three districts are summarised in Tables 2-10 and 2-11.

**Table 2-10: Available services by health facility for hypertension and diabetes**

	PHC/UPHC	BPHC	Taluk/Non-Taluk	DHQH	MCH
<b>Screening</b>					
Height, weight, BMI,	All available				
Blood pressure, RBS, FBS, PPBS	All available				
Habits and family history taking	All available				
<b>Diagnosis</b>					
Sr. cholesterol, sr. creatinine, urine albumin	All available				
ECG	Mostly available	Available			
Cardio ultrasound	Not available		Partially available	Available	
Cardiac troponin	Not available				Partially available
HbA1c	Not available			Partially available, only	Partially available, often

<sup>11</sup> An NCD staff nurse is a qualified staff nurse specifically assigned to conduct NCD screening, recording/reporting and follow up on the positive cases. They are supposed to receive three to five days training at the district level when newly recruited. However, the district training system is still in the process of being re-established, and currently new NCD staff nurses receive orientation from the nurses/doctors at their assigned facility or nearby.

<sup>12</sup> Hypertension: T.Amlodipine, T.Atenolol, T.Enalapril, T.Hydrochlorothiazide, T.Aspirin, T.Atorvastatin, and T.Isosorbtrate Dinitrate, Diabetes: T.Metformin, T.Glibenclamide, T.Glipzide, and T.Glimipride

	PHC/UPHC	BPHC	Taluk/Non-Taluk	DHQH	MCH
				used for diabetes type 1	limited usage
<b>Treatment</b>					
Basic drug	Available – prescription for 30 days			Prescription for 15 days or 30 days	Prescription for 15 days or 30 days
Insulin	Not available			Available	
Dialysis	Not available			Available	
Surgery for cardio-cerebrovascular disease/renal transplant	Not available				Available at some advanced MCHs

(Source: Compiled by JICA survey team based on facility visits)

**Table 2-11: Available services by health facility for breast and cervical cancer**

	PHC/UPHC	BPHC	Taluk/Non-Taluk	D HQH	MCH
<b>Screening</b>					
Via/Vili	All available				
Clinical breast examination	All available				
<b>Diagnosis</b>					
Colposcopy <sup>13</sup>	Not available			Available	
Histopathological examination (HPE)	Not available				Available
Mammography	Not available				Available
<b>Treatment</b>					
Surgery	Not available			Available	
Chemotherapy	Not available			In process of introduction in one	Available
Radiotherapy	Not available				Some available
Palliative care	Not available				Pilot is started in selected MCH

(Source: Compiled by JICA survey team based on facility visits)

#### <Monitoring of screening>

The numbers of screenings, positive rates and follow-up cases for treatment are monitored in the monthly meeting at the district and state level. The facility has set targets for the number of screenings per day of between 30 and 100 depending on the level and type of facility. The indicative targets for the positive rate of each disease have been set at 10% for hypertension and diabetes and 2-3 % for breast and cervical cancer. If the positive rates are lower than those targets, the quality of screening is questioned.

The number of screening cases (new and repeated cases) increased drastically in 2013 and came down in late 2015 (Figure 2-10). The positive rate among screening cases is 10% for hypertension

<sup>13</sup> When abnormality is detected under colposcopy, the biopsy is done with histopathological examination (HPE) for the confirmation. But HPE is only available at MCH, therefore, the secondary hospitals have to send the biopsy sample to MCHs.

and 4-5 % for diabetes on average<sup>14</sup> (Figure 2-11). It was reported that the recorded number of screenings might not show the actual number of new and repeated screened people, as multiple counts of the same person at the facilities may sometimes occur due to the patient IPs being unavailable or unrecognised. There have also been reports of the practice of bringing the same persons for screening intentionally and repeatedly due to the pressure to meet daily quotas. In addition, data for those who used private services are not included in the government system.<sup>15</sup> Therefore, a statistical achievement rate of screening against the target population is not available. While the quality of data needs to be improved, the utilisation of data can also be strengthened. For instance, data disaggregated by age, risk factors, economic status or geographic areas, and the trends of outpatient (OP)/inpatient (IP) cases with complications etc. could be utilised to understand the current disease patterns/trends and effects of and gaps in the interventions in detail, which could eventually improve policy planning and resource allocation.

While there is no supporting statistical data, it was reported from the interviews with health personnel that awareness of screening was becoming high in most areas and the coverage of screening among the target population was around 50-90%. Coverage is reported to be higher in rural areas than in urban areas, particularly as most community members in rural areas are known to PHC health personnel and there are fewer private facilities nearby. In 2014/2015, the National Institute of Epidemiology (NIE)<sup>16</sup> showed that the coverage of hypertension and diabetes screening among the studied population (30-60 years old) was around 50-60%, including screening conducted in the private sector. The screening rate for cancer was relatively low and for cervical cancer, in particular, clients often refused to undergo testing.

Continuous efforts have been made to increase the numbers of the population screened through use of IEC, mass media, counselling, and household visits etc. However, it was also reported that not all eligible visitors were screened due to shortages of manpower. Interviewees also stated that it will be necessary to increase NCD-dedicated services, including the introduction of mobile clinics for NCD screening and treatment, and village health nurses (VHN)/urban health nurses (UHN) in charge of NCDs, as well as increasing the numbers of NCD nurses.

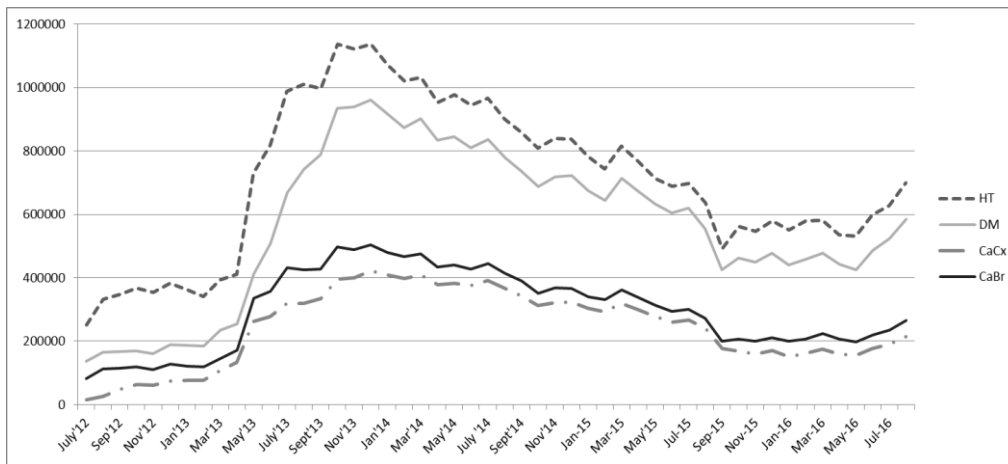
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<sup>14</sup> Positive against Via/Villa for cervical cancer and clinical breast examination for breast cancer.

<sup>15</sup> The state assumes that 1/3 of population over 30 years of age is their target as 1/3 uses private services and the remaining population do not use the health facility.

<sup>16</sup> The evaluation focused on rural areas.

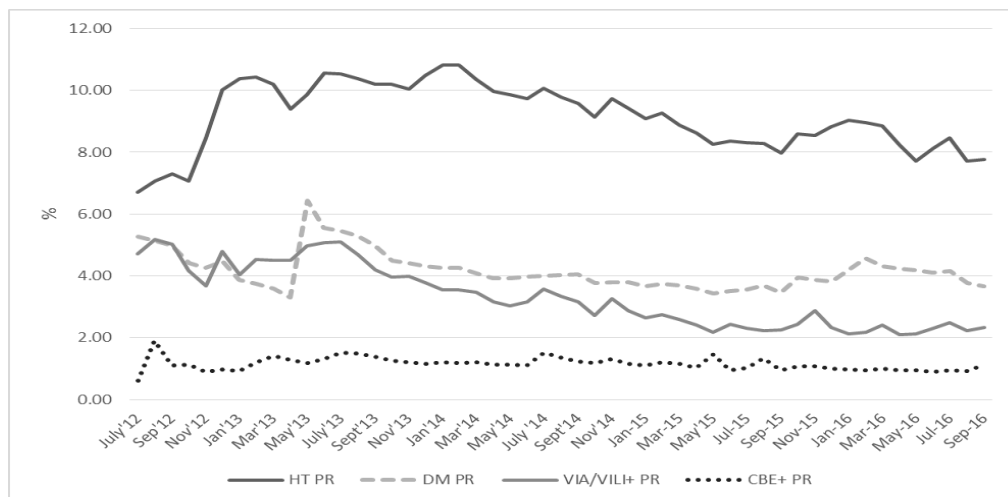




Note: HT: hypertension, DM: diabetes, CaCx: cervical cancer, CaBr: breast cancer

**Figure 2-10: Trend in the No. of NCD screening cases in Tamil Nadu from 2012-2016**

(Source: HFWD)



Note: HT PR: hypertension positive, DM PR: diabetes positive,  
VIA/VILI+ PR: cervical cancer positive, CBE+PR: breast cancer positive

**Figure 2-11: Trends of positive rates in Tamil Nadu 2012-2016**

(Source HFWD)

<Follow-up after the screening>

Every person receives the NCD card with the screening results, and for those with positive results and requiring treatment are given the NCD notes<sup>17</sup>. For the follow-up of the screened population, an NCD staff nurse usually calls the patients if they have not come to the facility on time for the results or treatment, or to confirm whether they went to the referred facilities. If patients do not respond, the NCD staff nurse informs the community-based health workers (the VHN or UHN),

<sup>17</sup> Patient brings the NCD note to the facility and doctor records the diagnosis and treatment. It can be used in any public health facilities and patient can use as a reminder for the next visit date.

who visit their homes and follow up on the patients. A small incentive is given to the VHN/UHN when they bring the patients to the facility for colposcopy or mammography. However, it has also been reported that the VHNS/UHNS are usually preoccupied with activities related to maternal and child health and do not have sufficient time to follow up on NCDs cases adequately.

One facility visited by the survey team recorded the number of patients each month who did not complete the referral at the facility on time; however, this did not take into account that these patients may have utilised other facilities. Some NCD staff nurses and medical doctors reported that the dropout rate of hypertension and diabetic patients for regular medication was around 10-15%, most of whom were migrant workers. While nurses kept the patient records manually and in the Health Management and Information System (HMIS) (see below for details), there is no record or mechanism for tracking the follow-up rate for patients who utilise multiple health facilities.

According to the NIE endline evaluation of TNHSP, dropout rates of receiving the screening results for diabetes<sup>18</sup> and cancers were around 50% and 70%, respectively. However, 50-70% of confirmed cases for hypertension/diabetes received treatment. Frequent visits for drugs, long waiting times and amount of time spent at the health facility as well as low awareness regarding long-term treatment were reported as challenges by the patients in continuing treatment. Thus, strengthening of the follow-up mechanism after screening remains one of the major challenges.

#### <Quality of services>

NCD clinics are usually open in the morning. An NCD nurse takes measurements of weight, height, blood pressure, blood sugar, and asks about habits and family disease history. The nurse also provides lifestyle modification counselling. Cervical and breast cancer screening is conducted for targeted women afterwards. When positive cases are found, they are referred to the doctor. The NCD nurse usually produces reports in the afternoon. In the most of the district headquarters hospitals, the NCD OPD is separate from the general OPD.

From observations, it appears that the screening, diagnosis and treatment are provided based on the protocol within the given resources. However one doctor usually has to see 100 – 300 out-patients over a period of 4 – 5 hours, and the average time one doctor can spend per patient is around 1 – 3 mins. Some doctors claimed the necessity of increases in the number of doctors in order to spend more time on OP consultations, particularly with new patients. A nutritionist/dietician is not available for secondary hospitals; thus it seems difficult to provide proper hospital dietary formulas or diet therapy for NCD patients.

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<sup>18</sup> Blood sugar results are only available on the next day of screening.

Some of the advanced diagnosis such as HbA1C, an important blood test to check if diabetes is under controlled status, or HPE for cancer diagnosis are only available at MCH with limited usage. It is the same for the chemotherapy, radiotherapy and palliative care for cancer treatment. The health personnel at the secondary health facility mentioned that it usually take three weeks or more to obtain the HPE results by the MCH which prevents from timely notification of the results to the patients. Interviewees stated that it is desirable for the secondary health facilities to provide such advanced services.

#### <Intersectoral collaboration>

- The School Education Department conducts school-based NCD interventions that incorporate NCD issues into the curriculum, and promotes the formation of junior heart clubs. While NCD screening is not provided at schools, doctors or trained teachers conduct regular health check-ups for students for common illnesses. Other collaborative activities include screening for cardiovascular disease at school and referral to government health facilities.
- The mobile clinic exclusive for the construction sites have been operationalised in collaboration with the Labour and Employment Department. NCD screening at workplaces was piloted by the TNHSP but this was not successful as they found it difficult to manage such a large number of small offices.

#### <New initiatives/pilots>

In Tamil Nadu, there have been several innovative initiatives/pilot projects implemented through utilization of public-private-partnership (PPP) and ICT<sup>19</sup>. Some of the successful practices have been reflected or adopted in the national policy, such as clinical based NCD screening. Some of the current initiatives are summarised below.

- Oral cancer screening – introduced in August 2016 at the block PHCs and secondary hospitals in selected districts. In addition to the screening at the health facility, dental assistant visits the households with tablet terminal. When abnormality is found in the mouth of the screened population, dental assistant takes a photo of the inside of the mouth and sends it to the dentist for further examination.



Tablet terminal

- Aadhaar card utilisation – the Aadhaar<sup>20</sup> card is the national identification card used for

<sup>19</sup> CMCHIS and free 108 ambulance services (mentioned below) are run through PPP contracts.

<sup>20</sup> The Aadhaar (card) is linked to some public subsidies and unemployment benefits and includes biometric and

collecting biometric and demographic data of residents. The pilot project, funded by the GoI, utilises the Aadhaar card as a patient ID number in one to two districts (100 – 150 institutions). The pilot will start in April 2017 at the earliest.

- UHC initiative - to provide all basic services, funded by the GoI, including NCD screening and treatment, at the household level through outreach services. Three districts will be selected and one block could be selected for each district.
- Population-based screening – to provide outreach screening services, funded by the GoI, at the household level by VHN/UHV with glucometer and electronic blood pressure apparatus in three entire districts

#### **Challenges identified by the survey**

- ✓ Further efforts are necessary to increase the screening coverage and strengthen follow-up mechanisms after screening
- ✓ Expansion of health promotion activities and advanced services (e.g. HbA1C or cancer diagnosis and treatment at the secondary level) can be considered based on need and demand
- ✓ Improvements of the quality of services can be made to the patient consultations by the doctors/nurses or lightening of the patients burden such as long waiting time in continuing treatment etc
- ✓ M&E of the programmes/interventions and data management/utilization can be improved

#### **2-5-2 Referral system**

In terms of the referral of the patients, there was a general referral slip used at all levels of health facilities. This was given to the patients. In cases of emergencies, they called the ambulance (#108 free service)<sup>21</sup> and informed the referred facility prior to the referral. If it was not an emergency, it was left up to the patients to decide where and when to go.



Free 108 ambulance

As the necessary basic drugs are available at all levels, most patients who received the treatment at higher levels returned to their nearest facility for regular medication. There is no referral slip for “back referral”, but the patients brought the discharge slip or OP slip from the higher-level

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demographic data of residents.

<sup>21</sup> Free ambulance service is available in entire state, and anybody can call an ambulance by calling 108.

facility. The health facilities usually keep a record of referrals from the lower level up to the higher level, but not for back-referral cases.

**Challenges identified by the survey**

- ✓ Follow-up of patients for treatment can be further improved

**2-5-3 Human resources**

A breakdown of numbers of human resources posted at each level is provided in Tables 2-12 and 2-13 below.

**Table 2-12: Numbers of human resources**

	Sanctioned	In position	Vacancy
<b>Primary health facility (as of Dec 2016)</b>			
Doctors	6,010	5,037	973 (16%)
Nurses	9,507	8,557	950 (10%)
Paramedical (pharmacist and lab-technician)	4,533	2,301	2,232 (49%)
<b>Secondary health facility (as of March 2017)</b>			
Doctors	4,056	3,199	857 (21%)
Nurses	7,270	6,638	632 (9%)
Paramedical	2,638	1,816	822 (31%)
<b>Tertiary health facility (as of Jan 2017)</b>			
Doctors	7,294	5,978	1,316 (18%)
Nurses	9,129	8,713	416 (5%)
Paramedical	6,866	3,364	3,502 (51%)

(Source: HFWD)

**Table 2-13: Major human resources at each level**

Facility	Human resources
PHC/UPHC	1-2 doctor (MBBS <sup>22</sup> ), 1 NCD staff nurse, staff nurses, pharmacist, lab technician, UHN/VHN, health inspector
BPHC	3-5 doctors (MBBS), 1 NCD staff nurse, staff nurses, pharmacist, lab technician, UHN/VHN, health inspector
Taluk/Non-Taluk	Several doctors (general surgeon, general medicine, obstetric/gynaecologist, dentist, MBBS), 2 NCD staff nurses, several nurses, lab technician, pharmacist etc
DHQH	Several doctors (general surgeon, general medicine, obstetric/gynaecologist, paediatrician, dentist, ENT, MBBS, visiting cardiologist, visiting herpetologist), 2 NCD staff nurses, several nurses, radiologist, lab technician, pharmacist etc
MCH	Speciality doctors, 2 NCD staff nurses, staff nurses, paramedical

(Source: Compiled by JICA survey team based on facility visits and HFWD)

The position of NCD staff nurse has been newly created in order to conduct NCD screening and data recording. One NCD staff nurse is posted at each primary health facility and two NCD staff nurses at each secondary and tertiary health facility. Usually, specialists such as cardiologists or

<sup>22</sup> Bachelor of medicine and bachelor of surgery

diabetologists are not posted at the district hospital level, therefore the physicians treat the NCD patients. One of the district hospitals managed to organize visits from a part time cardiologist and cardiothoracic surgeon for one or two days a week from the nearby MCH.

As mentioned above, an increase in the numbers of the doctors, both physicians and specialists, was recommended as necessary to improve the quality of services. NCD nurses, particularly at district headquarters hospitals and tertiary levels, tend to be over-worked and increase in the number has also been suggested. NCD nurses sometimes handle examinations when lab technicians are not available, which might be one reason they are overworked. The deployment of nutritionists/dieticians at the secondary level is also desirable in order to provide proper diet therapy, which is one of essential treatments for NCD control. Moreover, community health workers such as UHNs/VHNs for NCDs tend to be less frequently available.

The NCD staff nurses, as well as all health personnel including medical doctors, staff nurses, lab technicians, pharmacists, community health nurses and programme managers, received three to five day-training for NCD screening and treatment in 2011-2012 from the TNHSP. Since the TNHSP finished the activity in September 2015, training for newly posted personnel and refresher training remains on hold. While the HFWD resumed the training programme on NCDs with district-level TOTs, and planned to conduct training for all health personnel in 2016, the necessity of improving capacity on NCDs for health personnel has been claimed by various officers and experts. It was also suggested by the HFWD officials that the capacity of the medical superintendents and senior managers at the health facility on the hospital management needs to be improved.

**Challenges identified by the survey**

- ✓ Continuous training on NCDs is required for all health personnel
- ✓ Increasing the human resources required or dedicated for NCD is desirable

**2-5-4 Drug supply system**

Tamil Nadu Medical Services Corporation (TNMSC) is an organisation designated by the HFWD to adopt a streamlined procedure for procurement, storage and distribution of all essential drugs, consumables and equipment to the public health facilities. Each health facility is issued a passbook with an allotted amount of pharmaceuticals for each quarter, usually based on the requirements of the previous year. The facility can then utilise their quota for the purchase of drugs from the TNMSC warehouse at any time. Only when the necessary drugs are out of stock

at the TNMSC can they purchase the drugs from the market.

When the facility requires additional budget allocations, they can make a request to the HFWD before October with the justification of additional requirement. Otherwise, facilities within the district lend and borrow drugs from each other. There are also some contingency funds available at the discretion of the JDHS.

Beginning in the 2016/2017 fiscal year, a drug allotment exclusively for use with NCDs was issued under the NHM budget. Also, some portion (35%) of the revenue from the Chief Minister's Comprehensive Health Insurance Scheme (CMCHIS) can be used for the purchase of consumables.

While staff at most facilities mentioned that they received a sufficient budget allocation for basic drugs, it was also reported that there were shortages of some drugs, particularly for cancer treatment at the secondary level, which resulted in the referral of patients to tertiary or private hospitals. Most of the facilities mentioned that they would further require increases in the budget in coming years to meet increasing demands.

#### **Challenges identified by the survey**

- ✓ Responses to increasing demands for NCD drugs

#### **2-5-5 Cost**

Public health services – including NCD screening – are provided free of charge in Tamil Nadu, apart from costly imaging examinations such as CT and MRI. These examination costs can also be covered by the CMCHIS. Therefore it is difficult to assess the actual cost of each service; however, an examination of expenditures of the CMCHIS can provide an indication of the average cost of covered procedures. The expenditure figures from January 2012 to July 2015 showed that the highest cost per case was transplantation (Rs. 142,824) followed by cardiothoracic surgeries (Rs. 81,003).

#### **2-5-6 Quality**

- Accreditation – Two DHQs that were visited are accredited or in the process of receiving accreditation from the National Accreditation Board for Hospitals and Healthcare Providers (NABH).<sup>23</sup> Indian Public Health Standards (IPHSs) and Operational Guidelines for Quality

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<sup>23</sup> NABH is a constituent board of quality control of India supported by industry, consumers, and government stakeholders.

Assurance in Public Health Facilities, produced by the GoI, have also been reportedly observed by the primary and secondary health facilities<sup>24</sup>.

- Clinical care – While it is difficult to assess the quality of clinical skills in short-term observations, adherence to the protocol/guidelines for NCD screening, diagnosis and treatment appears to be more or less satisfactory at the primary and secondary levels within the available resources. However it was observed that the doctor usually spent 1 – 3 mins for each patient in OP consultations, often in an open space. Therefore, it is assumed that most consultations are unlikely to have provided sufficient time or a desirable environment for an attentive medical examination, a factor that is crucial for NCD patients.
- Records/communication – For the medical records at the secondary level, OP records are supposed to be kept in HMIS, but when HMIS is not functional or not in use, doctors temporarily keep their own notes. Furthermore, diagnosis, prescription and lab results are often handwritten on OP slips and patients’ notebooks. These practices may increase the risks of mistakes. It was reported that the usage of printer was limited due to the budget constraints. Explanations of drug compliance for the patients were also observed to be insufficient.
- Management – It was reported that “quality circles” had been established and quality care indicators were set and monitored at each secondary hospital by the TNHSP. However, after the TNHSP finished, this process became less active. HFWD is in the process of reactivating the quality control mechanisms.

#### **Challenges identified by the survey**

- QC mechanism can be reactivated/improved
- Patient centred care can be further pursued e.g. privacy, attentive consultations
- Efficiency and measures to reduce mistakes can be further improved by utilisation of HMIS/ICT

#### **2-5-7 Networks with the private sector**

The private sector plays an important role in the provision of health services in Tamil Nadu. It was reported that, overall, one-third of the population might use private health facilities. The private health facilities that have been empanelled for CMCHIS are expected to provide NCD screening for free. Patients who are referred from the public to the private hospital for diagnosis

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<sup>24</sup> Separate guidelines are provided for MCH.



such as mammography or colposcopy are able to receive such services for free. However, there seems to be no monitoring system for adherence.

Patients are referred between public and private facilities. It is common for doctors to work for both public and private systems, and patients can often be referred through the doctor's network.

It was reported that health data from private facilities was not recorded in the government system, apart from the cancer registry. HFWD is in the process of setting up a mechanism for the CMCHIS-empanelled private facilities to incorporate basic health data into the government system.

#### **Challenges identified by the survey**

- ✓ Establishment of mechanisms to collaborate with the private sector on data management system can be explored

## **2-6 Health information system**

### **2-6-1 Health management and information system (HMIS)**

The state-wide health management and information system (HMIS) has been progressively introduced since 2008 in a phased manner. Tertiary health facilities commenced utilisation only recently – in 2015 – and they are still in the process of working towards full usage. HMIS consists of four components, as indicated below:

- (1) Management information system (MIS): to unify the health reporting system and monitor the performance of the facility regularly.
- (2) Health management system (HMS): to manage patient data and automate the work flow process at the hospital.
- (3) College management system (CMS): to upload medical college specific contents.
- (4) University automation system (UAS): to automate necessary paperwork for faculty and students.

This report focuses on (1) and (2).

## **Operational description**

### <MIS>

- MIS has been operationalised at all levels, from primary to tertiary, with clinical information (patient census, morbidity, mortality, services, immunisation), ancillary services (blood bank, lab services), administration information (buildings, finance, personnel etc.), and programme information. It was monthly-consolidated data. An Institutional Service Monitoring Report (ISMR) was generated by MIS and used for monthly performance reviews with the districts and the state levels.
- It was reported by the HFWD that the average usage/reporting rate was almost 100 % at primary and secondary levels and 60-70% at the tertiary level, where it had just started recently.

### <HMS>

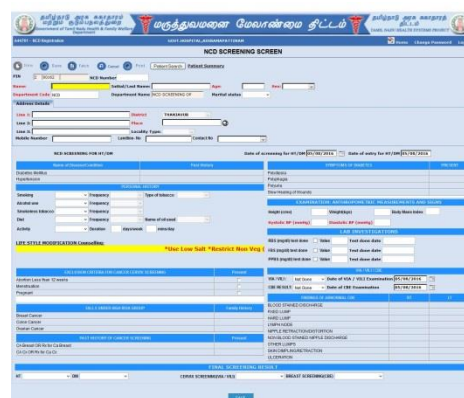
- HMS has been operationalised at secondary and tertiary levels, and is regarded as a patient management information system incorporating registration, OP consultation, lab and image examination, prescription, IP admission and diagnosis/treatment, medical waste management and so on.
- When patients come to the facility, the receptionist enters the patient's name, age and sex in the HMS and generates an OP slip with a PIN number, a unique 15 digit code consisting of the district code, level of facility, hospital code and patient code. When previous patients bring their PIN number/previous OP slip, they can be identified in the system. During the OP consultation, the doctor views the patient's data and enters the diagnosis and prescription real-time. The prescription is sent to the pharmacy through the system so the patient can receive the drugs by showing the PIN number/OP slip.
- From observations in the selected districts, each medical doctor at the OP consultation room in the secondary hospitals is given one computer. HFWD reported that around 60% of secondary facilities utilise HMIS for OP data entry and 50% for tertiary facilities.
- IP is yet to be fully operationalised in tertiary facilities. The IP usage rate is reported to be low at secondary facilities – around 10% on average. It was mentioned by HFWD officers and health facility personnel that one or two computers were usually allocated in the ward and the doctors or nurses did not have time to spend on the computer entering a lot of data every day.
- Technically, doctors/health personnel can search the patient data from other facilities with

the PIN number when they know which facilities need to be searched. However, it was observed during the visits that nobody actually seemed to have tried conducting such a search. They thought that as the HMS usage rate was still low, they could obtain sufficient information from the patients through the OP slip, referral slip or discharge summary.

- A common challenge for users is the slowness of the HMIS service, particularly since the tertiary facilities have started utilising it, as there is only one server in the state.

<NCD database (part of HMS)>

- People are advised to receive hypertension and diabetes screening every year and breast and cervical cancer screening every two years. People are given an NCD number as well as a PIN number, as primary health facilities do not provide a PIN number. Screening data including their lifestyle habits and family history and treatment data for the follow-up patients are entered into the NCD screening database.



NCD database entry screen

- NCD staff nurses usually enter the data into the system in the afternoon. It was reported by the HFWD that the reporting rate for the NCD database was high. However the details of habits or family history tend to be omitted.
- In order for the HFWD to monitor the performance and progress of the NCD programme in promptly, separate manually completed reports on the number of screenings, positive rates, and treatment cases by gender are submitted by district offices by email every month. However the quality of data is reportedly questionable due to missing data, duplication of patient numbers, inconsistency of some data, and lack of standardised definitions. The reporting format will be revised in December 2016 with introduction of a number of patients with complication such as retinopathy to incorporate the national government format and also to improve the standardisation of the data.

### Technical description

- A single server configuration and colocation is located in a government-owned data centre.
- Access to the system is controlled by rule-based user logon account system with passwords.
- Data transmissions are not encrypted nor secured and use general internet access over http protocol.

- Internet access is provided separately – not centralised – with designated private networks.

### **2-6-2 Health facility data utilisation**

Monthly meetings are conducted at the state and district levels at each different level where the implementation progress of main programmes and facility performance are reviewed. However, it appears that, for at least NCD programmes, monitoring tends to focus on the numbers rather than the proportions without targets, and the reliability of the data is questionable. Thus, the data available on morbidity and mortality remains limited.

### **2-6-3 State Health Data Resource Centre (SHDRC)**

SHDRC acts as a central repository of data from all 21 health directorates and programmes including HMIS. Some of the reports are still managed manually and there are no uniform formats. SHDRC sets the key performance indicators together with each directorate and programme and generates an on-demand basis dashboard for easy access by policymakers and health care providers.

In order to improve patient identification at health facilities, the HFWD is in the process of conducting a pilot project to utilise the Aadhaar card with biometric data, as mentioned earlier, and to link the PIN number with mobile phone numbers.

#### **Challenges identified by the survey**

- ✓ Low usage rate of HMIS
  - The HMIS service is often slow. This makes it difficult for doctors/personnel to utilise/rely on HMIS. Doubling up of work with both online and manual records sometimes leads to double registration/prescriptions for the same patient. Server duplication/decentralised server colocations can be considered. There are also still some remote areas where internet access is not stable.
  - IP data are large and doctors and nurses have difficulties in finding time for entry when they are busy moving around wards and other regular workloads.
  - The application can be improved to make it more user-friendly, e.g. offline services, hyperlink utilisation, upgradation of client system maintenance.
- ✓ Duplication of data
  - When patients fail to bring the previous OP slip or PIN number or when the system is down, the same persons may be registered as new patients with a new PIN number. Consequently, the number of recorded patients and screenings may often be more than is actually the case.

- ✓ Data coverage/utilisation
  - Incorporation of private health data into the government system needs to be pursued.
  - By better understanding the morbidity and mortality trends and monitoring and evaluating progress towards SDG goals, data can be utilised to improve policy planning and implementation, including effective resource allocation.
- ✓ Other
  - Double reporting for HMIS and manual reports

## Chapter 3 Laboratory services

### 3-1 Policy

IPHS Guidelines outline the requirements for basic laboratory services at primary and secondary levels. Apart from a few services, most facilities basically follow the guidelines. Tertiary hospitals have their own guidelines under the Medical Council of India. However, there is no national or state policy on laboratory practices. Some facilities have acquired accreditation from the National Accreditation Board for Testing and Calibration Laboratories (NABL), which is a private initiative, but it is not mandatory for public facilities. This is mainly for the private health sector to be empanelled for health insurance.

### 3-2 Services and functions

The available laboratory tests at different facility in the survey sites are summarised below.

**Table 3-1: Availability of major lab services by facility**

	PHC/UPHC	BPHC	Taluk/Non-Taluk	DHQH	MCH
Biochemistry (glucose, sr. cholesterol, sr. creatinine, urine albumin )	Available				
Haematology	Not available	Available			
Microbiology	Not available			Available	
Clinical Pathology (urine, motion, sputum)	Urine is available, but not others		Available		
Histopathology	Not available				Available
HIV (Rapid test)	Available				
HIV (Eliza)	Not available				Available
TB	Not available	Available			

(Source: Compiled by JICA survey team based on facility visits)

While the examinations necessary for NCD screenings, as defined in the protocol, are mostly available at PHCs and above, there is a limited range of diagnostics compared with IPHS due to the lack of or out-dated equipment, along with insufficient kits, reagents and skilled technicians. In most cases, patients are referred to private centres.



Clinical laboratory



Type of laboratory services available at DHQH

The development of district public health laboratories (DPHLs) started in 2011, and they became functional in 2013 under the jurisdiction of DPH. Each DPHL is located in the district headquarters hospital with a microbiologist and lab technician/s. In addition to the diagnostic examination of communicable diseases, they conduct swab tests in health facilities, bacteriological analysis of drinking water, and outbreak investigations in the community. Thus, they play an important role in communicable disease surveillance. They also conduct semi-auto analyser service camps once a year, which brings all analysers in the district together for calibration, and visit PHCs and secondary hospitals to ensure lab quality. However, these visits seem to be irregular.

### 3-3 Quality Control

Christian Medical Collage (CMC) Vellore, a private institute, has been providing a biochemistry laboratory quality control programme for all hospitals and BPHCs, as commissioned by the TNHSP. As the external quality assurance service (EQAS), a blind sample of glucose, creatinine, and cholesterol are sent to the facility every month. The facility runs the test and enters the results online or sends them by email, then receives feedback after one month with the score. Each facility or district is expected to review the results and take action if any significant deviation is observed. However, it appears from the observation that the level of the review/follow-up action varies among the facilities. Some BPHCs can only participate in selected samples due to the shortage of the reagent. Some interviewees mentioned that activities tended to become relaxed after the TNHSP assessment has been completed. Also, the PHCs other than BPHCs are not included in

the EQAS programme, and thus it only covers 40% of total laboratories in the state.

The CMC Vellore programme advises laboratories to conduct internal quality assurance services (IQAS) within the facility; however, the implementation rate is also reported to vary. No IQAS is practiced in the PHCs.

For the DPHL, EQAS consists of a proficiency-testing (PT) panel, cross-checking and on-site monitoring. For the PT panel, DPHL receives the blind samples from DPHPM to run tests on microscopy, serology and culture identification every three months. DPHL also sends 5% of negative samples and 10% of positive samples to DPHPM for cross-checking every three months. Those results are reviewed and assessed with DPHPM through reports as well as daily online communications. A DPHPM microbiologist visits all DPHLs 3-4 times a year for on-site monitoring.

GoI/CDC conducted a gap-analysis investigation for all district HQ hospitals and MCHs in November 2016. While the report is yet to be shared, one of the observations for the district HQ hospitals is that the multiple laboratories are isolated into their own separate programs – e.g. general, HIV, TB and blood bank. This might limit adequate human resource mobilisation and disturb patient flow. The necessity of creating a district-centralised laboratory was briefly mentioned by the DPHPM officer in charge of the laboratory. The proposal for the pilot project of establishing a centralised laboratory has been presented to the central government.

The JICA survey team observed that mostly examination results are recorded in the registry manually and given to the patient on a handwritten OP slip or note. Some of the laboratories, such as those for TB (Revised National Tuberculosis Control Programme: RNTCP) and HIV (Integrated Counselling and Testing Centre: ICTC), are not connected to HMIS.

**Challenges identified by the survey**

- ✓ QC mechanisms can be strengthened
- ✓ Rationalisation/integration of laboratories can be considered

## **Chapter 4 Donor assistance**

J-PAL<sup>25</sup> has been conducting a research project on NCD prevention, entitled “Inculcating Healthy Habits to Decrease the Burden of Diabetes” in Coimbatore, and a UNICEF-sponsored consultant has been positioned as a programme officer in the NCD cell since 2017. Apart from that, since the completion of the TNHSP by World Bank in September 2015, there have not been any donors or NGOs to implement NCD-related programmes.

## **Chapter 5 Proposed assistance for JICA technical cooperation**

### **5-1 Discussion**

#### **5-1-1 Major findings**

Tamil Nadu has established a structure for delivering basic services for NCD prevention, and early detection and treatment in line with national policies and strategies. The Government has shown strong commitment by setting a goal to reduce premature deaths from NCDs by one-third by 2030 and initiating state policy development on major NCDs.

NCDs tend to decrease the bodily function and quality of life of patients for longer time compared to maternal and child health and communicable diseases. The diagnosis and treatment can be more technologically intensive, patients need long-term sustained health services from health professionals with different/specialised skills, and community/individual involvement is a key ingredient for promoting access to services. Prevention and treatment need to be regularly offered over a sustained period, not just discrete events.<sup>26</sup>

Due to the current epidemiological transition caused by increasing NCDs; the demands and targets for health services have been drastically changed. Thus, further comprehensive health system response, including the need to increase coverage and improvement of the quality of services, is required to address the growing burden of NCDs. It would require considerable financial resources and a lengthy period of time; therefore, it is important to address it through a systematic and strategic approach based on the evidence.

One of the challenges is insufficient understanding of the current disease burden and effects and impacts of NCD programmes. While some level of situation analysis of burden of major NCDs has been undertaken in the process of the state’s NCD policy development, further in-depth analysis such as age or regional wise disaggregation, or economic cost analysis should be

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<sup>25</sup> J-PAL (Abdul Latif Jameel Poverty Action Lab) is a global network of 143 affiliated professors from 49 universities working to reduce poverty by ensuring that the policy is informed by scientific evidence.

<sup>26</sup> Helen M. Robinson et al., Non-communicable diseases and health systems reform in low-and middle-income countries, 2011.



conducted. M&E of outcomes level achievements and impacts of the intervention remains partial and needs to be strengthened. With state NCD policies tending to focus more on treatment and infrastructure development, policy direction and responses to initiatives for the prevention and early detection, in particular, can be reviewed and enhanced based on the evidence. These responses could include common approaches beyond different diseases such as addressing common risk factors like smoking, alcohol and healthy diet, or awareness-raising and community/individual involvement etc. At the same time, skill development for health care personnel and quality improvement of health services also needs to be strengthened.

**Table 5-1: Summary of findings and needs for JICA technical cooperation**

	Status	Needs for JICA TC
Policy/governance	<ul style="list-style-type: none"> <li>Tamil Nadu is conducting NCD programmes in line with national NCD policies/guidelines.</li> <li>Adopting the SDG as a state goal</li> <li>State policy on cardiovascular disease, cancer, mental health, and trauma is drafted.</li> <li>Implementation structure shifted from TNHSP to existing HFWO offices.</li> <li>Assessment of effects/impacts of interventions is not adequate.</li> </ul>	<ul style="list-style-type: none"> <li>Strengthening of NCD policy/strategy planning and operationalisation particularly on prevention and early detection.</li> </ul>
Service delivery	<ul style="list-style-type: none"> <li>Basic services are provided at primary to tertiary facility level.</li> <li>Assessment of NCD programmes and disease burden/trend is not adequate to determine gaps and opportunities for further improvement.</li> </ul>	<ul style="list-style-type: none"> <li>Strengthening of M&amp;E and implementation of 1st and 2nd prevention interventions</li> </ul>
1 <sup>st</sup> prevention	<ul style="list-style-type: none"> <li>IEC at health facility/public places/mass-media, and counselling at NCD screening are provided</li> <li>IEC/BCC is insufficient.</li> </ul>	<ul style="list-style-type: none"> <li>Strengthening of IEC/BCC</li> </ul>
2 <sup>nd</sup> and 3 <sup>rd</sup> prevention	<ul style="list-style-type: none"> <li>Standardised screening and basic diagnosis &amp; treatment services are available.</li> <li>Referral/back-referral of patients is left to patient's decision.</li> <li>Follow-up mechanism after screening is insufficient.</li> <li>Need to increase NCD services/human resources (e.g. mobile clinic, doctors, paramedical, equipment etc.) and expand the coverage &amp; improve quality.</li> <li>M&amp;E of interventions (e.g. screening coverage) is inadequate to determine gaps/opportunities for further improvement.</li> </ul>	<ul style="list-style-type: none"> <li>Strengthening of M&amp;E and data management for 2nd prevention</li> <li>Improvement of service quality</li> </ul>
Laboratory	<ul style="list-style-type: none"> <li>External QC programme is available for secondary and higher level of primary facility, but not for PHCs</li> <li>Isolated labs by different programmes are one of the challenges</li> <li>QC mechanism for entire facility needs to be strengthened/reactivated</li> </ul>	<ul style="list-style-type: none"> <li>Strengthening of QC mechanism</li> </ul>

	<b>Status</b>	<b>Needs for JICA TC</b>
Human resources	<ul style="list-style-type: none"> <li>• Dedicated NCD nurses and doctors/paramedical for screening/early diagnosis/treatment are available</li> <li>• More doctors/NCD nurses for district hospitals and tertiary hospitals and additional paramedical e.g. dietician for district hospitals are ideal for better quality services. Field workers dedicated to NCDs are ideal.</li> <li>• Continuous NCD training/capacity development is insufficient.</li> </ul>	<ul style="list-style-type: none"> <li>• Support for skill development</li> </ul>
Budget/cost	<ul style="list-style-type: none"> <li>• All public services except a few costly examinations are free. CMCHIS can be used for private services.</li> <li>• NHM is the main source of NCD budget</li> </ul>	<ul style="list-style-type: none"> <li>• Not suitable for TC</li> </ul>
Drug	<ul style="list-style-type: none"> <li>• General budget as well as NHM budget are available for NCD drugs. Demand is increasing, but no significant shortages are reported.</li> </ul>	<ul style="list-style-type: none"> <li>• No significant problems</li> </ul>
Health Information	<ul style="list-style-type: none"> <li>• HMIS is established for facility performance and patient records, however usage rate is still low.</li> <li>• Government data quality, coverage and utilization need to be improved for better understanding of current situation and planning/implementation for further improvement.</li> </ul>	<ul style="list-style-type: none"> <li>• Strengthening of data quality &amp; utilization</li> <li>• Improvement of HMIS utilization</li> </ul>

### 5-1-2 Discussions with Tamil Nadu Government

Dialogues were conducted with various officers from HFWD including high level officials on 4<sup>th</sup> and 5<sup>th</sup> April 2017 by sharing the survey results described above. The major areas of HFWD requests for JICA TC are summarised below.

<p>Major requests</p> <ul style="list-style-type: none"> <li>• Assistance for analysis/proposal for health system reform</li> <li>• BCC/IEC for prevention, risk reduction and health promotion</li> <li>• Follow-up mechanism for treatment compliance</li> <li>• Skill development including diagnosis and treatment for cancer, renal transplant, percutaneous trans luminal coronary angioplasty etc</li> <li>• Continuous quality improvement</li> <li>• M &amp; E with effective HMIS, data management</li> <li>• Expansion of advanced treatment</li> </ul>
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### 5-2 Proposal

The proposed technical cooperation by JICA based on the current findings and discussions with the government is described below. Refer to the Annex 3 and 4 for the preliminary Project Design

Matrix (PDM) and the Plan of Operation (PO).

### 5-2-1 Project outline

(1) Project Title: The Project for strengthening of prevention and control of Noncommunicable Diseases (NCDs) in Tamil Nadu (Tentative)

(2) Overall Goal: Health status of people in Tamil Nadu is improved

(3) Project Purpose: Prevention and control of NCDs (at the primary and secondary levels) is strengthened in Tamil Nadu

(4) Outputs:

- 1) NCD policy and strategy planning and operationalisation is improved in response to the epidemiological transition.
- 2) M&E and data management on NCD programmes is enhanced.
- 3) Capacity to improve the quality of health care services is developed
- 4) IEC/BCC for NCD prevention and early detection is strengthened.

(5) Target Areas: Tamil Nadu State (2 districts are selected as pilot sites)

(6) Target Group: Tamil Nadu State Health and Family Welfare Department, Health personnel in the pilot districts, people in Tamil Nadu

(7) Project period: 2018 – 2022

Project conceptual diagram is shown in Figure 5-1.

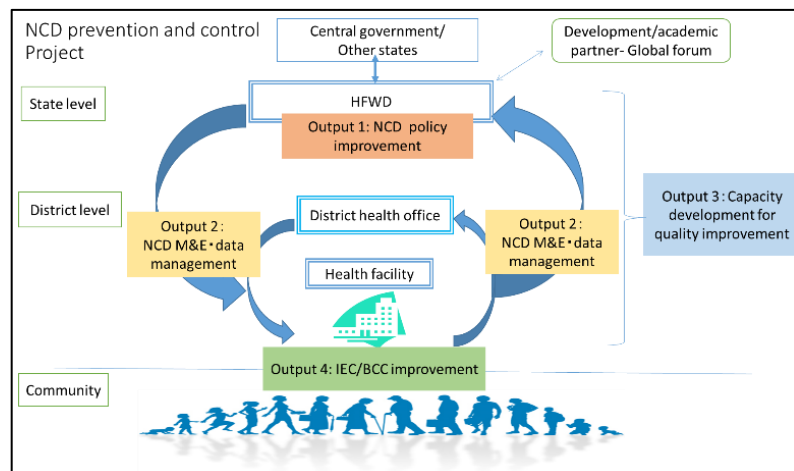


Figure 5-1: Project conceptual diagram

## 5-2-2 Major activities

### (1) NCD policy/strategy improvement

Considering the expected increase in the NCD burden due to the urbanisation and aging in Tamil Nadu, it is imperative to accelerate the responses for the prevention and early detection to halt and reverse current trends.

It is proposed to, firstly, conduct a situational analysis of ongoing responses for prevention and early detection, including an analysis of policy direction, institutional structure, strategies, progress and achievement and challenges. The situation analysis can be conducted at the state level as well as in selected pilot districts. It is desirable to conduct as in-depth an analysis as possible, including a household survey. It is also proposed to conduct resource analysis such as costing of NCD-related services and projections for the required budget in the coming years. Together with the results of the desk reviews on the up-to-date research findings and evidence, policy direction/vision and strategies for NCD prevention and early detection will be produced in line with the state policies on major NCDs. Japan's "Healthy Japan 21" could provide an example for the comprehensive preventive policy. The prevention and early detection strategy could include a common approach for different diseases, such as addressing common risk factors like smoking, alcohol and healthy diet, or awareness-raising and community/individual involvement etc.

Also as mentioned above, a health system traditionally tailored toward maternal and child health and communicable diseases needs to be reformed to address the current epidemiological transition. It may not be feasible for the project to directly support health system reform; however, it is desirable to conduct various analyses as comprehensively as possible, while keeping the perspective of system reform in mind. It is also important to address NCD responses with a multi-sectoral approach including private health sector. While it may be difficult to organise activities and move things forward by involving too many stakeholders, it would be worthwhile to create a platform for undertaking dialogues with stakeholders from various other sectors.

### (2) Improvement of M&E and data management

It is proposed to strengthen data management and utilisation for the evidence-based systematic and strategic planning and implementation. The M&E mechanism for the state goals related to the SDGs and NCD policies needs to be established/re-structured at state and district levels. A review of the current available data through HMIS or the other routes will be conducted on the type, definition, reporting format/route, quality, responsible agencies etc. The usage of each datum at different levels will also be assessed. As Tami Nadu has been progressively introducing ICT

into the health sector with various pilot projects, the utilisation of ICT other than HMIS for M&E can also be explored. The NCD cell or SHDRC could be the overall responsible office for the state M&E. The optimal institutional structure should be studied further.

In terms of HMIS (HMS and MIS), there are a number of challenges as well as opportunities. While it could be difficult for the project to fully address those challenges considering the scheme feature of technical cooperation, it would be worthwhile to review the current usage status and problems thoroughly. Then, it can be decided what can/should be done by the state and by the project. Particular caution will be required to avoid providing support for sub-optimisation. Emphasis should instead be placed on understanding the overall system and provide support to contribute to total optimisation.

Strengthening of district and facility-level data management is required to improve programme planning and implementation on the ground; however, improvements in this area depend on the availability of qualified human resources. Under the DHM at the district level, there is reportedly not always a dedicated NCD data manager, and their qualifications and capability for effective data management and utilisation have been questioned by some experts. The needs and feasibility should be further studied during a detailed design of the project.

One of the major challenges for the screening programme was the follow-up after the screening. At the moment, NCD nurses and community nurses follow up on them directly by phone or house visits, however it is rather labour-intensive approach and current practices do not seem fully functional due to the lack of the dedicated human resources. The possibility of utilising ICT or improving data management at the facility can be explored in this area.

### (3) Capacity development for quality improvement

Due to the suspension or insufficiency of NCD training, the need for continuous capacity development for health personnel was mentioned by various officers and personnel. As HFWD has resumed NCD training and Yen Loan Project includes an NCD training component for the primary health level, it is proposed for the project to study existing or planned training programmes for NCDs and plan and implement for capacity development where appropriate.

One of the possible areas could be the training for patient-centred health care which is one of the comparative advantage in the Japanese health care. Attentive consultations and medical examinations are crucial for NCD patients. While it would be difficult for the health personnel to simply provide more time for patients within the current congested situation, it is proposed to explore the possible ways and areas to improve the quality of care. The utilisation of nurses or paramedics for conduct consultations or health promotion advice can also be considered. At the same time, community workers – VHNs/UHNs – are reported to have fewer opportunities for

NCD training. The workload analysis should be done first to see if the community workers have the capacity to increase NCD activities; if so, capacity development can be carried out.

The need to improve quality-control efforts at health facilities was identified in the survey. The hospital management by senior managers who are medical personnel at the facility was mentioned as one of the areas to be improved. However, hospital management and quality control improvement are beyond the scope of NCD responses and are a huge dimension by themselves. Considering the advantage of bringing synergistic effects with the Yen Loan Project for its supported health facilities, it is proposed to carefully study and clarify the expected purpose and outcomes when implemented.

The Tamil Nadu government requested an opportunity to learn some advanced medical diagnosis and treatment skills, such as techniques for use with cancer cases, from Japan. The improvement of advanced medical skills could benefit overall NCD responses and also familiarisation with Japanese technology by the Tamil Nadu health sector, and could therefore bring mutual merits for future collaboration. Thus, it is desirable to consider positively the possible areas for collaboration with available Japanese resources

The approach to capacity development could include sending the experts from Japan or utilising local expertise to conduct training for various health personnel in Tamil Nadu, or organising training courses in Japan or a third country for the selective leaders or change makers. The opportunities for dialogue/collaboration with the national government, exchange visits with other states and participation in global forums can also be considered as it could contribute to the capacity development of the Tamil Nadu personnel as well as to disseminating the successful practices and lessons outside Tamil Nadu.

#### (4) IEC/BCC improvement

It is proposed to review current programmes and activities for IEC/BCC at different levels and produce an action plan based on the policy developed under Output (1) “NCD policy/strategy improvement.” For the prevention strategy, WHO PEN <sup>27</sup> recommends employing two approaches – a population-wide approach and a high-risk approach, but PEN itself focuses on the latter approach. It was reported that the research or scientific evidence for the effectiveness of population-wide approach is mostly lacking and there are even some reports indicating its ineffectiveness. Therefore, a literature review on up-to-date research and scientific evidence, as well as good practices from the same context and environment as Tamil Nadu can be conducted to consider the appropriate approaches.

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<sup>27</sup> WHO, Package of Essential Noncommunicable (PEN) Disease Interventions for Primary Health Care in Low Resource Settings, 2010

It might be challenging for a short-term project to support IEC/BCC activities and bring about a positive outcome within a limited time. Based on the policy developed under Output (1), the project could consider an intervention at the facility or district level, which could contribute to system-strengthening. Tamil Nadu has been conducting various innovative initiatives, and some of them have subsequently been introduced into national operations. Therefore, it is expected that the project could identify and participate in some innovative approaches relevant to the Tamil Nadu context.

### **5-3 Further steps**

There will be a detailed design survey to finalise the project design. The issues to be considered for finalising the project design are as follows:

(1) Close observation of state initiatives: There are several new initiatives and pilot projects, including the development of state NCD policies recognised during the survey. Those efforts could progress very quickly and some of the challenges and proposals identified during the survey might not be relevant after some time. Therefore, close observation and discussion with the HFWD on the proposed cooperation areas is essential at the time of detailed design. The political situation can also be monitored to determine whether it affects the initiation of the project.

(2) GoI/NHM-funded activities: The project should not duplicate existing GoI/NHM-funded activities. Confirmation of this can be undertaken once the assistance areas of the project have been finalised.<sup>28</sup>

(3) Implementation status of the Yen Loan Project: Particularly, the planned contents and implementation status for the training components can be closely reviewed to avoid duplication but also bring synergistic effects.

(4) Project implementation mechanism: While the expected main counterpart office would be the NCD cell under SHM, it is important to involve other health directorates such as DPHPM, DMRHS, and DME as they are the direct health service delivery agencies. It would also be ideal to involve other departments such as education or labour as well as external experts. It may be difficult to move things forward if this involves too many players in the official implementation structure; therefore, one idea would be to create an advisory team or technical taskforce with wider stakeholders to provide technical inputs and discuss collaboration efforts among various stakeholders etc. The appropriate implementation structure needs to be further considered.

(5) Prioritisation of assistance: The current proposal incorporates policy development, capacity development of quality and hospital management for interventions at the community level. It

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<sup>28</sup> Usually, the NHM budget is finalised in May or June for the year (the fiscal year is from April to March).

would require various experts and resources in different areas. When the project design is finalized, it is expected to make the clear logical linkage between the project purpose and outputs and prioritise or change the degree of each output by selecting effective and efficient interventions to achieve the project purpose, considering Japan's comparative advantage.

END



# Annex

## Annex 1: Schedule of First Survey Visit

## Schedule of First Field Visit

Date		Activity	Location	
2016/11/9	Wed	Arriving in Chennai, Tamil Nadu	Chennai	
2016/11/10	Thu	9:00 Internal meeting with JICA 15:00 Kick-off meeting with HFWD		
2016/11/11	Fri	11:00 Interview SHM, SHDRRC, TCS		
2016/11/12	Sat	11:00 Interview with DPH - DPHL		
2016/11/13	Sun	Internal meeting/report writing		
2016/11/14	Mon	11:00 Interview with NCD cell - Dr. Jerard & Dr. Mutu, 18:00 Meeting with DPH director		
2016/11/15	Tue	11:00 Interview with DPH (NCD officer, health promotion, training, civil/death registration)		
2016/11/16	Wed	10:30 Meeting with NCD cell, TCS (HMIS), 15:00 Visit to Cancer Institution of Adyer		
2016/11/17	Thu	8:30 Departing hotel 10:00 Visit to Tiruvallur district PH lab, 15:00 TCS		
2016/11/18	Fri	14:30 Meeting with DMS, 15:30 Meeting with NCD cell,		
2016/11/19	Sat	Internal meeting		
2016/11/20	Sun	report writing		
2016/11/21	Mon	9:40 Visit to Avadi hospital & UPHC in Chennai		Cuddalore
2016/11/22	Tue	Move to Cuddalore, 11:30 meeting with DDHS/JDHS, Municipal cooperation health officer		
2016/11/23	Wed	8:30 Visit to Cuddalore DHQH, 14:00 UPHC in town		
2016/11/24	Thu	9:20 Visit to 2nd hospital, 12:30 Block PHC, 14:00 additional PHC		
2016/11/25	Fri	10:00 Visit to Vilupurram MCH, Moving to Chennai 17:00 Meeting with Cancer Institute	Cuddalore – Chennai	
2016/11/26	Sat	10:00 Visit to Kumaran private hospital	Chennai	
2016/11/27	Sun	Report writing		
2016/11/28	Mon	10:00 Meeting with local consultant, 15:00 Meeting with Dr Raju/DPH		
2016/11/29	Tue	Moving to Madurai. Meeting with DDHS/JDHS, municipal cooperation	Madurai	
2016/11/30	Wed	9:00 Visit to Usilamapatti DHQH, BPHC		
2016/12/1	Thu	9:00 Visit to Vadipatti secondary hospital, PHC Moving back to Chennai		
2016/12/2	Fri	Meeting with local consultant, report writing	Chennai	
2016/12/3	Sat	Report writing		
2016/12/4	Sun	Report writing		
2016/12/5	Mon	Moving to Delhi	Chennai - Delhi	
2016/12/6	Tue	Moving back to Japan		

## Annex 2: Schedule of Second Survey Visit

## Schedule of Second Field Visit

Date		Activity	Location
2017/3/26	Sun	Arriving in Chennai	Chennai
2017/3/27	Mon	11:00 Meeting with NCD cell officer, SHDRC	
2017/3/28	Tue	11:00 Meeting with DMS planning and development section	
2017/3/29	Wed	Report writing	
2017/3/30	Thu	11:00 Meeting with NCD cell, DPH, 15:00 Meeting with Chennai Corporation	
2017/3/31	Fri	10:00 Meeting with NIE, 14:30 Meeting with laboratory officer in DPH, NCD nodal officer in DMS	
2017/4/1	Sat	Report writing	
2017/4/2	Sun	13:00 Internal meeting Moving to Cuddalore	
2017/4/3	Mon	8:30 Visit to Cuddalore HQ hospital, visit to PHC/meeting with DDHS	Cuddalore
2017/4/4	Tue	11:00 Meeting with SHM NCD cell officers	Chennai
2017/4/5	Wed	11:00 Meeting with Health Secretary 15:00 Meeting with Mission Director	
2017/4/6	Thu	8:00 Visit to RGGH, 10:00 Visit to Children Hospital, 15:00 Meeting with DME	
2017/4/7	Fri	Leaving for Delhi, 16:00 Reporting to JICA India office Leaving for Japan	Delhi
2017/4/8	Sat	Arriving in Japan	

## Annex 3: Preliminary Project Design Matrix

**Project Design Matrix Version 0 (as of May 2017)**

**Project Title: The Project for strengthening of prevention and control of NCDs<sup>1</sup> in Tamil Nadu**

**Project Period: 2018-2022**

**Project Sites: Two selected districts, Tamil Nadu**

**Direct Target Group: Health and Family Welfare Department, Health personnel in two districts in Tamil Nadu**

**Indirect Target Group: People living in Tamil Nadu**

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
<p>&lt; Overall Goals &gt;</p> <p>Health status of people in Tamil Nadu is improved</p>	To be decided	To be decided	
<p>&lt;Project Purpose&gt;</p> <p>Prevention and control of NCDs is strengthened in Tamil Nadu</p>			National and state health policies continue to prioritize NCDs
<p>&lt;Outputs&gt;</p> <p>1. NCD policy and strategy planning and operationalization is improved in response to the epidemiological transition</p>			Necessary financial resources are allocated to provide NCDs related services
<p>2. M&amp;E and data management on NCD programmes is enhanced.</p>			
<p>3. Capacity to improve the quality of health care services is developed</p>			
<p>4. IEC/BCC for NCD prevention and early detection is strengthened</p>			

<sup>1</sup> NCDs- Non-communicable diseases

Activities	Inputs		Important Assumptions
<p>1.1 to set up a taskforce team for the policy review and development on NCD prevention and control and develop a road map</p> <p>1.2 to conduct assessment on the progress/impacts and challenges of current NCD programmes and disease burden focusing on NCD prevention and early detection</p> <p>1.3 to conduct health system assessment for NCD prevention and control focusing on resources, e.g. resource mapping, costing/financial assessment, projection etc in view of health system reform</p> <p>1.4 to conduct a desk review on the cost effective approaches for the prevention and early detection</p> <p>1.5 to develop or update the policy/strategy on the NCD prevention and early detection based on the results of the above assessments</p> <p>1.6 to develop an implementation plan</p> <p>1.7 to review/assess the implementation and feedback the results to the next plan</p>	<p>By Japan</p> <p>1) Experts</p> <p>2) Local activity cost</p> <p>3) Equipment</p> <p>4) Training in Japan/third country as required</p>	<p>By Tamil Nadu</p> <p>1) Counterpart personnel (C/Ps)</p> <p>2) Office space and necessary office facilities</p> <p>3) Utility cost for the project office and project sites</p> <p>4) Personnel cost of C/Ps</p>	<ul style="list-style-type: none"> <li>• Security condition in Tamil Nadu and selected areas does not deteriorate.</li> <li>• Sufficient number of staff with requisite capacity is retained in the relevant offices and organizations</li> </ul>
<p>2.1 to set up a working team for M&amp;E system development</p> <p>2.2 to conduct a review of current M&amp;E system for NCD programmes including available data, reporting format/route, quality, responsible agencies and personnel etc at state, district and facility levels</p> <p>2.3 to review the HMIS (HMS and MIS) functionality and challenges at all health facility levels and study the possible areas of the project direct support</p> <p>2.4 to study the possible means of improving NCD patient follow up mechanism by utilizing ICT/data reporting framework</p> <p>2.5 to develop/revise M&amp;E framework for NCD programmes including HIMS</p> <p>2.6 to conduct capacity development/training of health personnel on the data management and utilization</p> <p>2.7 to assist implementing M&amp;E framework at the</p>			<p>Pre Conditions</p>



<p>state and selected districts</p> <p>2.8 to assess M&amp;E framework implementation and revise it based on the assessment results</p> <p>3.1 to conduct gap analysis of the quality of health services on NCDs at different levels</p> <p>3.2 to conduct need assessment and identify areas for the capacity/skill improvement on NCDs for different cadres</p> <p>3.3 to develop a training plan</p> <p>3.4 to implement a plan by conducting capacity development/training of health personnel in Tamil Nadu/India as well as in Japan and third country</p> <p>3.5 to assist promoting networking with national government and other states as well as other development partners, and participating in the global forums when appropriate.</p> <p>3.6 to assess its implementation and revise it based on the assessment results</p> <p>4.1 to conduct assessment on the current IEC/BCC strategies for prevention and earl detection and its effects</p> <p>4.2 to develop/revise the IEC/BCC strategies and approaches based on the policy/plan developed under 1</p> <p>4.3 to assist implementing IEC/BCC strategies – development of materials, training of health personnel, conduct activities - at the selected districts</p> <p>4.4 to assess its implementation and revise it based on the assessment results</p>			
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## Annex 4: Preliminary Plan of Operation

Plan of Operation (PO) as of May 2017

The Project for strengthening of prevention and control of NCDs in Tamil Nadu

Activity	Year Month	1st year												2nd year												3rd year												4th year											
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
<b>0. Overall</b>																																																	
0.1 To prepare for Project implementation	plan	■	■	■	■								■												■													■											
	actual																																																
0.2 To monitor/evaluate on the Project implementation	plan	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	actual																																																
<b>1. NCD policy and strategy planning and operationalization is improved in response to the epidemiological transition</b>																																																	
1.1 to set up a taskforce team for the policy review and development of NCD prevention and control and develop a road map	plan	■	■	■	■																																												
	actual																																																
1.2 to conduct assessment on the progress/impacts and challenges of current NCD programmes and disease burden focusing on prevention and early detection	plan			■	■	■	■	■	■	■	■	■																																					
	actual																																																
1.3 to conduct health system assessment for NCD prevention and control focusing on resources, e.g. resource mapping, costing/financial assessment, projection etc in view of health system reform	plan			■	■	■	■	■	■	■	■	■																																					
	actual																																																
1.4 to conduct a desk review on the cost effective approaches for the prevention and early detection	plan			■	■	■	■	■	■	■	■	■																																					
	actual																																																
1.5 to develop or update the policy/strategy on the NCD prevention and early detection based on the results of the above assessments	plan									■	■	■	■	■	■	■	■	■	■	■	■	■	■																										
	actual																																																
1.6 to develop an implementation plan	plan											■	■	■	■	■	■	■	■	■	■	■	■																										
	actual																																																
1.7 to review/assess the implementation and feedback the results to the next plan	plan																																																
	actual																																																
<b>2. M&amp;E and data management on NCD programmes is enhanced.</b>																																																	
2.1 to set up a working team for M&E system development	plan				■	■																																											
	actual																																																
2.2 to conduct a review of current M&E system for NCD programmes including available data, reporting format/route, quality, responsible agencies and personnel etc at state, district and facility levels	plan							■	■	■	■	■																																					
	actual																																																
2.3 to review the HMIS (HMS and MIS) functionality and challenges at all health facility levels and study the possible areas of the project direct support	plan							■	■	■	■	■																																					
	actual																																																
2.4 to study the possible means of improving patient follow up mechanism by utilizing ICT/data reporting framework	plan												■	■	■	■	■	■	■	■	■	■	■																										
	actual																																																
2.5 to establish/revise M&E framework for NCD programmes including HMIS	plan												■	■	■	■	■	■	■	■	■	■	■																										
	actual																																																
2.6 to conduct capacity development/training of health personnel on the data management and utilization	plan												■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
	actual																																																
2.7 to assist implementing M&E framework at the state and selected districts	plan																							■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
	actual																																																
2.8 to assess M&E framework implementation and revise it based on the assessment results	plan																																				■	■	■	■	■	■	■	■	■	■	■	■	
	actual																																																
<b>3. Capacity to improve the quality of health care services is developed</b>																																																	
3.1 to conduct gap analysis of the quality of health services on NCDs at different levels	plan							■	■	■	■	■																																					
	actual																																																
3.2 to conduct need assessment and identify areas for the capacity/skill improvement on NCDs for different cadres	plan							■	■	■	■	■																																					
	actual																																																
3.3 to develop a training plan	plan											■	■																																				
	actual																																																
3.4 to implement a plan by conducting capacity development/training of health personnel in Tamil Nadu/India as well as in Japan and third country	plan												■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
	actual																																																
3.5 to assist promoting networking with national government and other states as well as other development partners, and participating in the global forums when appropriate.	plan												■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
	actual																																																
3.6 to assess its implementation and revise it based on the assessment results	plan																																					■	■	■	■	■	■	■	■	■	■	■	■
	actual																																																
<b>4. IEC/BCC for NCD prevention and early detection is strengthened</b>																																																	
4.1 to conduct assessment on the current IEC/BCC strategies for prevention and earl detection and its effects	plan																																																
	actual																																																
4.2 to develop/revise the IEC/BCC strategies and approaches based on the policy/plan developed under 1	plan						</																																										

## Annex 5: Report on District Health Facility Survey by PHFI



# District Health Facility Survey for Non-Communicable Diseases in Tamil Nadu, India

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Supported by:

Global Link Management Inc, Tokyo, Japan

Arshi Munawwar, Gokula Kannan, KG Shrithar, Jerard Selvam, M. Kamatchi, V. Ramalingam, D. Ahamad, Akiko Hirano, K Srinath Reddy, Subhash Hira

May 2017

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## Summary

The non-Communicable Diseases (NCD) have emerged as the leading cause of illnesses and account for over 42% of all deaths in India. NCD have lead to significant morbidity and mortality in urban and rural population, especially among subjects aged 30–70 years of life. Hence, the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS) was launched by the Indian **Ministry of Health & Family Welfare** (MoHFW) in 2010. Furthermore, in line with WHO's *Global action plan for the prevention and control of NCD (2013-2020)*, India is the first country to develop specific national targets and indicators aimed at reducing the number of premature deaths from NCD by 25% by 2025. Also, in 2014, a National Multisectoral Action Plan that outlines actions by various sectors besides the health sector to reduce the burden of NCD and their risk factors was launched.

The district Non-Communicable Diseases health facility survey was commissioned by Japan International Cooperation Agency (JICA)-Tokyo through Global Link Management (GLM) Inc as a base line study in December 2016. This study was required for designing the JICA's Official Development Assistance (ODA)-2 loan for Technical Cooperation to support the on-going "Tamil Nadu Urban Health Care Project (2016)" under JICA ODA-1 loan to Tamil Nadu. The Public Health Foundation of India (PHFI) based in Gurgaon, India was awarded the design and conduct of the district NCD health facility survey study.

The purpose of district health facility survey was to collect information on NCD related policies at primary and secondary health facilities in 3 selected districts of Tamil Nadu, and to understand the gaps in the implementation of NCD prevention and control. Documents of the national policies as well as of the state level policies, regulations and guidelines/standards on NCD prevention and control including clinical treatment, medical

laboratory and public health laboratory were collected.

Following written approval of the National Health Mission (NHM) of Tamil Nadu to conduct the health facility survey, primary data on the primary and secondary health facilities in three select districts, namely Chennai, Cuddalore, and Madurai was collected. The capacity and gaps of health facilities studied in terms of NCD prevention and control at districts, urban/rural, and facility types were analyzed. For Secondary data, a data plan was developed to extract and analyze district-wise NCD data for hypertension (HT), diabetes mellitus (DM), cardio-vascular diseases (CVD), cancer-cervix and cancer breast for 32 districts of Tamil Nadu from 2014 to 2016 using NHM's HMIS database.

The results of 33 public health facilities surveyed showed that the NCD program was well institutionalized at district, sub-district, and PHC/Urban Health Centre levels in Chennai, Cuddalore, and Madurai districts. There was a significant attendance of patients for NCD at all levels, and it was likely to grow in the future due to increased awareness of services among communities. Even at the PHC/UHC, the average number of screened cases each month was as high as 419 cases for CVDs (Chennai), 337 cases per month for DM (Cuddalore), and 139 cases of cancers (Madurai). Although, the treatment and management of cancers was primarily done in tertiary level hospitals, the secondary level hospitals reported admission as high as 57 average cancer cases per month in Chennai. Similarly, average admission of 55 stroke cases per month in Madurai, an average of 42 cases of DM per month in Madurai, and average 39 cases of CVD per month in Chennai were reported. Availability of medicines for HT, DM, and CVD was found to be adequate at all levels, except for the treatment medicines for cancers.

The analysis of HMIS data base showed that among NCD cases, there was a significant increase in the incidence (new cases) of HT in the entire Tamil Nadu (2014 to 2016). On an average, new cases of HT occurred at the rate of 17 per 100 screened population ( $\geq 30$  years of age). These results were in agreement with previous studies from Tamil Nadu. The second highest numbers of new cases were reported for DM at 6 per 100 screened population. For cervical cancer, suspected positive rate was observed to be at 4.1 per 100 screened population. However, for breast cancer suspected incident cases were comparatively lower at 1.8 per 100 screened population. This study further established that that the NCD incidence rate in the population was directly proportional to the number of patients screened. For example, with higher number of cases coming for NCD screening, there was a probability of increased numbers of new cases that were diagnosed. Stroke as a clinical



entity was not captured in the HMIS database. The HMIS system requires expansion of data entry terminals and better Wi-Fi-connectivity in most health facilities.

It is likely that government health facilities were being accessed mainly by the rural and peri-urban populations. So, HMIS database analysis showed greater number of cervical cancer cases, occurring mainly among the agriculture population. The cancer screening was being done only for cervical, oral and breast cancers. Although cervical and breast cancers were prevalent among NCD, the diagnostic, pharmaceuticals, and treatment services for cancers were weak even at secondary hospitals in districts of Chennai, Cuddalore, and Madurai. Only tertiary level government medical college hospital in Chennai and a specialized cancer hospital in Chennai had cancer services. These services were grossly inadequate given that population was now living longer.

The laboratories had heavy load of tests. For example, average range of tests done per month were, for secondary level (12,595-13,151), for taluka level (sub-district) (1,494-3,211), and for UHC/PHC level (530-1,500). Despite the heavy load, laboratories were clean and well maintained. Even though each lab was equipped with the basic equipment needed for the particular center, it is recommended to upgrade labs and also increase technician workforce.

Posting of more specialist doctors for cardiology, diabetes, and oncology **will help to improve the services**. Shortage of other personnel was also evident but the administration has been efficient to distribute the available staff to different departments so that the patient care is smooth. For example, the NCD nurses are trained in lab procedures. The refresher training program for the NCD staff was completed in 2014-2015 but the newly recruited staff are yet to be trained.

In conclusion, **Cancer care should be introduced in all secondary hospitals of the state**. It is therefore recommended that the gaps listed above should be considered under the Japan Technical Co-operation-ODA. The technical assistance plan for establishment of the cancer management units in secondary hospitals especially that Japan has world-class expertise in establishing district-level cancer hospitals, upgrading laboratories, HR development, structured training programs, and for expanded HMIS. This technical assistance plan can be prepared by an Indian health institution in collaboration with the Japanese counterparts. The technical cooperation is expected to produce synergy with the current Yen Loan Project "Tamil Nadu Urban Health Care Project (2016)" and should particularly focus on the early detection and treatment, and laboratory improvement for NCD at the primary and secondary health facilities in the district. The project is further expected to promote development of socio-economic and human resources infrastructure, that directly supports

improving life-expectancy of Indians and enhancing people's quality of life.

The operational studies recommended to support technical cooperation project of JICA for Tamil Nadu include (a) exploring the anecdotal factors that make clients select between health centres and services; and (b) community advocacy and support needs to be further explored so as to develop an efficient model of community mobilization for the project.

## Background

Non-Communicable Diseases (NCD) are emerging as the leading cause of illnesses and deaths in India accounting for over 42% of all deaths (Registrar General of India in 2010). NCD cause significant morbidity and mortality both in urban and rural population, with considerable loss in potentially productive years (aged 30–70 years) of life. Consequently, the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS) was launched by the Indian **Ministry of Health & Family Welfare** (MoHFW) in 2010.

“Heart diseases, diabetes, cancers, and chronic respiratory diseases now affect younger people” says Dr. Poonam Khetrpal Singh, Regional Director of WHO, South-East Asian Region. She further adds that “...millions of productive individuals lost prematurely to NCD are seriously undermining social and economic development.”

### Specific national disease burden, targets and indicators

It is estimated that the overall prevalence of diabetes, hypertension (HT), Ischemic Heart Diseases (IHD) and Stroke is 62.5, 159.5, 37.0 and 1.5 respectively per 1000 population of India. According to the National Commission on Macroeconomics and Health Report (2005), the Crude Incidence Rate (CIR) for Cervix cancer, Breast cancer and Oral cancer is 21.3, 17.1 and 11.8 (among both men and women) per 100,000 population, respectively. There are an estimated 2.5 million cancer cases in India.

The main preventable risk factors for NCD are tobacco consumption, poor dietary habits, sedentary life-style, stress etc. National Family Health Survey III (2005-06), reported that the prevalence of current tobacco use was 57% and 10.8% among men and women respectively. Over 8,00,000 deaths occur every year due to diseases associated with tobacco use. The cancer registry data reveals that 48% of cancers in males and 20% in females are associated with tobacco consumption and are totally avoidable. Common cancers caused by smoking tobacco are lung, larynx, pharynx and oesophagus, while cancers of the mouth, tongue and lip are due to chewing and smoking tobacco.

States in India have already initiated some of the activities for prevention and control of NCD especially HT, diabetes, **cardiovascular diseases** (CVDs), stroke, and cancers. The Central

Govt. proposes to supplement their efforts by providing technical and financial support through National Program for Prevention and Control of Cancer, Diabetes, CVD and Stroke (NPCDCS). The NPCDCS program has the two disease components viz. (i) Cancer and (ii) Diabetes, CVDs and Stroke. These two disease components have been integrated at different levels as far as possible for optimal utilization of resources.

The NPCDCS aims at integration of NCD interventions in the National Health Mission (NHM) framework for activities at State, Districts, **Community Health Centre (CHC)** and Sub Centre level since the launch of NHM in 2014. This will help in the optimization of scarce resources and in the provisioning of services seamlessly to end customers/ patients, and in also ensuring long term sustainability of interventions. Thus, the institutionalization of NPCDCS at district level within the District Health Society, sharing administrative and financial system of NHM is a crucial program strategy for NPCDCS. The NCD cell at various levels will ensure implementation and supervision of the program activities related to health promotion, early diagnosis, treatment and referral, and further facilitate partnership with laboratories for early diagnosis in the private sector. Simultaneously, it attempts to create a wider knowledge base in the community for effective prevention, detection, referrals and treatment strategies through convergence with the ongoing interventions of NHM, National Tobacco Control Program (NTCP), and National Program for Health Care of Elderly (NPHCE) and build a strong monitoring and evaluation system through the public health infrastructure.

In line with WHO's *Global action plan for the prevention and control of NCD 2013-2020*, India is the first country to develop specific national targets and indicators aimed at reducing the number of premature deaths from NCD by 25% by 2025. In 2014, A National Multisectoral Action Plan that outlines actions by various sectors besides the health sector to reduce the burden of NCD and their risk factors was launched.

## Objectives of NPCDCS

- 1) Prevent and control common NCD through behaviour and life style changes,
- 2) Provide early diagnosis and management of common NCD,
- 3) Build capacity at various levels of health care for prevention, diagnosis and treatment of common NCD,
- 4) Train human resource within the public health setup, viz. doctors, paramedics and nursing staff to cope with the increasing burden of NCD, and

5) Establish and develop capacity for palliative and rehabilitative care.

## Strategies of NPCDCS

The Strategies of NPCDCS to achieve above objectives are as follows:

1) Prevention through behaviour change focusing on the following five messages: increased intake of healthy foods; increased physical activity through sports, exercise; avoidance of tobacco and alcohol; stress management; awareness about the warning signs of common cancers.

2) Early Diagnosis: Strategy for early diagnosis will consist of opportunistic screening of persons above the age of 30 years at the point of primary contact with any health care facility, be it at the village, CHC, District hospital, tertiary care hospital. Opportunistic screening will have in built components of mass awareness creation, self-screening, and trained health care providers. The investigations which may not be carried out in the health facilities can be outsourced to nearby government, **non-governmental organizations** (NGOs), or private facilities.

3) Treatment: "NCD clinics" will be established at CHC and District Hospital (NCD here refers to Cancer, Diabetes, HT, CVDs and Stroke) where comprehensive examination of patients referred by lower health facility/ health worker as well as those reporting directly will be conducted for ruling out complications or advanced stages of common NCD. Screening, diagnosis and management (including diet counseling, lifestyle management) and home based care will be the key functions.

4) Capacity building of human resource: All cadres of health personnel at various levels of health facilities will be periodically trained for health promotion, prevention, early detection and management by a team of trainers at Training Institutes/ Centres. These Training Institutes/ Centres will be identified by the State in consultation with the Centre.

5) Surveillance, Monitoring and Evaluation: Regular monitoring and review of the program will be conducted at the District, State and Central levels through monitoring formats and periodic visits and review meetings.

Package of Services in the NPCDCS. NPCDCS is providing preventive, promotive, curative and supportive services (core and integrated services) in Cancer, Diabetes, CVDs and Stroke at various government health facilities. The package of services depends on the level of health facility and may vary from facility to facility. The range of services include health promotion, psycho-social counseling, management (out-and-in-patient), day care services, home based care, and palliative care as well as referral for specialized services as needed. Linkages of district hospitals to private laboratories and NGOs is helping to provide the additional components of continuum of care and support for outreach services. The district is being linked to tertiary cancer care health facilities for providing comprehensive cancer care.

The services below district level are being integrated and will be integral part of existing primary health care delivery system. The NCD Cell at the district and above level is more specialized health care for i) cancer component; and (ii) diabetes, CVD, and stroke.

Table 1. Service Packages at different levels under NPCDCS

Health Facility	Package of Services
Sub centre	<ol style="list-style-type: none"> <li>1. Health promotion for behavior change</li> <li>2. 'Opportunistic' Screening using BP measurement and blood glucose by strip method</li> <li>3. Referral of suspected cases to CHC</li> </ol>
CHC sub-district	<ol style="list-style-type: none"> <li>1. Prevention and health promotion, including counseling</li> <li>2. Early diagnosis through clinical and laboratory investigations (Common lab investigations: Blood Sugar, lipid profile, <b>electrocardiogram</b> (ECG), ultrasound, X-ray etc.)</li> <li>3. Management of common CVD, HT, Diabetes mellitus (DM) and stroke cases (out-patient and in patients).</li> <li>4. Home based care for bed ridden chronic cases</li> <li>5. Referral of difficult cases to district /higher health facility</li> </ol>
District Hospital	<ol style="list-style-type: none"> <li>1. Early diagnosis of diabetes, CVD, HT, stroke and cancer</li> <li>2. Investigations: Blood Sugar, lipid profile, kidney function test (KFT),liver function test(LFT), ECG, ultrasound, X ray, colposcopy,</li> </ol>

		mammography etc. (if not available, it is being outsourced) 3. Medical management of cases (out-patient , inpatient and intensive Care) 4. Follow up and care of bed ridden cases 5. Day care facility 6. Referral of difficult cases to higher health care facility 7. Health promotion and counseling for behavior change
Tertiary Hospitals	Cancer	Only one in Chennai (govt.), one in Pondicherry (govt.) and one in Madurai (pvt.). Comprehensive cancer care including prevention, early detection, diagnosis, treatment, minimal access surgery after care, palliative care and rehabilitation

## Institutional framework for the implementation of NPCDCS activities

1. Program Structure-Integration of NPCDCS with NHM. Funds from Government of India are released to the State Health Society (SHS). SHS retains funds for state level activity and release them to the District Health Societies. NPCDCS operates through NCD cells under the program constituted at State and District levels and also maintains separate bank accounts at each level. Funds from Health Society are transferred to the Bank accounts of the NCD cell after requisite approvals at appropriate stage. This system ensures that both convergence, as well as independence in achieving program goals through specific interventions is achieved. It has thus merged the NPCDCS program at State and District Health Societies in order to institutionalize the program.

2. State Health Society (SHS). Under the NHM framework different Societies of national programs such as Reproductive and Child Health Program, Malaria, Tuberculosis (TB), Leprosy, National Blindness Control Program (**NPCB**), and NPCDCS have been merged into a common SHS that is chaired by Chief Secretary/ Development Commissioner, or Principal/Secretary (Health & Family Welfare).

3. District Health Society (DHS). At the district level all program societies have been merged into the District Health Society (DHS) except the AIDS program. The Governing Body of the

DHS is chaired by the Chairman of the Zila Parishad/ District Collector. The Executive Body is chaired by the District Collector (subject to State specific variations).

4. Technical Resource Groups, one each on (i) Cancer and (ii) Diabetes/CVD/Stroke have been established.

## Functions of NPCDCS

1. National CDCS Program. A National NCD Cell in MOHFW in Nirman Bhawan, New Delhi is established to plan, implement, monitor and evaluate activities of the program at the national level.

Role and responsibilities of the National NCD Cell is as under:

- Nodal body to roll out NPCDCS in the country
- Plan, Coordinate, and Monitor all the activities at National and State level.
- Develop operational guidelines, Standard Operating Procedures (SOP), Training modules, Quality benchmarks, Monitoring and reporting systems and tools.
- M&E of the program is done through Health Management Information System (HMIS), review meetings, field observations, surveillance, operational research, and evaluation studies.
- Prepare National Training Plan: Curriculum design, establish training resource centres, training modules, and organize national level training programs.
- Procurement of equipment and supplies provided as commodity assistance;
- Release of annual funds and monitoring of expenditures.

2. State NCD Cell. State NCD Cell is established in the Directorate of Health services. The NCD Cell is responsible for overall planning, implementation, monitoring and evaluation of the different activities.

Role and responsibilities of the State NCD Cell is as under:

1. Preparation of State action plan for implementation of NPCDCS strategies and activities.
2. Generate district-wise information of NCD through health facilities including sentinel sites.
3. Organize state & district level trainings for capacity building
4. Ensure appointment of contractual staff sanctioned for various facilities
5. Receive funds from State Health Society and release funds to districts.
6. Maintaining State and District level data on physical, financial, epidemiological profile.
7. Convergence with NHM activities and other related departments in the State/ District.



8. Ensure availability of palliative and rehabilitative services including oral morphine
9. Monitoring of the program through HMIS, review meetings, field observations.
10. Improve public awareness regarding health promotion and prevention of NCD.

3. District NCD Cell. The NCD Cell is responsible for planning, implementation, monitoring and evaluation of different activities; and achievement of physical and financial targets planned under the program in the District.

### Role and responsibilities of District NCD Cell

1. Preparation of district action plan for implementation of NPCDCS strategies and activities.
2. Maintain and update district database of NCD.
3. Conduct sub-district/ CHC level trainings for capacity building
4. Engage contractual personnel sanctioned for various facilities in the district
5. Maintain fund flow and submit Utilization Certificates
6. Maintaining district level data on physical, financial, epidemiological progress
7. Convergence with NHM activities
8. Convergence with the other related departments in the district
9. Ensure availability of palliative and rehabilitative services including oral morphine.

Budget: Systems and services covered under NPCDCS receive assistance from MoHFW to create and maintain facilities and services for patients suffering from cancer, diabetes, CVDs, hypertension, and Stroke. The resource sharing is: 80% of grant comes from Central share and 20% is from State share.

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Reference. *National Programme for the prevention and control of Cancer, Diabetes, Cardiovascular diseases & Stroke (NPCDCS). Operational Guidelines. DGHS, MOHFW, New Delhi, 2013.*

## SURVEY METHODS.

### 1. Organizational Profile

The district Non-Communicable Disease (NCD) health facility survey was commissioned by Japan International Cooperation Agency (JICA)-Tokyo through Global Link Management (GLM) Inc as a base line study in December 2016. This study was required for designing the JICA Official Development Assistance (ODA)-2 loan for Technical Cooperation to support the ongoing "Tamil Nadu Urban Health Care Project (2016)" under JICA ODA-1 loan to Tamil Nadu.

The Public Health Foundation of India (PHFI) based in Gurgaon, India was awarded the design and conduct of the district NCD health facility survey study by GLM Inc, Tokyo. PHFI is a public health institution, launched in 2006 as a **Public-private partnership (PPP)** initiative with MoH,-India, and is a response to redress the limited institutional capacity in India for strengthening public health research, training and policy development. The institution has grown rapidly since its launch and is actively engaged in strengthening health systems and improving public health services across India, through multi-level, and multi-component capacity building. PHFI has emerged as a productive research engine, conducting impact evaluation of national programs, generating policy and generating program relevant knowledge. PHFI plays a strong role in policy development, health communication and advocacy.

PHFI has established five Indian Institutes of Public Health (IIPH), each at Delhi, Hyderabad, Gandhinagar, Bhubaneswar and Shillong that have well trained faculty to generate research evidence, as well as build public health capacity. These institutes not only provide public health education to students but their research staff also collaborate and serve as technical advisers to health departments and public health programmes of the respective states.

## 2. Approach, methods of survey and work plan

2.1 Purpose of district health facility survey: To collect information on NCD related policies at primary and secondary health facilities in 3 selected districts of Tamil Nadu, and to understand the gaps in the NCD prevention and control. This information will help to formulate the possible technical cooperation project of JICA for Tamil Nadu. This project is expected to promote development of socio-economic and human resources infrastructure, which directly supports improving life-expectancy and enhancing people's quality of life. The technical cooperation is expected to produce synergy with the current Yen Loan Project "Tamil Nadu Urban Health Care Project (2016)" and will particularly focus on the early detection and treatment, and laboratory quality improvement for NCD at the primary and secondary health facilities.

### 2.2 Tasks completed:

- 1) The survey team collected documents of the national policies, regulations and guidelines/standards on the following
  - a) NCD prevention and control including clinical treatment
  - b) Medical laboratory
  - c) Public health laboratory
- 2) The survey team collected documents of the state level policies, regulations and guidelines/protocols in Tamil Nadu on the following
  - a) NCD prevention and control including clinical treatment
  - b) Medical laboratory
  - c) Public health laboratory
- 3) The survey team developed the plan to extract and analyze district-wise NCD secondary data of Tamil Nadu for 2014, 2015, 2016 from the NHM's HMIS database,
- 4) The survey team developed tools to collect primary data on the primary and secondary health facilities in three selected districts, namely Chennai, Madurai and Cuddalore on the following items:

- 4.a. collected information on the public health/sanitary laboratory system in three selected districts, on the number, location, function and network of laboratory;
- 4.b. analyzed the capacity and gaps of health facilities studied in terms of NCD prevention and control at districts, urban/rural, and facility types.
- 5) Provided technical advice on the identification of gaps of NCD prevention and control in Tamil Nadu and the possible assistance areas for JICA technical cooperation;
- 6) Provided coordination assistance for meetings/discussions and site visits for Japanese team as required.
- 7) Compiled data and prepared the report in English.

### 2.3 Work Plan and Schedule of activities:

- National documents of NPCDCS policy and implementation were collected from MoHFW-Delhi: Met Dr Mohamad Shaukat, Director, NPCDCS: December 3<sup>rd</sup>-5<sup>th</sup> , 2016
- Met and collected documents of State NCD Cell in Chennai:  
Commissioner/PD-NHM Mr. Derez Ahamad, IAS  
Advisor Dr. Capt. M. Kamatchi,  
Dy-Director (NCD Program) Dr. Jerard M. Selvam  
Jt. Director (NCD Program) Dr. K.G. Shrithar (December 9<sup>th</sup>-30<sup>th</sup> , 2016).
- Study tool development was done as a joint exercise with the GLM Japanese team through emails and skype calls. Questionnaire developed is attached. Data was collected under the following categories: December 9<sup>th</sup>-30<sup>th</sup>, 2016.
  - On patients: Services, counseling, diagnostic services, health promotion, inpatient and outpatient services, ICU, referrals, lab investigations.
  - Manpower
  - Physical infrastructure

- Equipment
  - Drugs supply system including cancer drugs
  - Behavioral aspects
  - Laboratory Quality control
  - Finance
- PHFI's Institutional Ethical Committee's waiver was applied for based on the study design that did not include interviewing any human subjects and that the interviews with facility supervisors were kept anonymous. January 10<sup>th</sup>, 2017.
- Data collection: January 10<sup>th</sup> -Feb 20<sup>th</sup>, 2017.  
 Team 1- Pre-trained on secondary data collection and study objectives. Team 1 was guided by Dr. Kamatchi and Dr. Jerard. Team 1 extracted and analyzed district-wise NCD data for 2014, 2015, 2016.
- Team 2- Pre-trained on primary data collection and study objectives. Team 2 was guided and accompanied by Dr. Shririthar, Jt Director of State NCD Cell. District visit plan was formed and emailed by Jt. Director to District NCD Coordinator for preparing facilities to meet the interview team. All facilities to be interviewed in 3 districts (Chennai, Cuddalore, Madurai) were short-listed in consultation with State NCD Cell and questionnaire was emailed to all facilities at least 3-5 days before the visit by the interviewing team. Visits were supervised by the PI and/or Dr. Vimala Ramalingam.
- Managed, collated and analyzed data. February 15<sup>th</sup>-March 10<sup>th</sup>, 2017.
- Preliminary report submission. March 18, 2017.
- Consultation on report content with NCD Cell, TN Government. April-May, 2017
- Final report submission. May 16, 2017.
- Intermittent consultations thereafter to prepare a policy brief and print report. June 30, 2017.

## 2.4. Deliverables

- Study tool/framework
- Preliminary report
- Final report
- Report as policy brief and printed copies

## Results and Findings

### 1. Primary data.

This was collected using the questionnaire (see Appendix 1) at 39 health facilities in 3 districts, namely Chennai, Cuddalore, and Madurai. The designation of the health facility, population covered, distance from the city centre, etc. is shown in Table 2 below. Interactive maps of the health facilities at different levels in the three districts covered under the survey are shown in (Figure 1)

Table 2. Level of health facility, geographic location, distance from city centre, and availability of NCD facility in districts of Chennai, Cuddalore, and Madurai (N=39)

District: Chennai (n=12)							
S.No	Name of the setting	Facility	Public/Private	TK/NTK/HQs	Distance to district /tertiary hospital,	Facility location	Population covered by the facility
1.	Govt HQ Hospital(GHQH)	Urban	Public-Sec	HQRS	45 Km	Tiruvallur	20,00,000
2.	General Hospital	Semi Urban	Public-Sec	TK	20 Km	Avadi	5,00,000
3	Kumaran Medical Hospital	Urban	Private-Sec	Pvt	2 Km	Kilpauk	X
4	Frontier Lifeline Hospital	Urban	Private-Sec	Pvt	5 Km	Mogappair	5,00,000
5	CHC	Urban	Public-Sub-Dist	TK	6 Km	Ambattur	5,20,627
6	Upgraded PHC	Urban	Public-PHC	TK	18 Km	Varadhara-japuram	50,000
7	Upgraded PHC	Urban	Public-PHC	TK	10 Km	Villivakkam	50,000
8	UHC	Urban	Public-PHC	TK	8 km	Shenoy nagar	50,000
9	UHC	Urban	Public-PHC	TK	12 km	Saidapet west	50,059
10	UHC	Urban	Public-PHC	TK	7 km	Manali	50,000

11	UHC	Urban	Public-PHC	TK	15 km	Kathivakkam	52479
12	UHC	Urban	Public-PHC	TK	7 km	venkata-puram	55696
District: Cuddalore (n=17)							
1.	JIPMER Govt. Medical College2	Urban	Public-Ter	Ter-tiary	Na	Puducherry	13,00,000
2	Aarupadai Veedu Medical College3	Urban	Private-Ter	Ter-tiary	15 Km	Puducherry	50,000
3	Govt HQ Hospital(GHQH)1	Urban	Public-Sec	HQRS	23 Km	Cuddalore	26,00,000
4	Govt. Hospital (Taluk),	Semi Urban	Public-Sec	TK	22 Km	Veppur	100,000
5	Govt.Hospital 4	Urban	Public-Sec	TK	20 Km	Kattumannar Koil	27,294
6	Govt.Hospital 5	Urban	Public-Sec	TK	36 Km	Kurinjipadi	2,38,416
7	Govt.Hospital	Rural	Public-Sec	TK	40 Km	Tittagudi	20,734
8	Govt..Hospital 6	Urban	Public-Sec	TK	60 Km	Virudhachalam	73,585
9	CHC	Semi-Urban	Public-Sub-Dist	TK	22 Km	Puduchathiram	28,664
10	CHC	Rural	Public-Sub-Dist	TK	20 Km	Pennadam	29,252
11	Upgraded PHC	Urban	Public-PHC	TK	15 Km	Karaikadu	48,000
12	Upgraded PHC	Semi-Urban	Public-PHC	TK	40 Km	Vadalur	36,000
13	Block PHC (Taluk)	Semi Urban	Public-PHC	TK	30 Km	Kurinjipadi	23677
14	Block PHC	Semi-Urban	Public-PHC	TK	70 Km	Mangalampet	45,666
15	PHC	Semi-Urban	Public-PHC	TK	20 Km	Sethiathopu	37,159
16	Govt..Hospital7	Urban	Public-Sec	Tk	20 Km	Panruti.	60,000
17	Govt..Hospital8	Semi-Urban	Public-Sec	Tk	50 Km	Bhuvanagri	22000
District: Madurai (n=9)							
1	Rajaji Medical Hospital	Urban	Public-Sec	Sec	Na	Panagal	100,000
2	Govt HQ Hospital(GHQH)	Rural	Public-Sec	TK	30 Km	Usilampatti	200,000

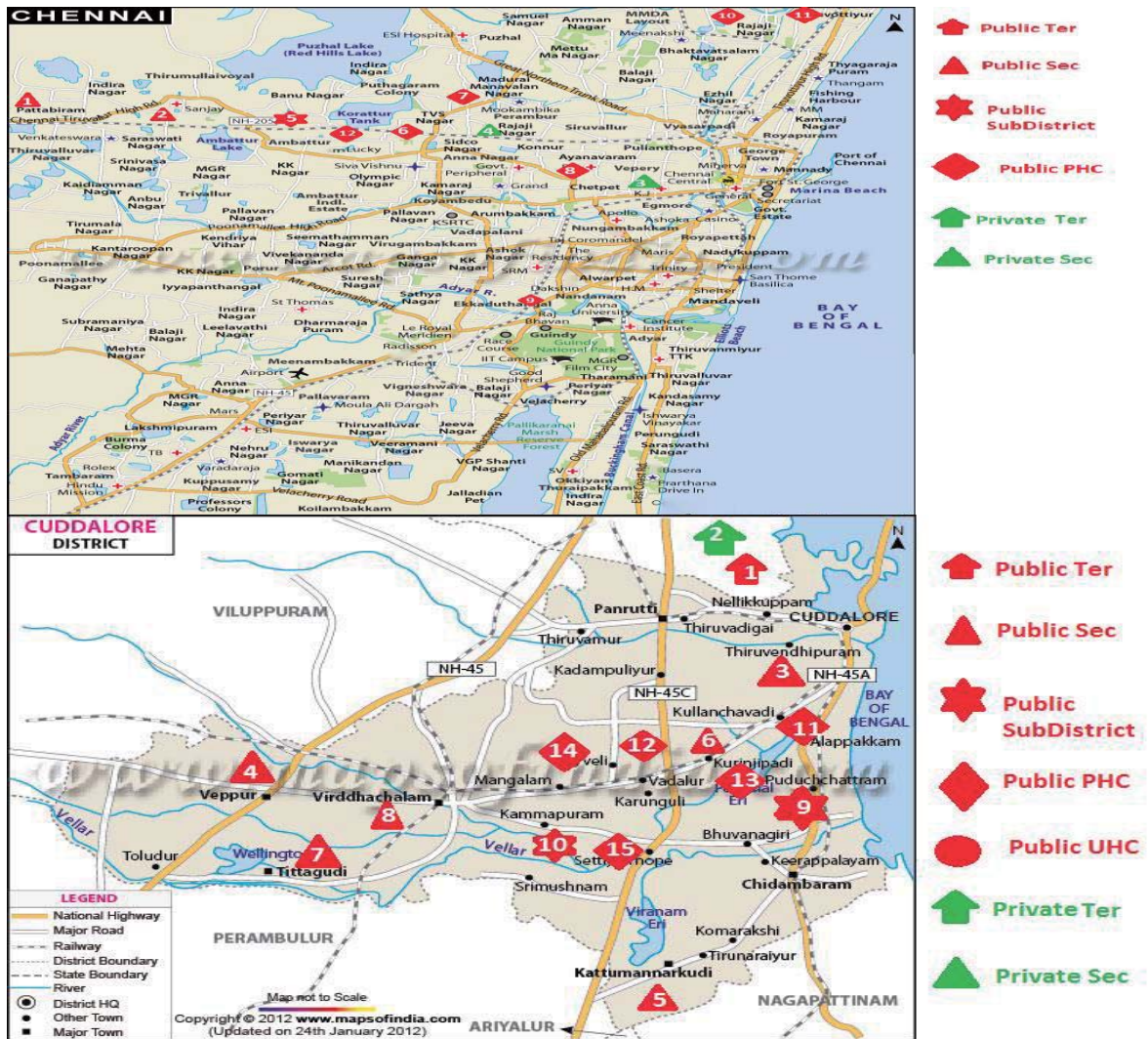


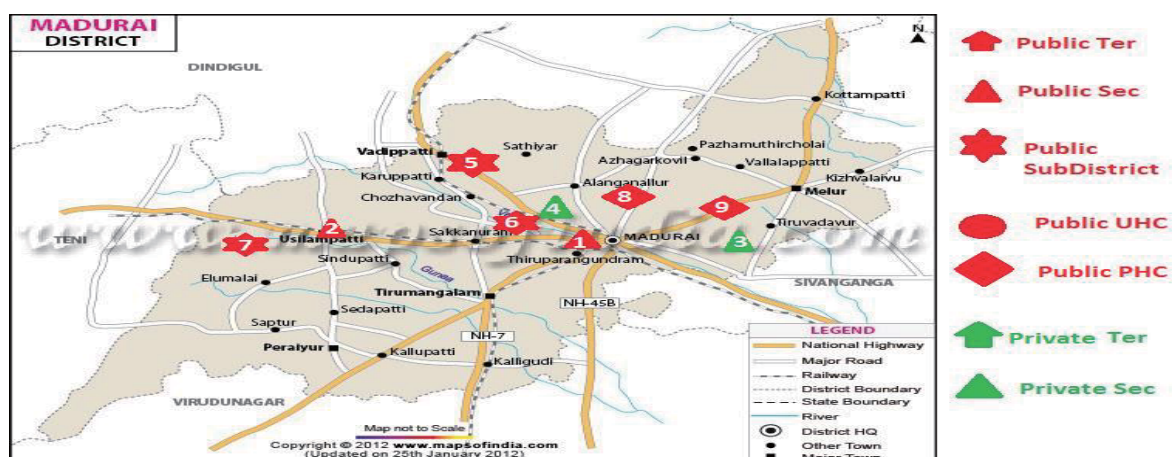
3	Vadamalayan Hospital	Urban	Private-Sec	Pvt	2 Km	Chokkikulam	500,000
4	Saravana multispeciality hospital pvt. Ltd	Urban	Private-Sec	Pvt	2 Km	Maruthupandiar Nagar, Narimedu	500,000
5	Sub District Hospital (Taluk)	Semi Urban	Public-Sub-Dist	TK	30 Km	T. Vadipatti	40,000
6	CHC	Rural	Public-Sub-Dist	TK	13 Km	Samayanallur	63,193
7	CHC	Rural	Public-Sub-Dist	TK	7 Km	Doddapanaickanur	19,524
8	PHC	Rural	Public-PHC	TK	20 Km	Kulamangalam	14,000
9	PHC	Rural	Public-PHC	TK	20 Km	Ayilangudi	20,935

TK= Taluka level; NTK= Non-Taluka level; HQS= District Headquarter level health facility.  
UHC= Urban health centre , UPHC= Urban Primary Health Centre, CHC=Community Health Centre

*Note: NCD screening is being done in all facilities*

Figure 1. Maps showing location of surveyed facilities in (A) Chennai; (B) Cuddalore; and (C) Madurai.





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Table 3. Descriptive analyses of health facility survey at Secondary Level Hospitals in three districts of Tamil Nadu (n=17)

S.No	Variables	Chennai (n=2)	Cuddalore (n=9)	Madurai (n=2)
1.	Are patients screened for:			
	• BP Measurement	✓	✓	✓
	• Blood Glucose strips(calorimetric method is universally available)	±	±	±
	• ECG	✓	✓	✓
	• Colposcopy	✓	✓	✓
	• PAP Smear	±	x	±
2.	Counselling for NCD	✓	✓	±
3.	Diagnostic services			
	• ECG Facility	✓	✓	✓
	• Hb	✓	✓	✓
	• DLC, TLC, Platelets	±	✓	✓
	• Bleeding, Clotting Time(BT/CT)	✓	✓	✓
	• Fasting /PP Blood Sugar	✓	✓	✓
	• Thyroid Profile/ Vitamin D/ C-Peptide/ HbA1c/ C-Reactive Protein/ Cardiac Enzymes	±	x	±
	• Lipid Profile	✓	x	✓
	• Blood Urea/ Liver Function Test/ Kidney Function Test	✓	x	✓
	• Urine Routine/ Urine Sugar	✓	±	✓
	• X-Ray	✓	±	✓
	• Cardiac Ultra Sound	±	±	✓
4.	No. of OPD cases screened/month (average)			
	• Cancer	70	44	174
	• Diabetes	667	2781	1160

	• CVDs	697	167	1179
	• Stroke	20	15	279
5.	No. of patients admitted/months (average)			
	• Cancer	57	1	38
	• DM	38	25	42
	• CVDs	39	29	23
	• Stroke	29	17	55
6.	No. of surgeries conducted/month (average)			
	• Cancer	14	0	15
	• Diabetes	12	1	13
	• CVDs	19	0	5
	• Stroke	1	0	1
7.	ICU/ICCU Facility for critical patients	±	✓	✓
8.	Lab examinations/month (average)			
	• No of biochemistry tests /month	3750	4640	5833
	• No of haematology tests/month	7957	6350	4750
	• No of endocrinology tests/month	44	0	917
	• No of microbiology tests/month	1188	548	875
	• No of pathology tests/month	210	947	220
9.	Manpower			
	• Diabetology	±	×	×
	• Cardiology	±	±	±
	• Medical oncology	±	×	±
	• MD Physician	±	±	✓
	• General duty Officer (Medical Officer)	✓	✓	✓
	• NCD Staff Nurse	±	✓	✓
	• Nurse/Midwife	✓	✓	±
	• Community Health Workers/ Counsellors/ Health Edu- cators	±	×	±
	• Cyto Pathologist/Cyto-Pathology Technician	±	×	±
	• Physiotherapist	±	✓	✓
	• Pharmacist	✓	✓	✓
	• Lab technician	✓	✓	✓
	• Statistics Assistant / Data Entry Operator	±	±	±
10.	Structured NCD training at regular intervals to enhance capacity	×	×	×
11.	Equipment			
	• Blood pressure measuring devices	✓	✓	✓
	• Oxygen cylinders	✓	✓	✓
	• Weighing machines	✓	✓	✓
	• ECG machines	✓	✓	✓
	• Cardiac monitor with defibrillator	±	±	✓

	• Measuring tape	✓	✓	✓
	• Ventilators	±	±	✓
	• Nebulizers	✓	✓	✓
	• Peak flow meters	±	±	✓
	• Stethoscope	✓	✓	✓
	• Thermometers	✓	✓	✓
	• Health education materials	✓	✓	✓
	• Pulse oximeters	✓	✓	✓
	• Spacers	±	±	✓
	• Glucometers	✓	✓	✓
	• Magna visualizer	±	✓	✓
	• Indirect laryngoscope	✓	±	✓
	• Punch biopsy forceps	✓	✓	✓
	• Consumable for screening of cervical cancer	±	✓	✓
	• Disposable tongue depressor	✓	±	✓
	• Pap smear kit	±	✗	✓
	• Infusion pump	✓	✓	✓
	• Ophthalmoscope	±	±	✓
	• Slit lamp	±	±	✓
12.	General Drugs			
	For HT and CVD-Tab Aspirin, Atenolol,Amlodipine, Enalaprin, methyl dopa, clopidogrel, atorvastatin, heparin. • Sorbitrate, diazepam, adrenalin, atropine, inj mephentine, inj normal saline/ringer lactate/mannitol, inj aminophylline, prednisolone, inj dexamethasone	±	✓	✓
	• For HT and CVD-Tab.Metoprolol, inj streptokinase, glyceryl trinitrate,	±	±	±
	• For Diabetes-Inj.Insulin Regular, metformin, benzathine penicillin,	✓	✓	✓
13	Indicative Drugs for treatment of Cancer:Inj Doxorubicin,Inj Cisplatin,Inj Carboplatin,Inj Paclitaxel,Inj Docetaxel, Inj Gemcitabine,Inj Oxaliplatin,Inj Herceptin,Inj Mabthera,Inj Velcade,Inj Avastin,Inj 5-FU, Inj Vincristine, Inj & tab Endoxan, Tab Tamoxifen, Cap Temozolimide, Cap Procarbazine, Cap CCNU, Inj Epirubicin, Methotrexate,Inj Vinblastine.	✗ (some facilities had methotrexate)	✗	±
14.	Infrastructure	fair state	fair state	fair state
	• Whether separate toilets are available?			
	• Male/Female	✓	✓	✓
	• Handicapped	±	✓	✗
	• Patients' bathroom facility (shower and sitting both)	✓	✓	±
	• Patient Transport Facilities Available	✓	✓	✓

	Are the power backup services available to support patients for at least 1 hour. in the event of a major failure of external power	✓	✓	✓
15.	Financial: Average annual budget of health facility	1.5 Cr	82 L	1.5 Cr
	Average annual budget for NCD	60L	48 L	30 L
	Average annual budget for NCD drugs	Not separate	Not separate	9 L
<p>TN pays annual subscription of Rs. 920 cr (\$150m) for CMHIS to provide health insurance to 30% population under the poverty line. ✓<i>Available</i>; ✗ <i>Not available</i>; ± <i>Available in few facilities</i></p> <p>BP, Blood Pressure, DLC, Differential leucocyte count; TLC, Total leucocyte count; HbA1c, glycated haemoglobin; BT/CT, Bleeding, Clotting Time; Pp, Post-prandial blood sugar; Hb, Hemoglobin</p>				

Table 4. Descriptive analyses of health facility survey at Sub-district Level Hospitals in three districts of Tamil Nadu (N=6)

S No	Variables	Chennai (n=1)	Cuddalore (n=2)	Madurai (n=3)
1.	Are the patients screened for:			
•	B.P Measurement	✓	✓	✓
•	Blood Glucose strips (calorimetric method was universally available)	✓	✗	✗
•	ECG	✓	✓	✓
•	Colposcopy	✗	✗	✓
•	PAP Smear	✗	✗	✗
2.	Counselling for NCD	✓	✓	✓
3.	Diagnostic services			
•	ECG Facility	✓	✓	✓
•	Hb	✓	✓	✓
•	DLC, TLC, Platelets	✗	✗	✓
•	Bleeding, Clotting Time	✓	✓	✓
•	Fasting /PP Blood Sugar	✓	✓	✓
•	Thyroid Profile/ Vitamin D/ C-Peptide/ Glycated Haemoglobin (HbA1c)/ C-Reactive Protein/ Cardiac Enzymes Testing	✗	✗	✗
•	Lipid Profile	✗	✗	✓
•	Blood Urea/ Liver Function Test/ Kidney Function Test	✓	✗	±
•	Urine Routine/ Urine Sugar	✓	✓	✓
•	X-Ray	✗	✓	±
•	Cardiac Ultra Sound	✗	✗	✗
4.	No. of OPD cases screened/ per month (average)			
•	Cancer	✗	175	245
•	Diabetes	✗	500	452
•	CVDs	✗	200	773
•	Stroke	✗	✗	6
5	No. of patients admitted/month (average)			
•	Cancer	✗	✗	✗
•	DM	✗	✗	4
•	CVDs	✗	✗	6
•	Stroke	✗	✗	✗
6.	No. of surgeries conducted/ month (average)			
•	Cancer	✗	✗	✗
•	Diabetes	✗	✗	✗
•	CVDs	✗	✗	✗
•	Stroke	✗	✗	✗

<b>7</b>	ICU/ICCU Facility for critical patients	x	x	x
<b>8.</b>	Break-up of lab examinations/month (average)	1,494	2,013	3,211
•	No of biochemistry tests per month	650	697	938
•	No of haematology tests per month	844	975	2122
•	No of endocrinology tests per month	x	x	x
•	No of microbiology tests per month	x	341(AFB microscopy)	151 (AFB microscopy)
•	No of pathology tests per month	x	x	x
<b>9</b>	Manpower			
•	Diabetology	x	x	x
•	Cardiology	x	x	x
•	Medical Oncology	x	x	x
•	MD Physician	x	x	x
•	General duty officer (Medical Officer)	✓	✓	✓
•	NCD staff nurse	✓	✓	±
•	Nurse/Midwife	✓	✓	✓
•	Community Health Workers/ Counsellors/ Health Educators	✓	✓	±
•	Cyto Pathologist/Cyto-Pathology Technician	x	x	x
•	Physiotherapist	x	x	x
•	Pharmacist	✓	✓	✓
•	Lab technician	✓	✓	✓
•	Statistics assistant / Data Entry Operator	✓	±	±
<b>10.</b>	Structured NCD training at regular intervals to enhance capacity	x	x	x
<b>11</b>	Equipment			
•	Blood pressure measuring devices	✓	✓	✓
•	Oxygen cylinders	✓	✓	✓
•	Weighing machines	✓	✓	✓
•	Ecg machines	✓	✓	✓
•	Cardiac monitor with defibrillator	✓	x	x
•	Measuring tape	✓	✓	✓
•	Ventilators	x	x	x
•	Nebulizers	✓	✓	±
•	Peak flow meters	✓	±	x
•	Stethoscope	✓	✓	✓
•	Thermometers	✓	✓	✓
•	Health education materials	✓	✓	✓
•	Pulse oximeters	✓	✓	✓
•	Spacers	x	x	x
•	Glucometers	✓	✓	x
•	Magna visualizer	x	✓	x



•	Indirect laryngoscope	✓	±	±
•	Punch biopsy forceps	✓	✗	±
•	Consumable for screening of cervical cancer	✗	✓	✓
•	Disposable tongue depressor	✓	✓	±
•	Pap smear kit	✗	✗	±
•	Infusion pump	✗	✗	±
•	Ophthalmoscope	✗	✗	✗
•	Slit lamp	✗	✗	✗
<b>12</b>	General Drugs			
•	For HT and CVD-Tab Aspirin, Atenolol, Amlodipine, Enalapril, methyldopa, clopidogrel, atorvastatin, heparin. Sorbitrate, diazepam, adrenalin, atropine, mephentinx, normal saline/ringer lactate/mannitol, prednisone aminophylline, , dexamethasone	±	±	✓
•	For HT and CVD- Metoprolol, inj streptokinase, glyceryl trinitrate,	✗	✗	✗
•	For Diabetes-Inj. Insulin Regular, metformin, benzathine penicillin,	Metformin	Metformin	Metformin
<b>13</b>	Indicative Drugs for treatment of Cancer: Doxorubicin, Cisplatin, Carboplatin, Paclitaxel, Docetaxel, Gemcitabine, Oxaliplatin, 5-FU Herceptin, Mabthera, Velcade, Avastin, , Vincristine, Endoxan, Tamoxifen, Temozolimide, Procarbazine, CCNU, Epirubicin, Methotrexate, Vinblastine.	✗ (only methotrexate available at some facilities)	✗	✗
<b>14</b>	Infrastructure	fair state	fair state	fair state
•	Whether separate toilets are available?			
•	Male/Female	✓	✓	✓
•	Handicapped	✗	✗	✗
•	Patients' bathroom facility (shower and sitting bath)	✗	✓	±
•	Patient transport facilities available	✗	✓	±
•	Are the power backup services available to support patients for at least 1 hour. in the event of a major failure of external power	✓	✓	±
<b>15</b>	Financial: Average annual budget of health facility	80 L	60 L	60 L
	Average annual budget for NCD	20L	7 L	20 L
	Average annual budget for NCD drugs	Not separate	Not separate	Not separate

TN pays annual subscription of Rs. 920 cr (\$150m) for CMHIS to provide health insurance to 30% pop under poverty line.

✓ **Available;** ✗ **Not available;** ± **Available in few facilities**

BP, Blood Pressure, DLC, Differential leucocyte count; TLC, Total leucocyte count; HbA1c, glycated haemoglobin; BT/CT, Bleeding, Clotting Time; Pp, Post-prandial blood sugar; Hb, Hemoglobin

Table 5. Descriptive analyses of health facility survey at Primary Health Centres in three districts of Tamil Nadu/UHC (N=14)

S No	Variables	Chennai (n=7)	Cuddalore (n=5)	Madurai (n=2)
1.	Are the patients screened for:			
•	BP Measurement	✓	✓	✓
•	Blood Glucose strips (Calorimetric method is universally available)	✓	±	✗
•	ECG	±	✓	±
•	Colposcopy	✗	±	✗
•	PAP Smear	✗	±	✗
2.	Counselling for NCD	✓	±	✓
3.	Diagnostic services			
•	ECG Facility	±	✓	±
•	Hb	✓	✓	✓
•	DLC, TLC, Platelets	±	✗	✗
•	Bleeding, Clotting Time	✗	✓	±
•	<b>Fasting /PP Blood Sugar</b>	✓	✓	✓
•	Thyroid Profile/ Vitamin D/ C-Peptide/ Glycated Haemoglobin (HbA1c)/ C-Reactive Protein/ Cardiac Enzymes Testing	✗	✗	✗
•	Lipid Profile	✗	✗	±
•	Blood Urea/ Liver Function Test/ Kidney Function Test	±	✗	✗
•	Urine Routine/ Urine Sugar	✓	✓	✓
•	X-Ray	✗	±	✗
•	Cardiac Ultra Sound	✗	✗	✗
4	No. of OPD cases screened per month (average)			
•	Cancer	38	80	139
•	Diabetes	281	337	227
•	CVDs	419	417	186
•	Stroke	114	1	1
5	No. of patients admitted/month ( average)			
•	Cancer	✗	✗	✗

•	DM	x	x	x
•	CVDs	x	x	x
•	Stroke	x	x	x
<b>6.</b>	No. of surgeries conducted/ month			
•	Cancer	x	x	x
•	Diabetes	x	x	x
•	CVDs	x	x	x
•	Stroke	x	x	x
•	ICU/ICCU Facility for critical patients	x	x	x
<b>7</b>	Lab examinations/month (average)	566	1,500	530
•	No of biochemistry tests/month	472	990	354
•	No of haematology tests/month	94	288	149
•	No of endocrinology tests/month	x	x	x
•	No of microbiology tests/month		222 ((AFB microscopy)	27 ((AFB microscopy)
•	No of pathology tests/month	x	x	x
<b>8</b>	Manpower			
•	Diabetology	±	x	x
•	Cardiology	x	x	x
•	Medical oncology	x	x	x
•	MD Physician	x	x	x
•	General duty officer (Medical Officer)	✓	✓	✓
•	NCD staff nurse	±	±	±
•	Nurse/Midwife	±	✓	✓
•	Community Health Workers/ Counsellors/ Health Educators	±	±	±
•	Cyto Pathologist/Cyto-Pathology technician	x	x	x
•	Physiotherapist	x	x	x
•	Pharmacist	✓	✓	✓
•	Lab technician	✓	±	±
•	Statistics assistant / Data Entry Operator	x	±	x
<b>9.</b>	Structured training for NCD at regular intervals to enhance capacity	x	x	x
<b>10</b>	Equipment			
•	Blood Pressure Measuring Devices	✓	✓	✓
•	Oxygen cylinders	✓	✓	✓
•	Weighing machines	±	✓	✓
•	ECG machines	±	✓	✓
•	Cardiac monitor with defibrillator	x	x	x
•	Measuring tape	✓	✓	✓
•	Ventilators	±	x	x
•	Nebulizers	✓	±	✓

•	Peak Flow Meters	✗	±	✗
•	Stethoscope	✓	✓	✓
•	Thermometers	✓	✓	✓
•	Health Education Materials	✓	✓	✓
•	Pulse Oximeters	✗	✓	✓
•	Spacers	✗	✗	✗
•	Glucometers	✓	✓	✓
•	Magna Visualizer	✓	✓	✓
•	Indirect Laryngoscope	✗	±	✗
•	Punch Biopsy Forceps	✗	✗	✗
•	Consumable For Screening Of Cervical Cancer	✓	✓	±
•	Disposable Tongue Depressor	✓	✓	✓
•	Pap Smear Kit	✗	✗	✗
•	Infusion Pump	✗	✗	✗
•	Ophthalmoscope	✗	±	✗
•	Slit Lamp	✗	±	✗
<b>11</b>	General drugs			
	For HT and CVD-Tab Aspirin, Atenolol,Amlodipine, Enalaprin, methyl dopa, clopidogrel, atorvastatin, heparin. Sorbitrate, diazepam, adrenalin, atropine, inj mephentine, inj normal saline/ringer lactate/mannitol, inj aminophylline, prednisolone, inj dexamethasone	±	±	✓
	For HT and CVD-Tab.Metoprolol, inj streptokinase, glyceryl trinitrate,	✗	✗	
	For Diabetes-Inj.Insulin Regular, metformin, benzathine penicillin,	±	±	✓
<b>12.</b>	<b>Indicative Drugs for treatment of Cancer:</b> Inj Doxorubicin,Inj Cisplatin,Inj Carboplatin,Inj Paclitaxel,Inj Docetaxel, Inj Gemcitabine,Inj Oxaliplatin,Inj Herceptin,Inj Mabthera,Inj Velcade,Inj Avastin,Inj 5-FU, Inj Vincristine, Inj & tab Endoxan, Tab Tamoxifen, Cap Temozolimide, Cap Procarbazine, Cap CCNU, Inj Epirubicin, Methotraxate,Inj Vinblastine.	✗	✗	✗
<b>13</b>	Infrastructure	fair state	fair state	fair state
•	Whether separate toilets are available?			
•	Male/Female	✓	✓	✓
•	Handicapped	✗	±	✗
•	Patients' bathroom facility (shower and sitting both)	✗	±	✗
•	Patient Transport Facilities Available	✗	±	✗
•	Are the power backup services available to support patients for at least 1 hour. in the event	✗	✓	±

	of a major failure of external power			
<b>14</b>	Financial: Average annual budget of health facility	5 L	3 L	5 L
	Average annual budget for NCD	2 L	1 L	1 L
	Average annual budget for NCD drugs	Not separate	Not separate	Not separate
<p>TN pays annual subscription of Rs. 920 cr (\$150m) for CMHIS to provide health insurance to 30% pop under poverty line.</p> <p><b>✓Available; ✗ Not available; ± Available in few facilities</b></p> <p>BP, Blood Pressure, DLC, Differential leucocyte count; TLC, Total leucocyte count; HbA1c, glycated haemoglobin; BT/CT, Bleeding, Clotting Time; Pp, Post-prandial blood sugar; Hb, Hemoglobin</p>				

## 2. HMIS DATA ANALYSED FOR NCD.

Data of NCD screening was retrieved from the HMIS data base system at the NHM, Chennai. The NCD data of 32 districts for a period of three years (2014-2016) was collated for hypertension (HT), diabetes mellitus (DM), cardio-vascular diseases (CVDs), cancer-cervix and breast cancer. Based on the growth rate, population size for each district was calculated for the year 2014, 2015 and 2016 respectively [Table 6].

Table 6: District wise population size of 32 districts in Tamilnadu

Over all population			
Dist	Year		
District	2014	2015	2016
ARIYALUR	770,969	777,132	783,291
CHENNAI	4,790,203	4,826,575	4,862,944
COIMBATORE	3,664,889	3,728,993	3,793,099
CUDDLORE	2,708,557	2,744,449	2,780,344
DHARMAPURI	1,575,219	1,599,326	1,623,433
BINDUGAL	2,241,705	2,288,485	2,295,261
ERODE	2,341,293	2,368,521	2,395,714
KANCHEEPURAM	4,454,121	4,608,528	4,762,931
KANYAKUMARI	1,925,609	1,946,420	1,967,233
KARUR	1,125,228	1,141,442	1,157,655
KRISHNAGIRI	2,000,541	2,039,477	2,078,411
MADURAI	3,204,798	3,259,385	3,313,971
NAGAPATTINAM	1,654,792	1,668,366	1,681,941
NAMAKKAL	1,799,923	1,826,171	1,852,411
PERAMBALUR	589,830	598,937	605,044
PUDUKOTTAI	1,671,657	1,689,301	1,706,944
RAMANATHAPURAM	1,388,240	1,405,134	1,422,027
SALEM	3,640,471	3,693,959	3,747,444
SVAGANGA	1,405,992	1,427,573	1,449,155
THANJAVUR	2,463,475	2,483,706	2,503,933
THE NILGIRIS	727,242	724,633	722,027
THENI	1,294,763	1,311,788	1,328,811
THOOTHUKUDI	1,765,043	1,801,931	1,817,821
TIRUCHIRAPPALLI	2,813,348	2,846,512	2,879,677
TIRUNELVELI	3,198,807	3,240,782	3,282,751
TIRUPUR	2,691,334	2,764,705	2,838,077
TIRUVALLUR	4,119,690	4,251,020	4,382,351
TIRUVANNAMALAI	2,564,810	2,596,758	2,628,701
TIRUVARUR	1,300,164	1,310,854	1,321,544
VELLORE	4,089,831	4,131,739	4,182,644
VILLUPURAM	3,839,807	3,698,649	3,757,481
VIRUDHUNAGAR	2,007,205	2,028,503	2,049,801
Grand Total	75,640,556	76,807,755	77,974,955

NCD clinics primarily focus on 30-60 years of age. But in the field, population above > 60 years of age, also avail the NCD services. Here the percentage of risk population was calculated taking into account persons who were  $\geq 30$  years of old. According to Census 2011, 49% of the population is  $\geq 30$  years of age. Moreover, due to urbanization, northern districts like Chennai, Kancheepuram, Vellore, Tiruvallur have observed higher proportion of persons with  $\geq 30$  years of age. Also, it is noteworthy that the Nilagiri district showed a negative trend in growth rate pattern of its population. Age specific-genderwise distribution of the population in 32 districts for a period of three years was studied [Figure 2-4].





Overview of NCD occurrence in TN (2014-2016)

On an average, 10.6% male and 14.6% female were screened annually for Hypertension during 2014-2016. For Diabetes, 5.3% male and 7.2% female were screened annually. For cervical and breast cancers, 9.8 and 10.0 females were screened annually, respectively. Please note that overall average data of three years doesn't include Chennai data. *The number of OPD patients screened for HT, DM, Cervical Cancer and Breast Cancer from 2014 to 2016 is presented in (Tables 7-9).*

**Table 7: Number (%)\* of people screened for NCD in 2014.**

District	Hypertension screened n(%)		Diabetes screened n(%)		Cervical cancer Screened n(%)	Breast cancer Screened n(%)	Number of person attended NCD clinics n (%)
	Male	Female	Male	Female			
ARIYALUR	29482 (15.7)	35598 (18.7)	13585 (7.2)	16052 (8.4)	26969 (14.2)	26937 (14.2)	65080 (17.2)
CHENNAI	147955 (6.3)		104428 (4.4)		33390 (2.9)	71339 (6.1)	147955 (6.3)
COIMBATORE	34691 (3.9)	38720 (4.3)	15195 (1.7)	17275 (1.9)	28954 (3.2)	31525 (3.5)	73411 (4.1)
CUDDALORE	114405 (17.1)	147362 (22.4)	47764 (7.1)	59217 (9.0)	114329 (17.4)	115210 (17.5)	261767 (19.7)
DHARMAPURI	10480 (2.6)	15962 (4.3)	4347 (1.1)	6710 (1.8)	12070 (3.2)	11891 (3.2)	26442 (3.4)
DINDUGAL	114039 (20.7)	149877 (27.3)	34292 (6.2)	44898 (8.2)	95283 (17.4)	96630 (17.6)	263916 (24.0)
ERODE	25431 (4.4)	30573 (5.4)	11284 (2.0)	14330 (2.5)	17513 (3.1)	20577 (3.6)	56004 (4.9)
KANCHEEPURAM	23546 (2.1)	28899 (2.7)	7306 (0.7)	8950 (0.8)	21302 (2.0)	25737 (2.4)	52445 (2.4)
KANYAKUMARI	63809 (13.6)	101102 (21.3)	18328 (3.9)	27330 (5.8)	68543 (14.5)	68285 (14.4)	164911 (17.5)
KARUR	60621 (22.2)	76571 (27.6)	24581 (9.0)	30995 (11.2)	55040 (19.8)	61944 (22.3)	137192 (24.9)
KRISHNAGIRI	12467 (2.5)	17009 (3.6)	5497 (1.1)	7427 (1.6)	12098 (2.5)	14570 (3.0)	29476 (3.0)
MADURAI	61059 (7.7)	95765 (12.3)	24566 (3.1)	37368 (4.8)	73257 (9.4)	76477 (9.8)	156824 (10.0)
NAGAPATTINAM	31288 (7.8)	41330 (10.1)	13034 (3.3)	17785 (4.3)	21852 (5.3)	20162 (4.9)	72618 (9.0)
NAMAKKAL	66927 (15.1)	78164 (17.9)	27255 (6.1)	31256 (7.1)	53726 (12.3)	66836 (15.3)	145091 (16.5)
PERAMBALUR	20140 (14.0)	23626 (16.3)	6084 (4.2)	6954 (4.8)	16335 (11.3)	16351 (11.3)	43766 (15.2)
PUDUKOTTAI	123420 (30.4)	200301 (48.5)	46538 (11.4)	73982 (17.9)	130867 (31.7)	116607 (28.3)	323721 (39.5)
RAMANATHAPURAM	92675 (26.9)	126950 (37.8)	45266 (13.2)	60423 (18.0)	101141 (30.1)	101746 (30.3)	219625 (32.3)
SALEM	64005 (7.0)	82674 (9.5)	26067 (2.9)	33394 (3.8)	67224 (7.7)	68656 (7.9)	146679 (8.2)

SIVAGANGA	44619 (13.0)	69539 (20.2)	15981 (4.6)	27178 (7.9)	48527 (14.1)	50809 (14.7)	114158 (16.6)
THANJAVUR	43226 (7.3)	56678 (9.3)	12863 (2.2)	17086 (2.8)	31239 (5.1)	30927 (5.0)	99904 (8.3)
THE NILGIRIS	15159 (8.7)	19609 (10.8)	6006 (3.4)	7556 (4.2)	13731 (7.6)	13945 (7.7)	34768 (9.8)
THENI	56428 (17.7)	99665 (31.6)	21014 (6.6)	34998 (11.1)	58254 (18.5)	54106 (17.1)	156093 (24.6)
THOOTHUKUDI	68911 (15.9)	95391 (21.5)	23979 (5.5)	33666 (7.6)	74402 (16.8)	77923 (17.6)	164302 (18.8)
TIRUCHIRAPALLI	160099 (23.4)	220677 (31.8)	60160 (8.8)	78846 (11.4)	151681 (21.9)	175235 (25.3)	380776 (27.6)
TIRUNELVELI	43744 (5.6)	65543 (8.3)	11052 (1.4)	16217 (2.0)	41438 (5.2)	44384 (5.6)	109287 (7.0)
TIRUPUR	66649 (10.0)	77516 (11.8)	34817 (5.2)	40607 (6.2)	61040 (9.3)	63652 (9.7)	144165 (10.9)
TIRUVALLUR	95317 (9.4)	157426 (15.7)	45700 (4.5)	74653 (7.5)	85423 (8.5)	86347 (8.6)	252743 (12.5)
TIRUVANNAMALAI	33060 (5.2)	45981 (7.3)	17510 (2.8)	24754 (4.0)	39699 (6.3)	40189 (6.4)	79041 (6.3)
TIRUVARUR	31544 (10.0)	46886 (14.6)	11626 (3.7)	15540 (4.8)	34558 (10.7)	33989 (10.6)	78430 (12.3)
VELLORE	27808 (2.8)	41764 (4.2)	10112 (1.0)	14645 (1.5)	23227 (2.3)	27446 (2.7)	69572 (3.5)
VILLUPURAM	35189 (3.9)	51768 (5.8)	10548 (1.2)	15263 (1.7)	24197 (2.7)	26576 (3.0)	86957 (4.9)
VIRUDHUNAGAR	16674 (3.4)	22914 (4.6)	4333 (0.9)	5778 (1.2)	13998 (2.8)	14976 (3.0)	39588 (4.0)

\*denominator is risk population aged  $\geq 30$  years estimated at 49% of total population or male/female counts.

**Table 8: Number (%)\* of people screened for NCD in 2015.**

District	Hypertension screened n(%)		Diabetes screened n(%)		Cervical cancer Screened n(%)	Breast cancer Screened n(%)	Number of person attended NCD clinics n (%)
	Male	Female	Male	Female			
ARIYALUR	39567 (20.9)	45212 (23.6)	21548 (11.4)	24137 (12.6)	33702 (17.6)	34440 (17.9)	84779 (22.3)
CHENNAI	116939 (4.9)		85885 (3.6)		26023 (2.2)	53476 (4.6)	116939 (4.9)
COIMBATORE	51390 (5.6)	60231 (6.6)	21837 (2.4)	24995 (2.7)	49172 (5.4)	51409 (5.6)	111621 (6.1)
CUDDALORE	107989 (15.9)	135607 (20.3)	59087 (8.7)	72929 (10.9)	105687 (15.8)	104304 (15.6)	243596 (18.1)
DHARMAPURI	24721 (6.1)	36438 (9.6)	15063 (3.7)	21212 (5.6)	28127 (7.4)	26588 (7.0)	61159 (7.8)
DINDUGAL	95566 (17.2)	120208 (21.7)	46609 (8.4)	58378 (10.5)	75705 (13.6)	75233 (13.6)	215774 (19.4)
ERODE	31793 (5.5)	40210 (7.0)	14426 (2.5)	18250 (3.2)	21721 (3.8)	24282 (4.2)	72003 (6.2)

KANCHEEPURAM	28891 (2.5)	38009 (3.4)	9767 (0.9)	13879 (1.2)	27911 (2.5)	30704 (2.7)	66900 (3.0)
KANYAKUMARI	48528 (10.2)	67510 (14.1)	25604 (5.4)	35515 (7.4)	41793 (8.7)	41170 (8.6)	116038 (12.2)
KARUR	32557 (11.7)	41203 (14.6)	16460 (5.9)	21063 (7.5)	27458 (9.7)	30883 (11.0)	73760 (13.2)
KRISHNAGIRI	10754 (2.1)	14396 (2.9)	7009 (1.4)	9182 (1.9)	9132 (1.9)	9319 (1.9)	25150 (2.5)
MADURAI	106988 (13.3)	174532 (22.0)	81833 (10.2)	132498 (16.7)	122609 (15.4)	126620 (15.9)	281520 (17.6)
NAGAPATTINAM	47125 (11.7)	63849 (15.4)	28430 (7.0)	37705 (9.1)	31522 (7.6)	29445 (7.1)	110974 (13.6)
NAMAKKAL	50688 (11.2)	58236 (13.1)	33935 (7.5)	37544 (8.5)	42773 (9.6)	45753 (10.3)	108924 (12.2)
PERAMBALUR	24338 (16.7)	27459 (18.7)	7661 (5.3)	8660 (5.9)	16604 (11.3)	17072 (11.6)	51797 (17.7)
PUDUKOTTAI	29635 (7.2)	49047 (11.8)	15299 (3.7)	26016 (6.2)	29449 (7.1)	27806 (6.7)	78682 (9.5)
RAMANATHAPURAM	86238 (24.8)	115525 (34.0)	59819 (17.2)	80944 (23.8)	91884 (27.0)	91898 (27.0)	201763 (29.3)
SALEM	91728 (9.9)	114586 (13.0)	35661 (3.9)	43590 (4.9)	86850 (9.8)	90341 (10.2)	206314 (11.4)
SIVAGANGA	238778 (68.3)	373601 (106.8)	154302 (44.1)	226127 (64.7)	255011 (72.9)	265991 (76.0)	612379 (87.5)
THANJAVUR	97607 (16.3)	130423 (21.1)	53760 (9.0)	71398 (11.6)	71094 (11.5)	66295 (10.7)	228030 (18.7)
THE NILGIRIS	13789 (7.9)	17031 (9.4)	5689 (3.3)	6871 (3.8)	12078 (6.7)	12026 (6.6)	30820 (8.7)
THENI	54398 (16.8)	91216 (28.5)	25671 (7.9)	40847 (12.8)	50219 (15.7)	46606 (14.6)	145614 (22.7)
THOOTHUKUDI	59550 (13.7)	81166 (18.2)	34028 (7.8)	47393 (10.6)	58201 (13.0)	59810 (13.4)	140716 (15.9)
TIRUCHIRAPALLI	57927 (8.4)	77325 (11.0)	27888 (4.0)	35744 (5.1)	54680 (7.8)	57115 (8.1)	135252 (9.7)
TIRUNELVELI	45152 (5.8)	63225 (7.9)	15900 (2.0)	21258 (2.6)	31960 (4.0)	33799 (4.2)	108377 (6.8)
TIRUPUR	50841 (7.5)	58422 (8.7)	31790 (4.7)	36866 (5.5)	45853 (6.8)	47054 (7.0)	109263 (8.1)
TIRUVALLUR	86636 (8.2)	131579 (12.7)	69526 (6.6)	105691 (10.2)	79607 (7.7)	81397 (7.9)	218215 (10.5)
TIRUVANNAMALAI	25658 (4.0)	34821 (5.5)	16492 (2.6)	21995 (3.5)	29634 (4.7)	29845 (4.7)	60479 (4.8)
TIRUVARUR	31471 (9.9)	44412 (13.7)	18736 (5.9)	24765 (7.6)	27020 (8.3)	26937 (8.3)	75883 (11.8)
VELLORE	45337 (4.5)	64348 (6.3)	22866 (2.3)	31688 (3.1)	40275 (4.0)	44576 (4.4)	109685 (5.4)
VILLUPURAM	35563 (3.9)	48047 (5.3)	17272 (1.9)	21160 (2.4)	21327 (2.4)	21897 (2.4)	83610 (4.6)
VIRUDHUNAGAR	76887 (15.5)	111974 (22.4)	42811 (8.7)	60211 (12.1)	65435 (13.1)	69667 (14.0)	188861 (19.0)

\*denominator is risk population aged  $\geq 30$  years estimated at 49% of total population or male/female counts.

**Table 9: Number (%)\* of people screened for NCD in 2016.**

District	Hypertension screened n(%)		Diabetes screened n(%)		Cervical cancer Screened n (%)	Breast cancer Screened n(%)	Number of person attended NCD clinics n (%)
	Male	Female	Male	female			
ARIYALUR	29127 (15.3)	35616 (18.4)	10213 (5.4)	12763 (6.6)	25776 (13.3)	23596 (12.2)	64743 (16.9)
CHENNAI	100637 (4.2)		89228 (3.7)		23482 (2.0)	37686 (3.2)	100637 (4.2)
COIMBATORE	24558 (2.6)	31196 (3.4)	8379 (0.9)	10523 (1.1)	21676 (2.3)	23201 (2.5)	55754 (3.0)
CUDDALORE	99897 (14.5)	115777 (17.1)	60048 (8.7)	68834 (10.2)	86785 (12.8)	88877 (13.2)	215674 (15.8)
DHARMAPURI	29304 (7.2)	42171 (10.9)	21196 (5.2)	29741 (7.7)	33913 (8.8)	31510 (8.2)	71475 (9.0)
DINDUGAL	85746 (15.2)	107077 (19.1)	49480 (8.8)	62076 (11.1)	63557 (11.3)	62321 (11.1)	192823 (17.1)
ERODE	23391 (4.0)	25888 (4.4)	10831 (1.8)	11650 (2.0)	15148 (2.6)	16308 (2.8)	49279 (4.2)
KANCHEEPURAM	21116 (1.8)	25613 (2.2)	4519 (0.4)	5330 (0.5)	21819 (1.9)	22106 (1.9)	46729 (2.0)
KANYAKUMARI	44196 (9.2)	66607 (13.7)	24609 (5.1)	38141 (7.9)	45304 (9.4)	43367 (9.0)	110803 (11.5)
KARUR	25966 (9.2)	30851 (10.8)	15246 (5.4)	17107 (6.0)	17506 (6.1)	20230 (7.1)	56817 (10.0)
KRISHNAGIRI	9890 (1.9)	14464 (2.9)	4361 (0.8)	6245 (1.3)	9265 (1.9)	9264 (1.9)	24354 (2.4)
MADURAI	77269 (9.5)	115817 (14.3)	67102 (8.2)	101344 (12.5)	91287 (11.3)	91737 (11.4)	193086 (11.9)
NAGAPATTINAM	17712 (4.4)	24955 (6.0)	9430 (2.3)	13403 (3.2)	7675 (1.8)	7465 (1.8)	42667 (5.2)
NAMAKKAL	44282 (9.7)	48695 (10.8)	31139 (6.8)	33981 (7.5)	41338 (9.2)	43119 (9.6)	92977 (10.2)
PERAMBALUR	14231 (9.6)	18977 (12.8)	3580 (2.4)	4676 (3.1)	10854 (7.3)	10437 (7.0)	33208 (11.2)
PUDUKOTTAI	16856 (4.1)	25425 (6.0)	7626 (1.8)	10555 (2.5)	11803 (2.8)	11184 (2.7)	42281 (5.1)
RAMANATHAPURAM	67957 (19.3)	94495 (27.4)	49470 (14.0)	68314 (19.8)	66411 (19.3)	60321 (17.5)	162452 (23.3)
SALEM	96722 (10.3)	118128 (13.2)	60755 (6.5)	73117 (8.2)	81508 (9.1)	89343 (10.0)	214850 (11.7)

SIVAGANGA	51469 (14.5)	78844 (22.2)	34055 (9.6)	50130 (14.1)	46106 (13.0)	54142 (15.2)	130313 (18.4)
THANJAVUR	64502 (10.7)	92749 (14.9)	30711 (5.1)	45773 (7.3)	54130 (8.7)	57809 (9.3)	157251 (12.8)
THE NILGIRIS	19075 (11.0)	23853 (13.2)	7412 (4.3)	8995 (5.0)	14429 (8.0)	14931 (8.3)	42928 (12.1)
THENI	21420 (6.5)	32359 (10.0)	5066 (1.5)	7934 (2.4)	19482 (6.0)	19385 (6.0)	53779 (8.3)
THOOTHUKUDI	60703 (13.8)	82480 (18.3)	40174 (9.1)	54633 (12.1)	49120 (10.9)	49488 (11.0)	143183 (16.1)
TIRUCHIRAPALLI	46909 (6.7)	61386 (8.6)	20038 (2.9)	25379 (3.6)	39154 (5.5)	40342 (5.7)	108295 (7.7)
TIRUNELVELI	44027 (5.5)	63130 (7.8)	27099 (3.4)	38608 (4.7)	31505 (3.9)	32139 (4.0)	107157 (6.7)
TIRUPUR	58279 (8.3)	65417 (9.5)	30588 (4.4)	34430 (5.0)	51740 (7.5)	53246 (7.7)	123696 (8.9)
TIRUVALLUR	67276 (6.2)	96090 (9.0)	49261 (4.5)	69262 (6.5)	61463 (5.8)	59475 (5.6)	163366 (7.6)
TIRUVANNAMALAI	40955 (6.3)	54092 (8.4)	28509 (4.4)	37890 (5.9)	35143 (5.5)	36858 (5.7)	95047 (7.4)
TIRUVARUR	22049 (6.9)	30375 (9.3)	15855 (4.9)	21532 (6.6)	19522 (6.0)	19882 (6.1)	52424 (8.1)
VELLORE	37133 (3.6)	51041 (5.0)	18351 (1.8)	23780 (2.3)	32478 (3.2)	36984 (3.6)	88174 (4.3)
VILLUPURAM	18126 (2.0)	24615 (2.7)	10314 (1.1)	12938 (1.4)	14357 (1.6)	15007 (1.6)	42741 (2.3)
VIRUDHUNAGAR	29098 (5.8)	40747 (8.1)	16257 (3.3)	23339 (4.6)	23845 (4.7)	25896 (5.1)	69845 (7.0)

\*denominator is risk population aged >=30 years estimated at 49% of total population or male/female counts.

**Table 10: Confirmed new cases of NCD per 100 suspect cases found during screening.**

District	2014 Confirmed cases/100 suspect cases				2015 Confirmed cases/100 suspect cases				2016 Confirmed cases/100 suspect cases			
	New HT cases (%)	New DM cases (%)	New Cervical CA (%)	New Breast CA (%)	New HT cases (%)	New DM cases (%)	New Cervical CA (%)	New Breast CA (%)	New HT cases (%)	New DM cases (%)	New Cervical CA (%)	New Breast CA (%)
ARIYALUR	15603 (24.0)	3214 (10.8)	2273 (8.4)	600 (2.2)	10644 (12.6)	2382 (5.2)	1505 (4.5)	438 (1.3)	4975 (7.7)	782 (3.4)	366 (1.4)	147 (0.6)
CHENNAI	14967 (10.1)	5306 (5.1)	2390 (7.2)	1590 (2.2)	12603 (10.8)	4658 (5.4)	2090 (8.0)	1370 (2.6)	9037 (9.0)	5820 (6.5)	1549 (6.6)	988 (2.6)
COIMBATORE	15935 (21.7)	2954 (9.1)	1698 (5.9)	721 (2.3)	32922 (29.5)	4704 (10.0)	2325 (4.7)	1183 (2.3)	11800 (21.2)	842 (4.5)	316 (1.5)	215 (0.9)
CUDDALORE	41008 (15.7)	4947 (4.6)	3301 (2.9)	2165 (1.9)	39935 (16.4)	4985 (3.8)	2515 (2.4)	1790 (1.7)	25311 (11.7)	3047 (2.4)	766 (0.9)	670 (0.8)
DHARMAPURI	9596 (36.3)	1431 (12.9)	2008 (16.6)	326 (2.7)	16193 (26.5)	3570 (9.8)	2523 (9.0)	530 (2.0)	12967 (18.1)	2214 (4.3)	1126 (3.3)	392 (1.2)

DINDUGAL	31219 (11.8)	4102 (5.2)	2006 (2.1)	1345 (1.4)	44803 (20.8)	6468 (6.2)	1714 (2.3)	1118 (1.5)	24238 (12.6)	3679 (3.3)	801 (1.3)	587 (0.9)
ERODE	9704 (17.3)	1055 (4.1)	731 (4.2)	358 (1.7)	29616 (41.1)	3966 (12.1)	2463 (11.3)	1023 (4.2)	11559 (23.5)	891 (4.0)	342 (2.3)	203 (1.2)
KANCHEEPURAM	3585 (6.8)	378 (2.3)	651 (3.1)	428 (1.7)	16234 (24.3)	3427 (14.5)	1837 (6.6)	937 (3.1)	7627 (16.3)	501 (5.1)	595 (2.7)	359 (1.6)
KANYAKUMARI	20564 (12.5)	4239 (9.3)	3769 (5.5)	1481 (2.2)	29190 (25.2)	5475 (9.0)	2012 (4.8)	1378 (3.3)	14198 (28.8)	3507 (5.6)	936 (2.1)	583 (1.3)
KARUR	24881 (18.1)	2267 (4.1)	1377 (2.5)	700 (1.1)	10257 (13.9)	873 (2.3)	549 (2.0)	386 (1.2)	6662 (11.7)	635 (2.0)	230 (1.3)	95 (0.5)
KRISHNAGIRI	3989 (13.5)	1500 (11.6)	1283 (10.6)	576 (4.0)	11006 (43.8)	2924 (18.1)	941 (10.3)	450 (4.8)	4191 (17.2)	1353 (12.8)	310 (3.3)	244 (2.6)
MADURAI	10398 (6.6)	1168 (1.9)	1330 (1.8)	699 (0.9)	73474 (26.1)	15047 (7.0)	5888 (4.8)	2900 (2.3)	21691 (11.2)	6054 (3.6)	1192 (1.3)	825 (0.9)
NAGAPATTINAM	18138 (25.0)	5634 (18.3)	3153 (14.4)	711 (3.5)	33061 (29.8)	10044 (15.2)	8005 (25.4)	1783 (6.1)	6932 (16.2)	1363 (6.0)	207 (2.7)	130 (1.7)
NAMAKKAL	7350 (5.1)	1131 (1.9)	2283 (4.2)	899 (1.3)	23575 (21.6)	5123 (7.2)	2948 (6.9)	973 (2.1)	12591 (13.5)	1863 (2.9)	867 (2.1)	350 (0.8)
PERAMBALUR	8130 (18.6)	1402 (10.8)	1107 (6.8)	371 (2.3)	7063 (13.6)	1079 (6.6)	877 (5.3)	258 (1.5)	4060 (12.2)	216 (2.6)	326 (3.0)	92 (0.9)
PUDUKOTTAI	43137 (13.3)	7329 (6.1)	5987 (4.6)	2580 (2.2)	21915 (27.9)	5928 (14.3)	3246 (11.0)	1449 (5.2)	5617 (13.3)	1582 (8.7)	272 (2.3)	220 (2.0)
RAMANATHAPU- RAM	19922 (9.1)	5445 (5.2)	2757 (2.7)	1120 (1.1)	35925 (17.8)	9165 (6.5)	2745 (3.0)	1256 (1.4)	18392 (11.3)	4482 (3.8)	1408 (2.1)	701 (1.2)
SALEM	24841 (16.9)	2008 (3.4)	1374 (2.0)	649 (0.9)	65322 (31.7)	7091 (8.9)	2610 (3.0)	1437 (1.6)	37790 (17.6)	5973 (4.5)	1032 (1.3)	650 (0.7)
SIVAGANGA	8000 (7.0)	943 (2.2)	1211 (2.5)	601 (1.2)	72472 (11.8)	15276 (4.0)	7893 (3.1)	2255 (0.8)	15705 (12.1)	3158 (3.8)	1538 (3.3)	380 (0.7)
THANJAVUR	8597 (8.6)	926 (3.1)	1223 (3.9)	627 (2.0)	69401 (30.4)	15442 (12.3)	6802 (9.6)	1880 (2.8)	26571 (16.9)	3400 (4.4)	1577 (2.9)	1227 (2.1)
THE NILGIRIS	4569 (13.1)	281 (2.1)	591 (4.3)	298 (2.1)	7491 (24.3)	664 (5.3)	954 (7.9)	299 (2.5)	7368 (17.2)	372 (2.3)	107 (0.7)	151 (1.0)
THENI	29566 (18.9)	4428 (7.9)	2972 (5.1)	824 (1.5)	31408 (21.6)	7115 (10.7)	2739 (5.5)	1072 (2.3)	10044 (18.7)	1577 (12.1)	642 (3.3)	290 (1.5)
THOOTHUKUDI	17066 (10.4)	1841 (3.2)	3906 (5.2)	1981 (2.5)	27857 (19.8)	5579 (6.9)	2444 (4.2)	1554 (2.6)	18059 (12.6)	3004 (3.2)	1066 (2.2)	611 (1.2)
TIRUCHIRAPALLI	40474 (10.6)	2012 (1.4)	3555 (2.3)	1587 (0.9)	19681 (14.6)	1895 (3.0)	898 (1.6)	614 (1.1)	16312 (15.1)	1570 (3.5)	534 (1.4)	344 (0.9)
TIRUNELVELI	7830 (7.2)	788 (2.9)	1019 (2.5)	506 (1.1)	31275 (28.9)	2753 (7.4)	1411 (4.4)	635 (1.9)	14710 (13.7)	2857 (4.3)	790 (2.5)	498 (1.5)
TIRUPUR	25679 (17.8)	4232 (5.6)	1762 (2.9)	780 (1.2)	26089 (23.9)	5852 (8.5)	1994 (4.3)	1135 (2.4)	21889 (17.7)	2877 (4.4)	496 (1.0)	613 (1.2)
TIRUVALLUR	26832 (10.6)	4720 (3.9)	2290 (2.7)	1320 (1.5)	30043 (13.8)	8989 (5.1)	2226 (2.8)	1520 (1.9)	21199 (13.0)	4861 (4.1)	1239 (2.0)	1001 (1.7)
TIRUVANNAMA- LAI	29060 (36.8)	7913 (18.7)	3483 (8.8)	1196 (3.0)	18059 (29.9)	5801 (15.1)	1451 (4.9)	784 (2.6)	13486 (14.2)	3932 (5.9)	791 (2.3)	538 (1.5)
TIRUVARUR	4857 (6.2)	425 (1.6)	1199 (3.5)	416 (1.2)	28127 (37.1)	5688 (13.1)	5101 (19%)	1616 (6.0)	7130 (13.6)	1342 (3.6)	255 (1.3)	267 (1.3)
VELLORE	9391 (13.5)	1321 (5.3)	945 (4.1)	461 (1.7)	36638 (33.4)	5101 (9.4)	3630 (9.0)	1409 (3.2)	17414 (19.7)	2099 (5.0)	879 (2.7)	494 (1.3)
VILLUPURAM	12601 (14.5)	2146 (8.3)	4255 (17.6)	1676 (6.3)	26116 (31.2)	2757 (7.2)	3422 (16.0)	1666 (7.6)	8553 (20.0)	1844 (7.9)	1308 (9.1)	596 (4.0)
VIRUDHUNAGAR	3847 (9.7)	829 (8.2)	551 (3.9)	270 (1.8)	71085 (37.6)	16475 (16.0)	7938 (12.1)	3720 (5.3)	9129 (13.1)	2583 (6.5)	631 (2.6)	507 (2.0)

Table 10 shows the number of confirmed cases of HT and DM, and suspect cases of Cervical Cancers and Breast Cancers NCD per 100 screened cases. Further details are presented below:

HT: New confirmed cases reported per 100 screened

In 2014, Tiruvannamalai (36.8%) and Dharmapuri (36.3%) showed highest percent of confirmed HT cases per 100 screened cases. However, Namakkal had lowest confirmed cases of HT at 5.1% (Figure 5).

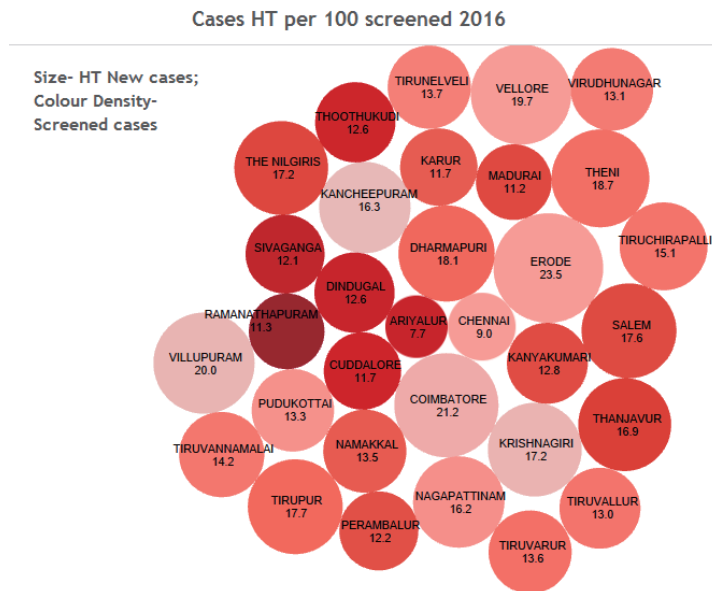
In 2015, Krishnagiri (43.8%) and Erode (41.1%), reported high percent of confirmed HT cases; while Chennai reported lowest confirmed HT cases at 10.8% (Figure 6).

In 2016, Erode (23.5%) and Coimbatore (21.2%) diagnosed high percent of confirmed HT cases; while Kancheepuram reported lowest confirmed HT cases at 2.0% (Figure 7).





Figure 7. New confirmed cases of HT reported per 100 screened (2016)



DM: New confirmed cases reported per 100 screened

In 2014, Tiruvannamalai (18.7%) and Nagapattinam (18.2%) reported highest percent of confirmed DM cases per 100 screened cases; Tiruchirappalli reported lowest confirmed cases at 1.4% (Figure 8).

In 2015 Krishnagiri (18.1%) and Virudhunagar (16.0%), reported highest percent of confirmed DM cases; Karur reported lowest confirmed DM cases at 2.3% (Figure 9).

In 2016, Krishnagiri (12.8 %) and Theni (12.1%), reported highest percent of confirmed DM cases; Karur reported lowest confirmed DM cases at 2.0% (Figure 10).

Overall, the average rate of confirmed DM cases was 6.0% among 100 screened cases during the period of three years.

Figure 8. New confirmed cases reported per 100 screened (2014)

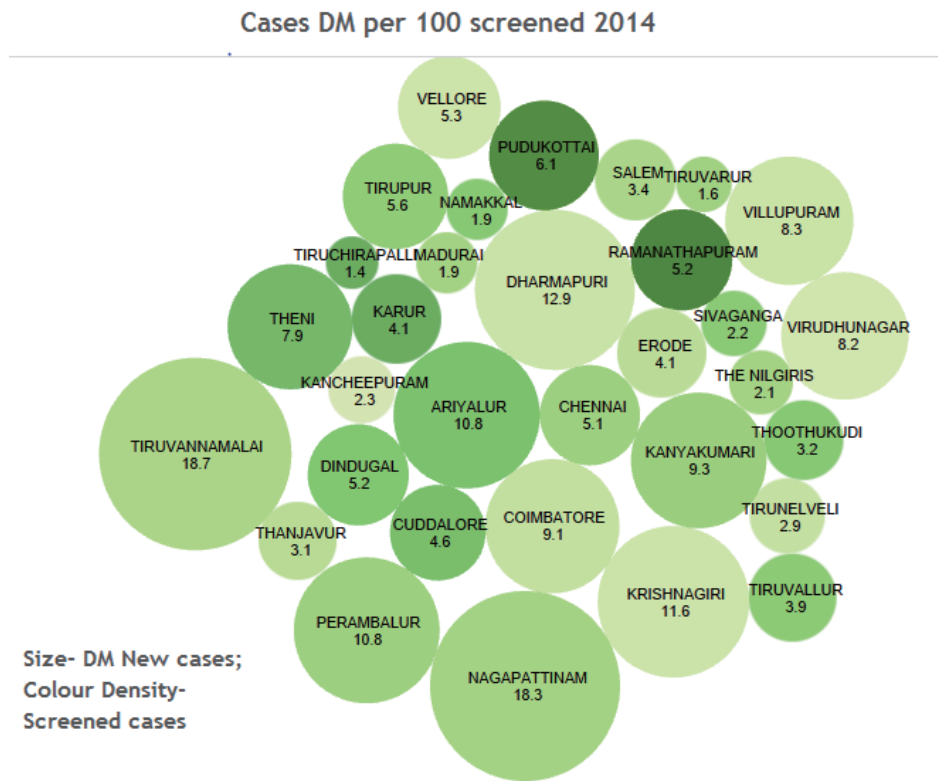


Figure 9. DM: New confirmed cases reported per 100 screened (2015)

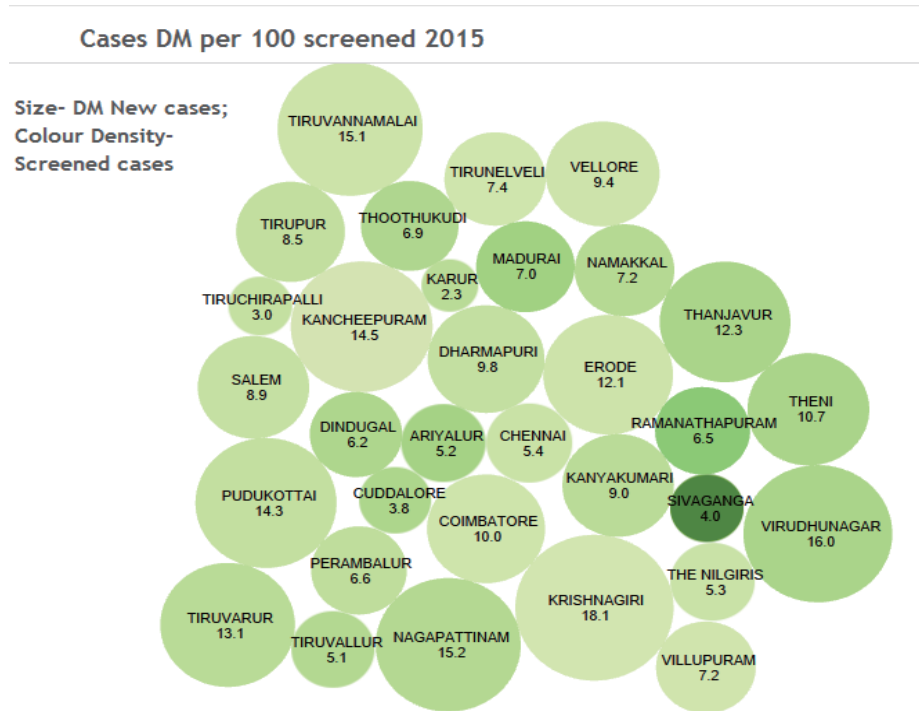
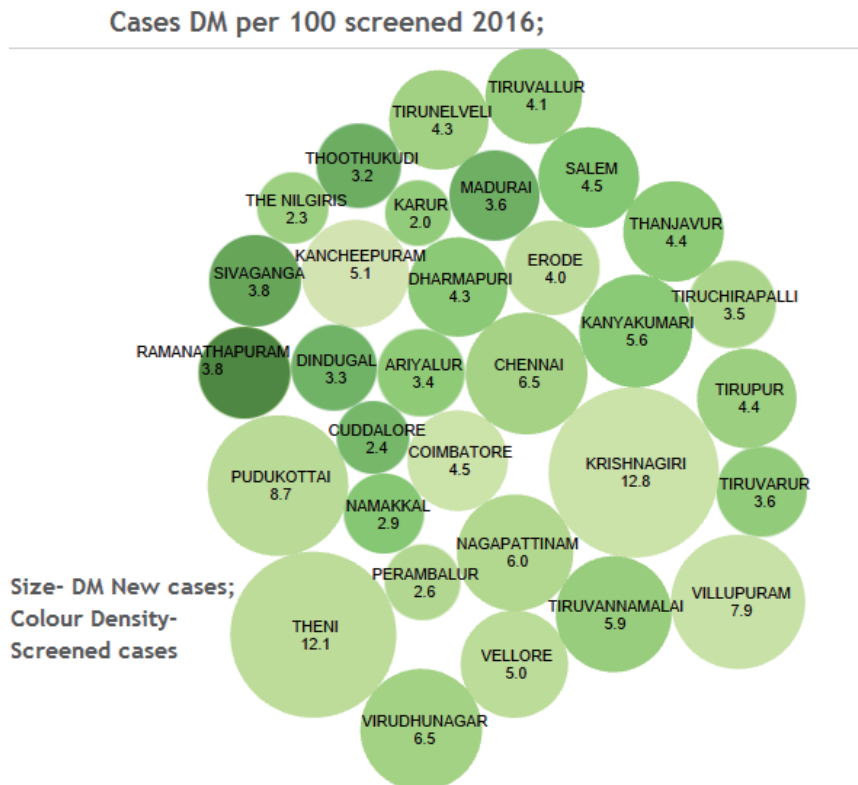


Figure 10. DM: New confirmed cases reported per 100 screened (2016)



Cervical cancer<sup>1</sup>: New suspected cases

Villupuram (17.6%) and Dharmapuri (16.6%) reported highest percent of suspected cases of cervical cancer per 100 screened cases in 2014, although, Pudukkottai and Ramanathapuram district had screened more cases in 2014. Madurai reported lowest suspected cases at 1.8% (Figure 11).

In 2015, Nagapattinum (25.4%) and Tiruvarur (19.0%), Villupuram (16.0%) reported highest percent of suspected cases. Tiruchirappali reported lowest suspected cases of cervical cancer at 1.6% (Figure 12).

In 2016, Villupuram (9.1%) reported highest percent of suspected cervical cancer cases and Cuddalore reported lowest number of suspected cervical cancer cases at 0.9% (Figure 13).

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<sup>1</sup> Cervical cancer cases reported in HMIS are suspect positive using VIA/VILI test.

Figure 11. New suspected cases of cervical cancers reported per 100 screened (2014)

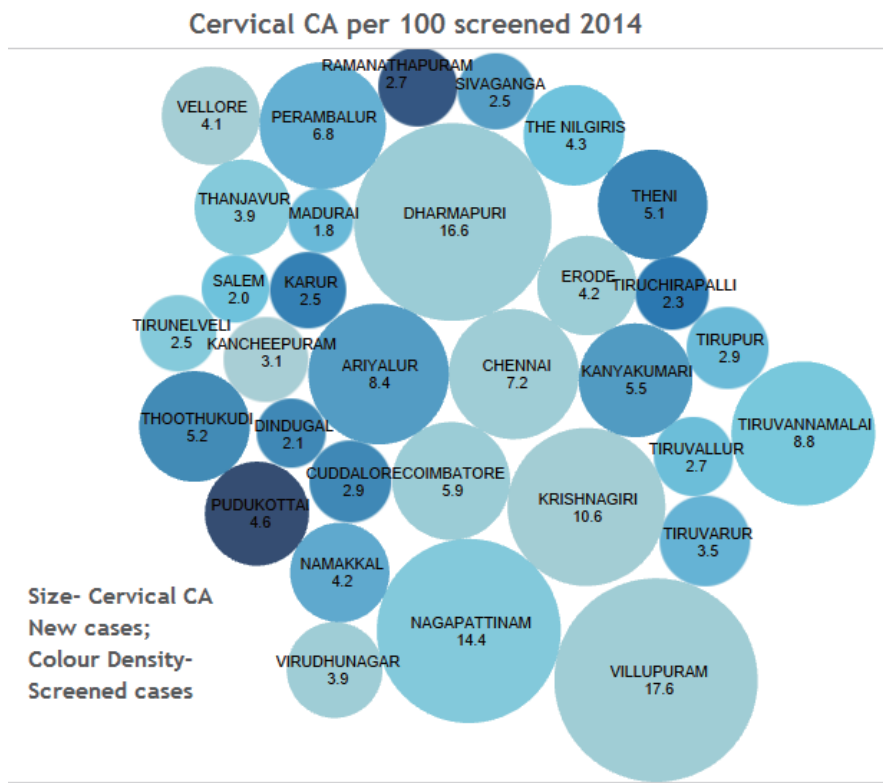


Figure 12. New suspected cases of cervical cancers reported per 100 screened (2015)

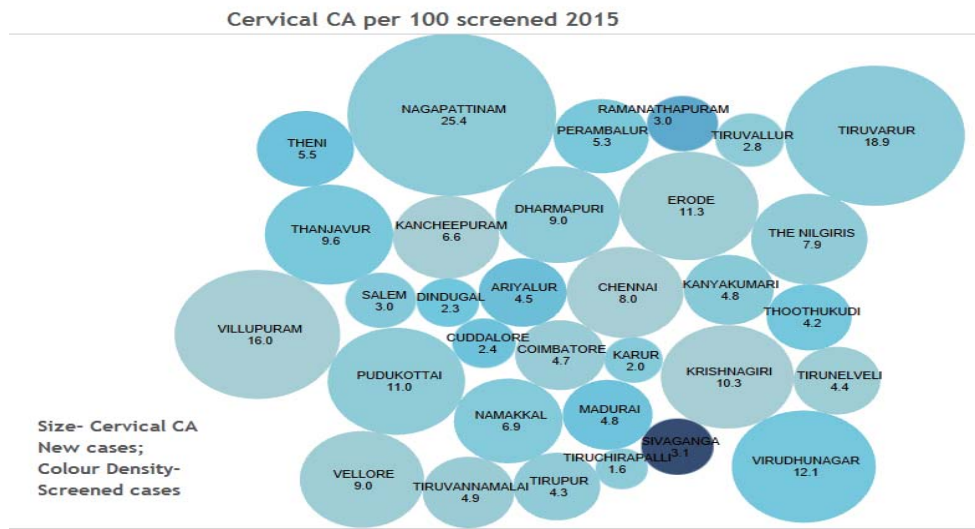
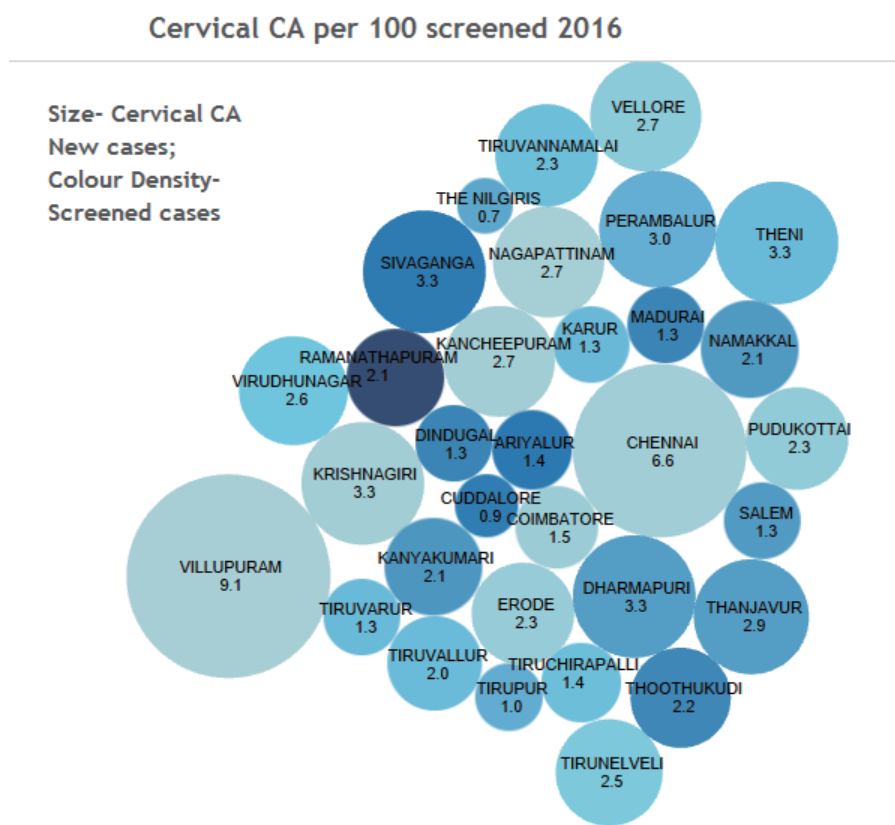


Figure 13. New suspected cases of cervical cancers reported per 100 screened in 2016.



### Breast Cancers: New suspected cases

In 2014, Villupuram (6.3%) reported highest percent of suspected breast cancer cases; and the lowest suspected cases of breast cancer were reported from Madurai and Salem, both at 0.9% (Figure 14).

In 2015, Villupurum (7.6%) reported consistently highest percent of suspected breast cancer cases; and the lowest suspected cases of breast cancer were reported from Sivaganga at 0.8% (Figure 15).

In 2016, Villupuram (4.0) reported consistently highest rate of suspected breast cancer cases; and the lowest suspected cases of breast cancer were reported from Karur at 0.5% (Figure 16).

Figure 14. New suspected cases of breast cancers reported per 100 screened (2014)

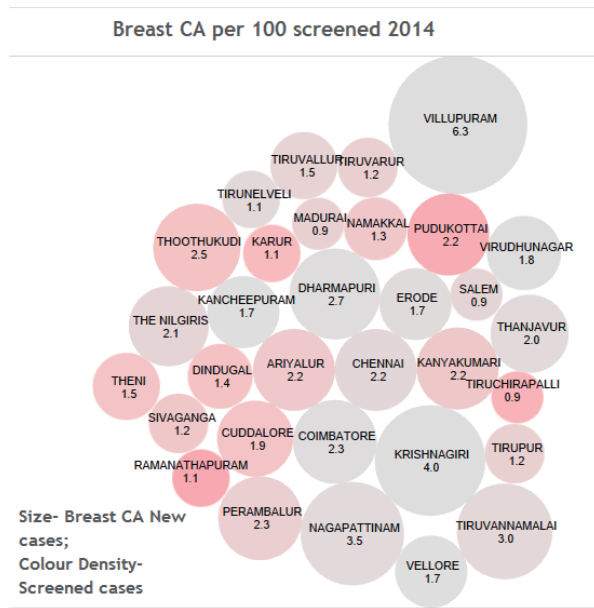


Figure 15. New suspected cases of breast cancers reported per 100 screened (2015)

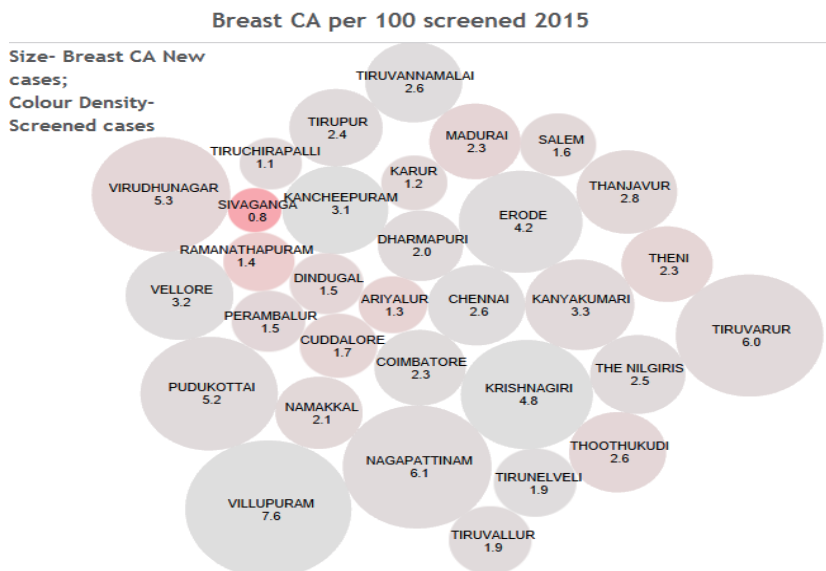
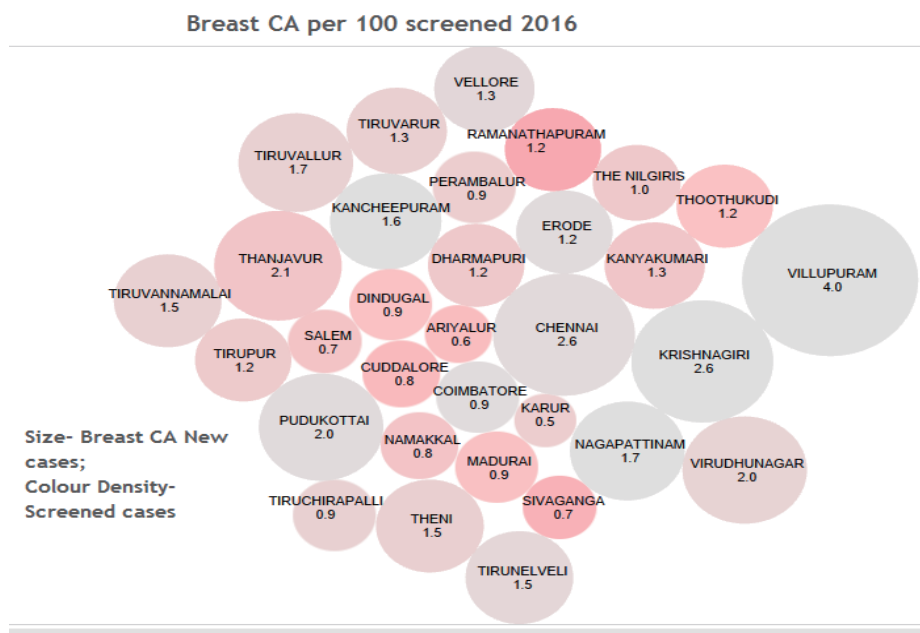




Figure 16. New suspected cases of breast cancers reported per 100 screened (2016)



In conclusion, distribution of cases of NCD in 2016 per 100 screened population were as given below:

Diabetes (DM): Southern districts like Krishnagiri (12.8%) and Theni (12.1%) showed highest rate of confirmed DM cases in 2016 (Figure 17A).

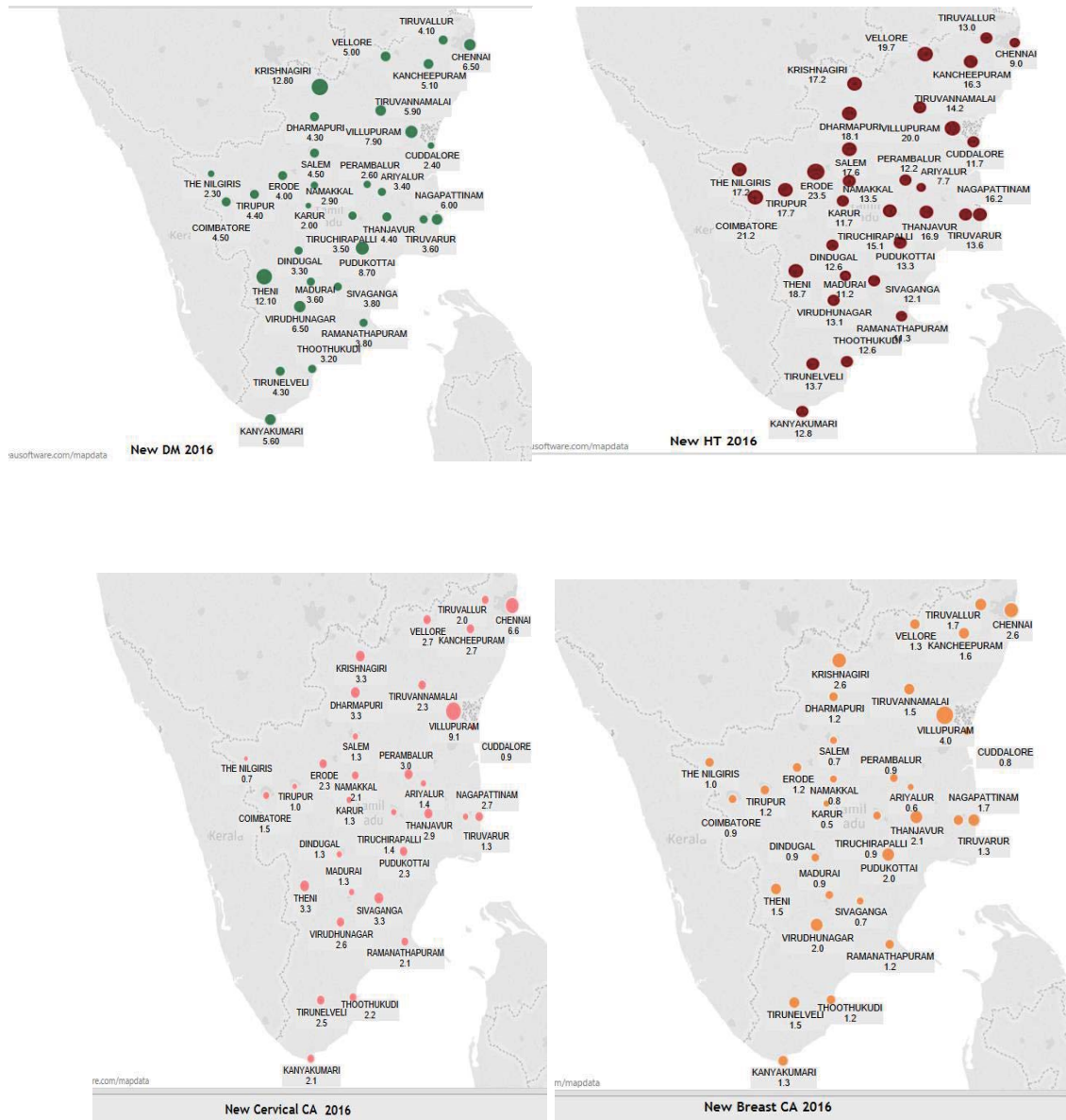
Hypertension (HT): Erode (23.5%) and Coimbatore (21.2%) had highest rate of confirmed HT cases per 100 screened cases (Figure 17B).

Cervical Cancer: Villupuram showed highest rate of suspected cervical cancer cases in 2016 at 9.1% (Figure 17C).

Breast Cancer: Villupuram showed highest rate of suspected Breast cancer cases in 2016 at 4.0% (Figure 17D).

Overall, in 2016 Villupuram district showed high rate of NCD cases: HT(20.0%), DM(7.9%), Cervical Cancer(9.1%) and Breast Cancer at (4.0%).

Figure 17. Density distribution of NCDs; (A)DM;(B)HT;(C)Cervical Cancer;(D) Breast Cancer



## Conclusions

1. The NCD Cell in the Tamil Nadu State NHM office in Chennai is well located. It is functioning effectively as a well-managed system.
2. The NCD health facility survey commissioned by JICA-Tokyo (through GLM-Tokyo) to PHFI received efficient support of the MD of NHM, and the NCD Cell.
3. Although the survey evaluated health facilities in three districts, namely Chennai, Cuddalore, and Madurai, the overall impression of the survey team was that the overall NCD program was efficient in the state but has to scale-up its coverage of NCD screening from around 10% annually to 50%.
4. Quantitative representation of facilities is being provided to give some idea of the level of functioning of secondary level health facilities in the three districts so that services can be upgraded (Table 11).

Table 11. Quantitative Representation of Secondary level hospitals in three districts of Tamil Nadu (n=17)

Variables	Chennai (n=2)	Cuddalore(n=9)	Madurai (n=2)
<b>I. Lab-Investigations</b>			
1. ECG facilities	100%	100%	100%
2. Hemoglobin, Platelet, bleeding/clotting time	100%	67%	100%
3. TLC/DLC	75%	67%	100%
4. Blood Sugar (Fasting/PP)	100%	100%	100%
5. Thyroid profile	50%	Nil	75%
6. C-reactive Protein	50%	Nil	50%
7. C-peptide/Vitamin D	25%	Nil	50%
8. Cardiac Enzyme Testing	50%	Nil	50%
9. HbA1C	75%	44.4%	75%
10. Lipid Profile (Serum Cholesterol)	100%	22%	100%
11. Lipid profile (triglycerides, HDL, LDL, etc.)	50%	Nil	75%
12. LFT (Serum bilirubin )	100%	33.5%	100%
13. LFT (SGOT, SGPT)	50%	Nil	75%
14. KFT (Serum creatinine)	100%	67%	100%
15. KFT (urea, other)	50%	Nil	50%
16. Urine routine/Urine Sugar	100%	78%	100%
17. Microbiology (bacterial cultures).	100%	56%	100%

18. X-Ray	100%	78%	100%
19. Cardiac Ultra Sound	75%	11%	100%
20. PAP Smear	50%	11%	50%
21. Colposcopy	50%	78%	100%
22. Histopathology tests	50%	Nil	75%
<b>II. Equipment</b>			
1. Blood Pressure measuring devices	100%	100%	100%
2. Oxygen cylinders	100%	100%	100%
3. Weighing Machines	100%	100%	100%
4. ECG machines	100%	100%	100%
5. Cardiac Monitor with defibrillator	75%	67%	100%
6. Measuring tape	75%	100%	100%
7. Ventilators	50%	22%	100%
8. Nebulizers	100%	100%	100%
9. Peak flow meters	50%	22%	100%
10. Stethoscope	100%	100%	100%
11. Thermometers	100%	100%	100%
12. Health education materials	100%	78%	100%
13. Pulse oximeters	100%	89%	100%
14. Spacers	50%	Nil	100%
15. Glucometers	100%	89%	100%
16. Magna Visualizer	75%	100%	100%
17. Indirect Laryngoscope	100%	22%	100%
18. Punch Biopsy forceps	100%	67%	100%
19. Consumable for screening of cervical cancer	75%	100%	100%
20. Disposable tongue depressor	100%	33%	100%
21. PAP smear kit	50%	11%	100%
22. Infusion pump	100%	89%	100%
23. Ophthalmoscope	75%	33%	100%
24. Slit Lamp	50%	56%	100%
<b>III. Manpower</b>			
Specialist Dr(s) for NCD (Diabetologist / Oncologist/ Cardiologist)	50%©	22%	75%
MD Physician	75%	33%	100%
General Duty Medical Officers	100%	100%	100%
NCD staff Nurses	50%	44%	50%
Community Health worker /Counsellors/Health educators	50%©	11%	50%
Cyto-Pathologists/Cyto-pathology technician	50%©	Nil	75%
Physiotherapists	75%	22%	100%
Pharmacist	100%	100%	100%
Lab-technician	100%	100%	100%
OPD Attendant	75%	44%	75%
Statistical Assistant/Data Entry Operators	50%	22%	50%
OT attendant	75%	11%	75%
<b>IV. Vehicles/Transport Services</b>			
Ambulance services	50%	22%	100%
Hospital jeep	25%	11	50%
Mini-van	Nil	Nil	Nil
Mortuary van	Nil	Nil	Nil

Note: © mostly available in Pvt. Settings

Table 12: Summary table of gaps in public health facilities of 3 districts (N=33)

S No	Variables	Chennai (N=10)	Cuddalore (N=16)	Madurai (N=7)
1	NCD screening	Cancer screening is done in little more than a quarter of the facilities.	Cervical and Breast Cancer screening is available in 60% of the facilities.	Cervical and Breast Cancer screening is available in 60% of the facilities.
2	Laboratory gaps	<p>&gt;20% of tests are outsourced at secondary level.</p> <p>HQR hospitals lack skilled Pathologists and technicians</p> <p>EQUAS/IQAS not done due to lack of funds.</p> <p>Technical audit not done.</p>	<p>&gt;30% of the tests outsourced at secondary level.</p> <p>All the patients are not screened for NCD due to limited manpower. Pathology tests need to be introduced</p> <p>HQR hospitals require more number of skilled Pathologists and technicians</p> <p>EQUAS/IQAS started in January'2017.</p>	<p>20% tests are outsourced at secondary level.</p> <p>Most of th Laboratory Instruments were non-functional.</p> <p>HQR hospitals require more number of skilled pathologists and technicians. Pathology tests need to be introduced</p> <p>Funds are limited for maintenance of instruments.</p>
<p><i>*Just skeletal services were available at district and sub-district levels due to the lack of equipment, lack of diagnostic kits, and the lack of technicians. These services are outsourced from private labs or diagnostic centres that are either paid for by the patients themselves or paid for by the hospital for poor patients under CM HIS.</i></p>				
3	Surgeries	Patients for NCD related surgeries are referred to Govt. tertiary care hospitals or to Pvt. Hospitals*.	Patients for NCD related surgeries are referred to Govt. tertiary care hospitals or to Pvt. Hospitals*	Complicated surgical procedures- outsourced to Govt. tertiary care hospitals.*
4	Inpatient services (IPD)	Cancer and stroke patients.*	Cancer patients are referred to private cancer hospital or Govt. tertiary care hospitals.*	Cancer patients are referred to private cancer hospital or tertiary care hospitals.*

<i>*Patients were either referred to tertiary hospitals or to private hospitals due to limited number of beds or the lack of supporting facility.</i>				
5	ICU/CCU Facilities	*	ICU/CCU beds were insufficient* (6 beds ICU and 4 bed CCU)	*
<i>*Patients were either referred to tertiary hospitals or to private hospitals due to limited number of beds or the lack of supporting facility.</i>				
6	Man power (gaps)	<i>*more skilled/specialist doctors, pathologist, technicians and NCD staff nurses are required in all the three districts even at the secondary level hospitals (only exception was Rajaji Medical College).</i>		
7	General drugs	75% of general drugs were available.	75% of general drugs were available.	80% of the drugs were available.
8	Cancer Drugs	Non-availability of Cancer Drugs even at secondary level hospitals was observed in all the three districts. Hence patients are referred to private hospitals or Govt. Tertiary care hospitals, and the expenses are either paid by the patients themselves or paid for by the hospitals for poor patients under CM HIS.		
9	Transport Facilities	Indian government has introduced an Ambulance service in all cities and district towns through a centralised system where an individual can dial 108 to get a free Ambulance service. But facility based transport such as Jeep, mini-truck, or mortuary van were not available below Secondary level in all the three districts.		

4. Strengths. The descriptive and quantitative analysis of NCD program and services is presented in the results section as Tables 3-5.

i) NCD program is institutionalized at district, sub-district (taluk), and PHC/Urban Health Centre levels in Chennai, Cuddalore, and Madurai districts.

ii) There is a significant patient attendance for NCD at all levels that is likely to grow with increased awareness among communities.

iii) Radiology and cardiac ultrasound equipment were functional but required upgrading in some secondary hospitals.

iv) Availability of medicines for HT, CVD, and DM was adequate at all levels, except for the treatment of cancers.

v) Availability of general doctors and nurses at all levels of health facilities was adequate, except for the availability of specialist doctors for cardiology, diabetes, and oncology.

## 5. Challenges.

i) Although cervical and breast cancers were prevalent among NCD, the diagnostic, pharmaceutical, and treatment services for cancers were weak even at secondary hospitals in districts of Chennai, Cuddalore, and Madurai. Only tertiary level government medical college hospital in Chennai and a specialized cancer hospital in Chennai have cancer services. These services need to be adequately addressed given that populations in India are now living longer.

ii) Although laboratories were clean and well maintained, there is need of more specialized equipment working on multiple parameters so as to increase the range of diagnostics.

iii) More specialist doctors for cardiology, diabetes, and oncology in secondary hospitals of all districts are needed to handle the patient load. More manpower in all cadres is required. For example, in the absence of NCD nurse, the regular staff of the health centre was seen to be "chipping in" to provide services to the NCD patients. This included even the medical officer(s), counselors, or even OPD attendants performing work of a NCD nurse. Table 11 illustrates the requirements in various categories of paramedical personnel in the public healthcare system.

iv) For NCD, training and capacity building of all cadres of healthcare providers at secondary and lower levels is required. Since the induction training in NCD was done in 2012, there is a need of refresher training for the healthcare providers.

v) More Transport facilities are needed for referral of critically ill patients. Although the national government has introduced an Ambulance service in all cities and district towns through a centralized system where an individual can dial 108 to get a free Ambulance service. Also facility based transport such as Jeep, mini-truck, mortuary van needed at sub-district and PHC



levels. For some of the facilities, vehicles have been sanctioned, but the order need to be expedited. Patient load much in excess of what the infrastructure is capable of handling is bound to undermine the quality of care at all levels. It has been difficult to arrange sufficient resources for the much required expansion of infrastructure to cope with the rush of patients.

vi) The annual budget of NCD program in Tamil Nadu through all three directorates is INR 45 crores (US\$6.5m/yr). Scaling-up the NCD program and strengthening the technical components will require substantial investment that is unlikely to be available from the current NHM allocations. The annual NHM budget for NCD in Tamil Nadu includes NCD staff salaries, medicines, diagnostics, HMIS etc. As a result, there is a chronic shortage of funds. Moreover, NCD staff need refreshed training to support the same more funds are needed . Hence, there is an urgent need for Tamil Nadu government to explore ODA investment to mitigate adverse outcomes of NCD.

6. The secondary data analyses using the HMIS showed that districts that were conducting increased screening had a higher rate of confirmed NCD cases, For example, districts of Shivanganga and Ramanathapuram that were early to start the pilot NCD in 2012 showed higher NCD rates in the State. There are several anecdotal factors that emerged for differences in the number of screening between districts: a) The Population size of the district; (b) NCD pilot screening was started in 2012 in 2-3 districts, and thereafter NCD screening was instituted in staggered expansion over years, till all districts were completed in 2015. Hence, there was a stepwise maturation of NCD screening and gradual build-up of cases for screening; (c) Local health leadership and community participation in NCD program is varied; (d) Disproportionate shortage of services and manpower between districts. A proper qualitative study will need to be done to answer this question with confidence.

7. The gap analysis done by the survey team for three districts is presented in tables 13-15 in the Annexures.

## Recommendations

1. Since the NCD program in Tamil Nadu is institutionalized since 2012, and has a significant demand for its services among the constituent communities, the survey team felt that upgrading some components of the NCD program will be a good investment.
2. For diagnostic services, skeletal services were available at district and sub-district levels. Hence there is a need to upgrade laboratories with latest equipment, introduce new diagnostic assays, and recruit technicians to support the facility. Since, these services are outsourced to private labs or diagnostic centres that are either paid for by the patients themselves or paid for by the hospital for poor patients under CMHIS. Apart from the diagnostics, patients requiring NCD related surgeries were either referred to tertiary hospitals or to private hospitals. The cost of the surgery is covered under CMHIS at the private hospitals as well as at the government tertiary care hospitals for poor patients.
3. A major requirement in the NCD program is of diagnostic, pharma, and clinical management of cancers at the secondary hospitals of Tamil Nadu. The cancer screening is done only for cervical, oral and breast cancers. The Japanese health system has expertise in establishing effective district-level cancer management.
4. The Laboratory component of NCD program requires up-gradation at the secondary hospital level and lower facilities. This is adequately reflected in Table 12 in section titled Conclusions.
5. Human resource management needs to be strengthened in Tamil Nadu because the NCD staff is overburdened and is multi-tasking.
6. The survey team identified an urgent need to implement training and capacity enhancement of all cadres of healthcare workers in all health facilities for NCD. This activity should be conducted at regular intervals and use a structured training curriculum.
7. The HMIS system requires expansion of data entry terminals and better wifi-connectivity in most health facilities. Stroke as a clinical entity needs to be captured in the HMIS database.

8. The survey team recommends that activities listed under items 2-7 should be considered under the Japan Technical Co-operation ODA. The technical plans of establishing the cancer management units in secondary hospitals, upgraded laboratories, HR development plan, structured training programs, and expanded HMIS will require to be prepared by a local Indian health institution in collaboration with the Japanese counterpart.

9. To explore several anecdotal factors that make clients select between centres, it will require a separate qualitative study. For example, factors such as the distance to the centre, quality of services rendered, courtesy of staff, availability of diagnostics, medicines, and transport, and community advocacy and support need to be explored in depth.

## Profile of District Health Facility Survey Team at PHFI

- 1) Team leader (PHFI-Delhi): Professor Subhash Hira, MD, MPH with more than 35 years of working experience in the global health sector: for MOH, Zambia, The University of Texas-Houston, Advisor to NACO-MOH, Grant Medical College & Sir JJ Hospital in Mumbai, MGM Medical University in Mumbai, The World Bank in Washington DC, and WHO-SEARO. He co-authored JICA-funded India Health Sector Report in 2013. Responsibility: overall coordination and budget management of the study, liaise with national and TN-state ministries of health, oversee data management and analysis, and report writing.
- 2) Officer with medical background (Chennai): Dr. Vimala Ramalingam, MD, DCH is a Pediatrician, Public Health, and Transfusion/laboratory medicine expert based in Chennai. She worked in TN Health Services Department for 20 years rising to be Addl. Director. She finally served as the Secretary-General of the Indian Red Cross-New Delhi for 6 years and has extensive experience with field data collection for health facility surveys, especially during Tsunami in TN. Responsibilities: participate in designing the health facility survey, train data collectors with the tool, accompany and supervise data collectors to districts, and coordinate the field data collection.
- 3) Project Coordinator (PHFI-Delhi) with more than 15 years of working experience. Responsibilities: Mr. Parveen Kumar provided admin and logistic support to the team in Delhi and Chennai.
- 4) Consultants in the districts. Two consultants, namely Dr. Arshi Munawwar and Dr. Gokula Kannan who are the young health sector development experts with more than 3 years' experience. Responsibilities: They visited the districts and NHM Statistics Unit in Chennai to collect data in the questionnaires, collate and digitalized data, and transferred data to TL from time to time. Confidentiality of the data was maintained. They assisted in checking accuracy of data and report writing.
- 5) Final Report writing. Dr. Subhash Hira, Dr. Arshi Munawwar, Dr. Vimala Ramalingam, Dr Akshaya Patil, Dr. Mercian Daniel, Mr. Gukula Kannan,

Team at GLM Inc, Tokyo

1) Dr. Akiko Hirano; 2) Ms Makiko Sugishita

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1) Ms Megumi Kitabatake; 2) Ms. Aditi Puri

NMH & NCD Team, Chennai

1) Dr. Derez Ahamad, IAS-PD, NHM

2) Advisor Dr. Capt. M. Kamatchi

3) NCD Director Dr. Jerard M. Selvam

4) Jt Director Dr. KG Shrithar



Annexes

1. Questionnaire



**District Health Facility Survey for NCD in Tamil Nadu**

Questionnaire Code:				Date:			
Name of Interviewer:							
Name and designation of Respondent:							
Name of District:							
Facility Name:							
Facility Address:							

Classification of Facility:		Public		Private	
Facility Location:	Urban	Rural	Semi-Urban		
Timing of Facility:					
<b>A</b>	<b>Population covered by the facility (in numbers)</b>				
<b>I</b>	<b>Services</b>				
1.	Are the patients screened for:				
a.	B.P measurement	<input type="checkbox"/> Yes <input type="checkbox"/> No			
b.	blood glucose by strip method	<input type="checkbox"/> Yes <input type="checkbox"/> No			
c.	ECG	<input type="checkbox"/> Yes <input type="checkbox"/> No			
d.	Colposcopy	<input type="checkbox"/> Yes <input type="checkbox"/> No			
e.	Pap smear	<input type="checkbox"/> Yes <input type="checkbox"/> No			
f.	Screening camps				
i.	Cancer	<input type="checkbox"/> Yes <input type="checkbox"/> No			
ii.	Diabetes	<input type="checkbox"/> Yes <input type="checkbox"/> No			
iii.	CVDs	<input type="checkbox"/> Yes <input type="checkbox"/> No			
iv.	Stroke				
v.	Others				
2.	Counselling	<input type="checkbox"/> Yes <input type="checkbox"/> No			
3.	Diagnostic services	At the facility	Out-sourced	Remarks/ suggestions	
a.	ECG facilities	<input type="checkbox"/>	<input type="checkbox"/>		
b.	Hb	<input type="checkbox"/>	<input type="checkbox"/>		
c.	DLC	<input type="checkbox"/>	<input type="checkbox"/>		
d.	Platelet count	<input type="checkbox"/>	<input type="checkbox"/>		
e.	TLC	<input type="checkbox"/>	<input type="checkbox"/>		
f.	Bleeding Time	<input type="checkbox"/>	<input type="checkbox"/>		
g.	Clotting time	<input type="checkbox"/>	<input type="checkbox"/>		
h.	Fasting /PP blood sugar	<input type="checkbox"/>	<input type="checkbox"/>		
I	Thyroid Profile	<input type="checkbox"/>	<input type="checkbox"/>		
J	Vitamin D	<input type="checkbox"/>	<input type="checkbox"/>		
K	C-peptide	<input type="checkbox"/>	<input type="checkbox"/>		
L	Glycated haemoglobin (HbA1c)	<input type="checkbox"/>	<input type="checkbox"/>		
M	Lipid profile	<input type="checkbox"/>	<input type="checkbox"/>		
N	Blood Urea	<input type="checkbox"/>	<input type="checkbox"/>		
O	Liver Function Test	<input type="checkbox"/>	<input type="checkbox"/>		
p.	Kidney Function Test	<input type="checkbox"/>	<input type="checkbox"/>		
q.	Urine routine	<input type="checkbox"/>	<input type="checkbox"/>		
r.	Urine Sugar	<input type="checkbox"/>	<input type="checkbox"/>		
S	X-ray	<input type="checkbox"/>	<input type="checkbox"/>		
t.	Cardiac Ultra Sound	<input type="checkbox"/>	<input type="checkbox"/>		

U	C-reactive Protein	<input type="checkbox"/>	<input type="checkbox"/>	
V	Cardiac Enzymes testing	<input type="checkbox"/>	<input type="checkbox"/>	
4.	Health Promotion			
a.	behaviour change	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
b.	for early detection	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
5.	OPD services	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
a.	OPD working hour	<input type="checkbox"/> hrs/week		
b.	No. of cases per month			
i.	Cancer	<input type="checkbox"/>		
ii.	Diabetes	<input type="checkbox"/>		
iii.	CVDs	<input type="checkbox"/>		
iv.	Stroke	<input type="checkbox"/>		
6.	IPD services	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
a.	No. of beds available	<input type="checkbox"/>		
b.	Bed occupancy rate in the last 12 months <input type="checkbox"/> <40% <input type="checkbox"/> 40-60% <input type="checkbox"/> >60%			
c.	No. of patients admitted per month			
i.	Cancer	<input type="checkbox"/>		
ii.	DM	<input type="checkbox"/>		
iii.	CVDs	<input type="checkbox"/>		
iv.	Stroke	<input type="checkbox"/>		
d.	No. of surgeries conducted per month			
i.	Cancer	<input type="checkbox"/>		
ii.	Diabetes	<input type="checkbox"/>		
iii.	CVDs	<input type="checkbox"/>		
iv.	Stroke	<input type="checkbox"/>		
7.	ICU/ICCU	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
a.	No. of beds available	<input type="checkbox"/>		
B	Bed occupancy rate in the last 12 months <input type="checkbox"/> <40% <input type="checkbox"/> 40-60% <input type="checkbox"/> >60%			
8.	Referrals			
a.	No of referral in and out cases per month	OP in <input type="checkbox"/> i out <input type="checkbox"/>		
		IP in                      out		
b.	Distance to nearest referral facility?	<input type="checkbox"/> Km		
c.	Means of transport to transfer emergency patients to nearest referral facility?			
9.	Home based care for bed ridden chronic cases	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
10	No of Lab examination			
A	Are the diagnostic Kits FDA / EU CE	<input type="checkbox"/> Yes	<input type="checkbox"/> No	



	approved				
B	No of biochemistry tests per month				
C	No of haematology tests per month				
D	No of Endocrinology tests per month				
E	No of Microbiology tests per month				
F	No of Pathology tests per month				
11	Is laboratory quality de-ionised water available for running the tests	<input type="checkbox"/> Yes <input type="checkbox"/> No			
12	Timeliness in reporting critical test results is followed.	<input type="checkbox"/> Yes <input type="checkbox"/> No			
<b>A</b>	What is the normal reporting time for critical patients				
<b>II.</b>	<b>Manpower</b>	<b>Number present to-day</b>	<b>Total number (including todays absentees)</b>		
1.	Specialist doctor	<input type="checkbox"/>	<input type="checkbox"/>		
a.	Diabetology	<input type="checkbox"/>	<input type="checkbox"/>		
b.	Cardiology	<input type="checkbox"/>	<input type="checkbox"/>		
c.	Medical Oncologist	<input type="checkbox"/>	<input type="checkbox"/>		
d.	MD physician	<input type="checkbox"/>	<input type="checkbox"/>		
e.	Other specialist (if any)	<input type="checkbox"/>	<input type="checkbox"/>		
2.	General Duty officer (Medical officer)	<input type="checkbox"/>	<input type="checkbox"/>		
	NCD staff nurse				
3.	Nurse/midwife	<input type="checkbox"/>	<input type="checkbox"/>		
4.	Community health workers	<input type="checkbox"/>	<input type="checkbox"/>		
5.	Counsellors	<input type="checkbox"/>	<input type="checkbox"/>		
6.	Health Educators	<input type="checkbox"/>	<input type="checkbox"/>		
7.	Cyto pathologist	<input type="checkbox"/>	<input type="checkbox"/>		
8.	Cyto-pathology technician	<input type="checkbox"/>	<input type="checkbox"/>		
9.	Physiotherapist	<input type="checkbox"/>	<input type="checkbox"/>		
10.	Pharmacist	<input type="checkbox"/>	<input type="checkbox"/>		
11.	Lab technician	<input type="checkbox"/>	<input type="checkbox"/>		
12.	OPD Attendant	<input type="checkbox"/>	<input type="checkbox"/>		
13.	Statistical Assistant / Data entry operator	<input type="checkbox"/>	<input type="checkbox"/>		
14.	OT Attendant	<input type="checkbox"/>	<input type="checkbox"/>		
15.	Registration Clerk	<input type="checkbox"/>	<input type="checkbox"/>		
16.	Any other staff (specify)				
17.	NCD related Trainings	Once at joining	Regular training	Non e	Details
a.	Doctors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

b.	Nurses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
c.	Community health workers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
d.	Other staff	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>III</b>	<b>Physical Infrastructure (As per specifications)</b>	<b>Existing</b>			<b>Remarks</b>
1.	Where is this facility located?				
2.	Is the facility easily accessible to local population?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
3.	Is a designated government building available for the facility?	<input type="checkbox"/> Yes <input type="checkbox"/> No			
4.	If there is no designated government building, then where is the facility located?				
a.	Rented premises	<input type="checkbox"/> Yes <input type="checkbox"/> No			
b.	Other government building	<input type="checkbox"/> Yes <input type="checkbox"/> No			
c.	Any other specify				
5.	OPD rooms/cubicles	<input type="checkbox"/> Yes <input type="checkbox"/> No			
A	Are the power backup services available to support patients for at least 1 hour. in the event of a major failure of external power Sources	<input type="checkbox"/> Yes <input type="checkbox"/> No			
6.	Waiting room for patients	<input type="checkbox"/> Yes <input type="checkbox"/> No			
A	Waiting Room Occupancy				
7.	No. of beds: Male				
8.	No. of beds: Female				
9.	Operation theatre	<input type="checkbox"/> Yes <input type="checkbox"/> No			
A	Dirty utility room(s)	<input type="checkbox"/> Yes <input type="checkbox"/> No			
B	Clean utility room	<input type="checkbox"/> Yes <input type="checkbox"/> No			
9i	Number of operating theatres				
10.	ICU	<input type="checkbox"/> Yes <input type="checkbox"/> No			
10i	If yes, in ICU what is the nurse:patient ratio	<input type="checkbox"/> 1:2 <input type="checkbox"/> 1:4			
11	Cardiac Care unit (CCU)	<input type="checkbox"/> Yes <input type="checkbox"/> No			
12	<u>Newborn and Infant Critical Care Unit (NICCU)</u>	<input type="checkbox"/> Yes <input type="checkbox"/> No			
A	If Not; no of dedicated beds for <i>newborns</i> /infants in CCU				
13	Laboratory	<input type="checkbox"/> Yes <input type="checkbox"/> No			

14	X-ray Room	<input type="checkbox"/> Yes <input type="checkbox"/> No		
15	Pharmacy	<input type="checkbox"/> Yes <input type="checkbox"/> No		
16	Water supply	<input type="checkbox"/> Yes <input type="checkbox"/> No		
16	Source of water	<input type="checkbox"/> Filtered <input type="checkbox"/> Unfiltered		
17	Electricity	<input type="checkbox"/> Yes <input type="checkbox"/> No		
18	Condition of floor (1- Floor in good condition; 2- Floor coming off in some places; 3- Floor coming off in many places or no proper flooring)	<input type="checkbox"/>		
19	Whether the cleanliness is ?(Observe)	Good	Fair	Poor
a.	OPD	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b.	OT	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c.	Rooms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d.	Wards	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e.	Toilets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
F	Whether separate toilets are available?(Observe)	<input type="checkbox"/> Male	<input type="checkbox"/> Female	<input type="checkbox"/> Handicaped
G	Patients' bathroom facility (both shower and sitting facility)	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
h.	Premises (compound)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20.	Transport facilities	Number of Vehicles		
a.	If running	Sanctioned	Available	On road
i.	Ambulance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ii.	Jeep	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
iii.	Car	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b.	not running	Driver not available	Money for POL not available	Money for repairs not available
i.	Ambulance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ii.	Jeep	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
iii.	Car	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21	Behavioural Aspects			
a.	How is the behaviour of the Facility staff with the patient			
i.	Courteous		<input type="checkbox"/>	
ii.	Casual/indifferent		<input type="checkbox"/>	
iii.	Insulting / derogatory		<input type="checkbox"/>	
b.	If the health centre is unequipped to provide the services needed, are patients transferred immediately without delay, with		<input type="checkbox"/> Yes <input type="checkbox"/> No	

	all the relevant papers, to a site where the desired service is available?		
c.	Is there a publicly displayed mechanism, whereby a complaint/grievance can be registered?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
<b>V</b>	<b>Equipment</b>	<b>Functional</b>	<b>Remarks</b>
1.	Blood Pressure measuring devices	<input type="checkbox"/> Yes <input type="checkbox"/> No	
2.	Oxygen cylinders	<input type="checkbox"/> Yes <input type="checkbox"/> No	
3.	Weighing Machines	<input type="checkbox"/> Yes <input type="checkbox"/> No	
4.	ECG machines	<input type="checkbox"/> Yes <input type="checkbox"/> No	
5.	Cardiac Monitor with defibrillator	<input type="checkbox"/> Yes <input type="checkbox"/> No	
6.	Measuring tape	<input type="checkbox"/> Yes <input type="checkbox"/> No	
7.	Ventilators	<input type="checkbox"/> Yes <input type="checkbox"/> No	
8.	Nebulizers	<input type="checkbox"/> Yes <input type="checkbox"/> No	
9.	Peak flow meters	<input type="checkbox"/> Yes <input type="checkbox"/> No	
10.	Stethoscope	<input type="checkbox"/> Yes <input type="checkbox"/> No	
11.	Thermometers	<input type="checkbox"/> Yes <input type="checkbox"/> No	
12.	Health education materials	<input type="checkbox"/> Yes <input type="checkbox"/> No	
13.	Pulse oximeters	<input type="checkbox"/> Yes <input type="checkbox"/> No	
14.	Spacers	<input type="checkbox"/> Yes <input type="checkbox"/> No	
15.	Glucometers	<input type="checkbox"/> Yes <input type="checkbox"/> No	
16.	Magna Visualizer	<input type="checkbox"/> Yes <input type="checkbox"/> No	
17.	Indirect Laryngoscope	<input type="checkbox"/> Yes <input type="checkbox"/> No	
18.	Punch Biopsy forceps	<input type="checkbox"/> Yes <input type="checkbox"/> No	
19.	Consumable for screening of cervical cancer	<input type="checkbox"/> Yes <input type="checkbox"/> No	
20.	Disposable tongue depressor	<input type="checkbox"/> Yes <input type="checkbox"/> No	
21.	PAP smear kit	<input type="checkbox"/> Yes <input type="checkbox"/> No	
22.	Infusion pump	<input type="checkbox"/> Yes <input type="checkbox"/> No	
23.	Ophthalmoscope	<input type="checkbox"/> Yes <input type="checkbox"/> No	
24.	Slit Lamp	<input type="checkbox"/> Yes <input type="checkbox"/> No	
25.	How often are BPMD calibrated and checked for accuracy?	<input type="checkbox"/> Once a year or more <input type="checkbox"/> Less than once a year <input type="checkbox"/> Never <input type="checkbox"/> Don't know	
26.	How the equipment is usually repaired and maintained?	<input type="checkbox"/> Repaired at the facility <input type="checkbox"/> Sent back to manufacturer for repair <input type="checkbox"/> Sent back to government store for repair	

		<input type="checkbox"/> Other, specify		
27	What, if any, are the difficulties in getting repairs to equipment' done?			
<b>VI</b>	<b>Drugs/medicines</b>	<b>Always available</b>	<b>Sometimes available</b>	<b>Never available</b>
1.	Tab Aspirin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	Tab .Atenolol	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	Tab.Metoprolol	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Tab. Amlodipine 10mg	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Tab Hydrochlorthiazide 12.5, 25 mg	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Tab.Enalapril 2.5/5mg	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Tab Captopril	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Tab. Methyldopa	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Tab Atorvastatin 10mg	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Tab Clopidogrel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	Tab.Frusemide 40mg	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	Inj.Streptokinase 7.5 lac vial	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	Inj.Streptokinase 15 lac vial	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	Inj.Heparin sod.1000 IU	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	Tab.Isosorbide Dinitrate (Sorbitrate)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	Glyceryl Trinitrate Inj, Sub lingual tabs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	Diazepam Inj & Tab	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18	Inj.Adrenaline	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19	Inj.Atropine sulphate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20	Inj.Digoxin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21	Tab.Digoxin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22	Tab.Verapamil(Isoptin)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23	Inj.Mephentine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24	Tab Potassium IP (Penicilliln V)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25	Inj. Normal saline (Sod chloride) 500ml	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26	Inj.Ringer lactate 500ml	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27	Inj.Mannitol 20% 300ml	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28	Inj.Insulin Regular	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29	Insulin Intermediate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

30	Tab. Metformin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31	Inj. Aminophylline	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32	Tab Folic Acid	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33	Inj Benzathine Benzyl penicillin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34	Carbamazepine tabs, syrup	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35	Inj Lignocaine hydrochloride	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36	Inj. Dexamethasone 2mg/ml vial	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37	Tab Prednisolone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38	Promethazine Tab, Syrup, Caps, Inj	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<b>Indicative List of Drugs for Treatment of Cancer</b>	<b>Always available</b>	<b>Sometimes available</b>	<b>Never available</b>
39	Inj Doxorubicin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40	Inj Cisplatin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41	Inj Carboplatin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
42	Inj Paclitaxel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
43	Inj Docetaxel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44	Inj Gemcitabine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
45	Inj Oxaliplatin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
46	Inj Herceptin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
47	Inj Mabthera	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
48	Inj Velcade	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
49	Inj Avastin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
50	Inj 5 FU	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
51	Inj Vincristine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
52	Inj & tab Endoxan (Cyclophosphamide)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
53	Tab Tamoxifen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
54	Cap Temozolimide	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
55	Cap Procarbazine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
56	Cap CCNU (lomustine)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
57	Inj Epirubicin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
58	Inj & tab Methotrexate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
59	Inj Vinblastine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
60	Inj Etoposide	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>VIII</b>	<b>Quality Control</b>	<b>Whether functional / available as per norms</b>		<b>Remarks</b>
1	ISO certification for all			

	equipment	<input type="checkbox"/> Yes <input type="checkbox"/> No	
2	Citizen's charter	<input type="checkbox"/> Yes <input type="checkbox"/> No	
3.	Internal monitoring		
a.	Social audit through Pan-chayati Raj Institution	<input type="checkbox"/> Yes <input type="checkbox"/> No	
b.	Social audit through Rogi Kalyan Samitis	<input type="checkbox"/> Yes <input type="checkbox"/> No	
c.	medical audit	<input type="checkbox"/> Yes <input type="checkbox"/> No	
d.	technical audit	<input type="checkbox"/> Yes <input type="checkbox"/> No	
E	economic audit	<input type="checkbox"/> Yes <input type="checkbox"/> No	
f.	disaster preparedness audit	<input type="checkbox"/> Yes <input type="checkbox"/> No	
G	Laboratory - Internal QC	<input type="checkbox"/> Yes <input type="checkbox"/> No	
H	Laboratory – External QC	<input type="checkbox"/> Yes <input type="checkbox"/> No	
I	Others		
J	QC Committee (Internal or External)		
4	External monitoring (Graduation by PRI (Zila Parishad)/ Rogi Kalyan Samitis	<input type="checkbox"/> Yes <input type="checkbox"/> No	
5	Availability of Standard Operating Procedures (SOP) / Standard Treatment Protocols (STP)/ Guidelines (Please provide a list)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
<b>IX</b>	<b>Finance</b>		
1	Annual budget allocated		
	Drugs		
a.	Cancer		
b.	DCS		
2	User charges		
a.	Consultation (annual visits for each NCD)		
b.	Diagnosis For each NCD		
c.	Medicines For each NCD		
3	No. of patients covered under CMCHIS		
a.	Cancer		
b.	DM		
c.	CVDs		
d.	Stroke		

Amount of CMCHIS annual sub- scription by TN state govt	980 cr
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Table 13. Gaps in public healthcare facilities at Secondary Level: Tamil Nadu (N=17)

S No	Variables	Chennai N=2	Cuddalore N=9	Madurai N=2
1	NCD screening	Confirmatory Cancer screening are done at tertiary level hospitals.	Confirmatory Cancer screening are done at tertiary level hospitals.	Confirmatory Cancer screening are done at tertiary level hospitals.
2	Diagnostic services	-18/23 NCD diagnostic services available -need to upgrade Lab equipments -Lipid profile-outsourced. -Endocrinology outsourced	-16/23 of NCD services available - need to upgrade Lab equipments -Lipid profile outsourced -Mammogram- outsourced -Doppler-outsourced -Laser for diabetic retinopathy-outsourced .	-19/23 of NCD diagnostic services available -Exotic biochemistry outsourced . -Exotic haematology - outsourced -Endocrinology - outsourced -HIV/HBV/HCV/CMV viral load- outsourced.
3	Surgeries	NCD related surgeries-outsourced	NCD related surgeries-outsourced	complicated surgical procedures-outsourced
4	Inpatient services (IPD)	Facility is not available for cancer and stroke patients. They are referred to private cancer hospital or tertiary care hospitals in Chennai	Cancer patients are referred to private cancer hospital or tertiary care hospitals.	Cancer patients are referred to private cancer hospital or tertiary care hospitals.



5	Facilities for critical subjects	NCD patients are referred to tertiary care hospitals	More ICU/CCU beds are needed	None
6	Man power	<ul style="list-style-type: none"> <li>• More specialist doctors are needed</li> <li>• More NCD staff nurses needed</li> <li>• Need for Data entry operators</li> </ul>	<ul style="list-style-type: none"> <li>• More specialist doctors are needed</li> <li>• More NCD staff nurses needed</li> <li>• 3,500 patients attend OPD. All not-screened for NCD due to limited man-power.</li> </ul>	<ul style="list-style-type: none"> <li>• More NCD staff nurses needed</li> <li>• Need of NCD counsellors</li> <li>• Need for separate Statistics data entry operators</li> </ul>
7	Physical infrastructure	<ul style="list-style-type: none"> <li>• fair state</li> </ul>	<ul style="list-style-type: none"> <li>• fair state</li> </ul>	<ul style="list-style-type: none"> <li>• fair state</li> </ul>
8	Equipment	<ul style="list-style-type: none"> <li>• 22/24 equipment available</li> <li>• At few facilities BP machine were not calibrated</li> <li>• Equipment maintenance require AMC</li> </ul>	No gap	<ul style="list-style-type: none"> <li>-No gap</li> <li>- Equipment maintenance require AMC</li> </ul>
9	General drugs	28/38 of drugs available	28/38 drugs available	34/38 of drugs available
10	Cancer medicines	0/21 cancer drugs available.( only	1/21 cancer drug available. (Only ta-	11/21 of cancer drugs available; rest are out-

		methotrexate available at one facility)	moxifens available at one facility).	sourced.
11	Laboratories	<ul style="list-style-type: none"> <li>need to upgrade Lab equipments with more equipments</li> <li>Pathology tests are not done</li> </ul>	<ul style="list-style-type: none"> <li>need to upgrade Lab equipments with more equipments</li> <li>PAP smear not done</li> </ul>	<ul style="list-style-type: none"> <li>need to upgrade Lab equipments with more equipments</li> <li>Cell counter is out of order</li> <li>Biochemistry analyser out of order</li> <li>HIV/HBV/HCV viral load facility is not available for dialysis patients.</li> <li>HBV/HCV/CMV ELISA kits are not available in the facilities.</li> </ul>
12	Lab QC	<ul style="list-style-type: none"> <li>Need for regular EQUAS/IQA</li> <li>Technical audit not done</li> </ul>	Need for regular EQUAS/IQAS i	No gap
13	Finance	<ul style="list-style-type: none"> <li>financial constraints</li> </ul>	financial constraints	financial constraints
14	Budget for NCD drugs and reagents	No separate budget	No separate budget	No separate budget
15	Other	Water purification system for drinking water not available.	HMIS not fully functional, Wifi connectivity issues.	No gaps

Table 14. Gaps in healthcare facilities at Sub District Hospital Level: Tamil Nadu

S.No	Variables	Chennai (n=1)	Cuddalore (n=2)	Madurai (n=3)
1	NCD Screening services	Cancer screening not done	Cancer screening not done	NCD screening not done
2	Diagnostic services	-17/23 NCD diagnostic services available -Labs not well equipped	-9/23 NCD diagnostic services available -Labs not well equipped	-16/23 NCD diagnostic services available -Labs not well equipped
3	IPD services	Not for NCD patients	Not for NCD	Not for NCD
4	Surgery facilities	Not for NCD patients	Not for NCD	Not for NCD
5	Facilities for Critical services (ICU/CCU/NICU)	not available	not available	not available
6	Laboratories	-Laboratories are not well equipped	-Laboratories not well equipped	-Laboratories are not well equipped -Semi autoanalyser not available -Bio-safety hood required in handling TB specimens and other infectious specimens.
7	Transport facilities	not available	not available	not available
8	Manpower	-Lack of specialist doctors for NCD -Lack of NCD staff	-Lack of specialist doctors for NCD -Lack of NCD staff	-Lack of specialist doctors for NCD -Lack of NCD staff nurses -Data entry operators not available
9	Infrastructure	No gaps	No gaps	-Waiting room for patients not available. -cleanliness fair
10	Equipment	16/24 available	13/24 available	-14/24 available -BPMD apparatus never calibrated -Difficulties in getting equipment repaired. -Digital x ray is not available -USG machine is not available -Cardiac ultrasound is not available -Digital foetal monitor is not available -Glucometer not available

11	General drugs	19/38 available	27/38 available	31/38 available
12	Indicative drugs for cancer	not available	not available	not available (except methotrexate)
13	Lab Quality control	None	None	ISO certification for equipment not done
14	Finance	Budget inadequate	Budget inadequate	Budget inadequate
15	Budget for NCD drugs and reagents	Not available	Inadequate	Inadequate
16	Other	water purification system is not available	-Stationary for NCD not available -Computer system for HMIS data entry not available	laboratory conditions not good

Table 15: Gaps in healthcare facilities at Primary Health Care (PHC)/Urban Health Centres (UHC) Level: Tamil Nadu (N=14)

S.No		Chennai N=7	Cuddalore N=5	Madurai N=2
1	NCD Screening services	Cancer screening not done	Cancer screening not done	Cancer screening not done
2	Diagnostic services	17/23 NCD diagnostic services available	8/23 NCD diagnostic services available	8/23 NCD diagnostic services available
3	IPD services (NCD)	not available	not available	not available
4	Surgery facilities (NCD)	not available	not available	not available
5	Admission to critical services	not available	not available	not available
6	Laboratories	-Diagnostic kits not available -Laboratories not well equipped	-Laboratories not well equipped -Reagents and kits are not provided on timely basis. -Semi-auto analyser not available -Autoclave not available	-Laboratories not well equipped.
7	Transport facilities	not available	not available	not available
8	Manpower	5/15 available	-7/15 available -lack of NCD staff nurses	6/15 available
9	Infrastructure	-Fair -Power backup not available	-Fair -Water purification system not available	-Fair

10	Equipment	-11/24 available -BP machines calibrated only when they are out of order.	-14/24 available -Difficulty in getting equipment repaired.	-14/24 available
11	General drugs	18/38 available	18/38 available	17/38 available
12	Indicative drugs for treatment of cancer	not available	not available	not available
13	Quality control	EQAS is not done	-ISO certification for equipment not done -Internal QC not done -External monitoring not done	-ISO certification for equipment not done -EQAS not done -SOP/ STP not available -External monitoring not done
14	Finance	No gap	Delay in release of budget	No gap
15	Budget for NCD drugs and reagents	Separate budget for NCD not available.	Budget allocated for NCD reagents and drugs inadequate	Budget allocated for NCD reagents and drugs inadequate.
16	Other	None	-more data entry terminals needed for HMIS systems -server connectivity big issue -Overcrowding. More NCD clinics are needed -Stationary for NCD not available. -Tele-communication services for follow-up of cases are needed for NCD nurses.	None