स्वास्थ्य एवं
परिवार कल्याण मंत्रालय
MINISTRY OF
HEALTH AND
FAMILY WELFARE

सत्यमेव जयते

GOVERNMENT OF PUDUCHERRY
புதுச்சேரி அரசு

PUDUCHERRY

STATE ACTION PLAN ON CLIMATE CHANGE AND HUMAN HEALTH







National Centre for
Disease Control
Government of India

National Programme
on Climate Change
and Human Health

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2022-27

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Table of Contents

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The State Action Plan on Climate Change and Human Health for the UT of Puducherry was prepared by the Directorate of Health and Family Welfare Services, Government of Puducherry. The document has been prepared with the technical assistance provided by National Programme on Climate Change and Human Health (NPCCHH) division, National Centre for Disease Control, New Delhi.

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Dr. Manimozhi. S, M.D.,
State Nodal Officer, NPCCHH,
Puducherry

PART I

Climate Change and its Health Impacts

CHAPTER 1
Introduction

Climate change is defined as: *"a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods."* It affects social and environmental determinants of health like clean air, safe drinking water, sufficient food, and secure shelter.

Climate change may negatively affect human health in several ways, but the most commonly experienced are increased frequency and intensity of heat waves leading to a rise in heat-related illnesses and deaths, increased precipitation, floods, droughts, and desertification leading to loss of lives. High temperature is known to increase the level of 'ground level ozone' and other 'climate-altering pollutants' other than carbon dioxide, which further exacerbate cardio-respiratory and allergic diseases and certain cancers. Besides these, there is an increase in the transmission and spread of infectious diseases, changes in the distribution of water-borne, food-borne, and vector-borne diseases, and effects on malnutrition.

The *United Nations Framework Convention on Climate Change (UNFCCC)* came into force on 21st March 1994. Since then, many steps have been initiated to reduce the effect of climate change at meetings like "Rio Convention 1992", *Kyoto protocol 1997*", "*Male' Declaration 1998*", "*Convention of Parties*", "Cancun Agreement 2010", " *Durban Platform 2011*", and "Nationally Determined Contributions (NDCs)" at Conference of Parties 21.

India is a signatory to the "*Male' Declaration*", wherein the need to strengthen the health sector has been identified so as to make it climate resilient. According to Male' Declaration, it is desired that healthcare facilities should be prepared and be made climate-resilient, particularly to be able to withstand any climatic event, and that essential services such as water, sanitation, waste management, and electricity are functional during such events. Further, to achieve resilient healthcare services, the health department has to undertake measures to initiate the greening of the health sector by adopting environment-friendly technologies and using energy-efficient services.

Initiatives undertaken by the Government of India, to institutionalize climate change-related initiatives are the identification of the Ministry of Environment, Forest & Climate Change (MOEF&CC) as the nodal ministry, formulation of National Environmental Policy 2006 and the Formulation of Prime Minister's Council on Climate Change for matters related to Climate Change.

MoEFCC developed National Action Plan on Climate Change with eight missions. Later on, four new missions (including Health Mission) were identified. The *Health Mission* aims to reduce climate-sensitive illnesses through integration with other missions under National Action Plan for Climate Change (NAPCC) as well

as through programmes run by various ministries. As a follow- up action, the Ministry of Health and Family Welfare (MoHFW) constituted a National Expert Group on Climate Change & Health (NEGCCH) to prepare National Action Plan on Climate Change and Human Health (NAPCCHH) and recommend strategies for indicators, mitigation, capacity building, etc. National Centre for Diseases Control (NCDC) is identified as the 'technical nodal agency' by MoHFW for the proposed National Mission on Health.

Under this programme, the states and the union territories were encouraged to develop state-specific action plans on climate change and human health. In this regard, he Puducherry Climate Change Cell (PCCC), was established under the National Mission for Strategic Knowledge on Climate Change (NMSKCC). PCCC plays a pivotal role in the preparation and implementation of the State Action Plan for Climate Change and Human Health (SAPCCHH) in the U.T. of Puducherry. It is also responsible for facilitating the line departments in mobilizing climate funds for the implementation of various mitigation and adaptation measures. Besides, the Cell plays a key role in integrating the scattered knowledge base on climate change in the U.T. and making it available on one platform. Capacity building and knowledge dissemination on climate change at the individual, institutional, and systemic levels are other important activities.

The impact of climate change on the health needs to be taken care of as Puducherry is at a high risk of experiencing climate-related illnesses. The State Action Plan on Climate change and Human Health, prepared for Puducherry for five years i.e. 2022 to 2027 under NPCCHH, focuses on the plan of action to adapt to these climate vulnerabilities in the state.

CHAPTER 2
Climate Vulnerability

The Union Territory of Puducherry lies in the southern part of the Indian Peninsula and has a distinct demographic profile. Puducherry spreads over an area of 297.5 km^2 and consists of four small geographically unconnected districts. Puducherry, Karaikal, and Yanam districts lie on the Bay of Bengal, and Mahe district lies on the Arabian Sea. The areas of Puducherry district and Karaikal district are bound by the state of Tamil Nadu, while Yanam and Mahe districts are enclosed by the states of Andhra Pradesh and Kerala respectively.

As per the census 2011, Puducherry has a total population of 12.48 lakhs, of which the males and females are 6,12,511 and 6,35,442 respectively.

The coastal region of Puducherry is one of the most vulnerable areas as severe tropical cyclones originate in the surrounding regions, resulting in a higher risk of climate-sensitive illnesses and extensive loss of damage and property due to natural hazards linked with climate change. Yanam area, adjacent to East Godavari district (Andhra Pradesh) with a long coastline is prone to cyclones and depressions.

Karaikal, part of the fertile Cauvery delta is situated on the East Coast of Tamil Nadu. Yanam skirted on the east and south by the Godavari River lies near the state boundary of Andhra Pradesh. Mahe bounded in the southwest by the Arabian Sea and in the north by the Ponniyam River lies on the West Coast of the country, near the state boundary of Kerala and Puducherry.

Vital Statistics of Puducherry

Date of formation of UT /de jure transfer	16.08.1962
Area (including all regions)	492 sq. km
Total Population (Census 2011)	946600
Male	466143
Female	480457
Population Density	3232 per sq. km
Sex Ratio	1029 females per 1000 males
Literacy Rate	85.4
Per capita income	Rs. 11677/-
Average Rainfall	2293.5 mm
Temperature	Max. 31.90°C ; Min. 24.50°C
Climate	Tropical

Karaikal District

Karaikal is situated on the **east coast of India**, in the deltaic region of Cauvery and experiences tropical maritime type of climate and moderate rainfall. Karaikal has an annual average rainfall of about 126 cm, 68% of which occurs during October to December. November receives highest rainfall, accounting for about a third of the annual total. The range of variation of annual rainfall is wide. Drought conditions may be experienced in case of annual rainfall less than 75%, once in three years on an average. In a year,there are on an average about 55 rainy days, i.e. days with rainfall of 2.5mm or more.

The level of temperatures in Karaikal is about the same as in Puducherry. December and January are the cool months with the maximum temperature at about 28ºC and the minimum at about 23ºC. Minimum temperature as low as 16ºC may sometimes be recorded.

Statistical data-Karaikal

Karaikal District	161 sq. km.
Capital	Puducherry
Karaikal District Population (2011 Census)	
Total Population	2,00,222
Male	97809
Female	1,02,413
Population Growth Rate	17.29%
Population Density	1,252 person per sq. km
Sex Ratio	1048
Literacy Rate(2011)	87.1%
Average Rainfall	1455 mm
Temperature	Max. 31.90°C; Min. 24.50°C
Climate	Tropical

Mahe District

Mahe is a tiny point in the geographical map of Kerala, 630 km away from Pondicherry. This former French Town covers an area of 9 sq. km, with over 36,000 inhabitants and is situated on the West Coast of the Indian Peninsula, just between Badagara and Thalassery and is a busy trade centre.

Vital Statistics

Particulars	MAHE	YANAM
Area	8.76 sq. km	30 sq. km
Population(Census 2011)	Male: 19143 Female: 22673 Total: 41816	Male: 27301 Female: 28325 Total:55626
Density of Population	4773 per sq. km	3,272 per sq. km
Average rainfall	3375 mm	1094 mm
Temperature	Max-32°C, Min-22°C	The average annual temperature is 27.8°C
Climate	Moderate	Tropical

Yanam District

Yanam is at a distance of 870 km, situated on the East Coast of the Indian Peninsula, bounded on all sides by the East Godavari District of Andhra Pradesh. The town of Yanam lies on the spot where the River Coringa (Atreya) branches off from Gauthami into two parts. The entire region, consisting of Yanam town and six villages is treated as a Municipality for purposes of local administration. The region, which covers an area of 30 sq. km, has a population of 55,626, according to the 2011 census.

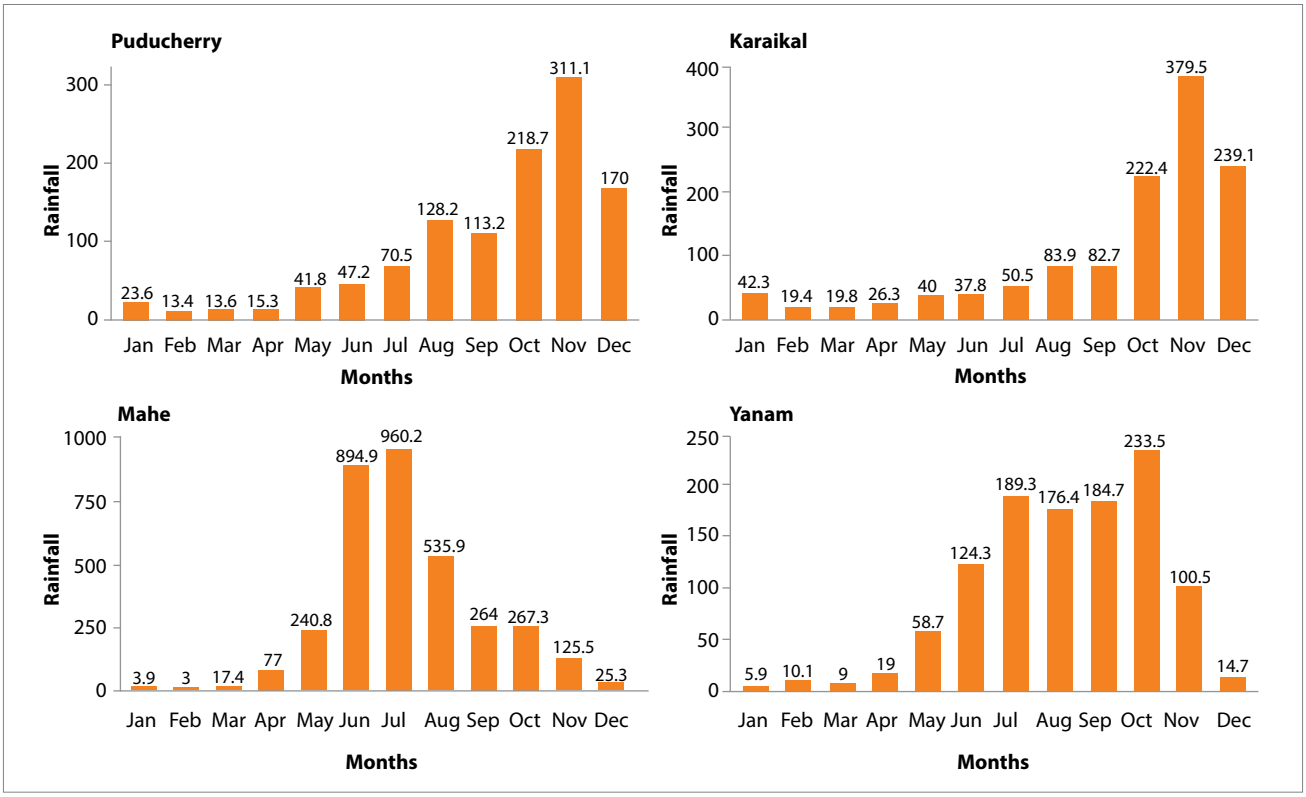
Climate Data of the State Climate and Weather Extremes

Puducherry region experiences a hot and tropical climate characterized by a daily range of temperature, humid weather, and moderate rainfall. There is no clear cut demarcation of seasons. Summer season is considered to fall between March to June and December to February are cooler months.

Rainfall analysis

The average annual rainfall for the period is 1234 mm. However, the quantum of normal rainfall is fluctuating. The Puducherry region gets its rainfall from the Southwest monsoon between June to September and the Northeast monsoon between October to December. About 50% of the total rain is concentrated over the two months of October-November. The variability of rainfall is fairly large and that of seasonal/monthly rainfall is still larger. In the Puducherry region, normal rainfall occurs once in three years, slight deficit/excess rainfall occurs once in five years and large excess/large deficit rainfall occurs once in hundred years.

Figure 1: The spatial and temporal variations of mean monthly rainfall from 1951-2016 (mm)



The monthly climatology of rainfall over Puducherry UT is shown in Figure1. Higher rainfall occurs from May to November during the Southwest monsoon season. However for the Northeast Monsoon season, maximum rainfall occurs in months of November and minimum rainfall in February over Puducherry and Karaikal. Mahe district receives maximum rainfall during July and minimum in February. Yanam district receives maximum rainfall during October and minimum in January. The 1951-2016 long-term mean annual rainfall total is 1166 mm, 1243 mm, 3415 mm, and 1126 mm over Puducherry, Karaikal, Mahe, and Yanam respectively. The monthly maximum mean temperature is in May in the UT except for the Mahe district, which experiences in April.

Rainfall in Puducherry shows low variability with both positive and negative trend. The assessment of rainfall trends and consecutive wet day's spells indicates that the amount of rainfall in Puducherry is declining. A positive trend in the annual rainfall, consecutive wet days and consecutive wet day's spells over the Karaikal is observed, but a negative trend is seen during monsoon seasons (months of June-July-August-September and October-November-December). Decreasing trend in annual, southwest monsoon rainfall, heavy rainfall events, and consecutive wet day's spells is observed over Mahe, however, a small increasing trend during the Northeast monsoon season is observed for Mahe. Annual and southwest monsoon has shown an increasing trend over Yanam. There is no trend in heavy rainfall days, consecutive wet days and spells over Yanam.

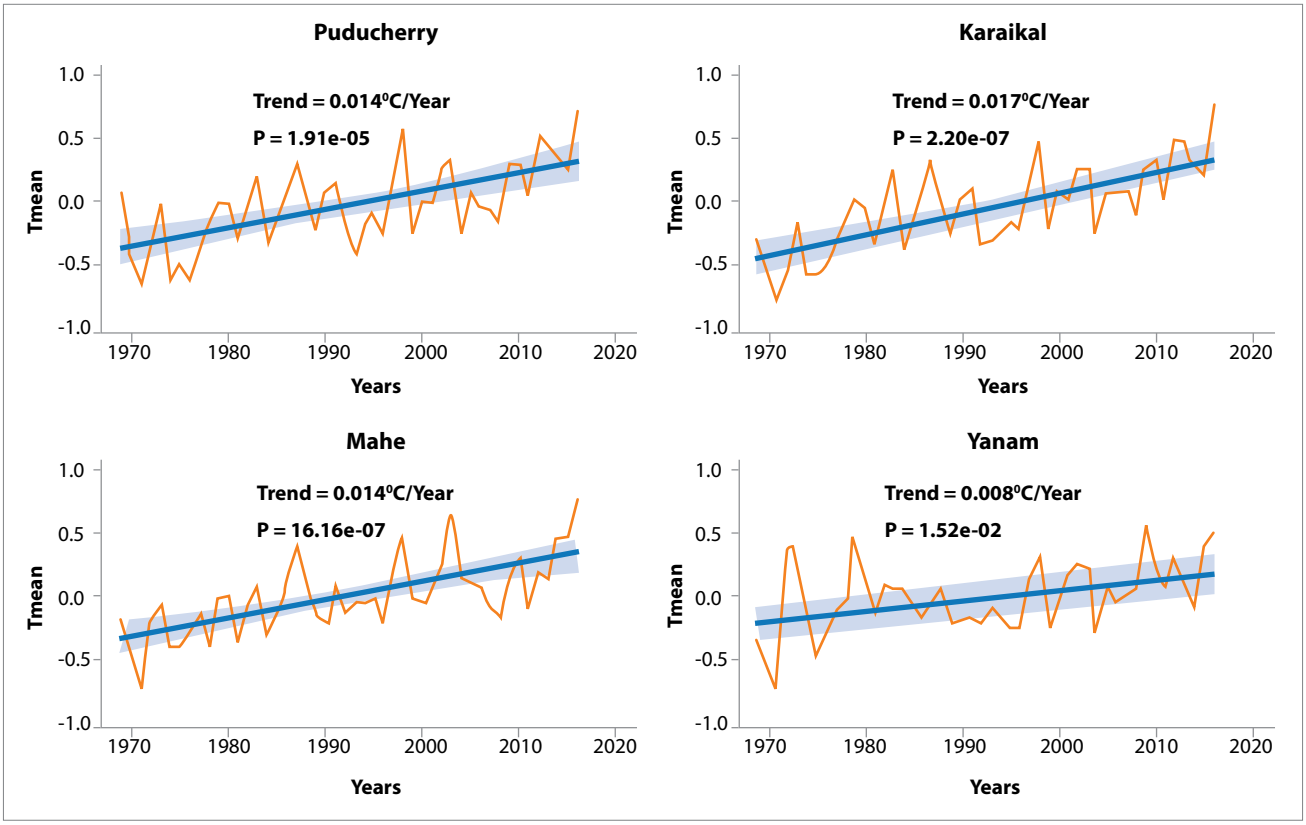
Temperature

The winter and summer months are not very severe. The temperature ranges from a minimum of 17°C to a maximum of 41°C. High variation is observed in the lower limit of minimum temperature during the months of July to December, similarly, there is significant variation in the upper limit of minimum temperature during the months of June and October.

Temperature Analysis

The trends indicate that the annual temperatures (maximum, minimum, and mean) and number of hot days (90th percentile) over Puducherry has constantly increased over the time period from 1969-2016. Annual number of events in very hot days (95th percentile) category shows increasing trends for all districts of Puducherry UT except Yanam. Annual cold nights at Yanam district show positive trends, while all the other districts show decreasing trends.

Figure 2: Annual mean temperature anomalies from 1969-2016



Sea-level rise

In 2014, global sea level was 2.6 inches above the 1993 average in the satellite record. Indian Ocean is most vulnerable for climate change induced sea-level rise. Sea-level rise in the northern Indian Ocean is 3.3 mm /year during 1993–2015, similar to the global mean sea-level rise (Swapna et al. 2017). Permanent Service for Mean Sea Level 1(PSMSL) is the global data bank for long- term sea level change information from tide gauges and bottom pressure recorders. Based on PSMSL data from 1916-2010, Chennai shows a positive trend of 0.39 mm/year and Vishakhapatnam shows a positive sea level rise of 0.73 mm/year during 1937-2009.

Humidity

The humidity is comparatively higher in Puducherry, ranging from 65% to 75% in general and becoming as high as 83%.

Solar Radiation

Solar radiation intensity (from 06.00 hrs. to 19.00 hrs.) during winter ranges from 0.07 to 62.66 Cal/cm^2/hr, during hot weather ranges from 0.92 to 71.87 Cal/cm^2/hr, during the southwest monsoon, it ranges from 1.00 to 59.46 Cal/cm^2/hr and during north-east monsoon it ranges from 0.10 to 44.43 Cal/cm^2 /hr.

Sunshine Hours

During winters, the average sunshine hours is 10.2 hrs. During the hot weather period, it decreases from 10.3 hrs to 9.5 hrs, during the southwest monsoon and the northeast monsoon periods, the average sunshine hours is about 7.1 hrs.

Cyclonic Storms/Severe Cyclonic Storms (CS/SCS)

Puducherry and the adjoining areas are affected by Cyclone/Severe Cyclones, which originate from the Bay of Bengal and move in a westerly northwesterly direction. From the frequency point of view there is no possibility of CS/SCS during January and February as well as from June to September. During the Northeast monsoon period, the maximum number of cyclones/severe cyclones has been 6 in frequency in the month of November followed by 2 in December and April and one each during March, May, and October. The highest estimated wind speed in the order of 189 km/hr and the lowest estimated wind speed in the order of 83 km/hr have hit Puducherry in the past.

Concluding, Puducherry and its neighborhood falls under rainfall surplus category with high temperatures during the months of May and June. The areas are chiefly benefited from the Northeast monsoon, contributing about 62% of the total amount of rainfall. It is also located close to the cyclone-prone zone of the East coast i.e. Cuddalore. The maximum temperature in the region varies from 28.2°C to 36.6°C and the monthly potential Evapo-transpiration varies from 92 mm to 183 mm.

Vulnerability Assessment

A health vulnerability assessment for climate change was conducted for Puducherry UT, aimed to develop a composite health vulnerability index for climate change in Puducherry and to compare the existing differences between the districts. The findings of the assessment revealed that the performance of districts showed wide variation under different components.

The district-level analysis of exposure indicators showed Mahe (0.57; Rank 1st) and Puducherry (0.48; Rank 2nd) as the most vulnerable districts and climate hotspots requiring more attention in terms of health action plans and local planning.

Karaikal (0.63) and Puducherry (0.50) were found to be the most vulnerable districts in terms of sensitivity, reflecting the poor health status of the population in terms of women health, child health, status of CSDs and other health-related indicators. This requires the need to establish early warning systems for climate-sensitive illnesses to face local challenges in these districts. The district-level analysis showed Karaikal (0.53) and Yanam (0.44) to be the most vulnerable districts considering overall vulnerability index.

CHAPTER 3

Climate Sensitive Diseases Prevalent in Puducherry

Healthcare Infrastructure

District-wise profile of government health institutions in Puducherry is mentioned in the table below (details in Annexure A)

Sl. No	Name of District	Number of Medical college (Govt./Pvt.)	Number of district/ civil hospital	Number of rural/ block/ taluka/CHC hospital	Number of PHCs	Number of Sub-centers	Number of other health research centre or national institutes
1	Puducherry	Govt-1 Private-6	5	2	30	55	JIPMER VCRC
2	Karaikal	Private 1	1	1	13	17	JIPMER
3	Mahe	-	1	1	2	4	-
4	Yanam	-	1	-	1	5	-

Climate-Sensitive Illnesses

Following are the climate-sensitive diseases prevalent in the UT:

- Acute Respiratory Illnesses attributed to Air Pollution
- Heat-related illnesses
- Vector-Borne Diseases and Zoonotic Diseases
- Water and Food-Borne Diseases
- Nutrition-related diseases
- Allergic Diseases
- Cardio-pulmonary Diseases
- Mental Health support
- Specific illnesses due to sea and coastal area
- Extreme weather events (floods, cyclones, drought)

Vulnerable Population Details

In Puducherry, the following population groups are identified to be more vulnerable to the climate change and its impacts. The district wise profile of the vulnerable population is indicated in the table below:

Vulnerable population - UT of Puducherry (2021)

Sl. No.	Category of vulnerable population	Total count for the district (2021)				
		Gender	Puducherry	Karaikal	Mahe	Yanam
1	Total Population	Male	506774	110237	22305	29021
		Female	512230	112910	23297	29815
2	Pregnant women		9800	500	350	675
3	Children's below 5 years of age	Male	32786	6886	1123	2047
		Female	32474	6875	1102	2073
4	Adolescent Population	Male	76073	18743	2755	4353
		Female	76173	19162	2679	4342
5	Elderly people age more than 60 years	1,55,000				

IDSP Data Puducherry: 2017 and 2018

Further, disease specific details i.e. recorded cases of the prevalence of various climate-sensitive diseases in Puducherry is mentioned in the table below:

Puducherry	No. of Positive Cases	
	2017	2018
Dengue	4568	588
Chikungunya	23	361
H1 N1	167	321
Other Influenza	49	50
JE	0	5
Typhoid Fever	658	279
Viral Hepatitis A	12	3
Viral Hepatitis E	6	1
Scrub Typhus	15	45
Leptospirosis	18	7
Cholera	0	0
Malaria	60	54
Anthrax	0	0
Acute Respiratory Infection (ARI)/Influenza like Illness (ILI)	1003742	1055792

Water and Food Borne Diseases

Illnesses due to contaminated water and food are usually seen following flood, drought, and other such extreme hazard events. Water-borne diseases such as typhoid, hepatitis, dysentery, and others caused from micro- organisms such as Vibrio vulnificus and Vibrio cholera, E.Coli, Campylobacter, Salmonella, Cryptosporidium, Giardia, Yersinia, Legionella are climate- dependant infectious diseases. The increase in temperature is seen to be associated with increased survival and abundance of micro-organisms. The decreased precipitation levels and drought situations result in decreased availability of safe water, reuse of wastewater, contamination of water sources, transmission from vertebrate to human or human to human, etc. Flooding causes contamination of water sources as well as disruption of the sewage disposal system. Further contributors are population displacement, overcrowding, poor sanitation and hygiene, subsequent faeco-oral contamination, and spread of pathogens etc.

Diarrhoea cases between April 2019 to March 2020

Diseases	Puducherry	Karaikal	Mahe	Yanam
Acute Diarrheal Diseases	69881	16986	3817	2746

Water and Food-Borne diseases 2019-21

Puducherry district						
Sl. No.	Year	Typhoid	Hepatitis A	Hepatitis E	Cholera	Shigella
1	2019	44	16	2	0	32
2	2020	1	4	4	4	13
3	2021	4	0	0	0	2
Karaikal district						
1	2019	3	0	0	0	0
2	2020	9	0	0	0	0
3	2021	8	0	0	0	0
Mahe district						
1	2019	0	0	0	0	0
2	2020	0	0	0	0	0
3	2021	0	0	0	0	0
Yanam district						
1	2019	107	0	0	0	0
2	2020	42	0	0	0	0
3	2021	11	0	0	0	0

Nutrition- Related Illness

Climate variability and extreme weather events affect food quantity and quality by reducing production, poor storage, pathogen infestation, disrupted supply chain, and hike in market prices. **Malnutrition** and consequent disorders, like retarded child growth and development have been identified as one of the health threats by the Working Group-II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Climate change results in food insecurity, by impacting food availability, food accessibility, food utilization, and food system stability. Drought occurrence diminishes crop yield, dietary diversity, supply chain disruption, increase in market prices, and also reduction in animal and aquatic products. These factors reduce overall food consumption, and may therefore lead to macro as well as micronutrient deficiencies.

Details indicating the prevalence of nutrition-related illness in Puducherry is mentioned in the table below:

Sl. No.	Particulars	NFHS 5	NFHS 4
1	Under 5 years stunted	20.0	23.7
2	Under 5 years wasted	12.4	23.6
3	Under 5 years underweight	15.3	22.0
4	Pregnant women with anemia	42.5	26.0
5	Anemia in children 6-59 between months	64.0	44.9

Allergic Diseases

Climate variability and frequent change in weather and extreme events have been linked to contributing to increasing allergic disorders. The recorded cases of these illnesses in Puducherry is mentioned in the table below:

Puducherry District Hospital Data	2018	2019
Eczema	1492	904
Dermatitis	2107	1617

Climate change and its associated incidents also influence various illnesses including respiratory tract infections like asthma, rhino-sinusitis, chronic obstructive pulmonary diseases (COPD), respiratory viral diseases (Avian Influenza) & circulatory collapse, posing danger to cardiac patients. The cited reasons are poor air quality, high ozone depletion levels, dust storms, extreme heat, desertification, alteration of allergens, change in timing and duration of survival and transmission cycle of respiratory virus, and alteration in bird migration.

Cardio-respiratory illnesses in the state

Sl. No.	Particulars	2018		2019	
		No. of IP cases	No. of Deaths	No. of IP cases	No. of Deaths
1	COPD	310	2	248	3
2	Asthma	488	8	474	3
3	Acute Respiratory infection	552	25	399	11
Total		**1350**	**35**	**1121**	**17**

Mental Health Illness

Non-communicable diseases and mental disorders have been found to be closely associated with variation in climate, exposure to various types of pollutants, and type of occupation.

Morbidity statistics related to prevalence of Mental Health diseases in Puducherry

District	2018	2019
Puducherry	28079	30250

Zoonotic Diseases:

Effect of variation in climate has been well established for illnesses which are spread through vectors or which are transmitted from animals to humans.

The incidence of common Zoonotic Diseases in Puducherry UT has been very low in the recent years.

Pondicherry district			
Sl. No.	**Year**	**Leptospirosis**	**Scrub typhus**
1	2019	5	40
2	2020	14	44
3	2021	11	55

*Karaiakal, Mahe and Yanam- Nil cases

CHAPTER 4
Vision, Goal and Objectives

Vision: Strengthening of healthcare services for all the citizens of the state especially vulnerable population i.e. children, women, elderly, tribal, and marginalized populations against climate- sensitive illnesses.

Goal: To reduce morbidity, mortality, injuries, and health vulnerability due to climate variability and extreme weather.

Objective: To strengthen healthcare services against the adverse impact of climate change on health.

Specific Objectives

Objective 1: To create awareness amongst the general population (vulnerable community), health-care providers, and policy makers regarding the impacts of climate change on human health.

Objective 2: To strengthen the capacity of the healthcare system to reduce illnesses/diseases due to variability in climate.

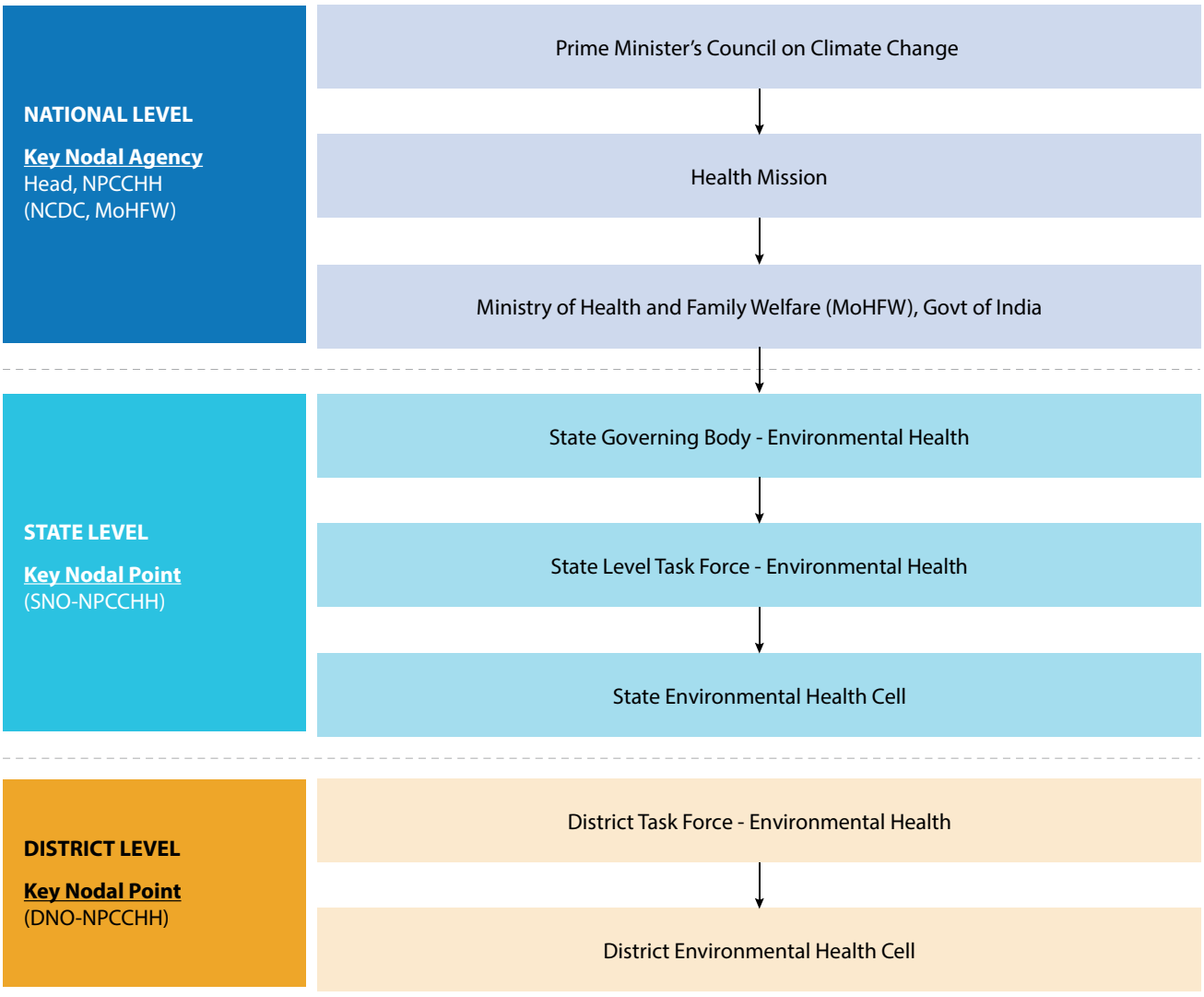
Objective 3: To strengthen health preparedness and response by performing situational analysis at national/state/district/and below district levels.

Objective 4: To develop partnerships and create synchrony/synergy with other missions and ensure that health is adequately represented in the climate change agenda in the country in coordination with the Ministry of Health & Family Welfare.

Objective 5: To strengthen state research capacity to fill the evidence gap on impact of climate change on human health.

CHAPTER 5
Organisational Structure

ORGANISATIONAL STRUCTURE



A. State Level - Governing Body - Environmental Health

The state level governing body for policy level decision is working under Chairpersonship of Honourable State Health Minister. The other members are as follows:

Honourable State Health Minister	Chairperson
Principal Secretary (Health)	Vice Chairperson
Director Health Services/Head of Health System	Member Secretary
Mission Director-National Health Mission	Member
Principal Secretary, Ministry of Revenue (Disaster)	Member
Principal Secretary, Ministry of Agriculture	Member
Principal Secretary, Ministry of Water and Sanitation	Member
Principal Secretary, Ministry of Transport	Member
Principal Secretary, Ministry of Animal Husbandry	Member
Principal Secretary, Ministry of Environment and Forests	Member
Principal Secretary, Ministry of Women and Child Development/Social Justice	Member
Principal Secretary, Ministry of Science and Technology/Earth Sciences	Member
Principal Secretary, Ministry of Education	Member
Principal Secretary, Ministry of Human Resource Development	Member
Principal Secretary, Ministry of Public Works Department	Member
Principal Secretary, Ministry of Power	Member
Principal Secretary, Ministry of Urban Development (Municipalities)	Member
Principal Secretary, Ministry of Finance	Member
Principal Secretary, Ministry of Law	Member
Principal Secretary, Ministry of Food and Civil Supplies	Member
Principal Secretary, Ministry of Panchayati Raj	Member
Regional Director - Health & Family Welfare (GoI)	Member
Director Medical Education and Research	Member
State Nodal Officer- Climate Change	Member
Head – NAPCCHH, CEOH&CCH Division, NCDC	Member

Roles and Responsibilities

The Governing body is responsible to undertake the following:

1. Recommend strategies for mitigating the adverse effects of climate change on human health
2. Prepare an Action Plan for Climate Change and Human Health
3. Review epidemiological data on environmental health and climate change
4. Recommend strategies for monitoring and evaluation of health impacts due to climate change

5. Recommend coordination mechanisms with various stakeholders
6. Recommend means of financial assistance to states and other agencies working in the field of health and climate change
7. Recommend National Environmental Health Policy and Strategy
8. Any other matter as directed by MoHFW, Govt. of India.

B. State Level Task Force - Environmental Health

This task force is working under the guidance of the Principal Secretary (Health), working through the Directorate of Health Services (DHS). It is responsible for directly overseeing the implementation of the State Action Plan for Climate Change and Human Health (SAPCCHH). The State level Task Force has inter-ministerial members which are suggested as:

Principal Secretary (Health)	Chairperson
Mission Director-National Health Mission	Vice Chairperson
Director Health Services/Head of Health System	Member Secretary
Director/Chairperson - Department of Revenue (Disaster)	Member
Director/Chairperson - Department of Agriculture	Member
Director/Chairperson - Department of Water and Sanitation	Member
Director/Chairperson - Department of Transport	Member
Director/Chairperson - Department of Animal Husbandry	Member
Director/Chairperson - Department of Environment and Forests	Member
Director/Chairperson - Department of Women and Child Development/Social Justice	Member
Director, Meteorological department of State/UT	Member
Director/Chairperson - Department of Public Works Department	Member
Director/Chairperson – Department of Urban Development (Municipalities)	Member
Director/Chairperson -Department of Education	Member
Director/Chairperson - Department of Food and Civil Supplies	Member
Director/Chairperson - Department of Human Resource Development	Member
Director/Chairperson - Department of Power	Member
Director/Chairperson - Department of Finance	Member
Director/Chairperson - Department of Law	Member
Director/Chairperson - Department of Panchayati Raj	Member
Director/Chairperson - State Ground Water Board	Member
Head - State disaster Management Authority	Member
Environmental Engineer/Scientist from Ministry of Environment	Member

Chairperson, State Pollution Control Board	Member
Regional Director - Health & Family Welfare (GoI)	Member
Director Medical Education and Research	Member
State Nodal Officer - Climate Change	Member
Director, ICMR Institute/Centre (If any branch in the State/UT)	Member
State Surveillance Officer	Member
Head – NAPCCHH, CEOH&CCH Division, NCDC, MoHFW	Member
Head, NCDC Branch of the state	Member

The task force of the Environmental Health Cell coordinates with the Centre (MoHFW, NCDC) for the execution of the SAPCCHH. An **Environmental Health Cell** within the State Health Department has been formed and a **Nodal Officer** from the Health Department has been appointed. The State Level Structure of the Environmental Health Cell is as follows:

Structure at State/UT Environment Health Cell

Nodal Officer (Public Health Expert - State Health Department)	1
Consultant - Capacity building/Training/HR Management	1
Consultant - Environmental Health	1
Data Manager & Analyst	1
Secretarial Assistants cum Data entry Operator	1

Executive Members of EHC

State Nodal Officer - Climate Change	Chairperson
State Program Manager - NHM	Member
Additional Director Public Health/NCD	Member
Additional Director NVBDCP	Member
Additional Director Immunization/Family Welfare	Member
Additional Director Medical (Mental Health)	Member
State Surveillance Officer/Additional Director Epidemic	Member
Head, State Nutrition Bureau	Member
Consultant, SHSRC	Member
Additional Director, IEC/State Mass Media	Member
State Epidemiologist, IDSP	Member
State Veterinary Consultant	Member
Microbiologist, IDSP	Member

Roles and Responsibilities of the UT Environmental Health Cell

- Preparation and implementation of the State Action Plan for Climate Change and Human Health
- Conduct Vulnerability assessment and risk mapping for commonly occurring climate-sensitive illnesses in the UT
- Assessment of needs for healthcare professionals (like training, capacity building, etc.) and organise training, workshop, and meetings.
- Maintain state and district level data on physical, financial, and epidemiological profile for climate-sensitive illnesses
- Ensure convergence with NHM activities and other related programs in the state /district
- Monitor programme, review meetings, and field observations
- Timely issue of warning/alerts to health professionals and related stakeholders as well as the general public through campaigns or using mass media (electronic or printed)
- Social mobilization for preventive measures through the involvement of women's self-help groups, community leaders, NGOs, etc.
- Advocacy and public awareness through media (street plays, folk methods, wall paintings, hoardings, etc.)
- Conduct of operational research and evaluation studies for climate change and its impact on human health.

District Level

The DHS has appointed the District Medical Officer/Chief Medical Health Officer as the District Nodal Officer, Climate Change. A District Level Task Force has been constituted by the District Nodal Officer- Climate Change in consultation with the SNO-CC.

Structure of District Level Task Force- Environmental Health

District Collector	Chairperson
Dean – Govt. Medical College in the district/Head- Department of Community Medicine of the Medical College	Vice Chairperson
Chief Medical Officer/District Medical Officer/District Nodal Officer – Climate Change.	Member Secretary
District Surveillance Officer	Member
District Programme Manager - NHM	Member
District Head, Department of Revenue (Disaster)	Member
District Head, Department of Agriculture	Member
District Head, Department of Water and Sanitation	Member
District Head, Department of Transport	Member
District Head, Department of Animal Husbandry	Member
District Head, Department of Environment and Forests	Member

District Head, Department of Women and Child Development/Social Justice	Member
District Head, Department of Science and Technology/Earth Sciences	Member
District Head, Department of Education	Member
District Head, Department of Food	Member
District Head, Department of Human Resource Development	Member
District Head, Department of Public Works Department	Member
District Head, Department of Power	Member
District Head, Department of Finance	Member
District Head, Department of Law	Member
District Head, Department of Panchayati Raj	Member

The District Environmental Health Cell has been constituted by the District Nodal Officer - Climate Change in consultation with the SNO-CC, and has the following members:

Structure of District Environment Health Cell

District Nodal Officer- Climate Change	Chairperson
District Veterinary officer	Member
District Surveillance Officer/District Epidemic Officer	Member
District RCH officer/FW Officer	Member
District Epidemiologist	Member
District Microbiologist	Member
District Immunisation Officer	Member
District Training Officer	Member
Data Entry operator	Supporting staff

Roles and Responsibilities of the District Environmental Health Cell

- Preparation and implementation of District Action Plan for Climate Change and Human Health
- Conduct Vulnerability assessment and risk mapping for commonly occurring climate - sensitive illnesses in the district
- Maintain and update the district database of illnesses
- Assess needs of healthcare professionals and conduct sub-district/CHC level training/workshop and meetings for capacity building
- Ensure appointment of contractual staff and engage them in the assigned task of data management under the NAPCCHH
- Maintain district level data on physical, financial, and epidemiological profile for these illnesses

Community Health Centre Level

The CHC Level Structure is as under:

- Medical Superintendent (CHC Hospital): Chairperson
- Taluka Health Officer/Talukas Health Officer: Member Secretary
- Health Education Officer/Similar Post: Member
- Block Development Officer: Member
- Health Supervisor: Member

Health Facility Level (PHC)

At the health facility level, the responsibility for programme implementation lies with the Medical Officer (In-charge) of the facility. The existing machinery of NHM is utilised for the related activities. The Rogi Kalyan Samiti (RKS) is responsible for reviewing and monitoring the programme implementation at the health facility level. The ANM, ASHA, and Anganwadi workers are to assist in activities related to the implementation of action plan at the local level.

PART II

Health Action Plans on Priority Climate Sensitive Health Issues

CHAPTER 6

Health Action Plan on Air Pollution Related Diseases

Air pollution is a major environmental risk to health. The formation, transport, and dispersion of air pollutants is determined partly by climate and weather factors such as temperature, humidity, wind, storms, droughts, and precipitation and partly by human activities known to produce various air pollutants. It is thus logical to assume that climate change will influence the dynamics of air pollution. By reducing air pollution levels, states can reduce the burden of disease from stroke, heart disease, lung cancer, and both chronic and acute respiratory diseases, including asthma.

Types of Air Pollution:

1. Ambient (Outdoor) Air Pollution
2. Household (Indoor) Air Pollution

Ambient (Outdoor) Air Pollution

Ambient air pollution is defined as potentially harmful pollutants emitted by industries, households, cars, and trucks. Ambient (outdoor air pollution) in both cities and rural areas has caused 3.7 million premature deaths worldwide in 2012, as per the estimations. Air pollution also affects health by causing acid rain; eutrophication due to nitrogen oxides, emissions from power plants, cars, trucks, and other sources; haze; toxic effects on wildlife; ozone depletion; crop and forest damage etc. Over 4 million people die prematurely from illness attributable to the household air pollution from cooking with solid fuels. 3.8 million premature deaths annually have been reported from non-communicable diseases including stroke, ischemic heart disease, chronic obstructive pulmonary disease (COPD) and lung cancer and are attributed to exposure to household air pollution.

Prominent causes of Ambient Air Pollution

1. Pollution by automobiles
2. Industrial Emission
3. Municipal and agricultural waste sites and waste incineration/burning
4. Residential cooking, heating, and lighting with polluting fuels

Prominent causes of Household Air Pollution

1. Use of kerosene as fuel for cooking
2. Burning of waste, cow dung, coal

3. Household Activities- everyday activities such as heating, cleaning, painting, and decorating
4. Common household products such as cleaning sprays, paints, varnish, pesticides, grease, solvent removers, and aerosol sprays may contain harmful chemicals that pollute the air

Air Quality Index: Air Quality Index is a tool for effective communication of air quality status to people in terms, which are easy to understand. It transforms complex air quality data into a single number (index value), nomenclature, and colour.

AQI monitoring stations in Puducherry

1. Central Pollution Control Board (CPCB) - Nil
2. Puducherry Pollution Control Committee - 6
3. System of Air Quality and Weather Forecasting and Research (SAFAR) – Nil

The Puducherry Pollution Control Committee is monitoring and analysing the short-term and long-term behavior of air pollutants in three locations in the urban space of Puducherry under the National Ambient Air Quality Monitoring Program (NAMP) through manual methods using High Volume Samplers. The details of the three air pollution monitoring stations are provided below:

Sl. No.	Station Name	Location	Classification
1	LAD	Local Administration Department, Suffren Street, Puducherry Municipality, Puducherry.	Residential Zone
2	DSTE	Office of the Department of Science, Technology and Environment, Anna Nagar, Puducherry Municipality, Puducherry.	Commercial-cum-Residential Zone
3	PIPDIC	PIPDIC Industrial Estate, Mettupalayam, Oulgaret Municipality, Puducherry.	Industrial Zone
4	B. Ed college	Nehru Nagar, Karaikal	Residential Area
5	Kovilpathu	Govt. Tourist Home, Kovilpathu, Karaikal	Commercial Area
6	PPCL	Puducherry Power Corporation Limited, Polagam, TR Pattinam, Karaikal	Industrial Area

AQI of all cities in Puducherry UT falls within the Good to Satisfactory limits .There is no city in Puducherry with AQI above 200.

Sl. No.	District	Highest AQI value in the previous year (2021)	Reason for High AQI
1	Puducherry	319 (4th November, 2021)	The highest AQI was recorded on 4th November 2021. This may be attributed to the bursting of crackers as the festival of Diwali was celebrated on the date in the year 2021.
2	Karaikal	74 (4th November, 2021)	
3	Puducherry	124	
4	Karaikal	73	

Morbidity, Mortality and related statistics of air pollution

The recorded cases of morbidity and mortality due to illnesses caused by air pollution in the recent years are mentioned in the table below:

Adaptation Plan

Sl. No.	Health effects due to Air Pollution	2018	2019
1	ARI patients attending OPDs of District Hospital	7134	6837
2	ARI patients attending emergency department of the casualty of CHC/SDH/DH/MC	552	399
3	No. of deaths due to Heart Attack at DH/MC		
4	No. of patients admitted with stroke at DH/MC	170	187
5	No. of newly detected Lung cancer patients	7	4
6	No. of deaths due to Lung cancer	0	0
7	Skin illness like dermatitis, eczema at skin OPD	3599	2521
8	Eye irritation patients at Ophthalmology OPDs	2354	2543

a. IEC Campaign

The districts are aimed to create awareness through Information, Education, and Communication Activities (IEC) developed using communication materials such as posters, audios, videos, organizing public health events, and advisories related to air pollution based on locally and culturally acceptable messages.

The content for the IEC on air pollution-related issues is provided by the NPCCHH division. The state/UT is responsible for the translation of the content into local or regional language/s (Tamil and English). The role of districts is to utilize these materials and disseminate them at all levels including the common population, vulnerable communities, healthcare providers, and policymakers.

IEC Dissemination Plan for 5 Years (2022-27)

Sl. No.	IEC Content	Dissemination Plan	Time line	Budget (In Lakhs) for 5 Years				
				2022-23	2023-24	2024-25	2025-26	2026-27
1.	Posters	2 Posters for Healthcare facilities in all districts	July - September	0.30 Puducherry	0.40 Puducherry & Karaikal	050 All districts	0.55 All districts	0.6 All districts
2.	Audio	Social Media (Facebook, Instagram, Twitter etc.)	August - October					
3.	Videos							
4.	GIF's							
5.	Public Health Advisories	1 in all the Healthcare facilities	September - October					

b. Public Health Advisories

Health advisories are issued to alert the population of the potentially harmful impact of air pollution. Advisories issued at the central level will be forwarded to all the districts through the state for public dissemination. The district is to ensure timely dissemination of health advisories in locally acceptable language.

c. Observation of Special Days

Special Day	Date	Planned Activities	Budget
International Day on Clean Air for Blue Sky	7th September	District and sub-districts levels are recommended to arrange community engagement activities such as: • Health facility-based plantation, awareness sessions • Community setting-based mass meetings, rallies, local/community radio programmes, street plays • Sports events: athletics, cycling • Competition and quiz	Rs. 500 per HWC Total - Rs. 65,000/year Puducherry - 0.41 lakhs Karaikal-0.15 lakhs Mahe - Rs. 2500 Yanam - Rs. 3000

Medical professional training

To strengthen the capacity of healthcare system to adapt/address illnesses/diseases due to impacts of air pollution, the training plan is as follows-

a. Training on air pollution and various health impacts

Schedule Plan For Training for 5 Years 2022-27

Sl. No.	Training programme	Timeline	Budget (in lakhs)				
			2022-23	2023-24	2024-25	2025-26	2026-27
1	DNO	August	0.5 (Puducherry)	0.6 (Puducherry & Karaikal)	0.7 (All districts)	1 (All districts)	1 (All districts)
2	MO	September- October					
3	Community Health Workers	October- November					
4	Panchayati Raj Institutions	November					

NPCCHH Training Plan at the District Level

Training Programme	Trainer	Participants	Training Content
Medical Officers (3 Days)	SNO, DNO	MO (DH, CHC, PHC)	Air pollution related illness
Community Health Care Workers (HWC) (2 Days)	MO	Community Health Workers (ANM, LHV/PHN,HI/HA, ASHA)	
Panchayati Raj Institutions (1 Day)	MO	Panchayati Raj Institutions, communities	

Sensitization/knowledge building workshops will be planned for seeking updates on various air pollution related health issues between district officials, medical officers, and academic institutions working on climate change.

Roles and Responsibility of Key Members

Sl. No.	Member	Responsibilities
1	SNO-CC	Coordinate the activities of assessing the impact of Air Pollution on health and to suggest measures to reduce the same. Coordinate with the Directorate of **Medical Education to** • To collect and compile data of patients with respect to air pollution effects on human health • To assist research on air pollution impact on health initiated by central/state govt. ministry, ICMR, or any other agencies
2	Director, from any research institute	• To create evidence of air pollution impact on health by undertaking various studies and research for the same.
3	Director, Meteorological Department	• To provide timely data of temperature, rainfall, wind speed, or any other relevant meteorological factors having relation with an increase or decrease in air pollution • To give inputs for reducing air pollution in relation to meteorological factors.
4	Chairperson, State Pollution Control Board	• To provide Air Quality Data for the cities identified under the Sentinel Surveillance for assessing the impact of air pollution. • To undertake measures to reduce air pollution and improve the quality of air. • To monitor the progress of activities undertaken for reduction of air pollution.
5	Chairperson, State Disaster Management Authority	• To monitor the situation of air pollution in different cities of state
6	State Surveillance Officers	• To take necessary action in regular data collection and analysis of data • To prepare and disseminate IEC on a regular basis to the cities for awareness generation
7	Environmental Engineer/Senior Scientistfrom MOEFCC	• To enlist and share probable causes of increase in air pollution • To give necessary inputs to reduce air pollution as per the causes identified

Roles and responsibilities

Designation	Details
State Nodal Officer-Climate Change	• Coordinate the State level Task Force Meetings to develop a Health Adaptation Plan on Air pollution and Health as a part of the State Action Plan on Climate Change and Human Health (SAPCCHH) • Undertake situational analysis of health impacts in the context of air pollution ▪ Reports/documents/policies developed related to air pollution and health undertaken in various programmes and in other departments in the UT. ▪ AQI Monitors installed (CPCB/SPCB//SAFAR) • Hot spot sites in the context of air pollution

Designation	Details

	• Identification and capacity building of Human Resources
	  ▪ Professionals from Medical Colleges, Directorate of Health, and Institutes working related to air pollution, NGOs etc.
	  ▪ Notification of designated Nodal Officers at every level i.e. district /block
	  ▪ Identification of nodal officers from the designated sentinel hospitals
	  ▪ Capacity Building of Nodal Officers and other health professionals an Community Health Workers- ASHAs, AWWs
	• IEC Development and Dissemination Plan
	• Development and Dissemination of Health Advisories
	• Surveillance establishment in the context of air pollution
	• Hospital Preparedness related to air pollution
	• Timely issue of warnings to hotspots areas, health professionals, and vulnerable and general population
	• To coordinate with the district nodal officers for overall periodic reviews, Supervision, Monitoring and Evaluation of the identified activities being carried out at all levels – State, District, Block, Town and Village/ward

District Nodal Officer- Climate Change	• To develop a Health Adaptation Plan on Air pollution and Health as a part of the DAPCCHH
	• To undertake situational analysis on air pollution and health at the district level
	• Review and approval of reports/documents/policies developed related to air pollution and health
	• Review of data from the AQI Monitors installed in the district (CPCB/SPCB/SAFAR or NCAP)
	• Human Resource identification and appointment-
	  ▪ Professionals from Medical Colleges, Training Institutes
	  ▪ Notification of designated Nodal Officers at every levels
	  ▪ Capacity building of Medical Officers, health professionals, & community health workers- ASHAs, AWWs
	• IEC Dissemination Plan
	• Dissemination of Health Advisories
	• Surveillance establishment and reporting
	• Healthcare facilities preparedness
	• Timely issue of warning/alerts to hotspot's areas, health professionals, and vulnerable and general population
	• Periodic reviews, supervision and monitoring of the identified activities
	• IEC, capacity building, surveillance, preparedness of healthcare facilities

Block Medical Officer	• Implementation of the identified activities on air pollution and health as per DAPCCHH or in consultation with DNO-CC/SNO-CC • Capacity building of the Medical officers, Nursing officers, Pharmacists, Communities health officers/workers • Integrate and coordinate to get support from Rashtriya Bal Swasthya Karyakram and Rashtriya Kishore Swasthya Karyakram • IEC dissemination for increasing awareness • Health advisories dissemination • Hospital preparedness for public health emergencies related to air pollution • Supervision and monitoring of surveillance activities, if any sentinel hospitals are involved in the block

Designation	Details
Community Health workers at the Village Level/ Ward Level	• Community level public awareness generation on health effects of air pollution, and ways to protect and prevent health problems **ASHAs** a. Awareness generation at the community level on the sources of air pollution, health problems, and ways to protect and prevent air pollution b. Organize campaigns particularly on health problems of women and children related to air pollution **AWWs –** (Through CDPO): At the Anganwadi centres, during immunisation sessions, awareness generation on the sources of air pollution in the household and outside, its health problems particularly on women and children and ways to address them.

Alert system

Automated Air Quality Warning devices in all the schools, offices, and other public buildings in the vulnerable areas for triggering warning manually by the local government.

a. Radio communication system for district administration.
b. Air quality alerts, based on the air quality index thresholds determined by the local government
c. Leaflets and pamphlets describing prevention guidelines.
d. 24/7 Tele-assistance communication services and devices.

ARI Surveillance Activity

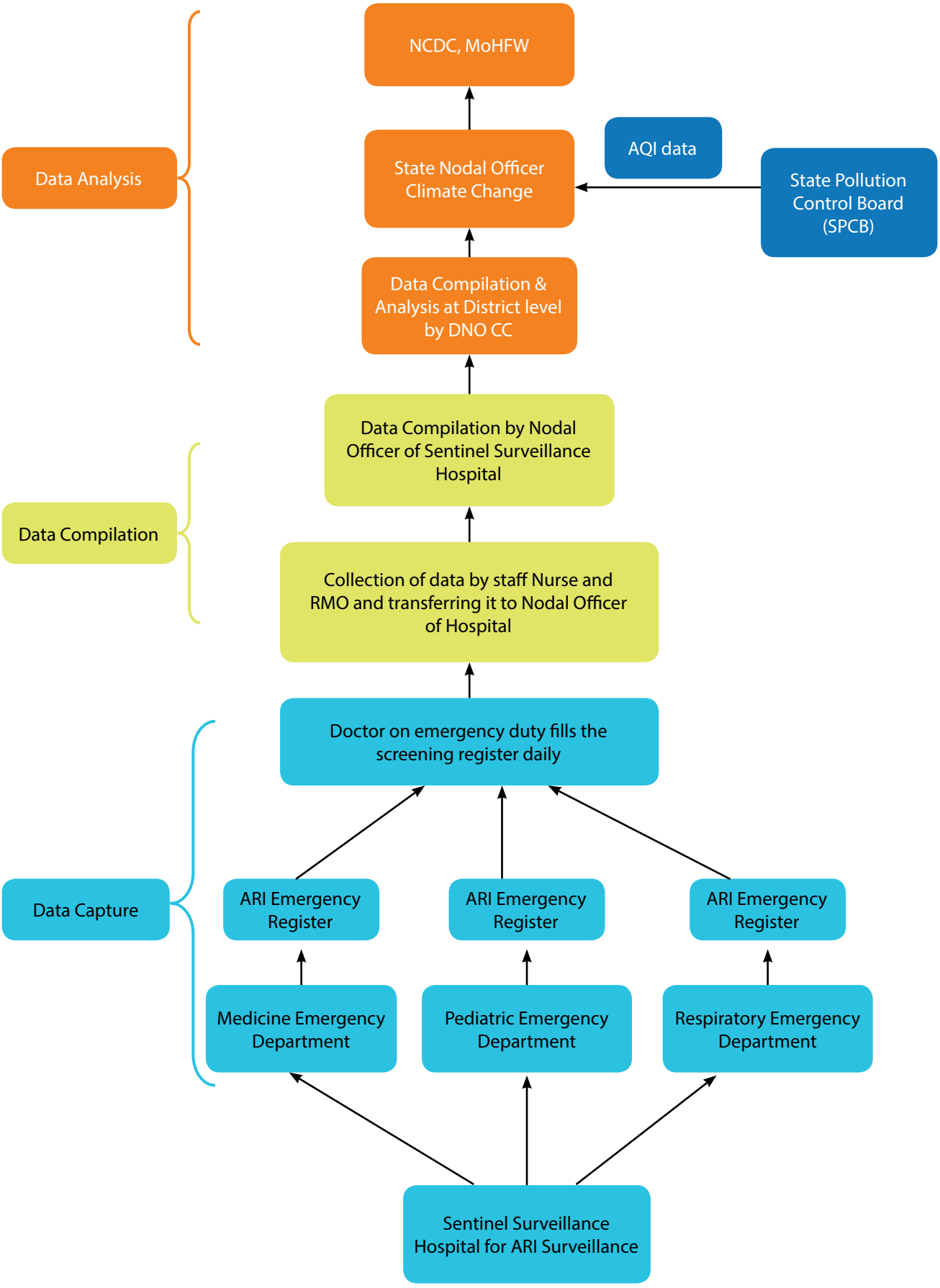
Puducherry & Karaikal are the two cities identified for ARI surveillance. Identified State Nodal Hospital for ARI Surveillance:

Indira Gandhi Govt. General Hospital & Post Graduate Institute, Puducherry District Surveillance Nodal Officer: Dr. Babu.G, 9443929299, drbabu21@gmail.com

City wise List of Sentinel hospitals selected for ARI surveillance activity

City	Name of Hospital	Public /Private	Type of Hospital	Name of Nodal (reporting) Officer	Contact Details of Nodal Officer of hospital
Puducherry	IGGH & PGI	Public	District Hospital	Dr. Babu. G	9443929299, drbabu21@gmail.c om
	GHCD	Public	Respiratory Hospital	Dr. Sivaraj	dr.sivaraj84@gmail.com
	RGGW CH	Public	Paediatric Hospital	Dr. Kathiravan	mkathir00@gmail.c om
Karaikal	GH	Public	District Hospital	Dr. Thaenambigai	986579943 thena1488@gmail. com

ARI Surveillance - Data Flowchart



CHAPTER 7

Health Action Plan on Heat Related Illnesses

In India, a heat wave is considered if the maximum temperature of a station reaches at least 40°C or more for plains, 37°C or more for coastal stations, and at least 30°C or more for hilly regions. The following criteria is used to declare a heat wave:

a. Based on the Departure from Normal

- **Heat Wave:** Departure from the normal is 4.5°C to 6.4°C
- **Severe Heat Wave:** Departure from the normal is >6.4°C

b. Based on Actual Maximum Temperature (for plains only)

- **Heat Wave:** When the actual maximum temperature ≥ 45°C
- **Severe Heat Wave:** When the actual maximum temperature ≥47°C

The adverse health effects of hot weather and heat waves are largely preventable. Prevention requires a portfolio of actions at different levels, these actions can be integrated into a defined heat–health action plan.

To declare a heat wave, the above criteria should be met at least at two stations in a Meteorological sub-division for at least two consecutive days. A heat wave is declared on the second day.

Different types of heat-related illnesses include:

1. Minor heat-related Illnesses: Heat rash, heat cramps, heat syncope
2. Major heat-related Illnesses: Heat exhaustion and heat stroke

Types of heat-related illnesses

Clinical Entity	Age Range	Setting	Cardinal Symptoms	Cardinal/ Important Signs	Pertinent Negative findings
Heat rash/ prickly heat/ Miliaria	All, but frequently children	Hot environment; +/- insulating clothing or swaddling (wrap in tight clothes)	**ITCHY RASH** with **SMALL RED BUMPS** at pores in the skin. Seen in setting of heat exposure; bumps can sometimes be filled with clear or white fluid	**DIFFUSED RED COLOUR SKIN OR VESICULAR RASH,** itching of the skin without visible eruption	**NOT FOCALLY DISTRIBUTED** like a contact dermatitis

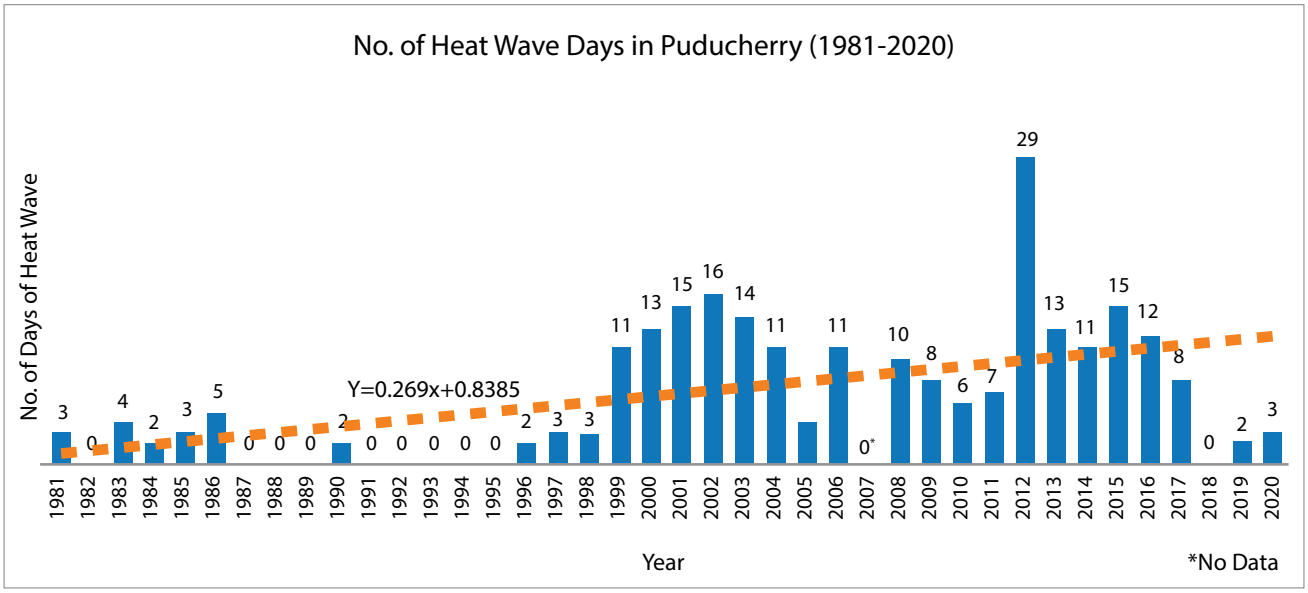
Clinical Entity	Age Range	Setting	Cardinal Symptoms	Cardinal/ Important Signs	Pertinent Negative findings
Heat cramps	All	Hot environment, **TYPICALLY WITH EXERTION, +/-** insulating clothing	**PAINFUL SPASMS** of large and frequently used muscle groups	Uncomfortable appearance, may have **DIFFICULTY FULLY EXTENDING AFFECTED LIMBS/JOINTS**	No contaminated wounds/tetanus exposure; no seizure activity
Heat exhaustion	All	Hot environment; +/- exertion; +/- insulating clothing or swaddling (wrap in a tight clothes)	Feeling overheated, light headedness, **EXHAUSTED AND WEAK,** unsteady, feeling of **VOMITING, SWEATY AND THIRSTY,** inability to continue activities	**SWEATY/** diaphoretic; flushed skin; hot skin; **NORMAL CORE TEMPERATURE;** +/- dazed, +/- generalized weakness, slight disorientation	No coincidental signs and symptoms of infection; no focal weakness; no difficulty in swallowing food or speech; no overdose history
Heat syncope	Typically adults	Hot environment; +/- exertion; +/- insulating clothing or swaddling (wrap in a tight clothes)	Feeling hot and weak; light headedness followed by a **BRIEF LOSS OF CONSCIOUSNESS**	Brief, generalized loss of consciousness in hot setting, short period of disorientation, if any	**NO SEIZURE ACTIVITY,** no loss of bowel or bladder continence, no focal weakness, no difficulties in food swallowing or speech
Heat Stroke	All	Hot environment; +/- exertion; +/- insulating clothing or swaddling (wrap in a tight clothes)	Severe overheating; profound weakness; **DISORIENTATION, NOT FULLY ALERT, CONVULSION, OR OTHER ALTERED MENTAL STATUS**	Flushed, **DRY SKIN** (not always), **CORE TEMP** ≥40°C **OR** 104°F; altered mental status with disorientation, incoherent behaviour, **COMA, CONVULSION;** tachycardia; +/- hypotension	No coincidental signs and symptoms of infection; no focal weakness; no difficulties in swallowing food or speech, no overdose history

There is no data on the prevalence of heat-related illness in Puducherry UT.

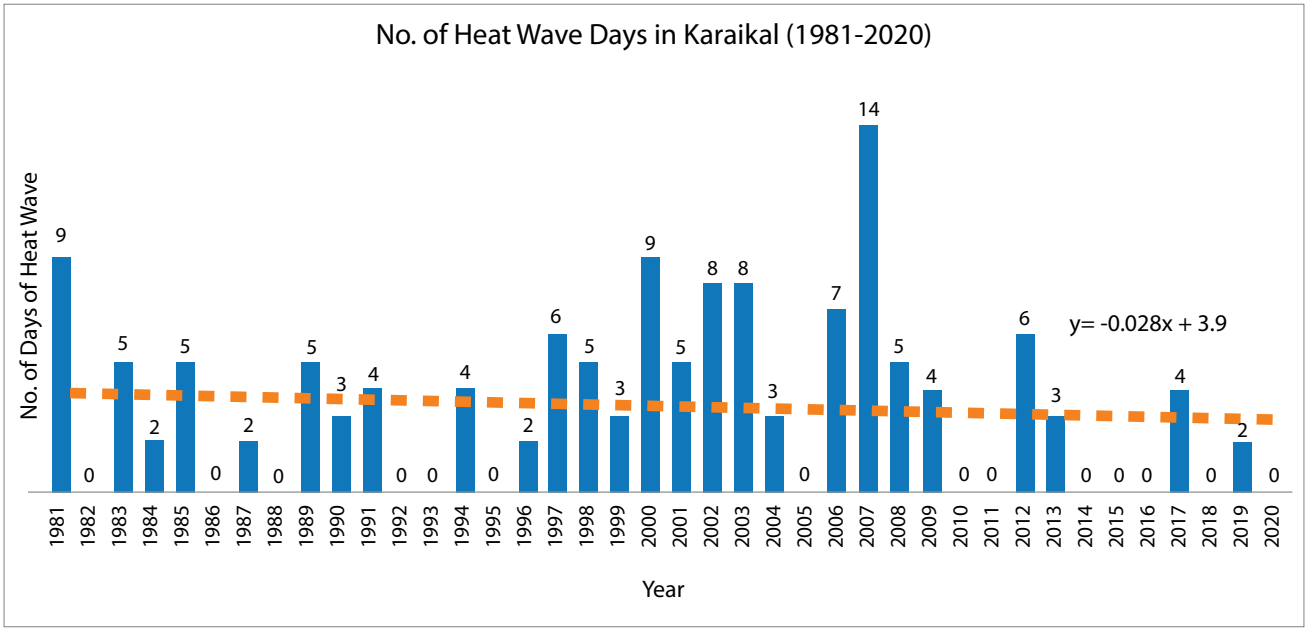
Geo-physical and Climate variables i.e., area with highest maximum temperature (Tmax), average day temperature as per IMD in previous 5 years (IMD Pune data for 2014-18).

Districts	Puducherry	Karaikal	Mahe	Yanam
Minimum Temperature (ºC)	16.6	19.2	19.94	23.45
Maximum Temperature (ºC)	42.7	42.4	29.91	33.68
Avg. Temperature (ºC)	28.9	29	24.83	28.16
Relative Humidity (%)	76.3	75.2		
Rainfall (mm)	1339	1173	2989	1073

Heat wave days in Puducherry District 1981- 2020



Heat wave Days in Karaikal District (1981- 2020)



Average maximum temperature (Tmax) from March to June of year 2014-2018

Districts	Puducherry	Karaikal	Mahe	Yanam
Avg. Temperature, ºC	28.9	29	24.83	28.16

Source: IMD Pune

Sl. No.	Name of District	T max in year 2016				T max in year 2017				T max in year 2018			
		Mar	Apr	May	June	Mar	Apr	May	June	Mar	Apr	May	June
1	Puducherry	33.6	35.4	35.9	35.9	33.1	35.5	37.7	37.1	32.4	34.2	35.4	36.6
2	Karaikal	32.7	34.5	34.9	34.7	31.3	34.6	36.5	36.9	32.3	34.3	35.2	36.4

Sl. No	Name of District	T max in year 2019				T max in year 2020			
		Mar	April	May	June	Mar	April	May	June
1	Puducherry	33.8	35.2	36.7	38.2	32.9	34.5	36.6	37.2
2	Karaikal	32.7	34.7	37.0	38.0	32.5	34.2	35.6	36.3

(Source: of Tmax: IMD)

Health Adaptation Plan for Heat-Related Illnesses

I. Awareness Generation

a. IEC Campaign

The districts are aimed to create awareness through Information, Education, and Communication Activities (IEC) developed using communication materials such as posters, audios, videos, organizing public health events, and advisories related to heat waves based on locally and culturally acceptable messages.

The content for the IEC on heat-related issues is provided by the NPCCHH division. The state/UT is responsible for the translation of the content into local or regional language/s (Tamil and English). The role of districts is to utilize these materials and disseminate them at all levels including the common population, vulnerable communities, healthcare providers, and policymakers.

IEC Dissemination Plan for 5 Years 2022-27

Sl. No.	IEC Content	Dissemination Plan for 5 Years	Timeline	Budget (in Lakhs) for 5 Years				
				2022-23	2023-24	2024-25	2025-26	2026-27
1.	**Posters**	2 Posters for Heathcare facilities in all districts	March-May	0.30 (Puducherry)	0.40 (Puducherry & Karai kal)	0.50 (All districts)	0.55 (All districts)	0.6 (All districts)
2.	**Audio**	Social Media (Facebook, Instagram, Twitter etc.)	March-May					
3.	**Videos**							
4.	**GIF's**							
5.	**Public Health Advisories**	1 in all the Healthcare facilities	March-May					

b. Public Health Advisories

Health advisories are issued to alert the population of the potentially harmful impact of increasing heat. Advisories are issued at the central level and will be forwarded to all the districts through the state for public dissemination. The districts are responsible for ensuring timely dissemination of health advisories in locally acceptable language.

II. Medical professional training

Training on heat-related illnesses

To strengthen the capacity of healthcare system to adapt/address illnesses/diseases due to impacts of heat, the training plan is as follows:

Sensitization/knowledge-building workshops will be planned for seeking updates on various heat-related illness between district officials, medical officers, and academic institutions working on climate change impact.

Guidelines National Action Plan on Heat Related Illnesses (https://bit.ly/NAPHRI)

Table 1: NPCCHH Training Plan at the District Level

Training Programme	Trainer	Participants	Training Content
Medical Officers (3 Days)	SNO, DNO	MO (DH, CHC, PHC)	Heat related illness
Community Health Care Workers (CHW) (2 Days)	MO	Community Health Workers (ANM, LHV/PHN, HI/HA, ASHA)	
Panchayati Raj Institutions (PRI) (1 Day)	MO	Panchayati Raj Institutions, communities	

Table 2: Schedule Plan for Training for 5 Years 2022-27

Sl. No.	Training programme	Timeline	Budget (in lakhs) for 5 years				
			2022-23	2023-24	2024-25	2025-26	2026-27
1	DNO	February	0.5 (Puducherry)	0.6 (Puducherry & Karaikal)	0.7 (All four districts)	1 (All districts)	1 (All districts)
2	MO	March					
3	CHW	March-April					
4	PRI	March-April					

III. Surveillance

HRI surveillance is conducted to establish a baseline of HRI morbidity and mortality, monitor HRI incidence in relation to environmental parameters, and improve health system preparedness to extreme heat. Since UT of Puducherry is not identified as a vulnerable state for heat-related illnesses, surveillance on HRI is yet to start in all the districts of Puducherry.

Roles and Responsibilities

The roles and responsibilities of the key implementation authorities is mentioned below:

Particulars	Responsibilities
SNO	• Disseminate early warnings at the state and district level • Finalization of IEC material and dissemination plan • Liaison with IMD for weather alerts and their dissemination • Liaison with other departments for combined IEC campaigns, coordinated response, and information sharing of health indicators for targeted action • Organize IEC campaigns at the state level on the observance of important environment-health days • Organize training sessions for the district-level officers and the surveillance nodal officers • Facilitate training of medical officers in clinical aspects of heat- health impact • Ensure daily surveillance reporting from district level • Ensure submission and analysis of heat-related deaths at the state and district level • Monitor daily health data with temperature and humidity levels to monitor trends and hotspots in the state • Review health facility preparedness and ambulance services to manage HRI • Identify health facilities at the different levels that can have heat illness wards with necessary treatment/cooling facilities • Keep existing Rapid Response Teams under IDSP prepared to manage HRI if needed for an emergency response to extreme heat • Review implementation of the IEC and surveillance activities at all levels • Evaluate and update relevant section of SAPCCHH with support from State Task Force • Create organizational support and strengthen Environmental Health Cell to implement NPCCHH vision, Goal, and Objectives • Organize sensitization workshops for other stakeholders and line departments • Organize seminars and conference to share knowledge and action under NPCCHH. • Collaborate with academic institute/s for support in updating SAPCCHH, Surveillance activity monitoring, training of health care professionals, vulnerability assessment, and applied research • Submit report of activities on heat-related health issues • Advocate for a reduction in greenhouse gas emissions
DNO	• Disseminate early warning to the block and health facility level • Ensure IEC dissemination to the community-level • Liaison with IMD to receive daily observed temperature and relative humidity information • Liaison with other departments for combined IEC campaigns, coordinated response, and information sharing of health indicators for targeted action • Conduct training for block health officers and medical officers • Conduct sensitization of vulnerable groups, police officers, outdoor works, women, children, etc. • Organize IEC campaigns at the district level on observance of important environment-health days • Ensure daily reporting from health facilities and compile the data • Analyze daily health data with temperature and humidity levels to monitor trends and hotspots in the district • Support timely suspected heatstroke death analysis and its reporting • Submit analyzed weekly report to SNO, NPCCHH, and other departments for necessary action • Coordinate with other agencies • Update DAPCCHH with support from District Task Force • Submit report of activities on heat-health under NPCCHH • Advocate for reduction in greenhouse gas emissions

Particulars	Responsibilities
Block health officer	• Conduct community level IEC activities • Ensure training of medical officers • Organize PRI sensitization workshops and trainings for vulnerable groups • Implement heat mitigation efforts
City Health Department	• Support in development and implementation of city-specific heat- health action plan
Medical Officer	• Conduct health facility-based IEC activities • Support community level IEC activities • Be aware of AQI levels and health impact of air pollution • Ensure necessary health facility preparedness in early diagnosis and management of cases
Panchayati Raj Institutions	• Conduct community level IEC activities

CHAPTER 8

Health Action Plan on Extreme Weather Event-Related Health Issues

Introduction

The Indian sub-continent is highly vulnerable to both natural and man-made disasters that generally result in heavy loss of life and mass causalities. The last few decades have witnessed an increased frequency of disasters resulting in large number of human causalities and economic losses.

There has been a paradigm shift in the government's focus from a rescue, relief, and recovery- centric approach to planning, prevention, mitigation, and preparedness-driven approach.

Extreme weather events and human health

States and UTs may have recorded raised morbidity and mortality due to the effect of extreme weather conditions i.e. frequent and severe episodes of heat waves, floods, droughts, and fires as a direct impact of climate variability and affecting the population at large.

Climate change can result in more hot days, resulting in more periods of drought, dust storms, or heavy rains (precipitation), and even flooding. The health gets directly affected due to injuries, hypothermia, hyperthermia, drowning, etc. and indirectly through population dislocation, crowding, poor living conditions, the faeco-oral transmission of gastro-intestinal pathogens causing water and food borne illnesses, respiratory illness, and other infectious diseases (e.g., leptospirosis, vector-borne disease, cholera and also mental illnesses).

Mortality and related statistics during disaster events in Puducherry

Year	Details of calamity	No. of deaths
2004	Tsunami tragedy	601
2005	Heavy rain/flood in Puducherry during North east monsoon	5
2007	Due to Whirl wind that occurred on 14.05.2008	4
2007	Cyclone at Yanam during the month of August 2007	2 (1-dead & 1 missing)
2008	Nisha Cyclone	4

Year	Details of calamity	No. of deaths
2009	Heavy Rain due to North East Monsoon	4
2010	Heavy Rain due to North East Monsoon	4
2011	Very Severe Cyclonic Storm Thane	12
2015	Heavy Rain due to North East Monsoon	4
2016	Drought (Puduchery & Karaikal)	Nil
2018	Flood (Yanam Region)	Nil
2018	Cyclone (Gaja) – Karaikal Region	Nil
2020	Cyclone (NIVAR) – Puducherry & Karaikal	Nil

Puducherry region consists of four taluks viz. Puducherry, Oulgaret, Villianur, and Bahour. Among these, Puducherry and Bahour are the coastal taluks, located in the heavy wind and cyclone zone, while the other four taluks are located in the flood zone. Puducherry region has been classified as a multi-hazard prone district. It is highly vulnerable to cyclone, flood/heavy rains, tsunami, fire, and industrial hazards. Tsunami 2004 severely affected the district. The region falls in earthquake zone II and does not have any history of damaging earthquake events.

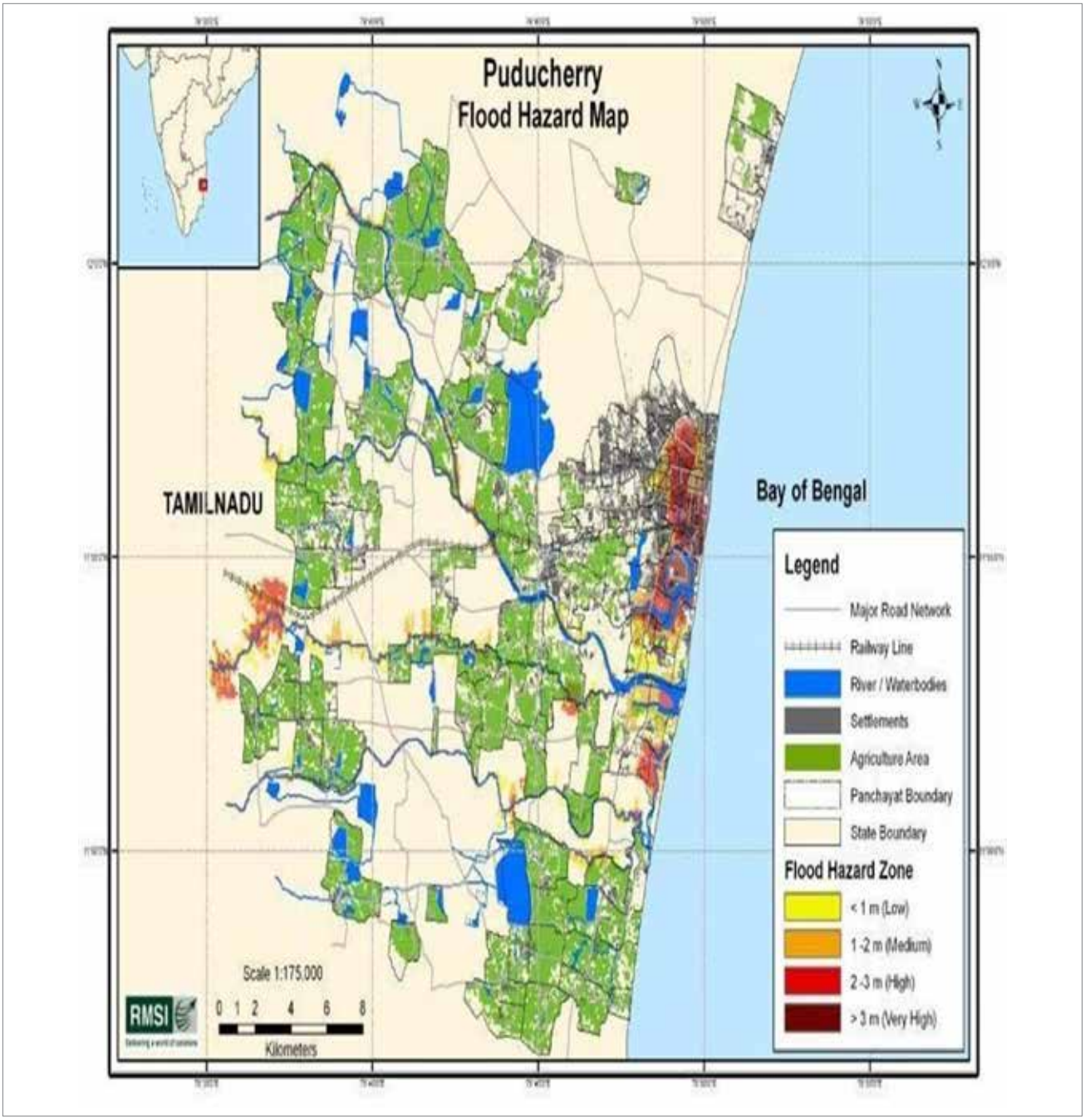
Heavy rain/Flood

The modelled flood hazard map is provided in the figure below. The flood inundation affects mostly low-lying areas along major rivers/drains within 2-3km from the shoreline. Both Oulgaret and Puducherry municipalities are prone to flood hazard while the southern part of the district are relatively less affected by flood.

Cyclone

The east coast of India is vulnerable to cyclones originating in the Bay of Bengal mostly during the November, December, and January months. The cyclone Thane (2011), Nisha (2008), the cyclone of 2000, and 1993 caused wide spread damage in the district. The cyclonic situation can lead to wave surges leading to water inundation in the coastal areas. However, in the case of Puducherry district, the damage is often caused by high wind velocity than due to wave surge and water inundation.

Flood hazard map: Puducherry district

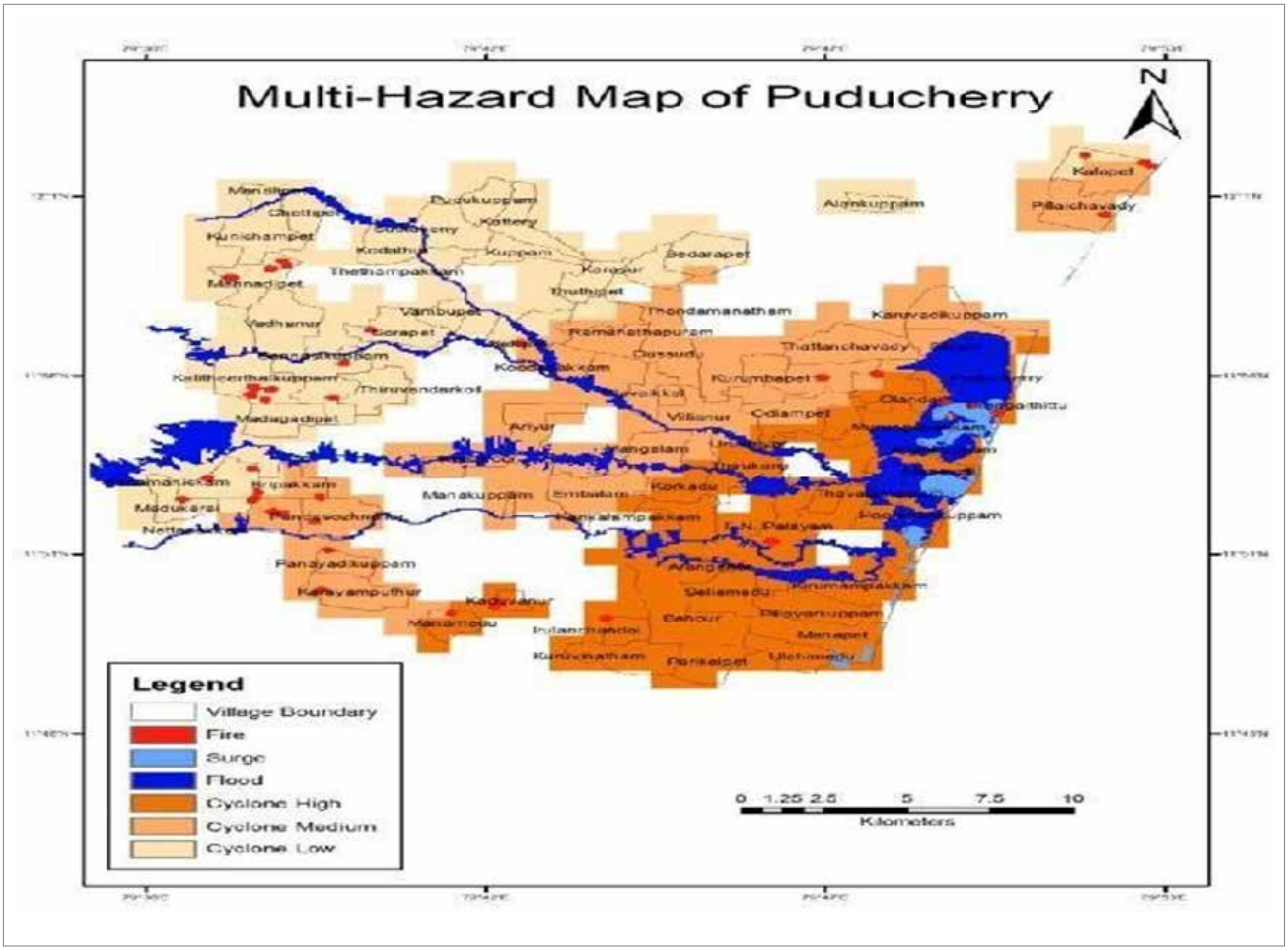


The district is under the influence of strong winds mainly during May, June, and July months due to the monsoon activities in the subcontinent. During May, the peak summer period, unbalanced tropospheric temperature causes a downburst (strong wind normally sustained for not more than 3 to 5 minutes) coupled with heavy thunderstorm over the district. However, there is no record of damage and life loss due to strong winds in the district.

Tsunami

The 2004 tsunami caused wide spread damage and loss of life in the district. Figure given below shows the model of water inundation due to the tsunami 2004 in Puducherry district.

Multi hazard prone area in Puducherry district



Action plan for diseases prevalent during disasters

Disaster Management Authority coordinates with the health staff as well as other stakeholders at the time of a disaster. Immediate communication is sent to the Nodal Officer for Disaster (Health), who in turn sends a communication to the Rapid Response Team, available in the health facility at all levels of healthcare facilities. Essential medicines, lab equipment, and ambulance facility are made available for effective management of cases. Necessary warnings and advisories are issued from time to time through social media. Private Medical colleges, volunteers, Self-help group members, and NGOs are involved for the surveillance and management of cases at the community level.

The initiatives include:

1. Provision of safe and resilient health facility

It is proposed to strengthen the WASH standards, biomedical waste management, uninterrupted supply of electricity, transportation, and kitchen services during a disaster.

2. IEC Activities

Annual IEC dissemination plan for extreme weather events and their health impact in Puducherry

IEC type	Material	Timeline	Mechanism
Advisory	bit.ly/NPCCHHPrg	Seasonal	By email to DNO for further dissemination to health facilities
Early warning	Bulletins/advisory by IMD (storm, cyclone), CWC (flood) sent by NPCCHH	Seasonal	• Health department/other government website/application • Digital display of temperatures on public places and health facilities
Posters	• 2 posters on various EWE and health impacts (English, Tamil) bit.ly/NPCCHHIEC • Posters on heat and health impacts (Tamil & English)	Seasonal, as needed	• Printing of copies for state- level dissemination at health facilities, public places/buildings • By email to DNO for printing at district level and dissemination to health facilities, schools, and other public/government buildings
Wall painting	Using available material	Painted in July-September	• In schools and selected colleges • In health facilities
Hoardings	Posters in Tamil, English	Seasonal, as needed	• To be planned with Puducherry Municipality
Audio-Visual	Audio Jingle (Tamil) • Video messages (Tamil, English) bit.ly/NPCCHHIEC • Video message (Tamil)	Seasonal, as needed	• Played seasonally and around relevant extreme weather events
Bus painting	Using available material	Painted in June-July, Seasonally as needed	With PRTC and Corporation city Bus service
Digital display	• GIF • Above mentioned video messages	Seasonal, as needed	Display in health facilities Public digital display boards in major cities
Social medial	All the above material + Relevant activity updates	Seasonal, as needed	• Facebook and Twitter handle of state NPCCHH, NHM • WhatsApp groups (State DNO, Health facility group)

Observance of important environment-health days

Day	Activities
International Day for Disaster Risk Reduction	**IEC Campaigns** • Audio-video spots broadcasting • Targeted awareness sessions i.e. women, children, occupational groups • Mock drill, disaster response exercise • Sports events • Competition: poster, poem/essay, quiz **Health facility level activities** • Health facility-based patient awareness sessions • Conduct assessment of disaster vulnerability/energy/water conservation measures • Review of implementation of climate-resilient measures

3. Capacity Building Activities

Training modules

- State-District level training modules
- Medical officer training
- Para medical officers & Health care workers
- Community level training: vulnerable population group such as women/children/elderly/different type occupations

Other training resources: NPCCHH channel https://bit.ly/NPCCHHyt

Training plan for Extreme Weather Events and Health

Training Programme for	Trainer	Topics	Timeline
District level (DNO-CC, trainers)	State Level Trainers SNO-CC, Consultant	• Climate change and impact of extreme weather events in India • Formation of disaster management committees and plans • Health facility vulnerability, resilient measures and disaster preparedness • Disaster response in coordination with state/ district disaster management authority • Post-disaster health impact assessment and response	February
Health facility level (MO of DH/CHC/PHC)	District Level Trainers DNO-CC	• Health facility disaster vulnerability assessment • Disaster management committee and plan • Climate resiliency measures (structural/ functional) • Health facility preparedness for EWE/disaster response • Post-disaster surveillance and damage assessment	February
Community Health care workers (MPH, ASHA, ANM etc)	District Level Trainers, MO	• Climate change and health impact of extreme weather events • Disaster planning and response	February-March
Panchayati Raj Institutions	District level trainers, MO, Health care workers	• Climate change and health impact of extreme weather events • Disaster planning and response with community participation	February-April

4. Strengthening Health Sector Preparedness

i. **Early warning:** Dissemination of early warnings for Coldwave, Flood, Cyclone etc to health facility level and community level

ii Surveillance

- Post-disaster health impact assessment
- Support post-disaster surveillance of communicable disease, health facility affected conducted by SDMA, IDSP, or other agencies

iii. Health Facility Preparedness

- Vulnerability assessment of health facility in context of climate change-extreme weather events
- Identify structural changes/retrofitting measures at the facility level to equip the healthcare facility
- Formalize disaster management plan and committee
- Emergency procurement arrangements & functioning of essential health services (safe water, immunization, maternal-child care etc.)
- Post-disaster damage assessment and referral plan in case of health facility damage
- Ensure routine monitoring and maintenance of support functions (water quality, waste management, etc.)
- Establish Sustainable Procurement Committee

Roles and Responsibilities

Particulars	Responsibilities
SNO	• Disseminate early warnings to the district level • Finalization of IEC material and dissemination plan • Formalize intersectoral coordination for disaster planning, management, and response with SDMA/IMD and other departments • Organize training of district level officers • Facilitate assessment and implementation of climate resilient measures in the healthcare facilities • Review implementation of IEC, training, and surveillance activities at all levels • Evaluate and update relevant sections of SAPCCHH with support from State Task Force • Create organizational support and strengthen Environmental Health cell to implement NPCCHH vision, Goal, and Objectives • Organize sensitization workshops for other stakeholders and line departments • Collaborate with academic institute/s for support in updating SAPCCHH, Surveillance activity monitoring, training of health care professionals, vulnerability assessment, and applied research • Submit reports of activities on EWE and health under NPCCHH
DNO	• Disseminate early warnings to the block and health facility level • Ensure IEC dissemination to community level and facilitate community level IEC activities • Organize trainings for block health officers and MO • Formalize intersectoral coordination for disaster planning, management, and response with SDMA/IMD and other departments • Liaison with other departments for combined IEC campaigns, coordinated response and information sharing of health indicators for targeted action • Identification and communication of evacuation routes and relief camps • Support planning and management of health care services in relief camps • Provide necessary IEC on health and sanitation in relief camps • Organize training for block health officers and medical officers with relevant training manuals

Particulars	Responsibilities
	• Conduct sensitization of vulnerable groups: police officers, outdoor works, women, children, etc. • Organize IEC campaigns at the district level on observance of important environment-health days • Facilitate disaster vulnerability assessments in health facilities and maintain records of such assessments and health facility damage due to EWE • Update DAPCCHH with support from the District Task Force • Submit reports of activities on EWE and health under
Block health officer	• Conduct community level IEC activities • Ensure training of medical officers • Organize PRI sensitization workshop and training for vulnerable groups • Facilitate disaster vulnerability assessments in health facilities and maintain records of such assessments and health facility damages due to EWE
Medical officer	• Conduct health facility-based IEC activities • Support community level IEC activities • Preparation of Disaster Management Plan and hospital safety plan • Assessment of health facility in context of climate change-extreme weather events • Identifying structural changes/retrofitting measures at the facility level to equip the healthcare facility to better respond to community needs during and after a disaster • Ensuring routine monitoring and maintenance of support functions (water quality, waste management) • Health facility preparedness for seasonal events
Panchayati Raj Institutions	• Conduct community level IEC activities • Ensure community involvement in planning and demonstration of measures taken before, during, and after an EWE

CHAPTER 9

Health Action Plan on Vector-borne Illnesses in Context of Climate Change

Introduction

NVBDCP an umbrella programme responsible for the implementation, supervision, and monitoring of the vector- borne diseases i.e. malaria, dengue, chikungunya, and Japanese encephalitis control in Puducherry. The UT of Puducherry is in the Elimination phase (Category I) as per the national framework for malaria.

Infrastructure

In Puducherry, the surveillance for vector-borne diseases is being carried out by at 5 hospitals, 4 CHCs, 39 PHCs, and 80 sub-centres. Also, 2 malaria clinics are functional, one at Puducherry and the other at Karaikal.

Laboratory Facilities

Laboratory facilities to diagnose malaria are available in the Office of the Assistant Director (Malaria), CHCs and in designated PHCs. No missed positive case is reported in recent years.

Dengue and Chikungunya

In the UT of Puducherry, 5 Sentinel Surveillance Hospitals (Dengue diagnostic facility) for diagnosis of Dengue/Chikungunya are available. Intensive spray and fogging operation are carried during the period of high transmission in the places where the cases of dengue are reported.

District wise morbidity, mortality, and related statistics for vector-borne diseases Malaria

District	2016		2017		2018		2019		2020	
	Cases	Deaths	Cases	Deaths	Cases	Death	Cases	Death	Cases	Deaths
Puducherry	53	0	48	0	51	0	14	0	6	0
Karaikal	18	0	8	0	1	0	5	0	7	0
Mahe	3	0	0	0	1	0	0	0	0	0
Yanam	2	0	4	0	1	0	2	0	0	0
Total	**76**	**0**	**60**	**0**	**54**	**0**	**21**	**0**	**13**	**0**

Dengue

District	2016		2017		2018		2019		2020	
	Cases	Deaths	Cases	Deaths	Cases	Death	Cases	Death	Cases	Deaths
Puducherry	407	1	3681	7	544	2	1862	2	520	1
Karaikal	83	1	886	0	36	0	172	0	38	0
Mahe	0	0	1	0	0	0	4	0	0	0
Yanam	0	0	0	0	1	0	0	0	0	0
Total	**490**	**2**	**4568**	**7**	**581**	**2**	**2038**	**2**	**558**	**1**

Chikungunya

District	2016		2017		2018		2019		2020	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Puducherry	20	0	23	0	358	0	790	0	242	0
Karaikal	0	0	0	0	3	0	7	0	4	0
Mahe	0	0	0	0	0	0	0	0	0	0
Yanam	0	0	0	0	0	0	0	0	0	0
Total	**20**	**0**	**23**	**0**	**361**	**0**	**797**	**0**	**249**	**0**

Other vector-borne diseases

Disease	2016		2017		2018		2019		2020	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Filaraisis	7	0	9	0	9	0	9	0	9	0
Japanese Encephalitis	0	0	0	0	5	1	0	0	1	0
Kala-azar	0	0	0	0	0	0	0	0	0	0
Zika virus	0	0	0	0	0	0	0	0	0	0

As high incidence of malaria cases were reported in the UT, 13 villages were identified as hot spots in 2019 and 5 villages in 2020. Further, the low-lying areas in the UT were also identified (refer Annexure C). As climate change is likely to alter the change in peak of vector density and opening of new foci of transmission, therefore, the time of IRS should be decided one month before the peak of malaria cases. In Puducherry, it is done during the months of April and May.

VBD	Months to initiate action
Malaria	April
Dengue	May
Chikungunya	May
Japanese Encephalitisis	June

Task and responsibilities of stakeholders for VBDs control

Sl. No.	Stakeholder	Task/activities	Responsibilities
1	NVBDCP	Overall guidance and policy formulation	To guide the state government in resurgence and containment of any VBD
2	ICMR-NIMR and other related institutes	To provide technical expertise to find solution to any outstanding research question related with epidemiology and control of VBDs	ICMR-NIMR to work in close collaboration with NVBDCP/vulnerable state in analysis of relationship between climatic parameters and particular VBDs. To help in identification of micro foci of transmission
3	State Nodal Officer, Climate Change	To supervise the state govt. in control of VBDs particularly in climate sensitive areas	To supervise the action taken in consultation with SPO
4	India Meteorological Department	To provide meteorological data as and when required	To help the state govt. in collaboration with any research institute, in analysis of relationship between climatic factors and a particular VBD so as to forewarn the impending outbreaks
5	NGO at state and district level for reach to community	Heath education at community level	To conduct workshops for IEC activities for different levels of staff in the identified areas in consultation with the state government
6	State Programme Officer	Overall planning and execution of Surveillance and intervention measures to control VBDs	To supervise and guide the DMOs in control ofVBDs
7	State Entomologist	To provide guidance in vector control	To generate data on fortnightly fluctuations in density of vector species so as to guide the state in choosing appropriate time of IRS activities. To generate data on susceptibility status of disease vectors for using appropriate insecticide for IRS/ larvicidefor vector control
8	Chief Medical Officer/ District Malaria Officer/ Disease Surveillance Officer	Execution of task assigned by the SPO	To supervise and guide surveillance and intervention measures for control of VBDs in the district
9	Media	To be vigilant for report of any upsurge/ outbreak of any VBD	To impart health education to masses through print and audiovisual means of communication

Action plan for Vector- Borne diseases

1. Rapid response team at the PHC level is formed with MO, Health Inspector, Health Assistant, ANM and ASHA for immediate action, control and prevention of transmission, whenever a VBD case is reported.
2. Through inter-departmental coordination- Health Inspector will have a periodical interaction with the local departments towards the sudden climatic change and its sequence, initiate the Health Field Staffs to deploy preventive methods on VBD.

3. The Health Inspector and Health Assistant will have details of low-lying and water logged areas in their jurisdiction, thus supporting them to undertake immediate action in the area, and also perform periodic surveillance and monitoring.
4. The RRT will have good relation with the local leaders of the area concerned and will immediately give the necessary advice to the local people about the ways and means of avoiding and protecting from the vector-borne diseases.
5. Several hot spots have been identified and will be monitored periodically during the sudden as well as seasonal climatic changes.
6. Any hike in the fever cases, larval indices, and adult vector mosquito population will be noted and remedial measures will be taken.

Capacity Building

The plan for the training of ToTs, DNO-CC, and Medical officers regarding the guidelines and operational framework of green and climate resilient measures in Health Care Facilities is mentioned in the table below:

Sl. No.	Training programme	Timeline	Budget (in lakhs) for 5 years				
			2022-23	2023-24	2024-25	2025-26	2026-27
1	DNO	February	0.5 (Puducherry)	0.6 (Puducherry & Karaik al)	0.7 (All four districts)	1 (All districts)	1 (All districts)
2	MO	March					
3	CHW	March-April					
4	PRI	March-April					

IEC

1. Audio Visual Skits in the local cable networks during peak and monsoon season.
2. VBD awareness notices to the public during field visits, surveys and camps.
3. Banners and sign broads in public places, schools, colleges, institutions, Traffic squares, bus stands, railway stations, public offices and private organizations.
4. Mass mike propaganda in special vehicles in the peak hours of the VBD cluster areas.
5. Illuminated LED display in New Bus stand and in Beach road.
6. LED display in the Traffic Signals of the Election Department and Police Department.
7. Mobile LED display mounted on special vehicles at evening hours in crowded places.
8. Awareness Scrolls in local cable networks.
9. Awareness Skits and songs on VBD prevention and control in local FMs.
10. Conduct of VBD exhibitions to create mass and practical awareness to public
11. Models of mosquito with awareness audio at the shopping malls and public gathering palaces.
12. Placing giant gas balloons with captive mosquito picture and wordings.

CHAPTER 10

Action Plan for Green and Climate Resilient Health Care Facilities

"Climate-resilient and environmentally sustainable healthcare facilities anticipate, respond to, cope with, recover from and adapt to climate-related shocks and stresses, while minimizing negative impacts on the environment and leveraging opportunities to restore and improve it, so as to bring ongoing and sustained health care to their target population and protect the health and well-being of future generations. (WHO)".

As the climate continues to change, risks to health systems and facilities including hospitals, clinics, and community care centers are increasing, reducing the ability of health professionals to protect people from a range of climate hazards. Healthcare facilities are the first and last line of defense against climate change impacts as they can be responsible for large emissions of greenhouse gases (GHGs), and because they provide the needed services and care to people harmed by extreme weather and other long-term climate hazards.

Framework for building climate-resilient and environmentally sustainable HCF

Source: WHO Guidance for Climate-Resilient and Environmentally Sustainable Health Care Facilities

The National Programme on Climate Change and Human Health (NPCCHH) is engaging critically with strengthening the healthcare services and facilities to adapt to as well as mitigate the impacts of climate change. The key components recognized under the programme include:

1. Environmentally Sustainable (Green) Measures at Healthcare Facilities:
   - Energy Auditing
   - Installation of LED lighting at Health care Facilities
   - Installation of Solar panels
   - Water Conservation Measures – Rain-water Harvesting
2. Climate Resilient Infrastructure at Healthcare Facilities including Retro Fitting of the Existing Healthcare Facilities

1. Environmentally Sustainable (Green) Measures at Healthcare Facilities

a. Energy Auditing

An energy audit identifies all the energy end-uses within the building, estimates how much energy is used in each department, and determines the amount of energy used in relation to the desired values.

The guiding principles in this respect include:

- The HCFs would develop a plan for the energy audit to assess the level of energy consumption.
- The responsibility for the energy audit would be of the IPC committee of the facility. If the healthcare facility lacks qualified staff, then the energy audit would be conducted by the state health department as well.
- The energy audit would also consider load management, poor maintenance aspects, and extreme temperature to avoid fire-related accidents. Audit would be conducted in the facility biannually.
- Installing sub-meters in the facility premises would be useful in understanding how much energy is used across the healthcare facility.

b. Replacing the existing non-LED lights with LEDs

Replacing the incandescent bulbs with LEDs leads to 75% less energy consumption. Each LED light saves approximately INR 700- 1400 over the course of a year.

The guiding principle in this respect would be:

- Healthcare facilities would have a policy on purchasing and using energy-efficient equipment and devices. The facilities would gradually phase out the incandescent bulbs with LEDs.

c. Installation of Solar panels

Healthcare facilities both in urban and rural areas consume a lot of energy throughout the day as the electrical equipment used directly or indirectly to treat patients requires uninterrupted power.

The guiding principle in this area would be:

- The state would, in a phased manner, install PV solar panels in unused spaces like the roof of the facility. This would reduce grid-based electricity consumption and decrease the peak demand of a facility, which means the organization has lower operating costs, and hence these saved costs can be utilized for better patient care.

d. Water conservation

In an HCF, sanitary fixtures consume 42% water while heating ventilation and air conditioning (HVAC) consumes 23% water, thus, major water-consuming area needs to be focused on reducing water consumption.

Rainwater harvesting for healthcare facilities has the potential to save thousands of litres of water every year. This in turn can result in substantial cost savings in addition to adopting climate-smart practices.

The guiding principles for water conservation in a HCF would be as follows:

- The healthcare facility would develop a strategy for the optimum usage of water.
- The HCFs would develop a plan for the conservation of water. e.g., water- efficient fixtures, dual flush mechanism, sensor-operated urinals, waterless urinals, rainwater harvesting
- The HCFs would have a plan for wastewater treatment. e.g., sewage treatment plant and effluent treatment plant at sites of generation of contaminated grey water, like pathology.
- The HCFs would develop a programme/plan for the conservation of water
- The HCFs would have a water management programme for the conservation of water by establishing a team, setting goals with timelines, conducting water audits, determining the cost of water, and preparing an action plan
- The HCFs would have an ongoing educational programme for the efficient usage and conservation of water for all the stakeholders (staff, patients and visitors)
- The HCFs would have a plan to train the staff on water savings techniques
- The HCFs would develop a wide variety of methods to communicate through IEC materials, new and/or revised operating guides and manuals

2. Climate Resilient Infrastructure at Health Care Facilities Including Retro Fitting of Existing Health Care Facilities

It is essential that HCF planning and designing should be responsive to local climate and hazard profile of the district. Strong focus should be given to designing all aspects of infrastructure and services as per relevant IS standards, building codes and local byelaws, and history of emergencies in the district to ensure patient safety and continuity of health service during emergencies. Few key interventions that would be undertaken to make the HCFs into green buildings would include:

New Buildings

- Climate risk assessment at the time of planning and designing the building.
- Use of high-performance glass on windows, doors, and roofs to prevent the heat inside and allows sunlight and fresh air to enter the room.

- Use double glazing glass on windows; it provides thermal and optical properties to the building and reduce the noise level.
- Insulation of building from inside and outside in colder regions of the country.
- Ensure the plinth level is above the high flood level as known locally or storm surge level (in coastal districts) and make the building accessible with ramps and railing to create a barrier free environment.
- Installation of Rainwater Harvesting System
- Installation of alternative energy systems
- Installation of STP & ETP

Existing Infrastructure

- Introduction of electronic patient records in the facility to reduce the use of paper.
- Availability of 10-30 per cent area for the herbal garden in the facility.
- Floor and wall finishes are conducive for infection prevention control practices.
- Modifications in the critical care rooms to make them functional during disaster
- Installation of Rainwater Harvesting System
- Installation of alternative energy systems
- Installation of STP & ETP

Activities being undertaken

Initial Assessment of the health are facilities for Green Measures in Healthcare Facilities to identify the gaps is the first step towards strengthening health facility. Currently, all HCFs may not meet all the criteria suggested in the IPHS and National building Code 2005. However, the new infrastructure development is in compliance with these guidelines. Further, the retrofitting measures are also being undertaken in line with the IPHS Guidelines and ISO and green building guidelines for the hospital infrastructure.

Also, rainwater harvesting system has been constructed in two District Headquarter Hospitals and one Community Health Centre in Puducherry district, as a part of the green initiative under NPCCHH. It is proposed to expand this to all the districts of Puducherry UT.

Implementation Plan

As per the proposed initiatives indicated above, following measures will be undertaken in Puducherry, as a part of achieving green and climate resilient infrastructure:

Activities	Percentage of facilities with proposed activity Budget (in lakhs)				
	2022-23	2023-24	2024-25	2025-26	2026-27
Energy Audit	10%	20%	35%	40%	50%
LED lighting	10%	20%	35%	40%	50%
Solar Panel	10%	20%	35%	40%	50%

Activities	Percentage of facilities with proposed activity Budget (in lakhs)				
	2022-23	2023-24	2024-25	2025-26	2026-27
Rain water Harvesting System	10%	20%	35%	40%	50%
Retrofitting of Healthcare facility	10%	20%	35%	40%	50%
Total Budget	5 lakhs	10 lakhs	6 lakhs		

Awareness Generation

As a part of the green and resilient measures, awareness generation measures will be undertaken covering, but not limited to following key areas of concern:

- Awareness and sensitization on all climate change induced events and health impacts
- Sensitization workshop on Sustainable Procurement
- Energy efficient measures and water conservation measures

IEC Dissemination Plan

IEC type	Material	Dissemination Timeline	Budget in lakhs				
			2022-23	2023-24	2024-25	2025-26	2026-27
Posters	2 Posters for Healthcare facilities in 4 Districts	November	0.3	0.4	0.5	0.55	0.6

Capacity Building

The plan for the training of ToTs, DNO-CC, and Medical officers regarding the guidelines and operational framework of green and climate resilient measures in Health Care Facilities is mentioned in the table below:

Sl. No.	Activities	Priority Districts	Timeline	Budget				
				2022-23	2023-24	2024-25	2025-26	2026-27
1.	Training of TOTs	4 districts	November	0.5 lakh	0.6 lakh	0.7 lakh	1 lakh	1 lakh
2.	Training of DNO-CC		December					
3.	Training of Medical officer		December					

Roles and Responsibilities

The table below highlights the roles and responsibilities of the associated staff to help support green climate and resilience infrastructure development in order to strengthen healthcare infrastructure.

Particulars	Responsibilities
SNO	• Finalization of IEC material and dissemination plan • Organize training sessions for the district-level officers and trainers • Identify health facilities for priority implementation based on disaster and health facility vulnerability • Identify relevant state level nodal agencies and collaborate with them for assessment of health facilities for implementation of measures • Facilitate and monitor necessary assessments at the health facility level • Facilitate implementation of structural and functional measures at the health facility level • Monitor the implementation of the activities • Support districts to identify sources of funding • Advocate for reduction in greenhouse gas emissions
DNO	• Conduct training for block health officers and medical officers with relevant training manuals • Support conduct of the following assessment at the health facility level- ▪ Energy audit ▪ Water audit ▪ Disaster-vulnerability assessment • Support the following functional measures at the health facility level: ▪ Formation and working of Water Management committee ▪ Formation and working of Sustainable Procurement committee ▪ Operational measures to make health facilities function during the disasters or power cut • Coordinate with other agencies for assessment and implementation of identified structural and functional measures • Update the DAPCCHH with support from District Task Force
Block health officer	• Ensure training of medical officers • Organize PRI sensitization workshops • Coordinate with other agencies for assessment and implementation of identified structural and functional measures
Medical officer	• Conduct health facility assessment: ▪ Energy audit ▪ Water audit ▪ Disaster-vulnerability assessment • Lead following functional measures: ▪ Formation and working of Water Management committee ▪ Formation and working of Sustainable Procurement committee ▪ Operational measures to make health facility functioning during disasters or power cut • Support community level IEC activities • Identify local funding opportunities: e.g. CSR initiative, NGO funding
Panchayati Raj Institutions	• Support retrofitting and new health facilities with local funding source and community involvement

PART III

Budget

CHAPTER 11
Budget

Sl. No.	Activities	Budget (In Lakhs)				
		Year 1	Year 2	Year 3	Year 4	Year 5
1	Task Force Meeting	0.1	0.1	0..2	0.25	0.3
2.	Sensitization meeting for program officials	0.6	1	1.25	1.5	1.75
3.	IEC material/campaign/	2	2	2.2	2.5	2.8
4.	Capacity Building	2	2	2.2	2.5	2.8
5.	Green & Climate Resilient HCF		5			
a.	Energy audit	-	2.5	2.5	2.75	2.8
b.	LED lighting	-	2.5	3	3.5	4
c.	Solar Panel	-	-	20	25	25
d.	Rain Water Harvesting	-	-	10	10.5	11
e.	Retrofitting of healthcare facility	-	-	5		5
6.	Monitoring & Evaluation	-	-	0.5	0.6	0.75
7.	Other operational cost	-	-	0.5	0.6	0.75

Note: Year 1 = FY 2022-23; Year 2 = FY 2023-24; Year 3 = FY 2024-25; Year 4 = FY 2025-26; Year 5 = FY 2026-27.

Annexures

Annexure A

1. List of Facilities at UT of Puducherry (UPHC-HWC & PHC-HWC)

Sl. No.	UPHC-HWC
1.	Ariankuppam (U) 24*7
2.	Gorimedu (U)
3.	Kalapet (U) 24*7
4.	Kosapalayam (U)
5.	Lawspet (U) 24*7
6.	Mettupalayam (U) 24*7
7.	Mudaliarpet (U)
8.	Murungapakkam (U)
9.	Muthialpet(U) 24*7
10.	Odiansalai (U)
11.	Reddiarpalayam (U) 24*7
12.	Villianur (U) 24*7
13.	UFWC (U)
14.	UPHC Dubrayapet
15.	UPHC Lawspet
16.	Kovilpathu (U)
17.	Karaikalmedu (U) 24*7
18.	UPHC Thirunagar
19.	Pandakal (U)
20.	UPHC Gramathi
21.	UPHC Guriampetta

Sl. No.	PHC-HWC (Rural)
1.	Abishegapakkam (R)
2.	Ariyur (R)
3.	Bahour (R)
4.	Karayamputhur (R)
5.	Katterikuppam (R)
6.	Kirumampakkam (R)
7.	Koodapakkam (R)
8.	Maducarai (R)
9.	Nettapakkam (R)
10.	Sedarapet (R)
11.	Sooramangalam (R)
12.	Sorapet (R)
13.	Thavalakuppam (R)
14.	Thirubuvanai (R)
15.	Thirukkanur (R)
16.	Kottucherry (R)
17.	Nallathur (R)
18.	Nedungadu (R)
19.	Neravy (R)
20.	Vizhidiyur (R)
21.	T R Pattinam (R)
22.	Nallambal (R)
23.	Varichikudy (R)
24.	Ambagarathur (R)

2. List of Sub-centres at UT of Puducherry

Sl. No.	Name of the District	Name of the Primary Health centres	Name of the Sub- centres
1.	**Puducherry (55)**	Abishegapakkam (R)	T.N. Palayam (R)
2.		Ariankuppam (U)	Veerampattinam (U)
3.			Nonankuppam(U)
4.		Ariyur (R)	Sivaranthagam (R)
5.			Melsathamangalam (R)
6.			Keezhur (R)
7.		Bahour (R)	Seliamedu (R)
8.			Kuruvinatham (R)
9.			Pinnatchikuppam (R)
10.			Keezhparikkalpattu (R)
11.		Gorimedu (U)	Kadirkamam (U)
12.		Kalapet (U)	Pillaichavadi (U)
13.			Kanagachettikulam (U)
14.		Karayamputhur (R)	Panayadikuppam (R)
15.			Manamedu (R)
16.		Katterikuppam (R)	Lingareddipalayam (R)
17.			Sandaipudukuppam (R)
18.			Suthukeni (R)
19.		Kirumampakkam (R)	Koravallimedu (R)
20.			Manapet (R)
21.			Moorthikuppam (R)
22.			Pillaiyarkuppam (R)
23.		Koodapakkam (R)	Poraiyur (R)
24.		Lawspet (U)	Govt. Quarters (U)
25.			Karuvadikuppam (U)
26.		Mettupalayam (U)	Thattanchavady (U)
27.		Mettupalayam (U)	Muthirapalayam (U)
28.			Kurumbapet (U)
29.		Mudaliarpet (U)	Thengaithittu (U)
30.		Murungapakkam (U)	Kompakkam (U)
31.		Muthialpet (U)	Solai Nagar (U)
32.		Nettapakkam (R)	Pandasozhanalloor (R)
33.		Reddiarpalayam (U)	J.J. Nagar (U)
34.		Sedarapet (R)	Alankuppam (R)
35.		Sooramangalam (R)	Nathamedu (R)
36.		Sorapet (R)	Sellipet (R)
37.		Thavalakuppam (R)	Poorankuppam (R)
38.			Andiarpalayam (R)
39.			Nallavadu (R)

Sl. No.	Name of the District	Name of the Primary Health centres	Name of the Sub- centres
40.		Thirubuvanai (R)	Thiruvandarkoil (R)
41.			Madagadipet (R)
42.			Kaltheerthalkuppam (R)
43.			Sanniyasikuppam (R)
44.		Thirukkanur (R)	Koonichempet (R)
45.			Kodathur (R)
46.			Manalipet (R)
47.		Villianur (U)	Manaveli (U)
48.			Muthulillaipalayam (U)
49.			Sulthanpet (U)
50.			Odiampet (U)
51.		UFWC Dubrayapet (U)	Dubrayapet
52.		CHC Karikalampakkam	Embalam (R)
53.			Aranganur (R)
54.			Korkadu (R)
55.			Uruvaiyur (R)
56.	**Karaikal (17)**	Kottucherry (R)	Rayanpalayam
57.			Poovam
58.			Thiruvettakudi
59.			Kottucherymedu
60.		Nallathur	Vadakattalai
61.		Nedungadu	Kurumbagaram
62.			Melakasakudi
63.			Vadamattam
64.		Neravy	Akkaraivattam
65.			Melaoduthurai
66.		Vizhidiyur	Manampet
67.		T R Pattinam	North vanjoor
68.			Pattinacherry
69.		Nallambal	Sethur
70.		CHC Thirunallar	Karukankudi
71.			Pettai
72.			Muppaithankudi
73.	**Mahe (4)**	CHC Pallor	Chembra
74.			Cherukallai
75.			Palloor east
76.			Chalakara
77.	**Yanam (5)**	Guriempeta	Savithrinagar
78.			Dariyalathippa
79.			Farampeta
80.			Mettakuru
81.			Kanakalapeta

3. Government Hospital - Contacts

Sl. No.	Name of Govt. Hospital	Contacts
1.	Medical Superintendent (G.H.)	2337070
2.	Asst. Director (RMO)	2336138
3.	G.H. Casualty	2336050
4.	JIPMER	2272380
5.	Mahatma Gandhi Dental College & Hospital	2279601
6.	Rajiv Gandhi Women & Child Hospital	2205020
7.	Indira Gandhi Medical College & Research Institute - Perunthalaivar Kamarajar Govt. Medical College, Puducherry	2274552/2277545 2277546

4. Private Hospitals

Sl. No.	Private Hospitals	Contacts
1.	Sri Manakula Vinayagar Medical College & Hospital	2643131
2.	Mahatma Gandhi Medical College & Research Institute	2615449 to 2615456
3.	Sri Lakshmi Narayana Institute of Medical Science	2299200
4.	Pondicherry Institute of Medical Science	2651173
5.	Sri Vengateshwara Hospital & Medical College	2260601
6.	Arupadai Veedu Medical College & Hospital	2615245, 2615246

Annexure B: NPCCHH-Organizational Structure of UT of Puducherry

1. Structure at Puducherry UT Environment Health Cell

State Nodal Officer	DR. MANIMOZHI.S 9994229731 puducherrynpcchh@gmail.com
Consultant-Capacity building/Training	Vacant
Consultant-Environmental Health	Vacant
Data Manager & Analyst	Vacant
Secretarial Assistants cum Data entry Operator	Vacant

2. District Nodal Officers- UT of Puducherry

District	Name	Designation	Contact Details
Puducherry	Dr. Manimozhi. S	Chief Medical Officer	9994229731 mozhi.222@gmail.com
Karaikal	Dr. R. Thaenambigai	Senior Medical Officer	9865079943 thena1488@gmail.com
Mahe	Dr. Sreejith Sukumaran	Chief Medical Officer, NFSG	8129392344 sriji72@gmail.com
Yanam	Dr. Lakshman Naik	General Duty Medical Officer	8610050335 Dr.lakshmannaik@gmail.com

3. Executive Members of Environment Health Cell

State Nodal Officer - Climate Change	Dr. Manimozhi	9994229731 puducherrynpcchh@gmail.com	Chairperson
Mission Director - NHM	Dr. Sriramulu	0413-2224039& 2224059 nrhmpondicherry@yahoo.co.in	Member
Deputy Director Public Health	Dr. Murali	ddph.pon@nic.in	Member
Additional Director NVBDCP	Dr. Vasanthakumari	Pm.nvbdcp@gmail.com	Member
Deputy Director Family Welfare	Dr. Ananthalakshmi	ddfwmchpdy@gmail.com	Member
Deputy Director Immunization	Dr. Rajambal	ddimmpuducherry@gmail.com	
Deputy Director, IEC	Dr. Ragunathan	deputydirectoriec@gmail.com	Member
State Surveillance Officer	Dr. Ravivarman	idspssupdyihip@gmail.com	Member
State Epidemiologist, IDSP	Dr. Srividhya	76685072	Member
Microbiologist, IDSP	Dr. Aruna	805669731	Member

Annexure C

1. Identified Low-Lying Area

PHC	VILLAGE	PHC	VILLAGE
Lawspet	Krishnanagar	Muthialpet	TV Nagar
	Samipillai Thottam		Ramalinga nagar
	Maduvupet		Ganeshnagar
Reddiyarpalayam	Bommianpet		Vaithikuppam
	Jawagar Nagar	Villianur	Nadaraj Nagar
Odiansalai	Attupatti	Villianur	Gopalankadai
Odiansalai	Guber Nagar	Villianur	samiyarthopu
Odiansalai	Rainbow Nagar	Kalapet	Selliamman Nagar
Odiansalai	Thirumudisethuram Nagar	Kalapet	Thidir Nagar - Chinnakalpet
Ariyankuppam	Nonakuppam	Kalapet	Pillaichavady
Thavalakuppam	NR Nagar	MHP	Nethaji Nagar

2. Malaria Hotspots

2019		2020	
PHC	VILLAGE	PHC	VILLAGE
Ariyankuppam	Manaveli	Ariyankuppam	Sivankoil Street
Kirumapakkam	Mathikrishnapuram		RK Nagar
Koodapakkam	Kodapakkam		Thiruvalluvar Street
Lawspet	Krishnanagar		Veerampattinam
Lawspet	Samipillaithottam	Kalapet	Chinnakalpet
Mettupalayam	Muthiraipalayam		
Mettupalayam	Thilashpet		
MHP	Vambakeerapalayam		
Mudaliarpet	Ramanar Nagar		
Mudaliarpet	Pointcare street		
Muthialpet	Dapasanpet		
Sooramangalam	Sooramangalam		
Thavalakuppam	Pooranakuppam		

Annexure D: State Pollution Control Committee

Secretary to Government	Chairperson secy-dste.py@gov.in
Director Department of Science, Technology and Environment	Member Secretary Contact: 0413- 2201256 dste.pon@nic.in/ppcc.pon@nic.in
Director of Industries	Member dic.pon@nic.in
Director of Agriculture	Member agri.pon@nic.in
Director of Health & Family Welfare services	Member dms.pon@nic.in
Puducherry Municipality Commissioner	Member momrpm.pon@nic.in
Karaikal Municipality Commissioner	Member municipal.kkl@nic.in
Senior Town Planner Town & Country Planning Department	Member tcppondy@gmail.com
Principal Puducherry Engineering College	Member info@ptuniv.edu.in