



STATE ACTION PLAN FOR CLIMATE CHANGE & HUMAN HEALTH **GOA**

(Revised Version- 19.04.2023)



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Ministry of Health
and Family Welfare
Government of India

GOA

STATE ACTION PLAN FOR CLIMATE CHANGE AND HUMAN HEALTH (2023)



National Centre for
Disease Control
Government of India



National Programme
on Climate Change
and Human Health



**National Programme
on Climate Change
and Human Health**

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EXECUTIVE SUMMARY

The impact of climate change is being experienced in the Indian sub-continent as is evident from the instances of increased heat waves, hazards, sea rise, and such events. The state of Goa is also being subjected to these changing climatic conditions as well as human health.

Climate change is a growing concern for sustainable development. Climate change poses several threats to the health of the population. Health effects of climate change occur either through direct effects (changes in temperature and precipitation and occurrence of heat waves, floods, droughts, and cyclones, etc.) or indirect effects (ecological disruptions resulting in crop failures, shifting patterns of diseases' vectors, or displacement of the population).

These pressing concerns about climate change's impact on human health are being addressed by the ongoing National Programme on Climate Change and Human Health. Under the programme, national, state, and district action plans to address climate-sensitive illnesses are to be developed. National Action Plan on Climate Change and Human Health (NAPCCHH) called for state-specific action plans to be prepared. As climate threat is determined by the demographic, socio-economic, and physiographic situations in the states, it is imperative to plan localized climate action plans determining the precautionary and anticipatory measures mitigating and adapting to the same by using long-term strategic planning such as state action plan on climate change and human health.

The State Action Plan for Climate Change and Human Health (SAPCCHH) proposes a multi-pronged approach to address the health-related aspects of climate change. It envisions strengthening the population's health against climate-sensitive illnesses. The goal is to reduce morbidity, mortality, injuries, and health vulnerability to climate variability and extreme weather. The objective is to build the capacity of healthcare services against the adverse impact of climate change on human health.

**Director
Directorate of Health Services
GOA**

ACKNOWLEDGEMENT

The guidance and oversight provided by Shri Vishwajeet Rane, Hon'ble Minister for Health, Shri Puneet Kumar Goel Principal Secretary Goa, Shri Arun Kumar Mishra, State Mission Director, NHM Goa, and other senior officials to develop the Goa State Action Plan for Climate Change and Human Health are gratefully acknowledged.

This document is based on inputs provided by officials and experts from the Goa Directorate of Health Services, especially IDSP. The strategies and activities were planned under the guidance and administrative support from Dr. Geeta Kakodkar, Director of Health Services, Goa. We are also grateful to Dr. Pradip Sarmukadam, Member Secretary, Goa State Biodiversity Board for his support.

Technical coordination and documentation support were done under the leadership of Dr. Prashant Suryavanshi, State Nodal Officer-National Program for Climate Change and Human Health (NPCCHH), and Dr. Utkarsh Betodker, State Surveillance Officer supported by Dr. Rajendra Kanekar, State Epidemiologist and Dr. Geetanjali Sardessai Kare, State Consultant for NPCCHH.

Part I



**National Programme
on Climate Change
and Human Health**

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 the 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 costing lives directly. High temperature is known to increase the level of ‘ground level ozone’ and other ‘climate-altering pollutants’ other than carbon dioxide, which further exacerbates 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 of the risk of disasters and 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 the global level including the “Rio Convention 1992”, “Kyoto protocol 1997”, “Male’ Declaration 1998”, “Convention of Parties”, “Cancun Agreement 2010”, “Durban Platform 2011”, and the “Nationally Determined Contributions” (NDCs) at the Conference of Parties 21”.

India is a signatory to the “*Male’ Declaration*” which calls for the strengthening of the health sector and achieving climate resilience. According to the “Male’ Declaration”, it is desired that healthcare facilities should be prepared to address human needs in face of climate change-induced vagaries and adopt climate-resilient practices, particularly to encourage that these can withstand any climatic event and that essential services such as water, sanitation, waste management, and electricity are functional during such events. Further, for achieving climate resilience, 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.

In this regard, initiatives undertaken by the Government of India include the identification of the Ministry of Environment, Forest & Climate Change (MoEF&CC) as the nodal ministry, the formulation of the National Environmental Policy 2006, and the formulation of the Prime Minister’s Council on Climate Change for matters related to Climate Change. MoEF&CC has 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 (NEGCH) to prepare National Action Plan on Climate Change and Human Health

(NAPCCHH) and recommend strategies for indicators, mitigation, capacity building, etc. for the health sector to respond to the climate emergency.

National Centre for Diseases Control (NCDC) is identified as the ‘technical nodal agency’ by MoHFW for the proposed National Mission on Health. The Centre for Environmental and Occupational Health Climate Change & Health (CEOH&CCH), NCDC, is implementing the National Programme of Climate Change and Human Health (NPCCHH), as a part of which the State Action Plan on Climate Change and Human Health (SAPCCHH) has been prepared for the state of Goa. SAPCCHH is a long-term vision and planning document prepared by the Department of Health Services, Goa, applicable till the year 2027. It highlights the current and future vulnerabilities to climate change, the disease burden, and the initiatives to be undertaken to ameliorate the same by formulating a climate-responsive and sustainable health care system in the state.

CHAPTER 2- CLIMATE VULNERABILITY

Goa - Geography and Demographics

Goa, a tiny emerald land on the west coast of India, was liberated from Portuguese rule in 1961. It was a part of the Union Territory of Goa, Daman & Diu till 30th May 1987 when it was carved out to form a separate state. It is located in the Konkan belt in the western part of India between N14°53'57" and N15°47'59" latitude and E73°40'54" and E74°20'11" longitude. It comprises of two revenue districts viz North Goa headquartered at the capital city of Panaji, and South Goa headquartered at Margao.

The boundaries of the state are defined in the north by the Terekhol river which separates it from the Sindhudurg district of Maharashtra, in the north-east by the Belgaum district of Karnataka, in the east and south by Uttar Kannada district of Karnataka and by the Arabian Sea in the west. Goa lies on the Western Coast of India and is 594 km (by road) away from Mumbai city. Further, its coastline covers a length of 105 km from north to south and approximately 60 km from east to west covering an area of 3702 sq. km.

The population of the state is 14.59 lakhs (as per 2011 Census) with a population density of 394 per sq.km with a considerable population nestled in urban areas. Although the economy is primarily agricultural, some mining activity and a significant amount of industry also exist in the state. Tourism, fisheries, and related activities are also major industries in Goa.



Health Profile

Background

Goa has one of the most extensive health systems in India and is one of the states with the best health indicators.

Goa supports a human population of 14.59 Lakhs (Census 2011) which is about 0.12% of India's population. The average population density has increased in the last 20 years from 272 persons per sq. km to 394 persons per sq. km. The population density of Goa is higher than the national population density of 382 persons per sq. km. While the population density of Goa has increased the decennial population growth rate has reduced significantly from 26% in 1987-88 to 8.23% as per the Census 2011. The decadal growth rate of the population for the decade 1991-2001 was 15.21%.

Indicator	Goa	India
Total population (In crore) (Census 2011)	0.14	121.01
Decadal Growth (Census 2011) (%)	8.17	17.64
Crude Birth Rate (SRS 2018)	12.4	20.0
Crude Death Rate (SRS 2018)	5.9	6.2
Sex Ratio (Census 2011)	973	940
Child Sex Ratio (Census 2011)	920	914

More than 62% of the state's population resides in urban areas and about 38% in rural areas. The sex ratio stands at 973 females per thousand males as against the national sex ratio of 940. As per the 2011 Census, 11,65,487 persons in the state are reported to be literate which constitutes 88.70 % of the total population. The state's workforce is about 577548, which constitutes 39.58% of the total population.

Status of Health Indicators

Indicator / Source	India	Goa	SDG Target by 2030
Maternal Mortality Ratio (MMR) / (SRS 2016-18)	113	NA	70
Infant Mortality Rate (IMR) / (SRS 2018)	32	7	-
Neonatal Mortality Rate (NMR) / (SRS 2018)	23	NA	12
Under 5 Mortality Rate (U5MR) / (SRS 2018)	36	NA	25
Total Fertility Rate (TFR) / (SRS 2018)	2.2	1.3	-
Modern Contraceptive Prevalence Rate (MCPR) / (NFHS-4)	47.8	66.2	-

Goa has already attained the targets set by SDG well in advance. The Total Fertility Rate has already fallen below replacement levels and hence it is indicative of a decline in the indigenous population. However, the population density especially towards the coastline is proportionally higher and is expected to remain so because of continuing tourism activities in addition to migration.

The Directorate of Health Services, Goa primarily seeks to provide preventive, promotive, curative, and rehabilitative health services to the people through the primary health care approach, which has been accepted as one of the main instruments of action for the development of human resources, accelerating the socio-economic development and attaining improved quality of life.

Goa is a small coastal state with a population of 0.14 crores (2011 census). However, it is seen that due to the increasing migrant population in urban areas, the facilities are not enough to provide healthcare facilities to all especially the increasing migrant population living in urban slums.

Indicator	Status
Operational AB-HWCs	
Sub Health Centers	102
Primary Health Centers	55
Urban Primary Health Centers	5

Source: AB-HWC Portal (till July 2022)

Indicator	Status
Human Resources (In-Place)	
Medical officer	219
Specialist	127
Ayush Doctors	107
Staff Nurses	625
ANMs	458
Paramedics	215
AYUSH Paramedics	27
Ambulances	

108-Type	25 under NHM and 25 under State
Bike ambulance	35
Mobile Medical Units	
Community Participation	
Rogi Kalyan Samitis (RKS)	37
Village Health Sanitation & Nutrition Committees (VHSNCs)	261
Village Health & Nutrition Days (19-20)	2000
ASHAs	NA
24*7 Facilities	
24*7 PHCs	13
24*7 CHCs	6
FRUs	2

Source: NHM-MIS report as on September 2022

The above tables detail the infrastructure and manpower in the health services. 4 of these have already achieved NQAS certification and the rest of the centres will soon apply for the same. Private practitioners and nursing homes also take care of the health needs of the population.

Over and above the existing medical infrastructure, Goa has launched Deen Dayal Swasthya Yojana in 2016. It is a universal insurance scheme providing insurance cover to the entire population. Also, under the Goa Mediclaim scheme, financial assistance is provided to every permanent resident of the state availing super specialty treatment that is not available in the Government Hospitals. The Goa State Illness Assistance Society scheme provides financial assistance to the extent of INR 1.50 lakhs per patient below the poverty line for availing super specialty treatment.

Climate Vulnerability

Indian sub-continent is experiencing rapid warming, particularly since the 1980s. As per IMD's (2019) analysis, the annual mean temperature during the 1901-2018 period showed an increasing trend of 0.6°C/100 years. Also, a significant increasing trend was seen in maximum temperature (1.0°C/100 years), and a relatively lower increasing trend (0.2°C/100 years) in the minimum temperature over India.

As per Chaturvedi et al 2012, “under the *business as usual* (between RCP6 and RCP8.5) scenario, mean warming in India is likely to be in the range of 1.7 to 2°C by 2030s and 3.3 to 4.8°C by 2080s relative to pre-industrial times”, further it was projected that “all India precipitation under the *business as usual* scenario is to increase from 4% to 5% by 2030s and from 6% to 14% towards the end of the century (2080s) compared to the 1961-1990 baseline”. (Annexure 7). These studies conducted at the national level, lend an understanding of the current and future climate projections and variations, although state-level projections are yet to be made.

Being a small state, the climate variations in Goa are negligible. The summer season in the state lasts between March to June. The state experiences extreme humidity due to the presence of the Arabian Sea towards its western border. The months between July to September experiences a rainy season due to the southwest monsoon. And mild winter season is experienced between November-February. In the state, summers are extraordinarily hot and humid, with maximum daily temperatures occasionally exceeding 35°C. Winters are somewhat cooler and less humid making it more comfortable.

Goa's mean annual temperature has increased by over 1°C since the beginning of the 20th century till date, much of it during the 1990-2018 period. Mean annual rainfall in Goa has increased by 68% over the same period. With increasing rainfall, the inter-annual rainfall variability in the state has also increased especially since the 1970s. While mean annual rainfall in the state has increased, moderate to light rainfall days (IMD category I) in Goa have declined over the 1901-2015 period, whereas very heavy and exceptionally heavy rainfall events (IMD category III) in the state have increased by a dramatic more than 100%.

Mean annual temperatures (model ensemble) in Goa may increase by around 2°C in the 2030s compared to the 1901-1950 period, and further to by around 4°C by 2080s under high emission scenarios. Goa will start experiencing heat waves (>40°C) beyond the 2040s, as maximum temperature increases by about 5°C towards the century end under high emission scenarios. Minimum temperatures are expected to rise even more by up to 8°C by the century end under the high emission scenarios.

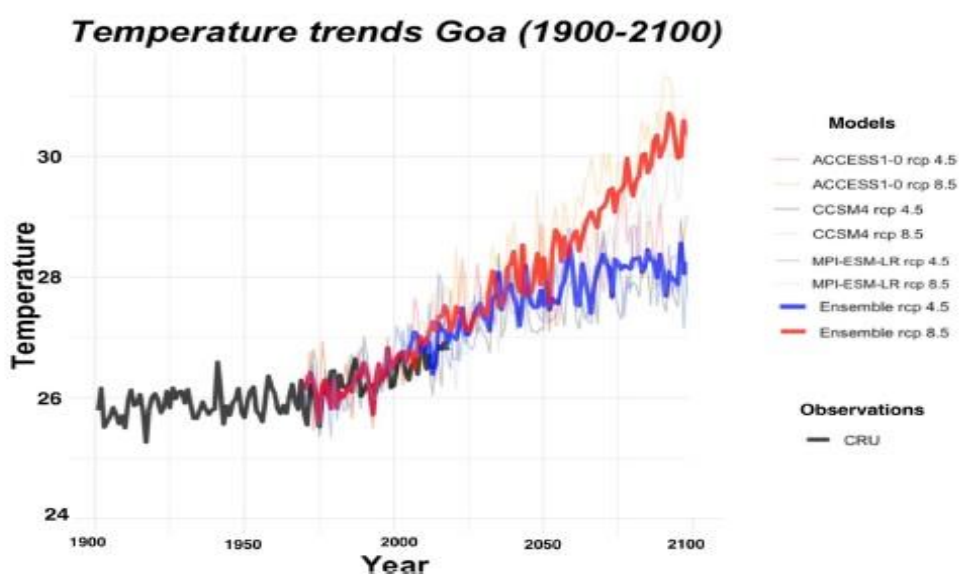


Figure 22: Projected mean temperature trend (deg C) in Goa under different climate change scenarios

The figure below shows the mean annual temperature map of Goa over the long-term period of 1951-2014. The methodology and data source for this figure is described in [Venkateswaran and Chaturvedi \(in Preparation\)](#). The mean temperature in Goa is found to be 26.7 °C, which is higher than the national average annual temperature i.e. 23.3 °C (Chaturvedi et al 2012). While spatial temperature variability is not high in Goa, hilly areas in the eastern parts of the state are generally cooler than the coastal areas in the west.

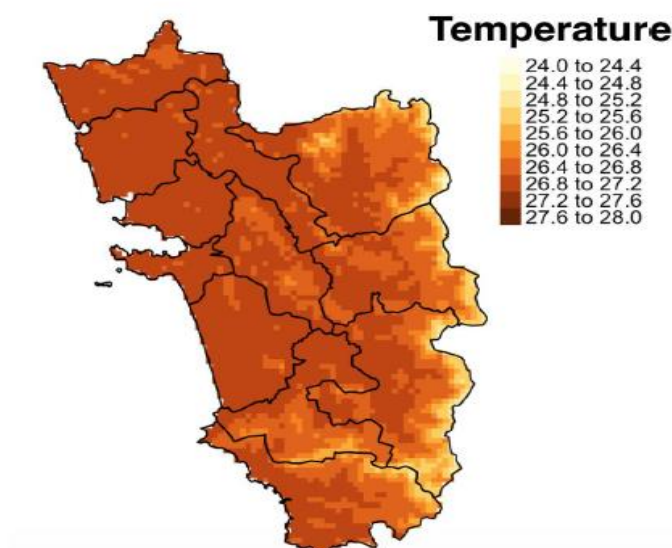


Figure 10: Long period average (1951-2014) spatial distribution of mean temperature (deg C) in Goa

The figure below shows the future mean annual temperature projections in the short-term, mid-term, and long-term.

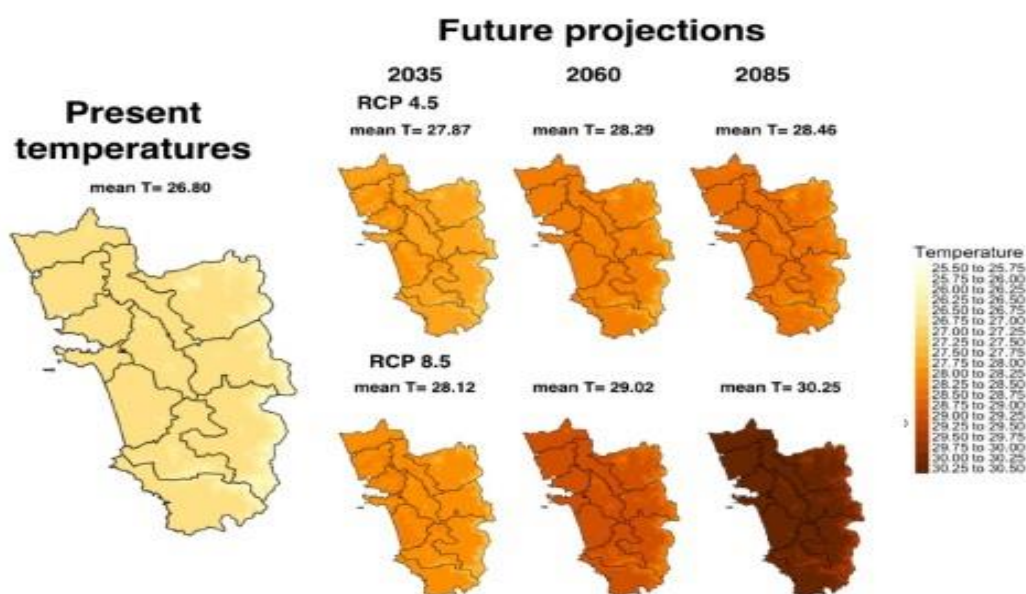


Figure 25: CORDEX model ensemble based mean temperature change (°C) projected for Goa for the year 2030s (2021–2050), 2060s (2046–2075) and 2080s (2070–2099) relative to the Present temperatures (1985–2015)

The average annual rainfall in Goa is about 3000 mm, which is about three times higher than the national average. The figure below shows the future mean annual rainfall projections in the short-term, medium-term, and long-term.

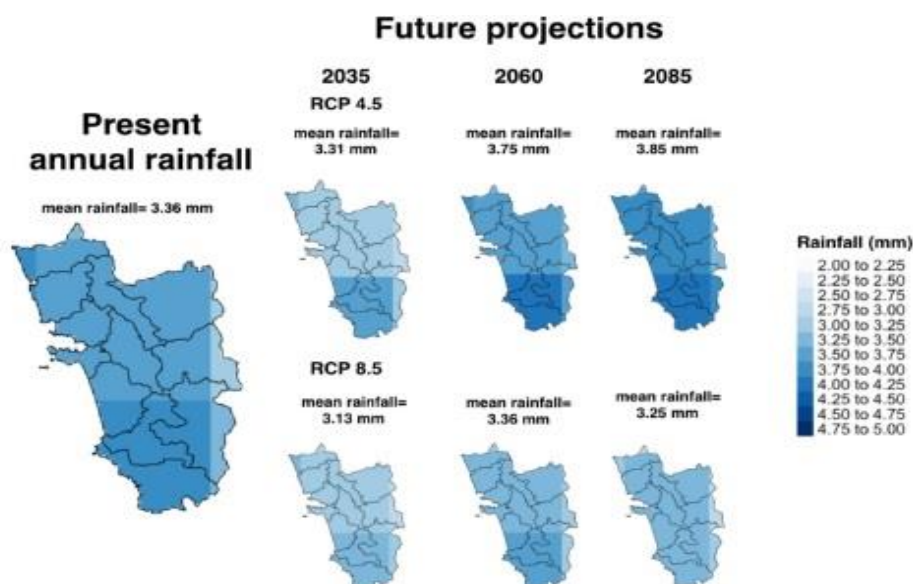


Figure 26: CORDEX model ensemble based mean daily rainfall change (mm) projected for Goa for the year 2030s (2021–2050), 2060s (2046–2075) and 2080s (2070–2099) relative to the Present temperatures (1985–2015)

- Extreme temperature and extreme rainfall events are projected to further increase in the state. An increase in extreme rainfall events could jeopardize the rich

biodiversity

- The flood vulnerability analysis of the state reveals that 14.73% of the land is under 15-meter elevation, much of it is in the coastal zone and is severely vulnerable to flooding both from extreme rainfall events and sea-level rise. This includes the mangrove ecosystems which are of immense ecological and socio-economic significance and are most vulnerable to rising sea levels. Three talukas including Salcete, Tiswadi, and Bardez are found to be the most vulnerable.
- Warming oceans, sea level rise, changes in precipitation, and ocean acidification due to increased CO₂ also affect corals which are biodiversity hotspots.
- Much of Goa's forest cover will be impacted adversely by the impacts of climate change by 2050 if the current trend continues. Livelihoods dependent *khazan lands* and the low-lying ecosystems including riparian ecosystems are in particular the immediate and most vulnerable groups.

CHAPTER 3- CLIMATE SENSITIVE DISEASES PREVALENT IN THE STATE

Climate change attributes new challenges to public health around the world. The phenomenon is linked with rising instances of diseases in the state, for instance through higher temperatures, flooding, air pollution, heat waves, and water scarcity.

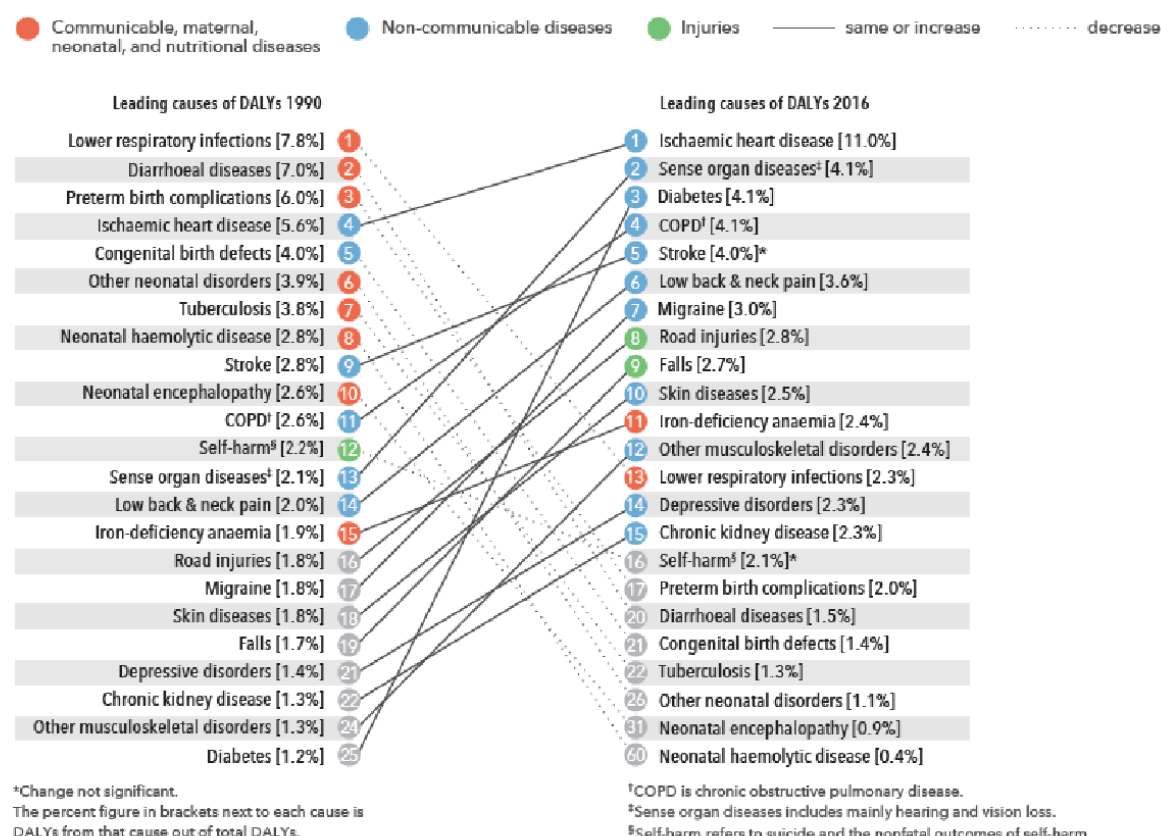
Following are the major climate-sensitive diseases prevalent in Goa:

- Air pollution-related illnesses
- Heat-related illnesses
- Vector-borne diseases
- Disaster-related health issues

AIR POLLUTION RELATED ILLNESSES

Chronic respiratory diseases

India is experiencing a rapid health transition with the rising burden of non-communicable diseases (NCDs) surpassing the burden of communicable diseases like water-borne or vector-borne diseases, TB, HIV, etc. Non-Communicable diseases like cardiovascular diseases, cancer, chronic respiratory diseases, diabetes, etc. are estimated to account for around 60% of all deaths. All of these are projected to increase soon due to the effect of adverse climatic changes.



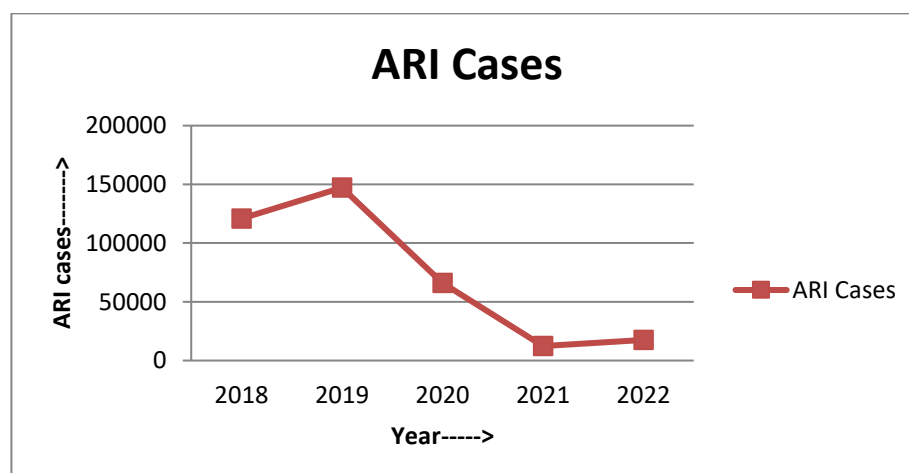
Leading causes of DALYs 2016 in the state (India: Health of the Nation's States. The India State-Level Disease Burden Initiative –Report 2017) are:

- Ischemic heart disease [11.0%]
- Diabetes [4.1%]
- COPD [4.1%]
- Stroke [4.0%]
- Road injuries [2.8%]
- Falls [2.7%]
- Depressive disorders [2.3%]
- Chronic kidney disease [2.3%]

COPD has risen to the 4th leading cause of DALY in Goa with the 4% contribution compared to its 2.6% contribution in the 1990's.

	2018-19	2019-20	2020-21	2021-22	2022-23
Newly Diagnosed Cases	267	2231	1319	1697	810
Follow up	598	8093	4004	3634	421

Pertaining to ARI cases, as per the data received and the graph below, there seems to be a decline in ARI cases recorded by IDSP. However, IHIP usage has been streamlined only post-2021, the data from prior years is from a different portal. Hence data discrepancy could cause alteration of inferences to some degree.



With the COVID pandemic, cases of lung involvement are also expected to add to the above burden. Asthma is a genetic disease triggered by both extrinsic and intrinsic factors. Cases are expected to rise with the increase in air pollution levels.

HEAT-RELATED ILLNESSES

Indian sub-continent is experiencing rapid warming, particularly since the 1980s. As per IMD's (2019) analysis, the annual mean temperature during the 1901-2018 period showed an increasing trend of 0.6°C/100 years.

Goa's mean annual temperature has increased by over 1°C since the beginning of the 20th century till date, much of it during the 1990-2018 period. Mean annual temperatures (model ensemble) in Goa may increase by around 2°C in the 2030s compared to the 1901-1950 period, and further to by around 4°C by 2080s under high emission scenarios.

The IMD provides the state with forecasts as well as warnings via Mausam, Meghdoot, and Damini Apps and also issues public advisories. The state of Goa experienced a heat wave once in the last decade, with no cases of stroke or deaths reported.

https://mausam.imd.gov.in/Forecast/mcmarq/mcmarq_data/Possibility%20of%20Heat%20wave%20on%2014th_March%20.pdf)

As per the projections, Goa may experience heat waves (>40°C) in a couple of years, as and when the maximum temperature is increased by about 5°C. Thereby, underlining the need for Hence, there will be a need for strengthening the healthcare system's response to heat wave-related illnesses including training and surveillance activities in the state.

VECTOR-BORNE DISEASES

The trend of vector-borne illnesses in Goa for the last five years is indicated in the table below.

Year	MALARIA			DENGUE		CHIKUNGUNYA	
	Cases	Pf Cases	Deaths	Cases	Deaths	Cases	Deaths
2018	377	50	0	335	1	77	0
2019	272	54	0	992	0	366	0
2020	102	32	0	376	0	15	0
2021	90	48	0	649	0	12	0
2022(till October)	2	1	0	429	0	106	0

The number of malaria cases indicates a steady decline since 2015 and there have been no deaths reported since 2018. Goa is in the Malaria Elimination phase as the API (Annual Parasite incidence is the number of positive cases per one thousand population) in both districts is less than one.

The increased construction activity in the suburbs, growing population densities, and inadequate sanitation conditions have contributed to the creation of fertile ground for mosquito breeding. The *Aedes Aegypti* mosquito which spreads dengue, chikungunya, yellow fever, and other diseases is a highly domesticated urban mosquito that prefers to live in the human habitat.

Focal cases of dengue and chikungunya are reported all over Goa and these are now under control due to sustained source reduction measures carried out with the involvement of local authorities. There have been no dengue or chikungunya-related deaths in the state since 2019. Also, no Filariasis cases have been reported in the state since 2014 as reported by NVBDCP.

In the current times, Goa is experiencing intermittent extended monsoon till November which also may result in the high density of mosquitoes in the urban areas. Hence, indicating a fluctuation in cases as a resultant of vector-borne diseases due to climate change.

DISASTER-RELATED HEALTH ISSUES

The health of human populations is sensitive to shifts in weather patterns and other aspects of climate change. Increased variability in the weather pattern will further impact the ability of the human body to adjust. Based on the climate change projections it is expected that:

1. The temperature in Goa may rise by 4-5 degrees and beyond a decade state may experience heat wave conditions as well which are currently not experienced in the state. This can cause health effects like dehydration, heatstroke, etc. which are known to be occurring in other states during heatwave conditions.
2. Mortality and morbidity rate due to mudslides, flooding, cyclonic events are also likely to rise.
3. Changing weather pattern is likely to increase the window for the occurrence of vector-borne disease
4. It is predicted that climate change can disrupt the health services related infrastructure and its capacity to serve due to severe events and rise in the number of illnesses
5. New diseases can be introduced in the state

CHAPTER 4- VISION, GOAL & OBJECTIVES

Under the framework of the National Action Plan on Climate Change and Human Health, the IDSP Cell at the Department of Health Services, Goa has adopted the vision, goal, and objectives for the State Action Plan on Climate Change and Human Health.

Vision: Strengthening of healthcare services for all the citizens of the state especially vulnerable groups like 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 health care services against the adverse impact of climate change on health.

SPECIFIC OBJECTIVES

Objective 1: To create awareness among the general population (vulnerable community), healthcare 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.

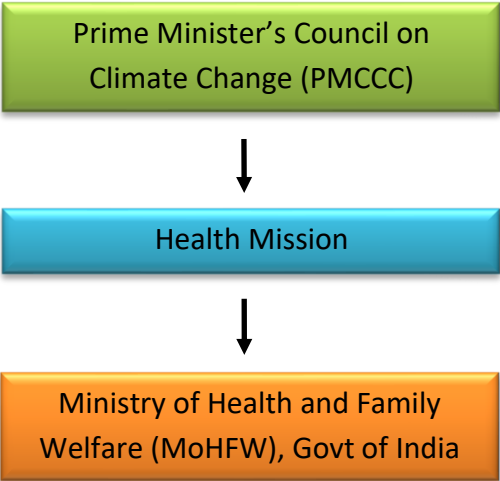
Objective 3: To strengthen health preparedness and response by performing situational analysis at national/ state/ district/ below district levels.

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 climate change's impact on human health

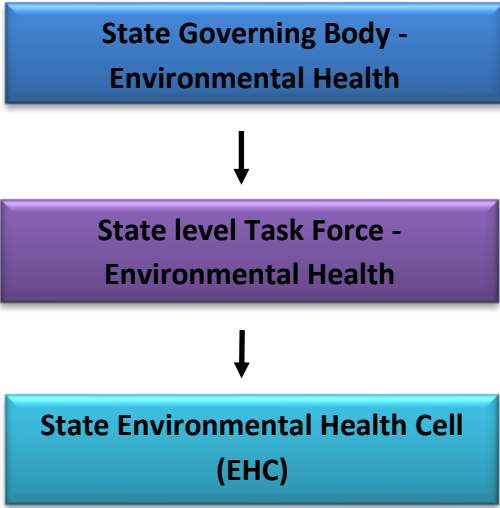
CHAPTER 5- ORGANISATIONAL STRUCTURE

NATIONAL LEVEL



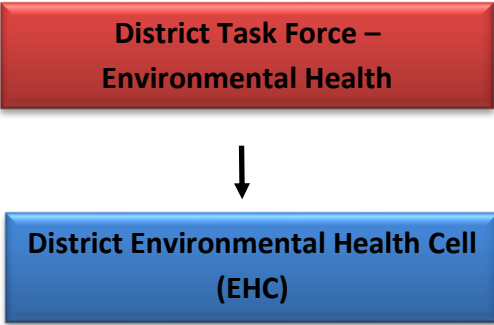
Key Nodal Agency
Head, NPCCHH
(NCDC, MoHFW)

STATE LEVEL



Key Nodal Point
SNO-CC

DISTRICT LEVEL



Key Nodal Point
DNO-CC

BLOCK LEVEL
(DNO-CC)



VILLAGE LEVEL
(DNO-CC)



Committees for implementation of the National programme on Climate Change and Human Health (NPCCH) are as follows:

A) State Level - Governing Body

The state-level governing body shall be working under the Chairmanship of the Honourable State Health Minister.

The other members may be as follows:

Honourable State Health Minister	Chairman
Principal Secretary (Health)	Vice Chairman
Director Health Services	Member Secretary
Mission Director-National Health Mission	Member
Director Medical Education	Member
Regional Director -Health & Family Welfare	Member

B) State-Level Task Force

This task force shall be working under the guidance of the Principal Secretary (Health) of the state. It shall be directly overseeing the implementation of the State Action Plan for Climate Change and Human Health (SAPCCHH) in Goa. It shall be working through the Directorate of Health Services (DHS) of the state, which will be the implementing agency for SAPCCHH.

The State Level Governing Body and Task Force are yet to be constituted.

C) State Environmental Health Cell

Establishment of the State Environmental Cell under the Directorate of Health Services has been approved and the constitution of the Multi-Sectoral Task Force has been notified. (Annexure 1)

1.	Secretary (Health)	Chairperson
2.	Director of Health Services	Member
3.	Dean, Goa Medical College	Member
4.	Director, Animal Husbandry & Veterinary Service	Member
5.	Director of Panchayat	Member
6.	Director of Municipal Administration	Member
7.	Chairman, Goa State Pollution Control Board	Member
8.	Director of Science, Technology & Environment	Member
9.	Director of Agriculture	Member
10.	Director, Indian Metrological Department	Member
11.	Chief Engineer, Water Resources Department	Member
12.	District Collector (North)	Member
13.	District Collector (South)	Member
14.	Deputy Director (Public Health)	Member
15.	Deputy Director (Medical)	Member
16.	State Programme Officer Non Communicable Disease Control Programme	Member
17.	State Programme Officer National Vector Borne Disease Control Programme	Member
18.	State Programme Officer Integrated Disease Surveillance Programme	Member
19.	State Programme Officer National Health Mission	Member
20.	State Nodal Officer (SNO)	Member Secretary

Roles and Responsibilities of the State Environmental Health Cell:

- Preparation and implementation of State Action Plan for Climate Change and Human Health.
- Conduct Vulnerability assessment and risk mapping for commonly occurring climate-sensitive illnesses in the state/ UT.
- Assessment of needs for health care professionals (like training, capacity building) and organize training, workshop, and meetings.
- Maintain state and district-level data on physical, financial, and epidemiological profiles 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 a campaign or using mass media (electronic or printed).
- Social mobilization against 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 operational research and evaluation studies for climate change and its impact on human health.

Note- Goa, being a small state, has not formed any district-level committees for any programme and conducts all activities from the headquarters

Part II



**National Programme
on Climate Change
and Human Health**

HEALTH ADAPTATION PLAN FOR ACUTE RESPIRATORY ILLNESSES ATTRIBUTED TO AIR POLLUTION

Air pollution is a major environmental risk to health. The formation, transport, and dispersion of many air pollutants are determined partly by climate and weather factors such as temperature, humidity, wind, storms, drought, and precipitation and by human activities like industrialization, construction and demolition activities, vehicular pollution, episodic crop residue burning, etc. known to produce various air pollutants. Air pollution is also associated with acid rain, and eutrophication due to nitrogen oxide emission in the air from power plants, cars, trucks, and other sources, haze, toxic effects on wildlife, ozone depletion in the atmosphere, crop, and forest damage, etc.

The health risks due to air pollution are associated with exposure to high levels of particulate matter (PM), ozone (O₃), nitrogen dioxide (NO₂) and sulphur dioxide (SO₂), etc. Air quality levels in an area are collectively communicated to the public as Air Quality Index (AQI). The particulate matters of less than 10 and 2.5 micrometers (PM₁₀ and PM_{2.5}) are capable of penetrating deep into the airway passages, entering the bloodstream, causing illnesses from acute and chronic respiratory systems, increase in malfunction of the other organs affecting the health of cardio-cerebrovascular renal diseases, and among pregnant females due to trans-placental crossing of pollutants affect foetus resulting in low birth congenital problems and associated complications.

Causes of air pollution

Ambient Air Pollution

- Pollution by automobiles
- Industrial Emission
- Tourism related activities
- Fisheries/ Agriculture & related activities
- Mining and related activities

Indoor Air Pollution

- Use of biomass, kerosene as fuel for cooking
- Burning of waste, cow dung, and coal in villages
- Tobacco smoke/ cigarettes/ beedi/ hookah/ recreational uses
- Mosquito coil/ candles/incense

Ambient (outdoor) air pollution in both cities and rural areas was estimated to cause approximately 7 million deaths worldwide, and 90% of these deaths have occurred in low and middle-income countries. In India, nearly 12.5% of deaths have been attributed to air pollution. An ICMR report concluded that Outdoor Air Pollution caused 6.7 lakh premature deaths, while Indoor Air Pollution caused 4.8 lakh premature deaths in 2017. Thus, it is logical to assume that a reduction in air pollution levels can help reduce the burden of diseases like acute and chronic respiratory diseases, heart diseases, strokes, and other allergic problems.

The quality of air is expressed by Air Quality Index (AQI) which is broadly categorized into six levels, i.e. Good, Satisfactory, Moderately Polluted, Poor, Very Poor, and Severe to communicate and help understand the AQI as well as the associated health problems.

Health Impacts of Air Pollution

According to the report of the Steering Committee on Air Pollution from the MoHFW (2015) and WHO reports on Air Pollution and Health, certain short-term and long-term health effects due to air pollution are shown in table 1 (Annexure 2)

As air pollution is recognized to impact the health of a large population living in both urban and rural areas in India, there is an urgent need to develop state-specific health adaptation plans related to air pollution to meet the objectives and targets to prioritize resources to address health-related issues in context of air pollution.

Activity Matrix

Health action plan on ‘Air Pollution and Health’ in Goa has been developed to protect, prevent control health problems and reduce morbidity and mortality due to illnesses related to air pollution.

The major components of the health action plan on air pollution and health are mentioned below-

AWARENESS GENERATION

To increase general awareness amongst all the relevant stakeholders including the general population especially vulnerable communities, health care providers, and policy makers regarding the impacts of air pollution on human health, the state has developed information, education and communication (IEC) communicating messages for preventable actions and seeking medical support using multiple communication materials such as posters, audios, videos, and organizing public health events.

IEC activities and dissemination plan at the state level:

Using posters on climate change and health impacts including messages of prevention and protection from air pollution for the general population, targeting vulnerable groups, and seeking medical support. These are disseminated in all healthcare facilities and all government educational institutes, along with using mass media channels for reaching out to the general population. (**Annexure 3**) Also, 7 audio-videos have been disseminated (reference links attached). (**Annexure 4**)

i. Target population:

- Urban areas** (Primarily Municipal corporations)
- Industrial areas** (like Corlim, Kundaim, Madkai, Margao, Pissurlem, Verna, etc.)
- Vulnerable groups** (children, women, older adults, traffic police, and outdoor workers)

ii. Annual IEC dissemination plan for Air Pollution and Health under NPCCHH, Goa

Table i: IEC dissemination plan

Indicator Statement	Indicator	Unit	Target 2022-23	Target 2023-24	Target 2024-25	Target 2025-26	Target 2026-27
IEC campaigns (see list *)	% of Districts implemented IEC campaign on Air Pollution	%	50%	50%	100%	100%	100%
	% of Districts included climate sensitive issues in the VHSNCs	%	50%	50%	100%	100%	100%

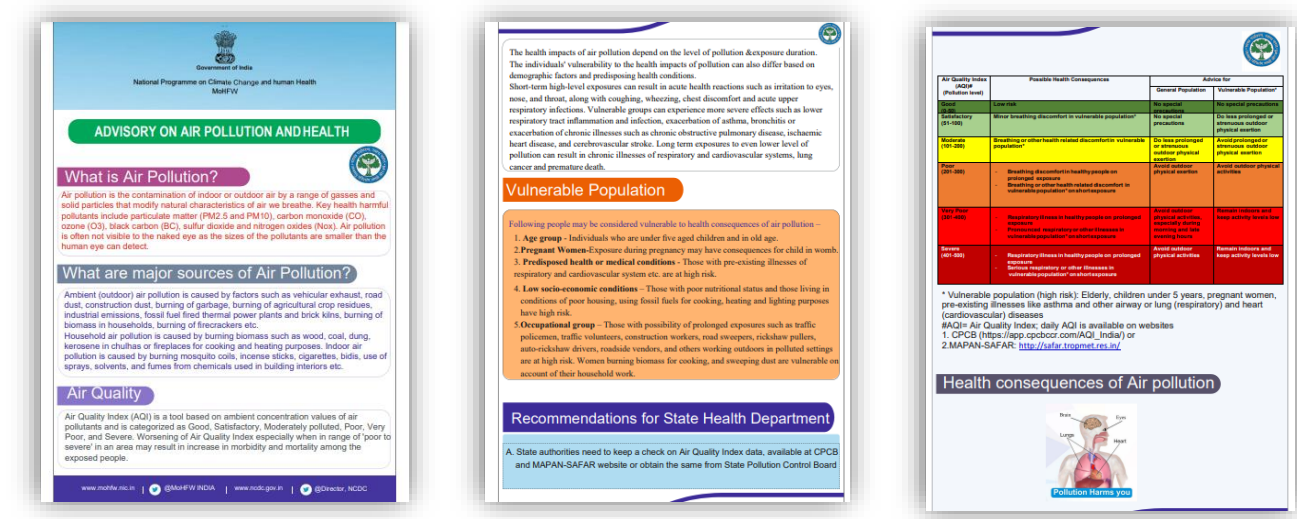
iii. Listed IEC activities for an IEC campaign for Air Pollution

- 1 or 2 video clips of 1-2 min duration broadcasted 1-2 times a day throughout the year on air pollution and its health impacts.
- 1-2 Large Wall Poster and/or 1-2 Foam board printed and disseminated in all healthcare facilities and all government educational institutes. One each at each facility/institute per year.
- Social Media – active circulation of audio-video clips and poster slideshow in prominent social media handles.
- Sensitization workshops for district, state, and regional level officers
- Community participation through meetings, education in school, Panchayati Raj Institutions and gram sabhas.

S. No	IEC Content	Priority Districts	Dissemination Plan	Mechanism	Timeline	Budget (in lakhs)				
						(2022-23)	2 years (2022-24)	(2024-25)	(2025-26)	(2026-27)
1.	Posters	2 districts	2 Posters per Healthcare facilities in all districts bit.ly/NPCCHHIEC	Printing of copies for state-level dissemination at health facilities, public places/building By email to DNO for dissemination to health facilities, schools and other public/government buildings	Sep to Nov	1 lakhs	1.2 lakhs	1.5 lakhs	1.8 lakhs	2 lakhs
2.	Audio	2 districts	3 audios bit.ly/NPCCHHIEC	Radio	October					
3.	Videos	2 districts	7 videos bit.ly/NPCCHHIEC	Social media/TV/public events-videos circulated during celebrations of important days.	October					
4.	Social Media	2 districts	All above material + relevant activity updates	Twitter WhatsApp groups(State DNO, Health facility group)	Through out the year					

Public Health Advisories

Health advisories (bit.ly/NPCCHHPrg) are issued to alert population of potential harmful impact of impending environmental phenomena like cold wave/frost, heat wave and elevated air pollution. Advisories are issued at central level and will be forwarded to the districts through State/UTs for public dissemination. State will be responsible to ensure timely dissemination of health advisories in locally acceptable language.



OBSERVATION OF HEALTH RELATED DAYS WITH EMPHASIS ON AIR POLLUTION RELATED EVENTS

- Days
 - a) International Day of Clean Air for Blue Skies (September 7)
 - b) Other Days-
 - World Car Free Day (September 22)
 - World Environmental Health Day (September 26)
 - Green Consumer Day (September 28)
- Activities
 - IEC Campaigns
 - Health Facility-Based Patient Awareness Sessions
 - Audio- Video spots broadcasting
 - Targeted Awareness Sessions – Traffic Police / Schools/ Women & Children
 - Street Plays and local cultural activities
 - Rallies
 - Sports events
 - Competitions: Poster/ Poetry/ Essay/ Quiz

CAPACITY BUILDING

To strengthen the capacity of the healthcare system to adapt/address illnesses/ diseases due to the impacts of air pollution, the following capacity building and training programme will be deployed by the state. Further, refresher training at regular intervals will be conducted to regularly help appraise the staff to strengthen the health sector response to air pollution-related illnesses.

i. Training material

Guidelines: (available bit.ly/NPCCHHguidelines)

- Health Adaptation Plan for Disease Due to Air Pollution
- Health Sector Preparedness for Air Pollution
- Handbook for Health Professionals on Air Pollution & Its Impact on Health

Training modules: (available bit.ly/NPCCHHguidelines)

- Women Training Manual (English, Hindi)
- Children Training Manual (English, Hindi)
- Traffic Police Training Manual (English, Hindi)
- Municipal Worker Training Manual (English/Hindi)

Other training resources: NPCCHHchannel <https://bit.ly/NPCCHHyt>

Training calendar:

TABLE iii: NPCCHH Training Plan at the State 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 and Extension Educators	
Panchayati Raj Institutions (1 day)	MO, MPHW	Panchayati Raj Institutions, communities	

Training Programme	Trainer	Training Contents	Timeline
Health facility level (MO of DH/CHC/PHC) 2 days	District Level Trainers DNO-CC	Air pollution-health impact, prevention measures Surveillance case identification and reporting Health facility preparedness	August-September December-January (review/repeat if necessary)
Community Health care workers (MPHW, ANM etc.) 2 days	State & District Trainers	Surveillance case identification and reporting	August-September December-January (review/repeat if necessary)
Panchayati Raj Institutions/ Communities 1 day	District Level Trainers, MO, Extension Educators	Air pollution-health impact prevention	September-October

Table iv: Recommended schedule of training for 5 years (2022-2027)								
Trainer	Priority Districts	Time of year	Content matter	Budget				
				(2022-23)	(2022-24)	(2024-25)	(2025-26)	(2026-27)
SNO-CC	2 Districts	July-September	Air pollution-related illnesses Cardio pulmonary diseases Allergic diseases	0.8 lakhs	1 lakh	1.2 lakhs	1.5 lakhs	1.8 lakhs
MO	2 Districts	October-November						
MO, Health care workers	2 Districts	December						

SURVEILLANCE

The state has established surveillance mechanisms on illnesses due to air pollution to help understand the health problems in the area and establish a pattern to better inform the impact of air pollution on the population as well as strengthen the healthcare facility’s response to the illnesses. The state has initiated Sentinel Surveillance for illnesses in the context of air pollution by identifying hospitals across the region.

There are **NIL** non-attainment cities as identified under the National Clean Air Programme of the MoEFCC as of yet in Goa.

SENTINEL HOSPITALS SELECTED FOR ARI SURVEILLANCE ACTIVITY:

Currently, 2 sentinel hospitals have been identified in Goa for acute respiratory illnesses (ARI) surveillance, the details of these include-

ARI Sentinel Surveillance					
S.No	District Name	Facility Name	Nodal Officer Name	Mobile Number	E mail
1	NORTH GOA DISTRICT	NORTH GOA DISTRICT HOSPITAL-ASILO	Dr.SaloniPrabhu District Epidemiologist North	+917767960688	dsungoa@gmail.com drsaloni95@gmail.com
2	SOUTH GOA DISTRICT	SOUTH GOA DISTRICT HOSPITAL-HOSPICIO	Dr.Annet Oliveira District Epidemiologist South	+919850926226	dsusgoa@gmail.com oliveiraannet@gmail.com

ROLES AND RESPONSIBILITIES

In accordance with the action plan on air pollution and its impact on human health, the following roles and responsibilities have been identified to be implemented at the state, district, block as well as healthcare facility level-

Particulars	Responsibilities
SNO	<p>Finalization of IEC material and dissemination plan</p> <p>Organize IEC campaigns at the state level on the observance of important environment-health days</p> <p>Organize training sessions for district-level officers and surveillance nodal officer</p> <p>Facilitate training of medical officers in clinical aspects of air pollution's health impact</p> <p>Real-time air quality data dashboard in proposed cities</p> <p>Monitor AQI levels in states especially in hotspots and NCAP cities</p> <p>Ensure reporting from sentinel hospitals and DNO</p> <p>Ensure necessary health facility preparedness</p> <p>Review surveillance reporting and monthly report submission by DNO</p> <p>Submit a report of activities</p> <p>Review implementation of IEC and surveillance activities at all levels</p> <p>Evaluate and update relevant sections of SAPCCHH with the support from State Task Force</p> <p>Liaison with State Pollution Control Board for AQI alerts and its dissemination</p> <p>Liaison with the Department of Environment for combined IEC campaigns and information sharing on health indicators for targeted air pollution reduction activities</p> <p>Awareness and action plan input sharing with the local bodies of cities with high AQI</p> <p>Create organization support and strengthen Environmental Health cell to implement NPCCHH vision, goal, and objectives</p> <p>Organize sensitization workshops for other stakeholders and line departments</p> <p>Organize seminars on Air Pollution and conferences to share knowledge and action under NPCCHH.</p> <p>Collaborate with academic institute/s for support in updating SAPCCHH</p> <p>Surveillance activity monitoring, vulnerability assessment, and applied research</p> <p>Advocate for reduction in the source of air pollution</p>
DNO	<p>Ensure IEC dissemination to the community level</p> <p>Facilitate community level IEC activities</p> <p>Organize training for Medical officer and Sentinel hospital nodal officers with relevant training manuals</p> <p>Organize training of vulnerable groups: police officers, outdoor works, women, children</p> <p>Organize IEC campaigns at the district-level on observance of important environment-health days</p> <p>Collect and monitor AQI levels in states especially in hotspots and NCAP cities</p> <p>Ensure daily reporting from Sentinel hospitals and compile the data</p> <p>Analyze daily health data with AQI level to monitor trends and hotspot in health impacts</p> <p>Submit analysed monthly report to SNO, NPCCHH Headquarter, and other departments for necessary action</p> <p>Submit report of activities</p> <p>Advocate for reduction in the source of air pollution</p>
Surveillance hospital nodal officer	<p>Train hospital staff and clinician responsible for daily reporting in case indentation and reporting flow</p> <p>Compile daily reports for the health facility and submit it to DNO and NPCCHH, Headquarter</p>
Medical officer	<p>Conduct health facility-based IEC activities</p> <p>Support community-level IEC activities</p> <p>Be aware of AQI levels and health impact of air pollution</p> <p>Ensure necessary health facility preparedness in early diagnosis and management of cases</p>
Panchayati Raj Institutions	<p>Conduct community-level IEC activities</p>

HEALTH ADAPTATION PLAN ON HEAT-RELATED ILLNESSES

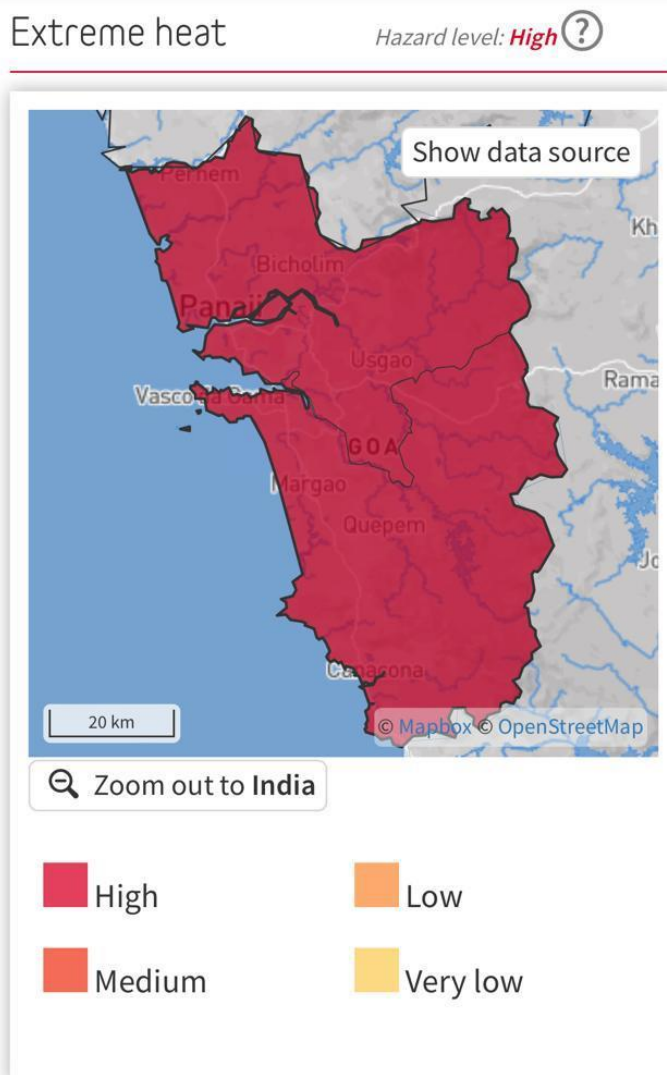
Introduction

Heat-related illnesses (HRI) encompass a spectrum of disorders ranging from heat syncope, muscle cramps, and heat exhaustion to a life-threatening emergency such as heat stroke. These illnesses arise when there is a disruption in the regulation of the body's temperature because heat input from the environment and body metabolism is increased in comparison to without the rise in temperatures from the skin via radiation, evaporation, and convection.

In India, a significant number of deaths occur every year due to heat-related illnesses. Integrated Disease Surveillance Programme (IDSP) at the National Centre for Disease Control (NCDC) under MoHFW, GoI is collecting and reporting the morbidity and mortality data of HRI from heat-vulnerable states since 2015. In the context of global warming, extreme weather events are on the rise and among them heat waves are projected to increase in number, intensity, and duration with consequent health risks.

The entire Goa (both districts North Goa and South Goa) are vulnerable to Heat hazard.

Goa - extreme heat hazard is classified as **high** based on modeled heat information currently available to this tool. This means that prolonged exposure to extreme heat, resulting in heat stress, is expected to occur at least once in the next five years. Project planning decisions, project design, and construction methods must take into account the level of extreme hazard.



Source : <https://www.thinkhazard.org/en/report/1490-india-go/EA>

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 are used to declare a heat wave:

A. Based on 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 $\geq 45^{\circ}\text{C}$

Severe Heat Wave: When the actual maximum temperature $\geq 47^{\circ}\text{C}$

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 gets declared on the second day.

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. As seen in the 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
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
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 $\geq 40^{\circ}\text{C}$ OR 104°F ; altered mental status with disorientation, incoherent behaviour, COMA, CONVULSION	No coincidental signs and symptoms of infection; no focal weakness; no difficulties in swallowing food or speech, no overdose history

				; tachycardia; +/- hypotension	
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Vulnerability Assessment for heat-related illness:

- Children below 5 years and elders above 65 years
- Pregnant women
- Labourers including those at construction sites/ Outdoor workers
- Farmers/ MNREGS workers
- Police personnel/ security staff
- Industrial workers working at High Temperatures
- Street hawkers/ Coolies/ salesmen
- Auto drivers/ Travellers/ Bus drivers
- Slum residents/ Beggars/ Homeless
- Alcoholics, Smokers, People consuming hot drinks frequently.
- Persons suffering from chronic diseases like Cardiovascular, Renal, Skin, Liver, Diabetes, Obesity, debilitated / malnourished etc.

HEALTH ADAPTAION PLAN:

The Heat wave action plan provides a framework for the implementation, coordination, and evaluation of extreme heat response activities in cities in Goa to reduce extreme heat-related illnesses. The primary objective of the action plan is to alert the populations at risk of heat-related illness in places where extreme heat conditions either exist or are imminent and to take appropriate precautions. Severe and extended heat waves can also disrupt general, social, and economic services.

The Heat Action Plan is a comprehensive early warning system and preparedness plan for extreme heat events. The plan presents immediate as well as longer-term actions to increase preparedness, information-sharing, and response coordination to reduce the health impacts of extreme heat on vulnerable populations. It is intended to mobilize individuals and communities to help protect their neighbours, friends, relatives, and themselves against avoidable health problems during spells of very hot weather.

The major components of the action plan are mentioned below-

Awareness Generation

To increase general awareness amongst all the relevant stakeholders, including the general population, especially vulnerable communities, health-care providers, and policy makers regarding the impacts of heat and ways to address them.

IEC

In accordance with the guidance provided, various communication materials will be adopted by the state in the local language and shared with the district for further dissemination. These include posters, audio, videos, advisories, and other mediums of awareness generation. These illustrate the preventive measures for the general as well as vulnerable populations to undertake in situations of a heat wave as well as in

seeking medical support. At the community level, the IEC material is to help the population to be aware of the heat wave situation as well as adapt to the same. The developed IEC material will be disseminated in the state during the intensive summer months regularly for maximum population reach-out in all the cities and districts with high susceptibility and exposure to heat wave-related events as per current as well as future climatic conditions.

Table 1 : Plan for IEC dissemination on Heat for 5 years

Indicator Statement	Indicator	Unit	Target 2022-23	Target 2023-24	Target 2024-25	Target 2025-26	Target 2026-27
IEC campaigns (see list *)	% of Districts implemented IEC campaign on heat-related illnesses	%	50%	50%	100%	100%	100%
	% of Districts included climate-sensitive issues in the VHSNCs	%	50%	50%	100%	100%	100%

Listed IEC activities for an IEC campaign for heat-related illness

- 1 or 2 audio/ video clips of 1-2 min duration broadcasted 1-2 times a day throughout the year on the heat-related illness and its health impacts relevant to that part of the year
- 1-2 Large Wall Poster and/or 1-2 Foam board printed and disseminated in all healthcare facilities and all government educational institutes. One each at each facility/institute per year
- Social Media – active circulation of audio-video clips and poster slideshow on prominent social media handles

S. No	IEC Content	Priority Districts	Dissemination Plan for 5 years (2022-27)	Timeline	Budget (in lakhs)				
					(2022-23)	(2022-24)	(2024-25)	(2025-26)	(2026-27)
1.	Posters	2 districts	2 posters for Healthcare facilities in all districts	February to March	0.4 lakhs	0.5 lakhs	0.6 lakhs	0.7lakhs	0.85 Lakhs
2.	Audio		4 audios (received from GOI)	April to May					
3.	Videos		7 videos (received from GOI)	April to May					

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 i.e. NCDC and will be forwarded to the districts for public dissemination. Districts are responsible for ensuring timely dissemination of health advisories in locally acceptable language.

Observance of important days

World Environmental Day will be observed for heat under NPCCHH every year

- Activities like poster competitions/ essay competitions/ drama competitions can be held in educational institutions
- Walkathons
- Advertisements/ publicity on social media
- Tree plantation drives and plant distribution
- IEC activities in organizations/ health centres
- Street plays/ songs etc.

CAPACITY BUILDING

To strengthen the capacity of the healthcare systems to adapt/address illnesses/ diseases due to the heat waves in the state of Goa, capacity building and training plans will be developed. This is indicated in the table below-

Table iii: Training schedule

Training Programme for	Trainer	Topics	Timeline
District level (DNO-CC, trainers)	State Level Trainers SNO-CC, Consultant	Heat-health impact, prevention measures Surveillance reporting and analysis with weather parameters Health facility preparedness	March
Health facility level (MO of DH/CHC/PHC)	District Level Trainers DNO-CC	Heat-health impact, prevention measures Surveillance case identification and reporting Health facility preparedness Clinical management of HRI	March
Community Health care workers (MPH, ANM, etc)	District Level Trainers, MO	Heat-health impact prevention Indoor and outdoor mitigation measures	March-April
Panchayati Raj Institutions	District Level trainers, MO, Extension Educators	Heat-health impact prevention Indoor and outdoor mitigation measures	March –April

Table iv: Schedule of training for the next 5 years (2022-2027)								
Trainer	Priority Districts	Time of year	Content matter	Budget				
				(2022-23)	(2022-24)	(2024-25)	(2025-26)	(2026-27)
DNO-CC	2 Districts	March to April	Heat-related illnesses					
MO		March to April						
District level trainers, MO, Health care workers		May to June		0.6 lakhs	0.75lakhs	0.9 lakhs	1.1 lakhs	1.25 lakhs

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

SURVEILLANCE

HRI surveillance is conducted to establish a baseline of HRI morbidity and mortality, monitor HRI incidence concerning environmental parameters, and improve health system preparedness to extreme heat. The state is collecting HRI data reports from IDSP and sharing with NCDC every month. The IHIP platform for HRI surveillance has been initiated and reporting is being streamlined.

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

Roles and responsibilities

The roles and responsibilities of the state staff to implement the action plan for heat-related illnesses is defined below-

Particulars	Responsibilities
SNO	Disseminate early warnings to the 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 and the surveillance nodal officers Facilitate training of medical officers in clinical aspects of the heat-health impact Ensure daily surveillance reporting from the district level Ensure submission and analysis of heat-related death 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 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 sections of SAPCCHH with support from State Task Force

	<p>Create organizational support and strengthen the Environmental Health cell to implement the NPCCHH vision, goal, and objectives</p> <p>Organize sensitization workshops for other stakeholders and line departments</p> <p>Organize seminars and conferences to share knowledge and action under NPCCHH.</p> <p>Collaborate with academic institute/s for support in updating SAPCCHH, Surveillance activity monitoring, training of health care professionals, vulnerability assessment, and applied research</p> <p>Submit a report of activities on heat-health under NPCCHH</p> <p>Advocate for a reduction in source of greenhouse gas emissions</p>
DNO	<p>Disseminate early warning at the block and health facility level</p> <p>Ensure IEC dissemination to the community level and facilitate community-level IEC activities</p> <p>Liaison with IMD to receive daily observed temperature and relative humidity information</p> <p>Liaison with other departments for combined IEC campaigns, coordinated response and information sharing of health indicators for targeted action</p> <p>Conduct training for health officers, and medical officers, with relevant training manuals</p> <p>Conduct sensitization of vulnerable groups: police officers, outdoor workers, women, children, etc</p> <p>Organize IEC campaigns at the district level on the observance of important environment-health days</p> <p>Ensure daily reporting from health facilities and compile the data</p> <p>Analyze daily health data with temperature and humidity levels to monitor trends and hotspots in the district</p> <p>Support timely suspected heatstroke death analysis and its reporting</p> <p>Submit analyzed weekly report to SNO, NPCCHH, and other departments for necessary action</p> <p>Coordinate with other agencies for response</p> <p>Submit a report of activities on heat-health under NPCCHH</p> <p>Advocate for the reduction in source of greenhouse gas emissions</p>
City Health Department	Support in the development and implementation of the city-specific heat-health action plan
Medical Officer	<p>Conduct health facility-based IEC activities</p> <p>Support community-level IEC activities</p> <p>Be aware of temperature levels and the health impact of heat stress</p> <p>Ensure necessary health facility preparedness in early diagnosis and management of cases</p>
Panchayati Raj Institutions	Conduct community-level IEC activities

HEALTH ADAPTATION PLAN FOR VECTOR-BORNE DISEASES

The effects of variation in climate has been well established for illnesses which are spread through vectors or which are transmitted from animals to humans. According to World Health Organization (WHO) climate change is considered as one of the paramount threat to human health. Climate change can have an effect on the geographic spread, transmission dynamics, and re-emergence of vector-borne diseases through multiple pathways. The effects of climate change can be seen on the pathogen, the vector, non-human hosts, and humans.

Vector-borne diseases (VBD) are climate-sensitive as the arthropod vectors such as mosquitoes, sand flies, ticks and mites are cold-blooded creatures. The development of vectors is affected by the temperature, rainfall, and relative humidity (RH). At lower temperatures, the rate of development is slow while at the higher temperatures the life cycle of vectors gets completed in a shorter time. Rainfall helps in the creation of breeding grounds for mosquitoes, while the RH helps in the survival and longevity of vectors. However, climate change poses a risk for such areas, as the unsuitable areas are likely to become suitable with the variations in temperature and precipitation patterns.

The major global vector-borne diseases identified by World Health Organization and are observed in India are malaria, dengue, chikungunya, Zika virus disease, Lymphatic Filariasis, Leishmaniasis and Japanese Encephalitis (J.E.). The most prevalent vector-borne diseases in the state of Goa include malaria, dengue and chikungunya. The monitoring and prevention of outbreaks for these is looked into by the National Vector-Borne Diseases Control Programme, Directorate of Health Services, Government of Goa.

Malaria is a life threatening disease caused by Plasmodium parasites that are transmitted to people through the bites of infected mosquitoes. Malaria is preventable and curable. Non immune travellers from malaria free areas are very vulnerable to the disease. Dengue is a mosquito borne viral infection. The infection causes flu like illness and occasionally develops into a potentially lethal complication called dengue haemorrhagic fever (DHF) and dengue shock syndrome (DSS). Chikungunya is a viral disease transmitted to humans by infected mosquitoes. It causes fever and severe joint pain. Other symptoms include muscle pain, headache, nausea, fatigue and rash. The registered cases of vector-borne illnesses in Goa over the last five years are indicated in the table below-

Year	MALARIA			DENGUE		CHIKUNGUNYA	
	Cases	Pf Cases	Deaths	Cases	Deaths	Cases	Deaths
2018	377	50	0	335	1	77	0
2019	272	54	0	992	0	366	0
2020	102	32	0	376	0	15	0
2021	90	48	0	649	0	12	0
2022(till October)	2	1	0	429	0	106	0

*<https://ncvdbc.mohfw.gov.in/WriteReadData/1892s/4278785141677647046.pdf>

*<https://ncvdbc.mohfw.gov.in/index4.php?lang=1&level=0&linkid=431&lid=3715>

*<https://ncvdbc.mohfw.gov.in/index4.php?lang=1&level=0&linkid=486&lid=3765>

As indicated above, the number of malaria cases in the state are declining since 2015 and no deaths have been reported since 2018. The state of Goa is in the Malaria Elimination phase as the API (Annual Parasite incidence is the number of positive cases per one thousand population) in both the districts is less than one.

Focal cases of dengue and chikungunya are reported throughout the state and are being checked and monitored. Further, reduction in cases is witnessed due to sustained source reduction measures carried out with the involvement of local authorities. There have been no dengue or chikungunya related deaths in the state since 2019. Furthermore, no Filariasis cases have been reported in the state since 2014 as per NVBDCP.

In recent times, Goa is experiencing intermittent extended monsoon till November which leads to a high density of mosquito presence in urban areas. Hence, potentially increasing the vector-borne disease burden in the state.

AWARENESS GENERATION AND IEC ACTIVITIES: The IEC activities for vector borne disease are jointly done by NVBDCP division and EHC -

- a. Advertisement and promotion through IEC:
 - i. Person to person communication method by ASHAs, MPWs and Insect collectors.
 - ii. Messages to community through cultural programs and Street plays during Ganesh festival etc
 - iii. Pamphlets, Radio jingles, Hoards, billboards, as and other advertisement modes
- b. Medical professional training:
 - i. Expanded training of doctors and associate staff
 - ii. Increased training of NGOs and Asha workers
- c. Carry out mass media campaigns
- d. Promote a culture of risk prevention, mitigation, and better risk management
- e. Promote attitude and behaviour change in the awareness campaigns linking air pollution and climate change.
- f. Engage local and regional media (community radio, TV)

IEC type	Material	Timeline	Mechanism
Posters	<ul style="list-style-type: none">Posters on VBD and climate change (English, Marathi)Adopt posters made by state NVBDC	<ul style="list-style-type: none">Pre monsoon and Post monsoon	<ul style="list-style-type: none">Collaborate with NVBDCP
Wall painting	Wall painting malaria endemic Districts	Seasonal	Government school, offices and Gram panchayat buildings
Hoardings		Seasonal	To be planned with hotspot Municipalities and District
Audio-Visual	<ul style="list-style-type: none">Audio Jingles	Pre monsoon and Post monsoon	Radio Channels
Digital display	<ul style="list-style-type: none">Available GIFAbove mentioned video messages	Seasonal	Display in health facilities Public digital display boards in major cities
Social medial	All above material + Relevant activity updates		<ul style="list-style-type: none">Facebook and Twitter handle of state NPCCHH, NHMWhatsApp groups (State DNO, Health facility group)

Links to materials: (Annexure 4)

Observance of important environment-health days

Observance of the following days is recommended for awareness on climate change and vector borne diseases-

Day	Activities List
• World Malaria Day (April 25)	<ul style="list-style-type: none">Targeted awareness sessions: urban slums, schools, women, childrenStreet plays, local cultural activities, ralliesClinical Management Training for DengueDengue Awareness Week
• World Mosquito Day (August 20)	
• World Environmental Health Day (September 26)	

Capacity Building :

To strengthen the capacity of healthcare system to adapt/address illnesses/ diseases due to vector-borne diseases-

Training Programme	Trainer	Budget	Timeline
District level (DNO-CC, trainers)	NVBDCP, DHS Goa	NVBDCP funds	March
Health facility level (MO of DH/CHC/PHC)			Feb- March
Community Health care workers (MPH, ANM etc)			Feb- March
Panchayati Raj Institutions			March – April

ROLES AND RESPONSIBILITIES

In order to address the current as well as future exposure of the state to vector-borne diseases due to the changes in temperature and rainfall patterns, the following roles and responsibilities have been identified to be conducted by the departments at the state, district, block, and healthcare facility level-

NVBDCP, Goa	Overall guidance and policy formulation	Guide the state governments in resurgence and containment of any VBD
State Nodal Officer, Climate Change	To support the state govt. in control of VBDs	Oversee vector control measures Oversee health sector preparedness Oversee VBD surveillance, control in post-disaster situations in community and relief camps Train DNO, DMO Sensitization workshops to increase awareness on climate change and its impact on VBD
India Meteorological Department	To provide meteorological data as and when required	To help the state govt. in building collaboration with any research institute, analysis of relationship between climatic factors and a particular VBD so as to forewarn the impending outbreaks
NGO at state and district level for reach to community	Health education at community level	Conduct workshops for IEC activities for different level of staff in the identified areas in consultation with the state govt.
State Programme Officer	Overall planning and execution of surveillance and intervention measures to control VBDs	Supervise and guide the DMOs in control of VBDs
State Entomologist	To provide guidance in vector control	Generate data on fortnightly fluctuations in density of vector species so as to guide the state government in choosing appropriate time of IRS activities. To generate data on susceptibility status of disease vectors for using appropriate insecticide for IRS/larvicide for vector control
Chief Medical Officer/District Malaria Officer/Disease Surveillance officer	Execution of task assigned by the SPO	Supervise and guide surveillance and intervention measures for control of VBDs in the district.

HEALTH ADAPTATION PLAN FOR DISASTER MANAGEMENT

Floods, droughts, cyclones, earthquakes, and landslides have been a recurrent phenomenon in the history of the Indian sub-continent. About 60% of the landmass is prone to earthquakes of various intensities, over 40 million hectares is prone to floods, about 8% of the total area is prone to cyclones and 68% of the area is susceptible to drought. .

India has been experiencing an increasing number of climate change related natural disasters, resulting in extensive loss of lives, livelihoods, the environment and economy. During Kerala floods of 2018, almost 5.4 million people were affected while Cyclone Fani in Orissa affected almost 16.5 million people. These two disasters led to total loss and damages of almost 5 billion USD. Different disasters can be linked with different health implications, which are summarized in the Table (Annexure 8)

General Disaster Profile:

Goa is prone to excessive rainfall and flooding/ landslides. The coastal regions of the state are also prone to coastal flooding along with some internal areas The entire coastal zone of Goa is exposed to the impacts of floods, cyclones, and tsunami.

- There has been an increase in flood incidents in Goa
- Rainfall peak events have increased. Coastline erosion has also been observed. Illegal sand mining, filling up and reclamation of marshy lands, and loss of mangrove systems is also contributing to increase waterlogging and flooding. However, more data analysis is needed in this context.
- There is a rise in temperature as well as the sea level, affecting the ecosystems significantly. This in turn affects the sea catch and thus the nutrition of coastal population.
- Wind speed changes affect the spread of infectious agents causing the diseases.
- There has been an decrease in the cases of vector-borne diseases in the past few years like malaria, dengue, chikungunya etc.
- Even non-communicable diseases incidence and severity is affected in the event of disasters due to hindrances in the supply chain of medicines.
- There is also an increase in injuries and violence against the vulnerable populations' post-disasters.
- Occupational health of industrial workers is affected due to changing temperatures, making them take longer and more frequent breaks during the day and at the same time increasing the hours of late-nightshifts.
- Accessibility to health care facilities and health workers is also decreased due to extreme weather events.

Following are districts with Hotspots identified for events:

- Floods: parts of Salcete, Ponda, Dharbandora, Sanguem, Tiswadi, Bardez, Pernem, Sattari, Bicholim
- Landslides: parts of Salcete, Ponda, Quepem, Canacona

Strengthening Health Sector Preparedness

- Early warning: Dissemination of early warnings for Cold wave, Flood, Cyclone etc to health facility level and community level
- Surveillance
- Post-disaster health impact assessment
- Support post-disaster surveillance of communicable disease, health facility affected conducted by SDMA, IDSP or other agencies

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)
- Establish Sustainable procurement committee

ADAPTATION PLAN

Awareness generation and sensitization programmes:

To increase the general awareness amongst all the relevant stakeholders including vulnerable communities, healthcare providers, and policy makers regarding the impacts of extreme weather events and disasters and ways to address them. The districts are aimed to create awareness by Information Education and Communication Activities (IEC) through the development of locally and culturally acceptable messages in posters, audio, video, organising public health events, and issuing advisories related to health impacts of extreme weather events. Some of the pathways identified in this regard include-

- Mass meetings to be organized for schools and college students
- Advertisement and promotion through IEC
- Posters, pamphlets, billboards and other advertisement modes like social media
- Rallies
- Wall paintings on earthquake resistant buildings in important places to educate people and give information on earthquake resistant technology
- Public awareness programmes on safe construction practices

CAPACITY BUILDING :

To strengthen the capacity of healthcare system to adapt/address illnesses/ diseases due to extreme weather events or disasters.

- Training of trainers at the state, district and block levels to enhance the capacity of disaster management committee
- Medical professional training
- Training of doctors and other health workers on health impacts due to disasters
- Increased training of the community-level staff.

- Specialist trainings like Search & Rescue and First Aid for disaster management teams
- Studies and Research
- Preparation of Training manuals, standard operating procedure, and documentation on best practices
- Mock drills to be carried out before the disaster season by the key players to find out the feasibility of the plan and ensure greater role.

Training Plan :

Training Programme	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

Roles and Responsibilities

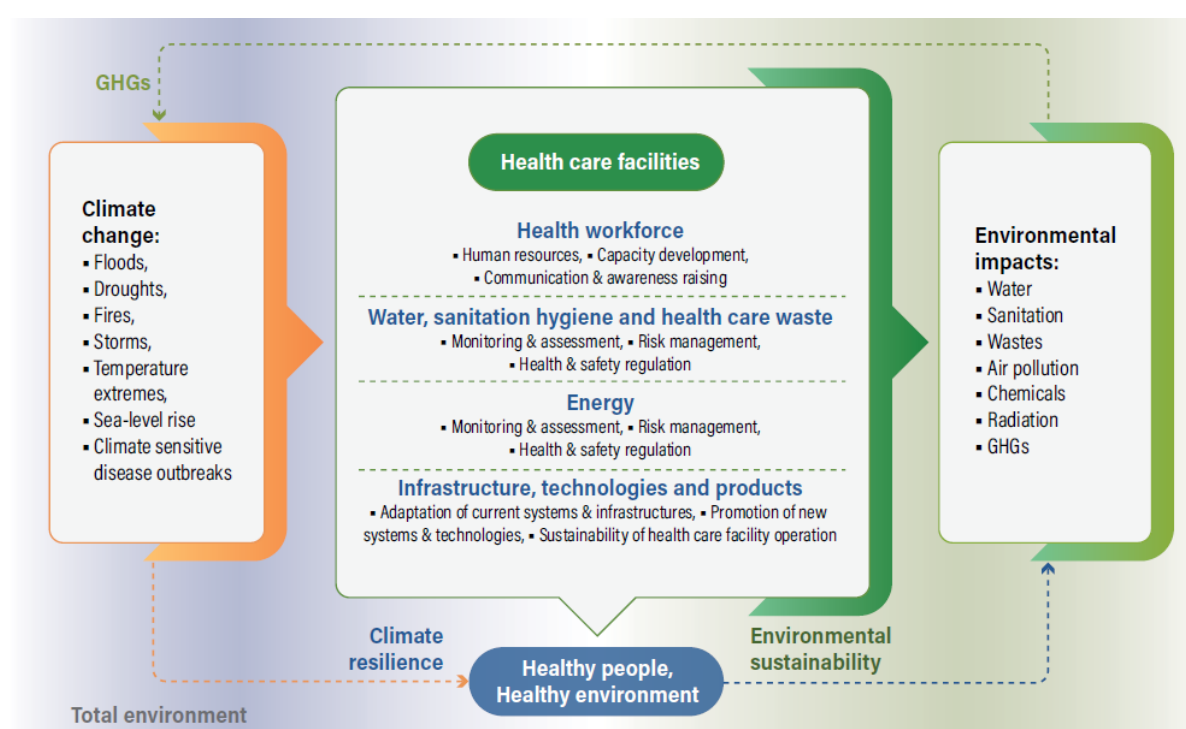
Particulars	Responsibilities
SNO	Disseminate early warnings to the district level Finalization of IEC material and dissemination plan Formalize inter-sectoral coordination for disaster planning, management and response with SDMA/IMD and other response departments Organize training of district level officers Facilitate assessment and implement of climate resilient measures in health facilities Review implementation of IEC, training, and surveillance activities at all levels Evaluate and update relevant sections of SAPCCHH with support from the 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 (Extreme Weather Events)
DNO	Disseminate early warning to the block and health facility level Ensure IEC dissemination to community level and facilitate community level IEC activities Organize training for block health officers and MO Formalize intersectoral coordination for disaster planning, management and response with SDMA/IMD and other response 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 & relief camps Support planning and management of health care services in relief camps Provide necessary IEC on health and sanitation in relief camps Training for block health officers and medical officers with relevant training manuals Conduct sensitization of vulnerable groups: police officers, outdoor works, women, children etc Organize IEC campaigns at district level on observance of important environment-health days Facilitate disaster vulnerability assessments in health facilities and maintain records of such assessment and health facility damage due to EWE Submit reports of activities on EWE and health under NPCCHH
Medical officer	Conduct health facility-based IEC activities Support community-level IEC activities Preparation of Disaster Management Plans 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 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 Community involvement in planning and demonstration of measure taken before-during-after an EWE

HEALTH ADAPTATION PLAN FOR GREEN AND CLIMATE RESILIENT HEALTHCARE FACILITIES

“Climate-resilient and environmentally sustainable health care 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 centres – are increasing, reducing the ability of health professionals to protect people from a range of climate hazards. Health care facilities are the first and last line of defence to 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.

Figure: 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 Health Care 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 Health Care Facilities including Retro Fitting of Existing Health Care Facilities

Environmentally Sustainable (Green) Measures at Health Care Facilities

a. Energy Auditing:

An energy audit identifies all energy end-users 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 per cent of water while heating ventilation and air conditioning (HVAC) consumes 23 per cent of 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 liters 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 the 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, patient 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

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 costal 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 disasters
- Installation of Rainwater Harvesting System
- Installation of alternative energy systems
- Installation of STP & ETP

IMPLEMENTATION PLAN:

HEALTH SECTOR PREPAREDNESS

Objective	Activities	Priority district s	Identified Health facilities	timeline	Budget (in lakhs)				
					2022 -23	2023- 24	2024- 25	2025 -26	2026 -27
Strengthening Healthcare System	Energy Audit	2	PHCs CHCs SDH DH	January to February	120	145	175	210	260
	Energy Saving appliances	2	PHCs CHCs SDH DH	February					
	Solar Panels installation	2	PHCs CHCs SDH	December					
	Rainwater Harvesting	2	PHCs CHCs SDH DH	January					
	Retrofitting of Health care facilities	2	PHCs CHCs SDH DH	February					

AWARENESS GENERATION

- Awareness and sensitization on climate change events such as heat waves, flooding, air pollution events, and waste management
- Sensitization workshops on Sustainable Procurement
- Awareness on energy efficient measures and water conservation measures

IEC DISSEMINATION PLAN

Dissemination of IEC material

IEC type	Material (Link/ Annexure)	Dissemination Timeline	Targeted Districts			Budget in Lakhs		
				2022- 23	2023- 24	2024- 25	2025- 26	2026- 27
Posters	1-2 Posters per HCF per year	November	2	0.6 lakhs	0.75 lakhs	0.9 lakhs	1.1 lakhs	1.32 lakhs
Wall Painting		December	2					
Audio- visual		March	2					

CAPACITY BUILDING

The plan for training of ToTs, DNO-CC and Medical officers on guidelines and operational framework of Green and Climate resilient measures in Health Care Facilities is mentioned in the table below-

S.No	Activities	Priority Districts	Timeline	Budget				
				2022-23	2023-24	2024-25	2025-26	2026-27
1.	Training - TOTs	2 districts	November	0.6 lakhs	0.75 lakhs	0.9 Lakhs	1.1 lakhs	1.32 lakhs
2.	Training of DNO-CC		December					
3.	Training of Medical Officers		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 source of greenhouse gas emissions
DNO	Conduct training for health officers, medical officers, with relevant training manuals Support conduction for 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 Water committee 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
Medical Officer	Conduct health facility assessment Energy audit Water audit Disaster-vulnerability assessment Lead following functional measures Water committee 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 Organize PRI sensitization workshop
Panchayati Raj Institution	Support retrofitting and new health facilities with local funding source and community involvement

CHAPTER 11- BUDGET


S. No	ACTIVITIES	INDICATOR	TARGET					BUDGET					(in Lakhs)
			2022-23	2023-24	2024-25	2025-26	2026-27	2022-23	2023-24	2024-25	2025-26	2026-27	
		PROGRAMME MANAGEMENT											
1	Taskforce meeting to draft health sector plan for heat and air pollution	% State Task Force Quarterly Meetings conducted in a year	25%	50%	75%	100%	100%	1	1.2	1.45	1.74	2.1	
2	Sensitization workshop/meeting of the state programme Officers and District level Health Officers.		100%	-	-								
		GENERAL AWARENESS											
03.	Development of IEC material, campaigns, Innovative IEC/ BCC Strategies	% of Districts implemented IEC campaign on all climate sensitive issues	50%	100 %	100%	100%	100%	2	2.45	3	3.6	4.17	

CAPACITY BUILDING OF HEALTH PROFESSIONALS AND HEALTH WORKERS												
04		% Of Districts completed TOT	100%	-	-	-	-					
		% of Medical Officers trained in Districts	50%	50%	70%	90%	100%	2	2.5	3	3.7	4.3 7
	Orientation/ Training /capacity Building of healthcare staffs	% of health workers and MPHW /AWW trained on NPCCHH in District	50%	50%	70%	90%	100%					
		% of targeted sensitization trainings planned for vulnerable population in district (PRI Training)	50%	50%	70%	100%	100%					

STRENGTHENING OF THE HEALTH SYSTEM												
05		Energy auditing of the Healthcare for energy efficiency in the HCFs	100%									
	Green and Climate-resilient Health care facilities and Surveillance(SRRE)	% of HCF that replaced existing (Non-LED) lighting facility with LED in Districts	100%	100 %								
		% HCF with installed solar Panels in Districts	10%	20%	30%	40%	50%					
								120	145	175	210	260
		% HCF with Rain water harvesting system in districts	10%	20%	30%	40%	50%					
		%HCF with installed Retrofitting of healthcare facilities	10%	20%	30%	40%	50%					
		Surveillance, Research, Review, Evaluation(SRRE)						1	1.2	1.45	1.75	2.1
06	Infrastructure/ equipment	Furniture etc for office excluding computers						0.5				
07	Human Resource	1 Accountant @20000 pm 1 Data manager @ 20000 pm 1 Data Entry Operator @ 11000pm 1 MTS @10000pm TOTAL= Rs 61000 pm						7.32	7.69	8.0703	8.474	8.9
		2 MO @65000 pm (if MBBS not available AYUSH will be capped @ 50000 pm) TOTAL= Rs 130000 pm						15.6	16.38	17.20	18.06	18.96 3
	TOTAL							149.42	176.42	208.920 3	247.32 4	300.6 03

Annexure 1

No. 1654
Govt. of Goa
Directorate of Health Services
Panaji, Goa
1/8/2019


GOVERNMENT OF GOA,
PUBLIC HEALTH DEPARTMENT
SECRETARIAT, PORVORIM-GOA PIN 403 521

2197

No. 21/17/2018-I/PHD/ 1860

Dated : 31/07/2019

To,

The Director of Health Services,
✓ Panaji-Goa

Sub:-Establishment of Environment Health Cell under Directorate of Health Services and constitution of Multi Sectoral Task Force.. regarding...

Sir,

I am directed to refer to your Note No.Nil dated 27/05/2019 on the subject cited above and to convey herewith the approval of the Government for the following :-

(1) Establishment of Environment Health Cell under Directorate of Health Services.

(2) To Notify the constitution of Multi Sectoral Task Force as per following structure :-

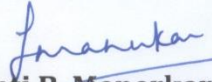
1	Secretary (Health)	Chairperson
2	Director of Health Services	Member
3	Dean, Goa Medical College	Member
4	Director, Animal Husbandry & Veterinary Service	Member
5	Director of Panchayat	Member
6	Director of Municipal Administration	Member
7	Chairman, Goa State Pollution Control Board.	Member
8	Director of Science, Technology & Environment	Member
9	Director of Agriculture	Member
10	Director, Indian Metrological Department	Member
11	Chief Engineer, Water Resources Department	Member
12	District Collector (North)	Member
13	District Collector (South)	Member
14	Deputy Director (Public Health)	Member
15	Deputy Director (Medical)	Member

JDS P
2/8
02/12/19

16	State Programme Officer Non Communicable Disease Control Programme	Member
17	State Programme Officer National Vector Borne Disease Control Programme	Member
18	State Programme Officer Integrated Disease Surveillance Programme	
19	State Programme Officer National Health Mission	Member
20	State Nodal Officer (SNO) Climate Change/State Epidemiologist	Member Secretary

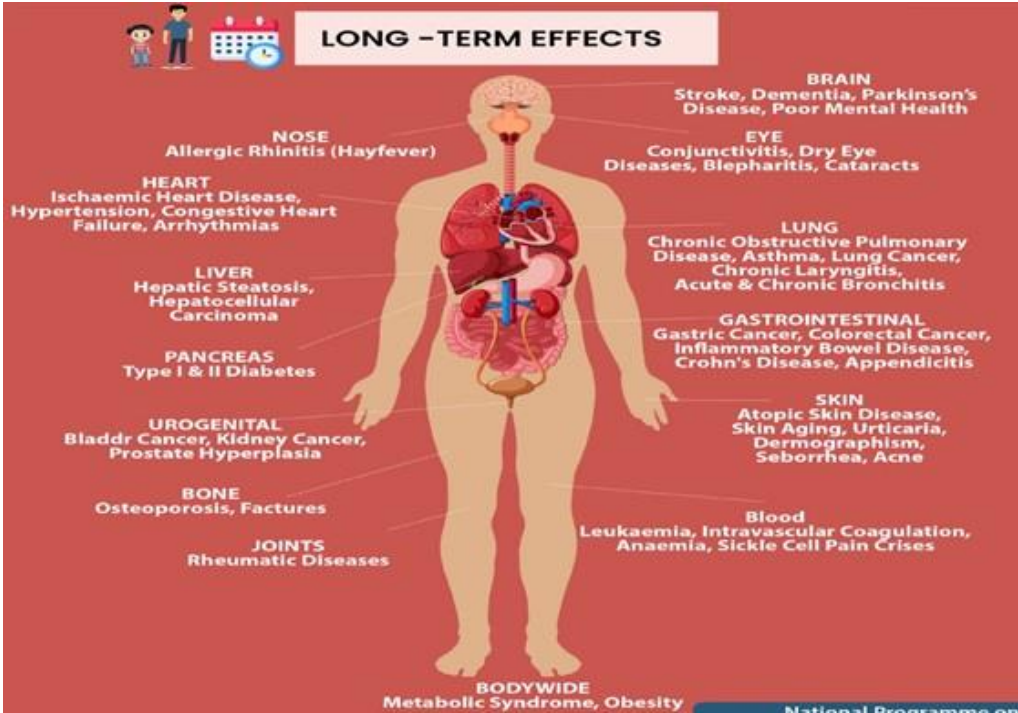
You are therefore requested to issue necessary Order in this regard at the earliest.

Yours faithfully


(**Trupti B. Manerkar**)
Under Secretary (Health)

Annexure 2

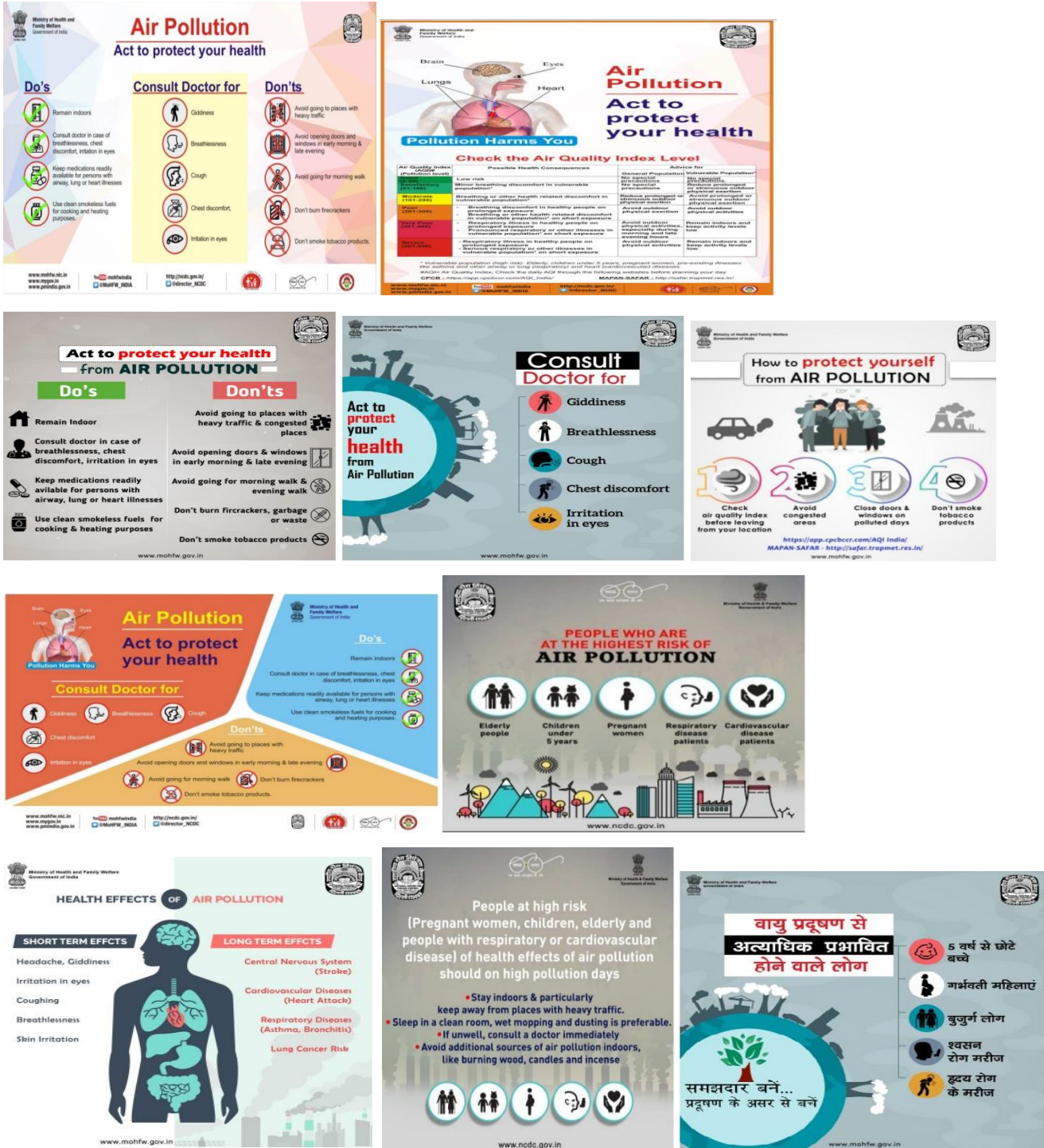
Table 1. Health Effects attributed to short-term and long-term exposures to Air Pollution	
Health Effects attributed to short-term exposure to air pollution	Health Effects attributed to long-term exposure to air pollution
Respiratory & cardiovascular emergency department visits Respiratory & cardiovascular primary care visits Use of respiratory & cardiovascular medications Respiratory & cardiovascular hospital admissions Days of restricted activity Work absenteeism School absenteeism Daily mortality/deaths	Acute symptoms (Wheezing, coughing, phlegm production, respiratory infections) Chronic respiratory diseases incidence&prevalence (asthma, COPD, chronic pathological changes) Physiological changes (e.g. lung function) Chronic changes in physiologicfunctions Chronic cardiovascular diseases Intrauterine growth restrictions (lowbirthweight at term, intra-uterine growthretardation, small for gestational age) Mortality due to cardiovascular &respiratory diseases Lung cancers



Annexure 3

IEC on Air Pollution and Health under the NPCCHH

ANNEXURE: POSTERS DISTRIBUTED TO THE DISTRICTS (English & Local language)





Annexure 4

AIR POLLUTION

Links are given below

<https://drive.google.com/drive/u/0/folders/1LbPjTB8B6bIBnpiIpCgz3qxXz8LLZTxw>

<https://drive.google.com/drive/folders/1x2eXBjdjrrv-Rw2pcchMTVOl8tQzm623?usp>

<https://pib.gov.in/PressReleaseDetail.aspx?PRID=1842630>

IEC (NVBDCP)

<https://nvbdcp.gov.in/Doc/Leaflets.pdf>

- <https://nvbdcp.gov.in/Doc/Wall%20Paintings.pdf>
- <https://nvbdcp.gov.in/Doc/JE-IECBCC-Posters.pdf>
- https://nvbdcp.gov.in/Media/KA-Tool-kit/01_Poster%20for%20community.jpg
- <https://nvbdcp.gov.in/Doc/PosterDengue.pdf>
- <https://nvbdcp.gov.in/Doc/DengueEnglish.pdf>

Observance of Important Days in the State of Goa

National Programme on Climate Change and Human Health (NPCCHH) is a flagship programme of Ministry of Health and family Welfare, Government of India shaping Health system response to climate change in the country with goal to reduce morbidity, mortality, injuries and health vulnerability to climate variability and extreme weather events.

There are a number of days that are celebrated internationally which focus on environment and climate. In this context, the Goan cell of the NPCCHH and DHS Goa is organising a yearlong event. This PEDAL FOR WORK activity is for staff working under the Directorate of Health Services-Goa and was launched on 7th April 2022 on the occasion of World Health Day.

The objective of this activity is to:

- To promote cycling (increased physical activity) amongst staff
- Toward reduction of carbon footprint
- As a part of the Fit India movement and also to set an example of the physical activities for reducing NCDs
- To set an example to other Non DHS staff and general public that cycle can be used as a mode of transport.

Terms and Conditions are as follows

- Qualification Round: To get Entry / qualify for this activity, participant has to cover atleast 50km (cycling for work) and send screenshot along with the selfie to the programme. The activity may be shared to social media platform with hashtag as #PedalForWorkGoa
- : Once the entry is confirmed the participant will get Entry Kit as a participation gift and also qualify for next round (Participants will get jerseys/ bib shorts)
- Tracking/ Data Checking
 - 1) Participant has to track their activity on any tracking App and the HO has to certify their activity
 - 2) For State level participation HOs certification along with selfie and tracking data in prescribed format is compulsory

Tasks and Rewards

- Bronze : to participate in the Bronze Category, participant has to complete 200 kms of cycling to work
- Silver : to participate in the Silver Category, participant has to complete 400 kms of cycling to work
- Gold : to participate in the Gold Category, participant has to complete 1000 kms of cycling to work

Prizes/Awards

- Prizes/ Awards will be given category-wise. Values of the prizes differ depending on the category.
- Daily/Monthly Basis- the respective Health Officer will congratulate the staff who travelled to work by cycle. Also provision of small gift will be kept depending on the budget approval. (Small gift with Programme branding will be awarded).
- Final Annual Prizes will be awarded category wise on the basis of lucky draw.
- Annual Prizes will be given during state function on World Health Day 2023.



The 3rd International Day of Clean Air for Blue Skies was celebrated on 7th September 2022 at PHC Shiroda, with the Theme being 'The Air We Share'. A brief introduction of NPCCHH was given to all by the State Nodal Officer for Climate Change Dr. PrashantSuryavanshi. Tree Plantation activity and distribution of medicinal plants and fruit/ flower saplings was carried out in the presence of ShriSubhashShirodkar, Honourable Minister/ MLA of Shiroda constituency. A Walkathon was organised featuring the students of ShriKamaxi Homeopathy College along with the organisers/ PHC staff was flagged off by the Chief Guest. The students displayed the winning Posters which were created on the theme #TheAirWeSharefor visually driving home the message to the villagers and other onlookers. The participants made their way through the village streets and market shouting simple easy to understand slogans in the vernacular language. Queries of bystanders were answered along the way. A talk on the International Day of Clean Air for Blue Skies was given by Dr.GeetanjaliSardessaiKare

(Goa state Consultant, NPCCHH) to emphasise the impact of air pollution on their lives and how their involvement and community participation can impact preservation of natural resources including air for future generations.

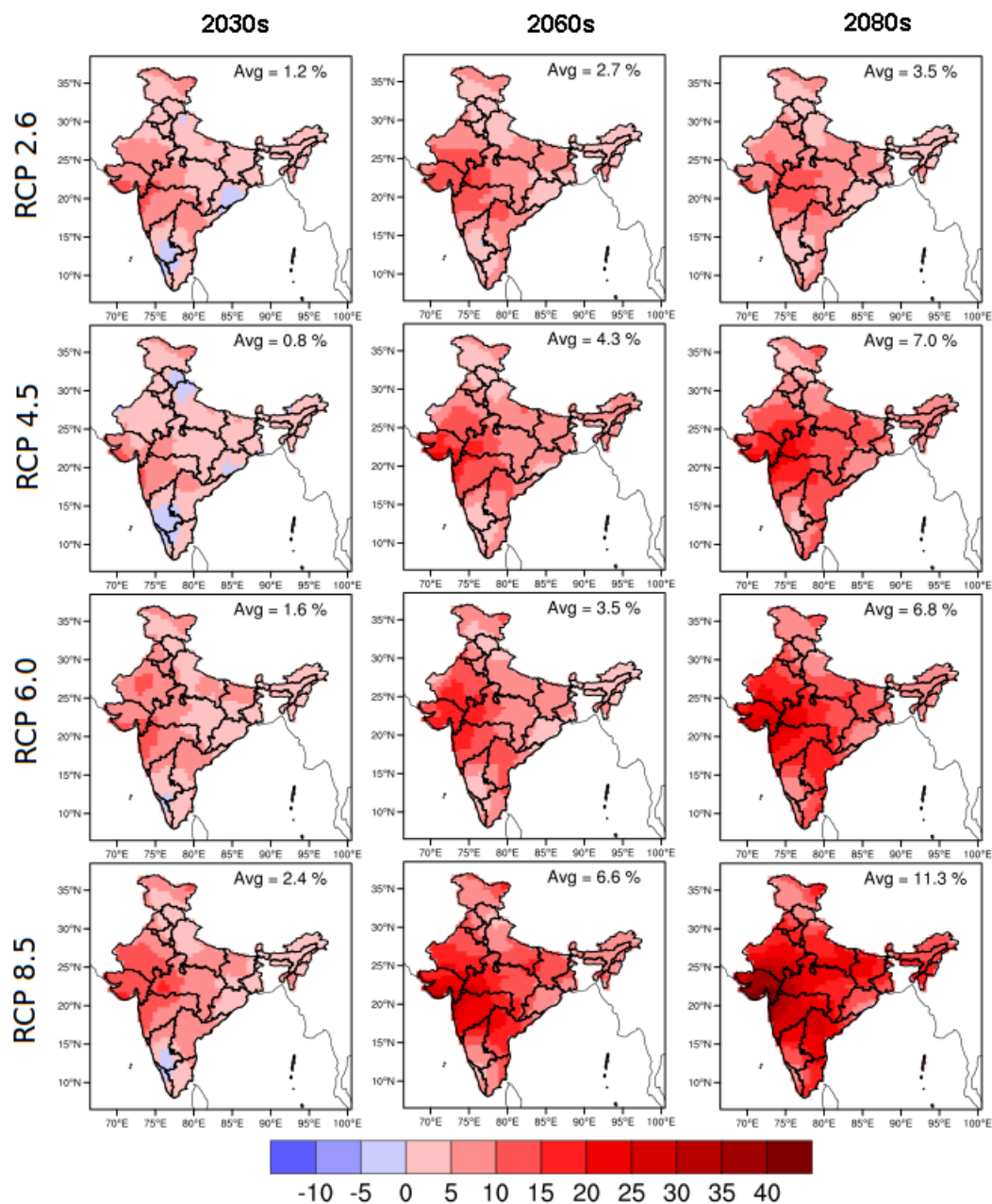


Annexure 6

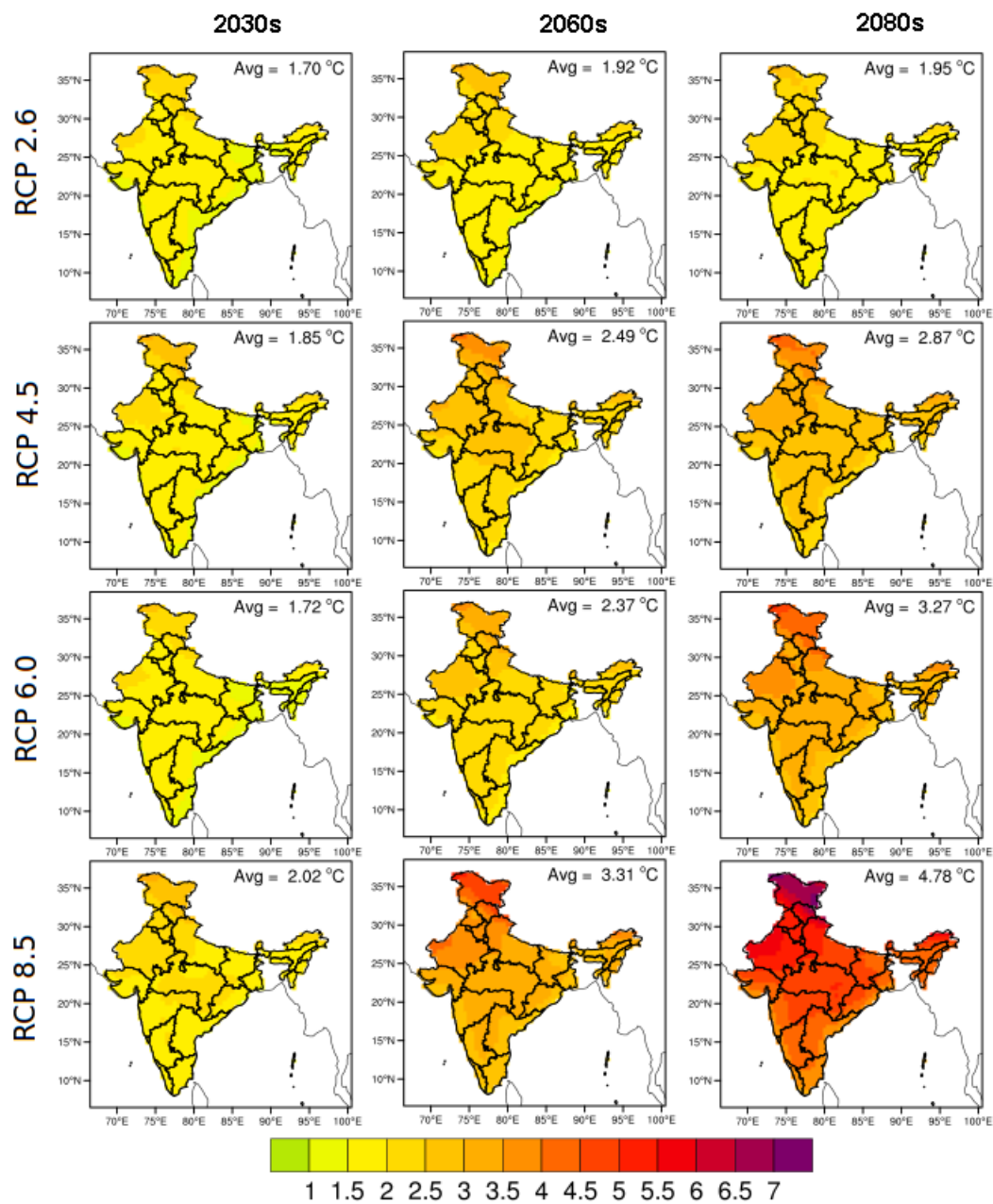
Acronyms

UNFCCC	United Nations Framework convention on Climate Change
NEGCH	National Expert Group on Climate Change and Health
CEOHCCH	Centre for environmental and occupational Health climate change & health
VI	Vulnerability Indices
DoPH&FW	Department of Public Health and Family Welfare
MoEFCC	Ministry of Environment, Forests and Climate Change
MoHFW	Ministry of Health and Family Welfare
NAPCC	National Action Plan on Climate Change
NAPCCHH	National Action Plan on Climate Change and Human Health
NCDC	National Centre for Disease Control
NFHS	National Family Health Survey
SAPCC	State Action Plan on Climate Change
SAPCCHH	State Action Plan for Climate Change and Human Health
EWARS	Early warning Alert Response System
ARI	Acute Respiratory Illness
IEC	Information Education and Communication
CPCB	Central Pollution Control Board
IMD	Indian Metrological Department
HRI	Heat Related Illnesses
IDSP	Integrated Disease Surveillance Programme
GIS	Geographical Information System

Annexure 7



CMIP5 model ensemble mean precipitation change (%) projected for 2030s (2021-2050), 2060s (2046-2075) and 2080s (2070-2099) relative to the pre-industrial period (1880s i.e over 1861-1900) (Source: Chaturvedi et al 2012)



\ CMIP5 model ensemble mean temperature change ($^{\circ}\text{C}$) projected for 2030s (2021-2050), 2060s (2046-2075) and 2080s (2070-2099) relative to the pre-industrial period (1880s i.e over 1861-1900)

Annexure 8

Table. Health implications associated with different types of climate change related disasters.

Primary	Secondary	
Heavy Rainfall	Floods Injuries, water borne diseases, vector-borne	
	Flash floods	diseases, death, drowning, hypothermia, and
	Urban floods	animal bites Indirect (infected wounds, complications of injury, poisoning, poor mental health, communicable diseases, and starvation)
	Landslides/slope failures	high mortality and few injuries: trauma and suffocation by entrapment
Dry spells / Low Rainfall	Drought	Nutrition-related, Dust-related and airborne,
	Desertification	migration-related
	Forest fire	
Oceanic storms	Cyclones	Trauma, Drowning, Injuries, gastroenteritis, vector-borne disease and acute respiratory illness.
Winds	Dust storms / Sandstorms	Respiratory problems, eye problems.
	Thunderstorms	Injuries, Thunderstorm asthma.
	Air Pollution	Respiratory Disorders, Cardiovascular Disorders, Ophthalmic Disorders
Temperature extremes	Heat wave	Dehydration, Heat cramps, Heat stroke; accelerated respiratory disease & cardiovascular disease
	Cold wave	Heart attacks, Injuries, frost nip and frost bite, Hypothermia, immersion foot, influenza, Norovirus, Asthma, Sore throats
	Fires (urban, rural, industrial)	Burns, Mortality, wheezing, coughing, sore eyes, respiratory issues, heat induced illnesses, Carbon Monoxide poisoning
	Lightening disaster	Mortality, Injury, Burn, Disability