स्वास्थ्य एवं
परिवार कल्याण मंत्रालय
MINISTRY OF
**HEALTH AND
FAMILY WELFARE**

सत्यमेव जयते

HARYANA

STATE ACTION PLAN ON CLIMATE CHANGE AND HUMAN HEALTH







National Centre for
Disease Control
Government of India

National Programme
on Climate Change
and Human Health

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2022-27

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PART I

Climate Change and its Health Impacts

CHAPTER 1
Introduction

The State of Haryana is situated in the northern part of India and is bounded by Punjab and Himachal Pradesh to the north, and by Rajasthan to the west and south. The river Yamuna defines its eastern border with Uttarakhand and Uttar Pradesh. Haryana also surrounds Delhi on three sides, forming the northern, western, and southern borders of Delhi. Haryana is a landlocked state in northern India with total geographical area of the state is 44,212 km^2, which is 1.4 % of the geographical area of the country.

Haryana is administratively divided into 21 districts, 47 sub-divisions, 67 tehsils, 45 sub-tehsils and 116 blocks. Haryana has a total of 81 cities and towns and 6,759 villages. Haryana is the nation's seventeenth most populous state and the population of Haryana, is 25,353,081, according to the 2011 census. The population density is 573.4 people/km^2. Haryana has a skewed sex ratio at 861.

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

Climate change may negatively affect human health through a number of ways, but the commonly experienced are increased frequency and intensity of heat waves leading to 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 exacerbate cardio-respiratory and allergic diseases and certain cancers. Beside these, there is increase in transmission and spread of infectious diseases, changes in the distribution of water-borne, food borne and vector-borne diseases and effects on 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 were initiated to reduce the effect of climate change at meetings like "Rio Convention 1992", *Kyoto protocol 1997", "Male' Declaration 1998",* "Convention of Parties", "*Cancun Agreement 2010", "Durban Platform 2011", "* Nationally Determined Contributions" (NDCs) at Conference of Parties 21.

India is signatory to "*Male' Declaration"* wherein health sector has to be strengthened so as to make it climate resilient. According to Male' Declaration, it is desired that health-care facilities should be prepared & climate-resilient, particularly in promoting to encourage that these are able to withstand any climatic event, and that essential services such as water, sanitation, waste management and electricity are functional during such events. Further, for climate resilient, the health department has to undertake measures to initiate the

greening of the health sector by adopting environment- friendly technologies, and using energy-efficient services.

Initiatives undertaken by Government of India are: a) Identification of Ministry of Environment, Forest & Climate Change (MoEF&CC) as nodal ministry; b) Formulation of National Environmental Policy 2006; c) Formulation of Prime Minister's Council on Climate Change for matters related to Climate Change.

MoEFCC 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, Ministry of Health and Family Welfare (MoHFW) constituted a National Expert Group on Climate Change & Health (NEGCCH) to prepare National Action Plan on Climate Change and Human Health (NAPCCHH) and recommend strategies for indicators, mitigation, capacity building etc.

National Centre for Diseases Control (NCDC) is identified as the 'technical nodal agency' by MoHFW for the proposed National Mission on Health. 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), under which the Haryana has prepared its State Action Plan on Climate Change and Human Health (SAPCCHH). Since the inception of the programme i.e. 2019, the SAPCCHH is a long-term vision and planning document prepared by the Department of Health & Family Welfare, Haryana, applicable for up till year 2027. Based on this document, district specific action plans will also be prepared. The Haryana SAPCCHH highlights the current and future vulnerabilities to climate change in the state, the disease burden and the initiatives to be undertaken by the state to reduce the disease burden and develop a climate responsive and sustainable healthcare ecosystem in the state.

CHAPTER 2

Demographic and Health Status of Haryana

Over the decade, population health status in Haryana has been better than the all-India average. However, improvement in Haryana's population health status has failed to keep pace with faster rise of population health status all over the country. Epidemiological transition in Haryana has resulted in a higher burden of non-communicable diseases.

Dynamic interaction of emergent infectious diseases such as COVID-19 with NCD comorbidities calls for strengthening of health systems to deal with communicable and nutritional diseases as well as NCDs. Prevalent disease burden and emergent public health challenges call for strengthening of specialist services, hospital infrastructure and epidemiological surveillance. Haryana is vulnerable to emerging infectious diseases, despite improvements in conventional and summary measures of population health. Targeted health systems strengthening is needed to improve access for the poor and build the state's resilience to deal with emerging public health challenges.

Table 1: Key demographic indicators in the state

Demographic Indicator	Value (Census 2011)
Area	44,212 sq. km
Population	25,351,462
Population (Male)	13,494,734
Population (Female)	11,856,728
Total Child Population (0-6 Age)	3,380,721
Male Population (0-6 Age)	1,843,109
Female Population (0-6 Age)	1,537,612
Literacy Rate	75.55%
Districts	22
Blocks	140
Villages	7356

Table 2: Age and sex wise distribution of rural and urban population in Haryana (Census, 2011)

Age Group	Total Population			Rural			Urban		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
1	2	3	4	5	6	7	8	9	10
All Ages	1,34,94,734	1,18,56,728	2,53,51,462	87,74,006	77,35,353	1,65,09,359	47,20,728	41,21,375	88,42,103
0-4	12,83,789	10,78,730	23,62,519	8,70,623	7,32,300	16,02,923	4,13,166	3,46,430	7,59,596
5-9	13,71,825	11,26,932	24,98,757	9,20,472	7,59,410	16,79,882	4,51,353	3,67,522	8,18,875
10-14	14,74,136	11,94,542	26,68,678	9,96,086	8,16,773	18,12,859	4,78,050	3,77,769	8,55,819
15-19	14,87,548	11,89,842	26,77,390	9,94,391	8,05,600	17,99,991	4,93,157	3,84,242	8,77,399
20-24	13,72,799	11,94,687	25,67,486	8,89,577	7,69,002	16,58,579	4,83,222	4,25,685	9,08,907
25-29	11,78,340	10,53,619	22,31,959	7,37,729	6,46,512	13,84,241	4,40,611	4,07,107	8,47,718
30-34	9,76,844	9,16,747	18,93,591	6,05,409	5,68,791	11,74,200	3,71,435	3,47,956	7,19,391
35-39	9,12,717	8,49,146	17,61,863	5,69,510	5,28,103	10,97,613	3,43,207	3,21,043	6,64,250
40-44	7,90,581	7,15,369	15,05,950	4,95,956	4,51,413	9,47,369	2,94,625	2,63,956	5,58,581
45-49	6,55,749	5,86,065	12,41,814	4,03,338	3,61,716	7,65,054	2,52,411	2,24,349	4,76,760
50-54	5,10,688	4,54,540	9,65,228	3,10,495	2,79,793	5,90,288	2,00,193	1,74,747	3,74,940
55-59	3,74,209	3,76,729	7,50,938	2,24,344	2,38,544	4,62,888	1,49,865	1,38,185	2,88,050
60-64	4,13,958	4,30,391	8,44,349	2,76,636	2,97,321	5,73,957	1,37,322	1,33,070	2,70,392
65-69	2,55,270	2,49,169	5,04,439	1,71,739	1,71,688	3,43,427	83,531	77,481	1,61,012
70-74	1,88,304	1,85,857	3,74,161	1,30,774	1,29,624	2,60,398	57,530	56,233	1,13,763
75-79	97,692	98,525	1,96,217	68,101	68,863	1,36,964	29,591	29,662	59,253
80 and above	1,33,397	1,41,192	2,74,589	97,815	1,00,330	1,98,145	35,582	40,862	76,444

Socioeconomic status of Haryana

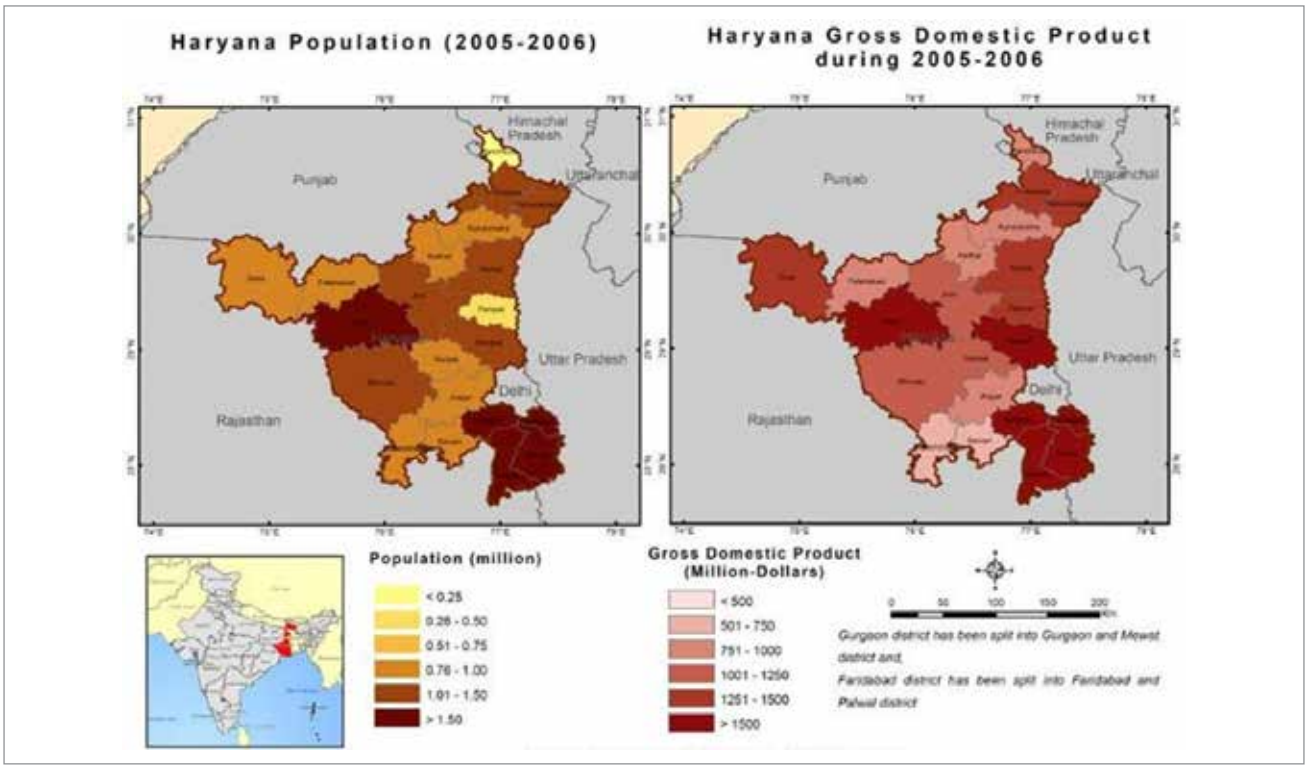


Table 3: Public Health Infrastructure in Haryana

Year	Hospitals	CHCs	PHCs	Dispensaries	Sub-Centers	District T.B. Centers/Clinics	Total
1	2	3	4	5	6	7	8
1970	70	#	89	147	534	#	840
1980	84	#	89	247	1,060	#	1,480
1990-91	79	41	394	230	2,293	#	3,037
2000-01	78	64	402	229	2,299	#	3,072
2010-11	69	86	429	193	2,465	#	3,242
2017-18	62	125	499	63	2,636	#	3,385
2018-19	63	127	511	64	2,636	15	3,416
2019-20	68	133	536	63	2,655	15	3,470
2020-21 (P)	71	120	526	55	2,726	15	3,513

Table 4: Human resources for health in Haryana

Year/District	SMO and above, Medical Officers and Dental surgeons (Class I & II) (Excluding Teaching Staff)		Staff Nurses/Matron Sister In-charge		Midwives/ANMS/MPHW/ MP HS (M&F)		Nurses Orderly		Lab. Technicians/Lab. Technicians (malaria) Lab. Assistants		Dispensers/Pharmacists		Radiographers		Ophthalmic Assistant		Total	
	Sanctioned	In-Position	Sanctioned	In-posit ion	Sanctioned	In-position	Sanctioned	In-position	Sanctioned	In-Position	Sanctioned	In-position	Sanctioned	In-position	Sanctioned	In-position	Sanctioned	In-position
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
2000	–	1,610	–	1,442	–	2,274	–	–	–	527	–	853	–	–	–	–	–	6,706
2010	–	1,53	–	485	–	2,275	–	1,2211	–	459	–	736	–	–	–	–	–	6,714
2018-19	4,335	3,718	3,656	2,224	5,864	4,757	–	–	1,148	572	1,024	706	299	100	189	76	16,515	12,153
2019-20	4,881	4,063	4,399	2,168	6,538	5,190	–	–	1,260	545	1,050	680	314	95	190	75	18,632	12,816
2020-21 (P)	4,979	3,588	4,403	2,143	5,985	4,514	–	–	1,271	524	1,082	716	315	90	190	78	18,225	11,653

Geography and Climate in Haryana

Geography

The State of Haryana is situated in the northern part of India and is bounded by Punjab and Himachal Pradesh to the north, and by Rajasthan to the west and south. The river Yamuna defines its eastern border with Uttarakhand and Uttar Pradesh. Haryana also surrounds Delhi on three sides, forming the northern, western

and southern borders of Delhi. Haryana is a landlocked state in northern India with total geographical area of the state is 44,212 km^2, which is 1.4 % of the geographical area of the country.

There are no perennial rivers in Haryana, Ghaggar is the only seasonal river, which flows through the northern fringes of the state. Major land use in Haryana is agriculture (85%), Forest (2.4 %), about 7.2% fallow and 5% waste land. The state has about 33,000 hector land under protected area network, which consists of 2 national parks, 8 wildlife sanctuaries and 2 conservation reserves. Over 500 bird species have been recorded in the State, which is almost 40 percent of total bird species in the country.

Haryana may be divided into five natural topographic divisions which provide a suitable framework upon which a systematic study of landform environment may be founded. These are:

- **Semi-desert sandy plain** (230-350 metres): This area includes the districts of Sirsa and parts of Hissar, Mahendergarh, Fatehbad, Bhiwani and shares border with Rajasthan.
- **Ghaggar Yamuna Plain** (below 300 metres): Divided in 2 parts - the higher one is called 'Bangar' and the lower 'Khadar'. This alluvium plain is made up of sand, clay, silt and hard calcareous balls like gravel known locally as kankar.
- **Aravali Hills** (300-600 metres): This is a dry irregular hilly area
- **Shivalik Hills** (over 400 meter): These hills are the source of the rivers like Saraswati, Ghaggar, Tangri and Markanda. Parts of Panchkula, Ambala and Yamunanagar districts.
- **The Foot Hill** Zone (300-400 metres).

State	Haryana
Longitude	74°28' and 77°36' E longitude
Latitude	27°39' to 30°35' N latitude
Altitude/Elevation	Varies between 700 and 3600 ft (200 metres to 1200 metres) above sea level
Annual high temperature	31.5ºC
Annual low temperature	17.5ºC
Total annual precip.	657 mm
Warmest month	May (40.2 ºC)
Coldest Month	January (6.4 ºC)
Wettest Month	August (190.7 mm)
Driest Month	October (9.9 mm)
Number of days with rainfall (≥1.0 mm)	34.2 days
Days with no rain	330.8 days
Humidity	48%

Climate

The Climate of the Haryana State is subtropical, semi-arid to sub-humid, continental and monsoon type. The average rainfall varies from less than 300 mm in south-western parts to over 1000 mm in the hilly tracks of Shivalik hills. Entire Haryana State experiences four seasons in the year namely cold season from November to March, hot season from April to June, southwest monsoon season from last week of June to mid of

September and post monsoon season from September to beginning of November. During cold weather season, seasons of western disturbances affect the climate of the state and bring rainfall of light intensity. Located at an elevation of 217.25 meters (712.76 feet) above sea level, Haryana has a humid subtropical, dry winter climate. The State's yearly temperature is 29.13°C (84.43°F) and it is 3.16% higher than India's averages. Haryana typically receives about 21.34 milli-meters (0.84 inches) of precipitation and has 41.08 rainy days (11.25% of the time) annually.

The long-term analysis for trends in observed temperature over Haryana using IMD gridded temperature at daily time scales show that there is no significant trend in the mean maximum and minimum temperature shows an increase of about 1.0°C to 1.2°C. Similarly trends in observed seasonal precipitation is negligible in many parts of Haryana, parts of Bhiwani, Faridabad, Fatehabad, Gurgaon, Jhajjar, Jind, Karnal, Kurukshetra, Mahendragarh, Rohtak, Sirsa, Sonipat show decreasing trend in the monsoon rainfall.

A. Temperature

Most of the year, the climate of the state is of a pronounced continental character, very hot in summer and markedly cold in winter. In between are the pleasant months of spring. Haryana is extremely hot in summer at around 45°C and mild in winter. The hottest months are May and June and the coldest are December and January. The hot weather season commences in the month of March and continues through April to June. In the month of May the diurnal range of temperature increases more and the day become hotter. During June the mean maximum temperature reaches as high as 45 °C. January is the coldest month. The normal minimum temperature ranges from 3°C to 9°C. Temperature dips to freezing point during the month of December/January.

Table 5: Observed Temperature Statistics average over the time period 1969-2005 (37 years) for Haryana

Season	Statistics	Maximum Temperature (in degree °C)	Minimum Temperature (in degree °C)
Annual	Average (mm)	31.4	17.4
	Range – Average (mm)	30.9–31.9	17–17.8
Winter	Average (mm)	21.9	7.3
	Range – Average (mm)	21.5–22.5	6.9–7.6
Pre monsoon	Average (mm)	35.1	19.0
	Range – Average (mm)	34.6–35.8	18.5–19.6
Monsoon	Average (mm)	35.8	25.4
	Range – Average (mm)	35.4–36.2	25.2–25.7
Post monsoon	Average (mm)	28.2	11.9
	Range – Average (mm)	27.7–28.7	11.3–12.5
Winter	Range (inter-annual variation)	0.02–0.02	0.03–0.03
Pre monsoon	Range (inter-annual variation)	0.04–0.04	0.13–0.14
Monsoon	Range (inter-annual variation)	0.02–0.03	0.02–0.02
Post monsoon	Range (inter-annual variation)	0.04–0.04	0.06–0.07

Mean maximum temperature in the state is projected to increase by 1.3°C and mean minimum temperature by 2.1°C towards mid-century. The increase in mean maximum temperature is projected to be 4.2°C and mean minimum temperature 4.7°C towards end century respectively[1].

B. Rainfall

There are two seasons of rainfall in the state. The south-west monsoon season, the principal source of ground water sets in last week of June and withdraws towards end of September and contributes about 80% of annual average rainfall. Another period of rainfall is winter rain from December to March is about 20% of total rainfall which is mostly absorbed into the soil. More than 50% of the annual rainfall received in the four rainy months for June to September, only there by leading to large variations on temporal scale. Rainfall is highly variable in time and space. The Normal Rainfall for the State of Haryana is 614 mm, but it has great spatial variations.

Average number of rainy days in Haryana during the southwest monsoon is about 25 days and varies spatially from 14 days to 40 days. Days when there are high rainfall events range from 1 to 3 days and similarly the extreme rainfall days are less and is about 1 day. Average number of rainy days in Haryana during the post monsoon (winter) is about 2 days and varies from 1 days to 3 days. Days when there are high and extreme rainfall events are negligible.

Trends in observed seasonal precipitation is negligible in many parts of Haryana, parts of Bhiwani, Faridabad, Fatehabad, Gurgaon, Jhajjar, Jind, Karnal, Kurukshetra, Mahendragarh, Rohtak, Sirsa, Sonipat show decreasing trend in the monsoon rainfall.

Table 6: Observed Rainfall Statistics average over the time period 1971-2005 (35 years) for Haryana

Season	Statistics	Value (in mm)
Annual	Average (mm)	544
	Range – Average (mm)	295.4–1228.9
Winter	Average (mm)	23.2
	Range – Average (mm)	11–54.8
Pre monsoon	Average (mm)	42.6
	Range – Average (mm)	14.4–84.2
Monsoon	Average (mm)	446.5
	Range – Average (mm)	230.4–1008.3
Post monsoon	Average (mm)	31.8
	Range – Average (mm)	12.2–81.6
Winter	Range (inter-annual variation)	1.1–2.2
Pre monsoon	Range (inter-annual variation)	0.6–0.8
Monsoon	Range (inter-annual variation)	0.3–0.6
Post monsoon	Range (inter-annual variation)	0.6–1.1

1 Haryana State Action Plan on Climate Change

Mean annual rainfall in the state is projected to decrease marginally by about 63 mm (3%) by mid- century and increase by about 347 mm (17%) by end century. Monsoon months, JJAS show marginal to 14% increase in mid and end century scenarios respectively[1].

C. Humidity

The air over the entire state is dry during the greater part of the year. Humidity is high in the monsoon months. April and May are the driest months with relative humidity of about 30% in the morning and less than 20% in the afternoons.

D. Winds

Winds are generally light during the post monsoon and winter months in the state. They strengthen during the summer and monsoon months. Except during the monsoon months, winds are predominantly from a westerly or north-westerly direction and tend to be more northerly in the afternoon. Easterly and south-easterly winds are more common in the monsoon months. Climate change may result in increased duration of warm season and rainy season which is directly correlated with occurrence of vector borne diseases. Change in climate may also change vector behaviour. Rising global temperatures can lengthen the season and increase the geographic range of disease-carrying mosquitoes. Increased rainfall, flooding and humidity creates more viable areas for vector breeding and allows breeding to occur more quickly.

CHAPTER 3

Climate Sensitive Issue/Diseases Prevalent in the State

Human health has always been influenced by weather and climate. Changes in climate and climate variability, particularly changes in weather extremes, affect the environment that provides us with clean air, food, water, shelter, and security. Climate Change (CC), together with other natural and human-made health stressors, threaten humans health and well-being in numerous ways.

Following are the major Climate Sensitive Diseases prevalent in Haryana:

- Acute Respiratory Illnesses attributed to Air Pollution
- Heat-related illnesses
- Vector-Borne Diseases (Dengue, Malaria, Chikungunya)
- Water-Borne Diseases (cholera, diarrhoea, typhoid, amoebiasis, hepatitis, gastroenteritis and worm infections)
- Extreme weather events (floods, earthquake, thunderstorm etc.) affecting health
- Emerging and remerging diseases (H1N1 influenza, COVID-19)

Table 7: Prevalence and trend of Vector Borne Diseases in Haryana

Year	Dengue		Malaria		Chikungunya	
	Cases	Deaths	Cases	Deaths	Cases	Deaths
2019	1207	0	1497	0	0	0
2020	1377	0	111	0	14	0
2021	11835	13	54	0	21	0
2022	8996	18	52	0	242	0

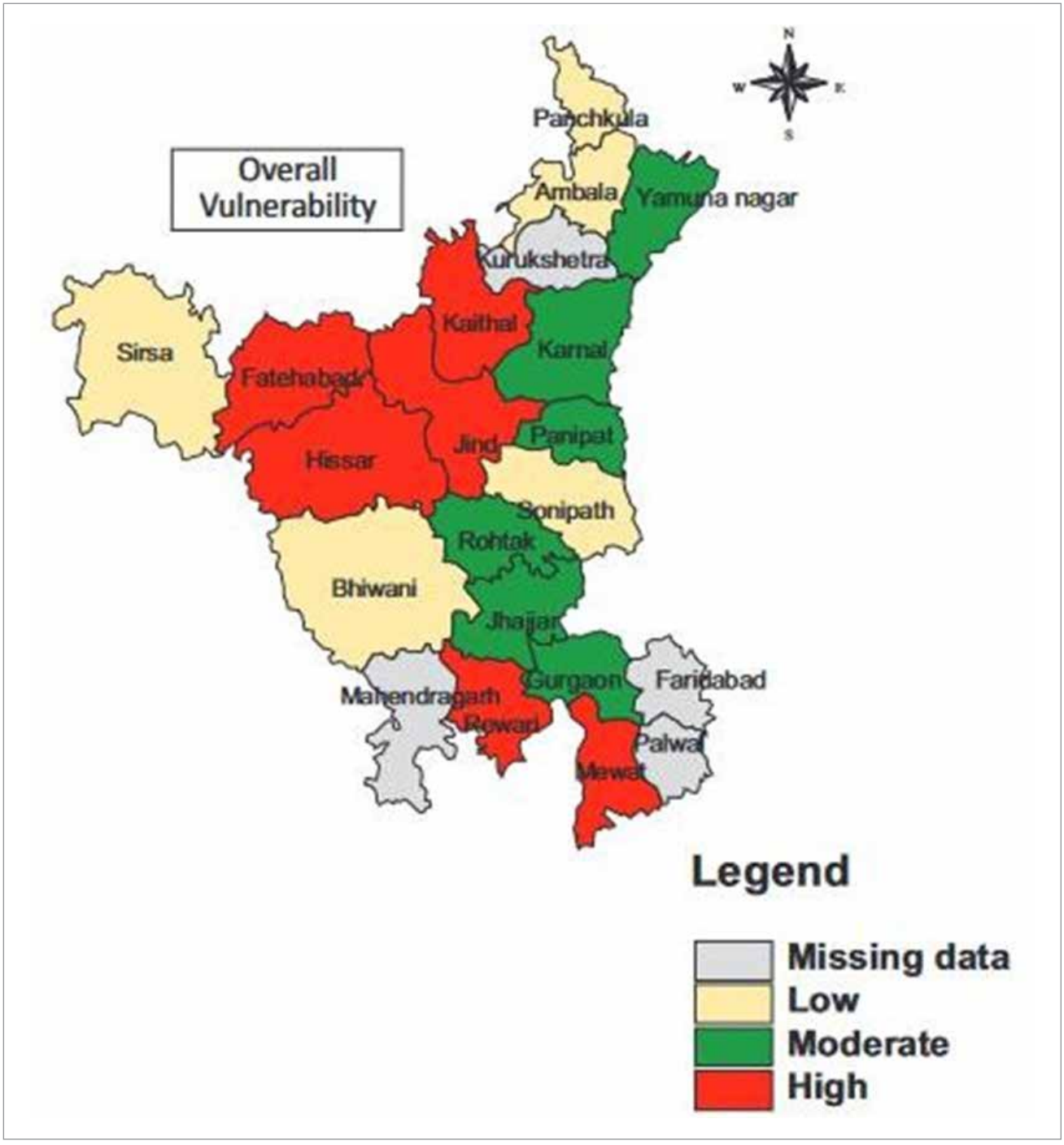
Table 8: Outbreaks of Water Borne Diseases in Haryana

Name of Disease	2020			2021			2022		
	Outbreak	Cases	Deaths	Outbreak	Cases	Deaths	Outbreak	Cases	Deaths
Cholera	0	0	0	3	794	1	2	2	0
Gastritis	0	0	0	6	195	0	2	105	0
Hepatitis	2	77	3	0	0	0	4	74	0
Typhoid	0	0	0	0	0	0	1	25	0
Total	**2**	**77**	**3**	**9**	**989**	**1**	**9**	**206**	**0**

Table 9: Trends of Acute Respiratory Infection/Influenza like illness and Influenza cases and deaths in Haryana

Details	2016	2017	2018	2019	2020	2021	2022
ARI/ILI	1,489,564	1,298,009	1,346,024	1,401,912	963,078	660,000	265,153
Suspected influenza Cases	159	421	124	2090	178	43	459
Influenza A	68	254	61	1041	44	6	103
Total Deaths	5	9	7	16	0	0	12

Figure 1: Overall climate change and health vulnerability in Haryana



Source: Pilot Tool for Assessment of Health Vulnerability to Climate Change at the Sub-National Level in India, IIHMR Jaipur).

Floods in Haryana

Flood is a temporary inundation of large region due to increase in reservoir levels, or of rivers flooding their banks because of heavy rains, high winds, cyclones, storm surge along coast, melting snow or dam bursts. In the sub-region of Haryana, the propensity of flooding is more as a hazard rather than a disaster. The areas under low-lying contour zone (heterogeneous topography) and along the river of Yamuna are subject to flood hazard. There are number of instances when several districts faced flood hazard primarily due to heavy rain in monsoon and discharge in Yamuna.

The main cause of floods in other districts like Gurgaon, Mewat, and Rohtak can be attributed to the heterogeneous topography. There is no perennial river; however, several Barsati Nallahs/Hills Torrent can be found which crisscross the entire region and become the cause of floods during rainy season. The existence of low-lying areas in districts like Rohtak, Jhajjar and Rewari could be blamed for water logging during heavy rain. Hence there is a strategy required at local level in preparedness & planning of response. Considering that Climate change may bring about changes in the rainfall pattern further, experience may not be adequate to plan for flood protection. On the other hand the drainage of Rohtak and Gurgaon depend on the drainage capacity through Delhi- which would require inter-state collaboration.

CHAPTER 4

Vision, Goal and Objectives

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

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

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

Specific Objectives

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

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

Objective 3: To strengthen health preparedness and response by performing situational analysis at 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 state in coordination with the Ministry of Health & Family Welfare.

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

CHAPTER 5
Organisational Structure

ORGANISATIONAL STRUCTURE

NATIONAL LEVEL

Key Nodal Agency
Head, NPCCHH
(NCDC, MoHFW)

- Prime Minister's Council on Climate Change
- Health Mission
- Ministry of Health and Family Welfare (MoHFW), Govt of India

STATE LEVEL

Key Nodal Point
(SNO-NPCCHH)

- State Governing Body - Environmental Health
- State Level Task Force - Environmental Health
- State Environmental Health Cell

DISTRICT LEVEL

Key Nodal Point
(DNO-NPCCHH)

- District Task Force - Environmental Health
- District Environmental Health Cell

Institutional Structure at the State Level

A. Governing Body - Environmental Health

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

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

B. State Level Task Force - Environmental Health

This task force shall be working under the guidance of 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 their state/UT. It shall be working through Directorate of Health Services (DHS) of the state, which will be the implementing agency for SAPCCHH.

The State level Task Force shall have inter-ministerial members which are suggested as:

Designation	Role in the Task Force
Principal Secretary (Health)	Chairperson
Mission Director - National Health Mission	Vice Chairperson
Director General Health Services/Head of Health System	Member Secretary
Director/Chairperson - Department of Revenue (Disaster)	Member
Director/Chairperson - Department of Agriculture	Member
Director/Chairperson - Department of Water and Sanitation	Member
Director/Chairperson - Department of Transport	Member
Director/Chairperson - Department of Animal Husbandry	Member
Director/Chairperson - Department of Environment and Forests	Member
Director/Chairperson - Department of Women and Child Development/Social Justice	Member
Director, Meteorological department of State/UT	Member
Director/Chairperson - Department of Public Works Department	Member
Director/Chairperson – Department of Urban Development (Municipalities)	Member
Director/Chairperson - Department of Education	Member
Director/Chairperson - Department of Food and Civil Supplies	Member
Director/Chairperson - Department of Human Resource Development	Member
Director/Chairperson - Department of Power	Member
Director/Chairperson - Department of Finance	Member
Director/Chairperson - Department of Law	Member
Director/Chairperson - Department of Panchayati Raj	Member
Director/Chairperson - State Ground Water Board	Member
Head - State disaster Management Authority	Member
Environmental Engineer/Scientist from Ministry of Environment	Member
Chairperson, State Pollution Control Board	Member
Regional Director - Health & Family Welfare (GoI)	Member
Director Medical Education and Research	Member
State Nodal Officer - Climate Change	Member
Director, ICMR Institute/Centre (If any branch in the State/UT)	Member
State Surveillance Officer	Member
Head – NAPCCHH, CEOH&CCH Division, NCDC, MoHFW	Member
Head, NCDC Branch of the state	Member

The Task force of the State/UT's Environmental Health Cell will coordinate with the Centre (MoHFW, NCDC) for execution of state/UTs SAPCCHH.

DGHS will create an *Environmental Health Cell* within State Health Department, and will identify a *Nodal Officer* from Health department which preferably should be a senior Public Health Expert of the state.

The proposed State Level Structure of Environmental Health Cell is as follows:

C. Structure of State Environment Health Cell (EHC)

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

D. Executive Members of EHC

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

Roles and Responsibilities of the State Environmental Health Cell

1. Preparation and Implementation of State Action Plan for Climate Change and Human Health
2. Conduct Vulnerability assessment and risk mapping for commonly occurring climate sensitive illnesses in the state/UT.
3. Assessment of needs for health care professionals (like training, capacity building) and organise training, workshop and meetings.

4. Maintain State and District level data on physical, financial, epidemiological profile for climate sensitive illnesses.
5. Ensure Convergence with NHM activities and other related programs in the State/District
6. Monitor programme, Review meetings, Field observations.
7. Timely issue of warning/alerts to health professionals and related stakeholders as well as community through campaign or using mass media (Electronic or printed),
8. Social mobilization against preventive measures through involvement of women's self-help groups, community leaders, NGOs etc.
9. Advocacy and public awareness through media (Street Plays, folk methods, wall paintings, hoardings etc.)
10. Conduction of operational research and evaluation studies for the Climate change and its impact on human health.

Institutional Structure at the District Level

The DHS will appoint the District Medical Officer/Chief Medical Health Officer as the District Nodal Officer – Climate Change. A District Level Task Force will be constituted by the District Nodal Officer- Climate Change in consultation with the SNO-CC.

A. Structure of District Level Task Force - Environmental Health

Designation	Role in the Task Force
Deputy Commissioner	Chairperson
Dean – Govt Medical College in the district/Head- Department of Community Medicine of the Medical College	Vice Chairperson
Chief Medical Officer/District Medical Officer/District Nodal Officer – Climate Change.	Member Secretary
District Surveillance Officer	Member
District Programme Manager – NHM	Member
District Head, Department of Revenue (Disaster)	Member
District Head, Department of Agriculture	Member
District Head, Department of Water and Sanitation	Member
District Head, Department of Transport	Member
District Head, Department of Animal Husbandry	Member
District Head, Department of Environment and Forests	Member
District Head, Department of Women and Child Development/Social Justice	Member
District Head, Department of Science and Technology/Earth Sciences	Member
District Head, Department of Education	Member
District Head, Department of Food	Member
District Head, Department of Human Resource Development	Member

Designation	Role in the Task Force
District Head, Department of Public Works Department	Member
District Head, Department of Power	Member
District Head, Department of Finance	Member
District Head, Department of Law	Member
District Head, Department of Panchayati Raj	Member

District Environment Health Cell

The District Environmental Health Cell will be constituted by the District Nodal Officer- Climate Change in consultation with the SNO-CC at District level, a District Environmental Health Cell shall be constituted, which shall be comprise of the following:

B. Structure of District Environmental Cell

Designation	Role in the District EHC
District Nodal Officer- Climate Change	Chairperson
District Veterinary officer	Member
District Surveillance Officer/District Epidemic Officer	Member
District RCH officer/FW Officer	Member
District Epidemiologist	Member
District Microbiologist	Member
District Immunisation Officer	Member
District Training Officer	Member
Data entry operator	Supporting staff

Roles and Responsibilities of the District Environmental Health Cell

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

Institutional Structure at the Health Facility Level

A. Community Health Centre

Designation	Role in the District EHC
Medical Superintendent (CHC Hospital)	Chairperson
Taluka Health Officer/Talukas Health Officer	Member Secretary
Health Education Officer/Similar Post	Member
Block Development Officer	Member
Health Supervisor	Member

B. Primary Health Centre (PHC)

At the PHCs, the responsibility for implementation will lie with the Medical Officer (In- charge) of the facility. The existing machinery of NHM will be utilised for the related activities. The Rogi Kalyan Samiti (RKS) would be reviewing and monitoring implementation at the health facility level. The ANM, ASHA and Anganwadi worker will assist in activities related to implementation of action plan at local level.

PART II

Health Action Plans on Priority Climate Sensitive Health Issues

CHAPTER 6

Health Action Plan on Air Pollution Related Diseases

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

Two major types of Air Pollution:

1. **Ambient (Outdoor) Air Pollution**

   Outdoor air is often referred to as ambient air. The common sources of outdoor air pollution are emissions caused by combustion processes from motor vehicles, solid fuel burning and industry. Other pollution sources include smoke from bushfires, windblown dust, and biogenic emissions from vegetation (pollen and mold spores).

2. **Household (Indoor) Air Pollution**

   Just like outdoor air pollution, indoor air pollution can pose a risk to health. As we spend much time in our homes, it is important that the air is as clean as possible. Indoor air pollution can come from sources outside the home, such as emissions from transport or smoke from neighboring wood heaters, and from sources within homes.

Ambient (outdoor air pollution) in both cities and rural areas was estimated to cause 3.7 million premature deaths worldwide in 2012. Air pollution also affects health by causing acid rain; eutrophication due to nitrogen oxides, emission in air from power plants, cars, trucks, and other sources; Haze; toxic effects on wildlife; Ozone depletion; Crop and forest damage etc. Over 4 million people die prematurely from illness attributable to the household air pollution from cooking with solid fuels. 3.8 million premature deaths annually from non-communicable diseases including stroke, ischemic heart disease, chronic obstructive pulmonary disease (COPD) and lung cancer are attributed to exposure to household air pollution.

Prominent causes of Ambient Air Pollution in Haryana state:

1. Pollution by Automobiles
2. Industrial Emission

Prominent causes of Household Air Pollution in Haryana state:

1. Use of biomass as fuel for cooking
2. Burning of agriculture waste

Other factors contributing air pollution in state are:

1. Diesel Generators
2. Incomplete combustion

Health Consequences of Air Pollution

Exposure to high levels of air pollution can cause a variety of adverse health outcomes. It increases the risk of respiratory infections, heart disease and lung cancer. Both short- and long-term exposure to air pollutants have been associated with health impacts. More severe impacts affect people who are already ill. Children, the elderly and poor people are more susceptible. The most health-harmful pollutants closely associated with excessive premature mortality – are fine PM2.5 particles that penetrate deep into lung passageways.

Air Pollution and Climate Change

Air pollution and climate change affect each other through complex interactions in the atmosphere. Air pollution is intricately linked with climate change because both problems come largely from the same sources, such as emissions from burning fossil fuels. Both are threats to people's health and the environment worldwide.

Climate change affects air quality, which in turn can lead to adverse health outcomes. Disruptions to weather patterns influence our air quality by increasing and distributing air pollutants, such as ground-level ozone, fine particulates, wildfire smoke, and dust. Changes to weather seasons also impact the production, distribution, and severity of airborne allergens.

Air pollution exposure is associated with oxidative stress and inflammation in human cells, which may lay a foundation for chronic diseases and cancer. In 2013, the International Agency for Research on Cancer of the World Health Organization (WHO) classified air pollution as a human carcinogen.

Air Quality Index

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

Air Quality Index (AQI) Category	
Good	0-50
Satisfactory	51-100
Moderately Poor	101-200
Poor	201-300
Very Poor	301- 400
Severe	401-500

Number of AQI Monitoring Stations within State

Although no cities have been identified under National Clean Air Program (NCAP) in the Haryana, there are various AQI monitoring stations within the state as follows:

1. By Central Pollution Control Board (CPCB) - 36
2. BY State Pollution Control Board (SPCB)- 45
3. By System of Air Quality and Weather Forecasting and Research (SAFAR) – 20

Vulnerability Assessment for air pollution

Based on the readings from these various AQI monitors, state has identified following cities as the **high priority cities and districts for Air Pollution Surveillance.**

Sl. No.	Name of the city/District	Average AQI	Reasons for High AQI
1	Bhiwani	Average AQI is above 200, which falls it in "poor" and "very poor" category – (November 2023)	Automobiles, Pollution from industries, Dust, stubble * Haryana had recorded 2,561 farm fires in 2021
2	Faridabad		
3	Jind		
4	Kaithal		
5	Karnal		
6	Kurukshetra		
7	Rohtak		
8	Sonepat		

Risk Mapping to Identify the 'Hot spots' for Vulnerable Population with Respect to Health Infrastructure and Other Resources for air Pollution

- Identification of Vulnerable group of population living in areas with poor air quality
- Identifying the major sources of pollution
- Availability of healthcare services in high priority districts
- Building the capacity of health care personnel on managing diseases arising from polluted air
- Sensitizing the health system on the impact of air pollution
- Creating awareness among the vulnerable population on appropriate behaviour and preventive methods
- Advocacy for stronger regulations on industries and factories responsible for air pollution

Health Sector Adaptation plan for Air Pollution Control

Health action plan on 'Air Pollution and Health in Haryana State is being developed to protect, prevent control health problems and reduce morbidity and mortality due to illnesses related to air pollution.

Awareness Generation

- IEC dissemination
- Carry out mass media campaigns
- Promote a culture of risk prevention, mitigation, and better risk management
- Promote attitude and behaviour change in the awareness campaigns linking air pollution and climate change.
- Engage local and regional media (community radio, TV)

A. Sensitisation Workshops

Various levels of Training	Topics	Timeline
Sensitization workshops for State Level officers	Introduction to Air pollution and its impact on health Role and responsibilities of state and regional level officers	October - November
Sensitization workshops for District Level officers	Introduction Air pollution its impact Role and responsibilities of District level officers	December
Panchayati Raj Institute Workshops	Prevention measures of Air pollution Role and responsibilities of PRI	January

B. IEC Activities for Air Pollution

- At least 1-2 Wall Poster disseminated in all healthcare facilities.
- Social Media – active circulation of audio-video clips and poster slideshow in prominent social media handles.
- Radio jingles during March to July in high priority districts
- Sensitization workshops for district, state and regional level officers
- Community participation through meetings, heat related illness education in school, Panchayati Raj Institutes and Gram Sabha.

IEC Plan for next five years

Sl. No.	Indicator Statement	Indicator	Target 2022-23	Target 2023-24	Target 2024-25	Target 2025-26	Target 2026-27
1.	IEC campaigns	Percentage of Districts implemented IEC campaign on heat related illnesses	50%	100%	100%	100%	100%
2	PRI and VHNC sensitization	Percentage of Districts included climate sensitive issues in the VHSNCs	25%	50%	75%	100%	100%
3	Community participation	Sensitization of rural population for Air pollution	Pilot study in one district	5 districts	50 %	75 %	100%

C. 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 forwarded to Districts through State/UTs for public dissemination.

District will ensure timely dissemination of health advisories in locally acceptable language.

IEC Examples

Observation of the environment-health days

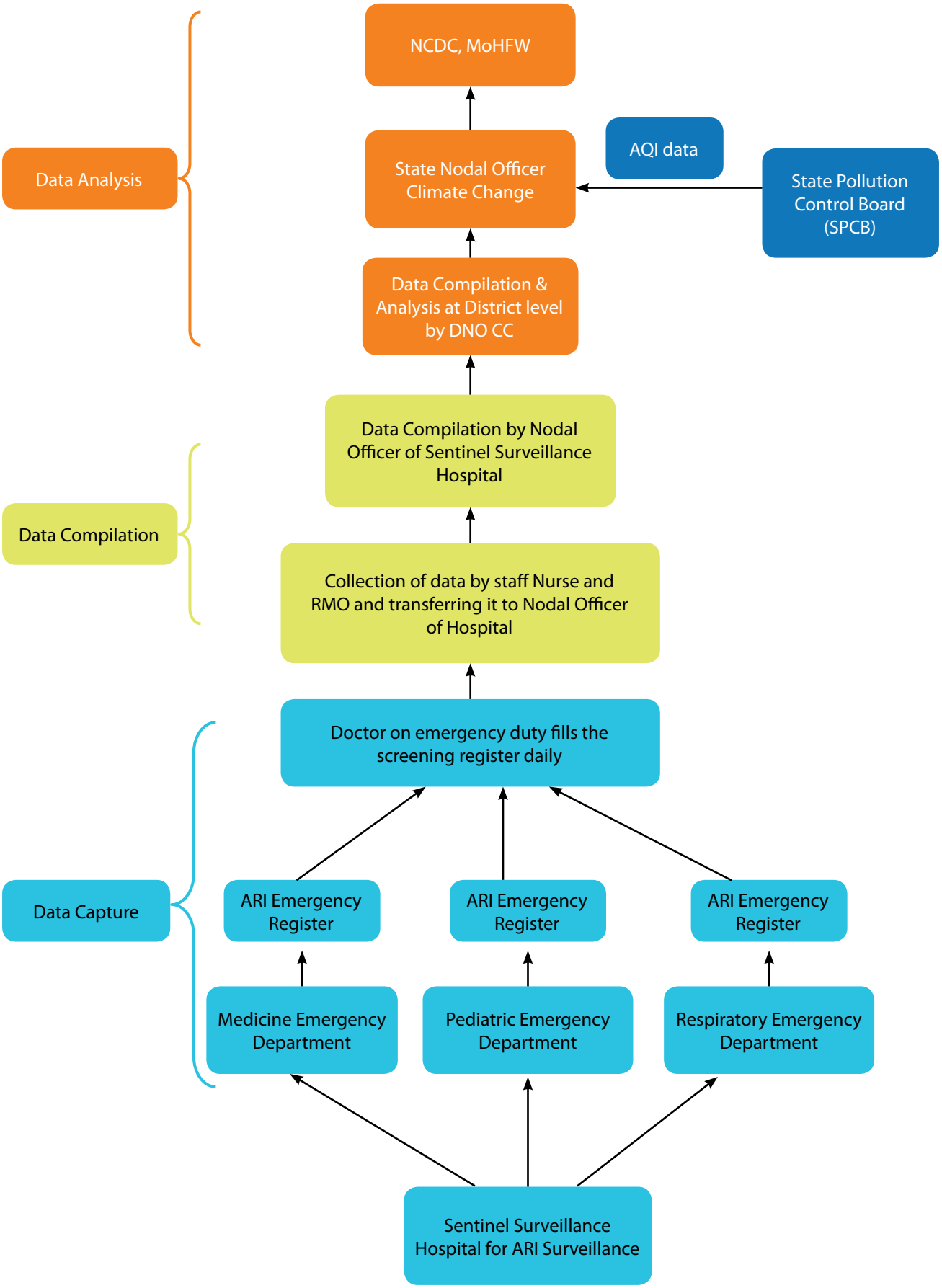
Day	Activities
World Environmental Day Clean air for blue skies	• IEC Campaigns • Workshops for district Nodal officers on Air pollution and its impact on health and strategies to reduce to impact of air pollution

Capacity Building

Training Calendar

Type of Training	Participants	Content of Training	Timeline
State Level ToT	State Level officers, regional level officers, District level officers	Air pollution its impact and Surveillance	August
District Level Training	District level supervisors, THO	Air pollution its impact and Surveillance	September
Medical Officer Training	Medical officers	Air pollution its impact and Surveillance	October
Paramedical staff training	MPW, ANM, LHV, etc.	Air pollution its impact and Surveillance	November
PRI training	PRI members	Awareness generation	December

ARI Surveillance Activity at State Level



Roles and responsibilities

Responsible Person	Roles and responsibilities
SNO	• Finalization of IEC material and dissemination Plan • Organize IEC campaigns at state level on observance of important environment-health days • Organize training sessions for district level and surveillance nodal officer • Facilitate training of medical officers in clinical aspects of air pollution's health impact • Real time air quality data dashboard in Proposed cities • Monitor AQI levels in states especially in hotspots and NCAP cities • Ensure reporting from sentinel hospitals and DNO • Ensure necessary health facility preparedness • Review surveillance reporting and monthly report submission by DNO • Submit report of activities • Review implementation of IEC and surveillance activities at all levels • Evaluate and update relevant section of SAPCCHH with support from State Task Force • Liaison with State Pollution Control Board for AQI alerts and its dissemination • Liaison with Department of Environment for combined IEC campaigns and information sharing on health indicators for targeted air pollution reduction activities • Awareness and action plan input sharing with Ahmedabad Municipal corporation, Vadodara Municipal corporation and Surat Municipal corporation • Create organization support and strengthen Environmental Health cell to implement NPCCHH vision, Goal and Objectives • Organize sensitization workshops for other stakeholders and line departments • Organize Seminars on Air Pollution and Conference to share knowledge and action under NPCCHH. • Collaborate with academic institute/s for support in updating SAPCCHH, Surveillance activity monitoring, vulnerability assessment and applied research • Advocate for reduction in source of air pollution
DNO	• Ensure IEC dissemination to community level • Facilitate community level IEC activities • Conduct training for Block health officers, Medical officer, Sentinel hospital nodal officers with relevant training manuals • Conduct training of vulnerable groups: police officers, outdoor works, women, children • Organize IEC campaigns at district level on observance of important environment-health days • Collect and monitor AQI levels in states especially in hotspots and NCAP cities • Ensure daily reporting from Sentinel hospitals and compile the data • Analyse daily health data with AQI level to monitor trends and hotspot in health impacts • Submit analysed monthly report to SNO, NPCCHH, HQ and other departments for necessary action • Submit report of activities • Update DAPCCHH with support from District Task Force • Advocate for reduction in source of air pollution
Surveillance hospital nodal officer	• Train hospital staff and clinician responsible for daily reporting in case indentation and reporting flow • Compile daily reports for the health facility and submit it to DNO and NPCCHH, HQ

Responsible Person	Roles and responsibilities
Block health officer	• Conduct community level IEC activities • Ensure training of medical officers • Organize PRI sensitization workshop and training for vulnerable groups
Medical officer	• Conduct health facility-based IEC activities • Support community level IEC activities • Be aware of AQI levels and health impact of air pollution • Ensure necessary health facility preparedness in early diagnosis and management of cases
Panchayati Raj Institutions	• Conduct community level IEC activities

CHAPTER 7

Health Adaptation Plan for Heat Related Illnesses

Introduction

In India, heat wave is considered if 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. Following criteria are used to declare a heat wave:

A. Based on Departure from Normal

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

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

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

The Heat Index is a measure of how it really feels when relative humidity is factored in with the actual air temperature. If the temperature is 34ºC and relative humidity is 75%, the heat index i- how it feels – is 49ºC. The same effect is reached at just 31 ºC when relative humidity is 100%. The adverse health effects of hot weather and heat-waves are largely preventable. Prevention requires a portfolio of actions at different levels, these actions can be integrated in a defined heat–health action plan.

National Disaster Management Authority (NDMA) prepared Guidelines for Preparation of Action Plan-prevention and management of Heat wave-2017, wherein the roles and responsibilities of various agencies were identified. Emergency Medical Relief (EMR), Ministry of Health and Family Welfare prepared detailed guidelines on prevention and management of heat related illnesses – 2015 wherein pathophysiology, risk factors, clinical manifestations, management, prevention and public health action plan for managing heat related illnesses has been explained. 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 will be declared on the second day.

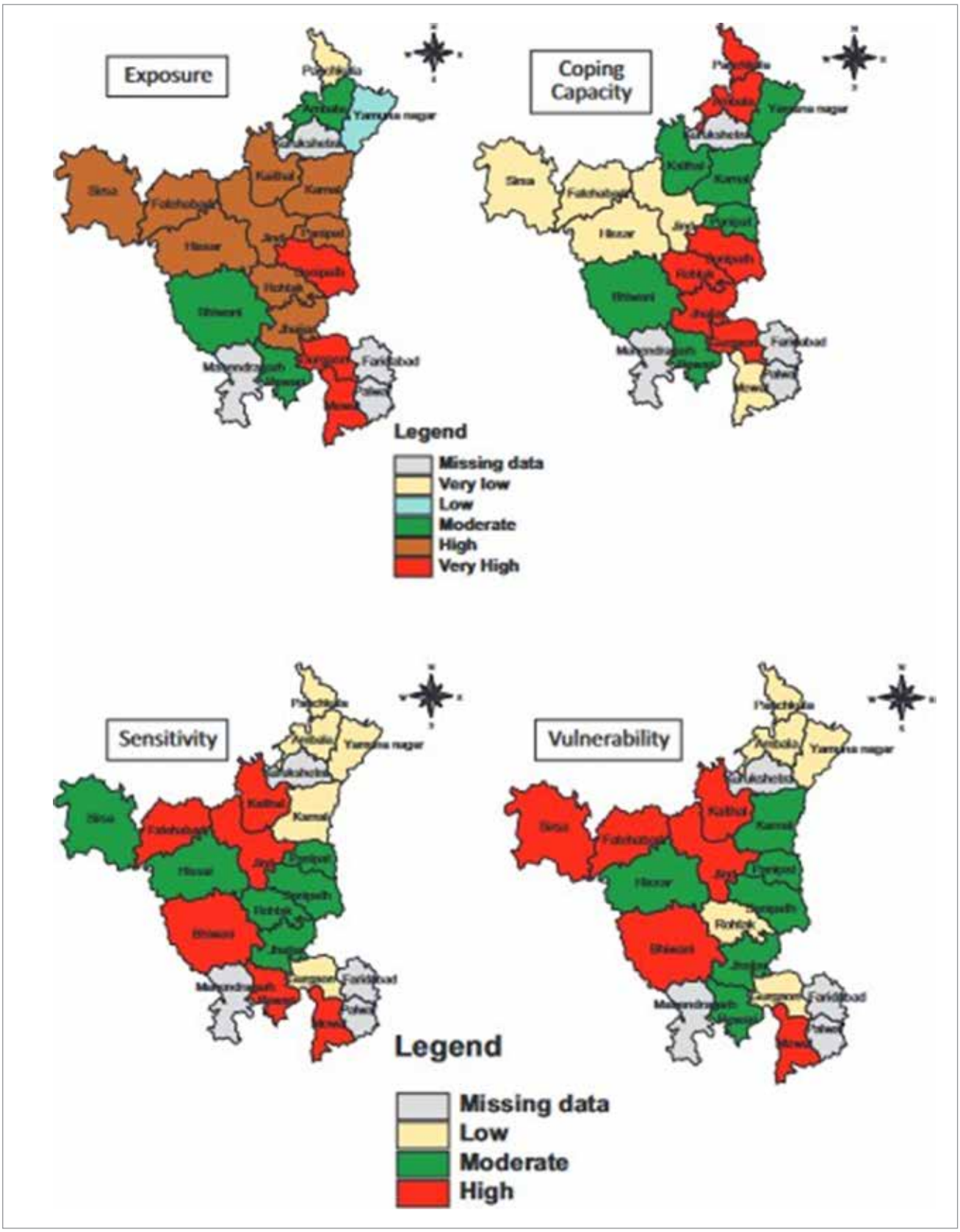
Different types of heat related illnesses

Clinical Entity	Age Range	Setting	Cardinal Symptoms	Cardinal/ Important Signs	Pertinent Negative findings
Heat rash/ prickly heat/ Miliaria	All, but frequently children	Hot environment; +/- insulating clothing or swaddling (wrap in tight clothes)	**ITCHY RASH with SMALL RED BUMPS** at pores in the skin. Seen in setting of heat exposure; bumps can sometimes be filled with clear or white fluid	**DIFFUSED RED COLOUR SKIN OR VESICULAR RASH**, itching of the skin without visible eruption	**NOT FOCALLY DISTRIBUTED** like a contact dermatitis
Heat cramps	All	Hot environment, **TYPICALLY WITH EXERTION**, +/- insulating clothing	**PAINFUL SPASMS** of large and frequently used muscle groups	Uncomfortable appearance, may have **DIFFICULTY FULLY EXTENDING AFFECTED LIMBS/ JOINTS**	No contaminated wounds/tetanus exposure; no seizure activity
Heat exhaustion	All	Hot environment; +/- exertion; +/- insulating clothing or swaddling (wrap in a tight clothes)	Feeling overheated, light headedness, **EXHAUSTED AND WEAK**, unsteady, feeling of **VOMITING, SWEATY AND THIRSTY**, inability to continue activities	**SWEATY/** diaphoretic; flushed skin; hot skin; **NORMAL CORE TEMPERATURE**; +/- dazed, +/- generalized weakness, slight disorientation	No coincidental signs and symptoms of infection; no focal weakness; no difficulty in swallowing food or speech; no overdose history
Heat syncope	Typically adults	Hot environment; +/- exertion; +/- insulating clothing or swaddling (wrap in a tight clothes)	Feeling hot and weak; light headedness followed by a **BRIEF LOSS OF CONSCIOUSNESS**	Brief, generalized loss of consciousness in hot setting, short period of disorientation, if any	**NO SEIZURE ACTIVITY**, no loss of bowel or bladder continence, no focal weakness, no difficulties in food swallowing or speech
Heat Stroke	All	Hot environment; +/- exertion; +/- insulating clothing or swaddling (wrap in a tight clothes)	Severe overheating; profound weakness; **DISORIENTATION, NOT FULLY ALERT, CONVULSION, OR OTHER ALTERED MENTAL STATUS**	Flushed, **DRY SKIN** (not always), **CORE TEMP ≥40°C OR 104°F**; altered mental status with disorientation, incoherent behaviour, **COMA, CONVULSION**; tachycardia; +/- hypotension	No coincidental signs and symptoms of infection; no focal weakness; no difficulties in swallowing food or speech, no overdose history

- In 2022, Punjab and Haryana experienced 24 days of severe heat wave or heat waves as compared to only two such days in 2021 (Source: Ministry of Earth Sciences in Parliament on February 9, 2023).
- In 2020, Punjab and Haryana had experienced one and three days of severe heat wave, respectively.

Heat stress and health vulnerability assessment

Figure 2: Overall health vulnerability mapping to heats stress along with mapping for exposure, adaptive capacity and sensitivity for heat stress in Haryana



Source: Pilot Tool for Assessment of Health Vulnerability to Climate Change at the Sub-National Level in India, IIHMR Jaipur).

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/salesmen
- Auto drivers/Travellers/Bus drivers
- Coolies/Slum residents/Beggars/Homeless
- Alcoholics, Smokers, Consuming hot drinks oftenly.
- Persons suffering from chronic diseases like Cardiovascular, Renal, Skin, Liver, Diabetes, Obesity, debilated/malnourished etc.

Data of vulnerable population of State

Sl. No.	Category of vulnerable population	Total count (2011 census)
1	Elderly people age more than 60 years	21,94,000 (28,90,000-2021 projection)
2	Women (15-19 yrs.) who were already mothers or pregnant (%) (Source: NFHS 4)	5.8%
3	Total Child Population (0-6 Age)	3,380,721

Heat Wave Action Plan in Haryana

The Heat-Wave Action plan provides a framework for implementation, coordination and evaluation of extreme heat response activities in districts and cities in state that reduces the negative impact of extreme heat. The heat action plan's primary objective is to alert those populations at risk of heat-related illness in places where extreme heat conditions either exist or are imminent, and to take appropriate precautions, which are at high risk.

The heat-wave action plan 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. Broadcast media and alerting agencies may also find this plan useful. Severe and extended heat-waves can also cause disruption to general, social and economic services.

A. Awareness Activities

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

Sensitization workshop for State and District level Officers

Various levels of Training	Topics	Timeline
Sensitization workshops for State Level officers	Introduction Heat related illness and its important Role and responsibilities of state and regional level officers	January
Sensitization workshops for District Level officers	Introduction Heat related illness and its important Role and responsibilities of District level officers	February
Panchayati Raj Institute Workshops	Prevention measures of Heat wave illness Role and responsibilities of PRI	March

IEC Activities conducted in Haryana

State has customized posters and distributed to all district and Municipal corporations. To aware generation about heat related illness on radio and local news channel by District Nodal Officers. State has shared all health advisory time to time with all districts.

IEC Plan for next five years

Sl. No.	Indicator Statement	Indicator	Target 2022-23	Target 2023-24	Target 2024-25	Target 2025-26	Target 2026-27
1	IEC campaigns	Percentage of Districts implemented IEC campaign on heat related illnesses	50%	100%	100%	100%	100%
2	PRI and VHNC sensitization	Percentage of Districts included climate sensitive issues in the VHSNCs	25%	50%	75%	100%	100%
3	Community participation	Sensitization of rural population for HRI	Pilot study in one district	5 districts	50%	75%	100%

IEC activities for heat related illness

- At least 1-2 Wall Poster disseminated in all healthcare facilities.
- Radio jingles during March to July in all districts
- Sensitization workshops for district, state and regional level officers
- Community participation through meetings, heat related illness education in schools.

B. Capacity Building

- Clinical management training of HRI for all Physician, district nodal officer and district epidemiologist
- Training for Surveillance of HRI and their reporting for district nodal officer, RMO outreach and district epidemiologist.
- Medical officer training for HRI Clinical management and Surveillance for HRI at district level.

Training Calendar

Type of Training	Participants	Content of Training	Timeline
State Level ToT	State Level officers, Regional level officers, District level officers	Surveillance, Preventive Measures and Clinical Management	Feb-March
District Level Training	District level supervisors, THO	Surveillance, Preventive Measures and Clinical Management	March-April
Medical Officer Training	Medical officers	Surveillance, Preventive Measures and Clinical Management	April-May
Paramedical staff training	MPW, ANM, LHV, etc.	Surveillance and Preventive measures	April-May
Panchayat Raj Institute training	PRI members	Awareness generation	April-May

C. Surveillance Activities

The heat waves are generally experience during the month of April to July in Haryana. The daily reporting of heat stroke diseases is started from 1 march to 31st July of every year. The every district is collecting information from their health facilities as per case definition.

- Daily monitoring of health related illness on IHIP Portal
- Guidelines to all health facilities & district and municipal authorities on management of heat related illnesses – Establish heat stroke treatment room.
- Efforts to develop Heat Action Plan
- IEC for public
- District Level Death Investigation Committee:
  It should be three member committee to confirm Heat Stroke Deaths.

  This Committee will comprise of:

  1. District Civil Surgeon
  2. District Surveillance Officer
  3. Experts – Physician/Paediatrician either from Medical College or Public health department.

Every suspected death should be investigated & confirmed by District Committee within 3 days of the death.

State has conducted

- Clinical management training of HRI for all Physician, district nodal officer and district epidemiologist
- Training for Surveillance of HRI and their reporting for district nodal officer, RMO outreach and district epidemiologist.
- Medical officer training for HRI Clinical management and Surveillance for HRI at district level.

D. Hospital Preparedness

A committee on air pollution and health to be constituted preferably including officials from departments of Medicine, Respiratory Medicine Pediatrics, Cardiology, Neurology, Endocrinologists, etc. Including emergency and nursing division and Pharmacists.

The Committee will be responsible for development of specific action plan for hospital to address the health issues related to air pollution in its catchment areas. Such action plan will consist of activities to strengthen healthcare services in the facility in the context of air pollution, Key activities may include:

- OPD for Pediatrics/Medicine/Respiratory Medicine/Cardiology/NCD, etc. where more cases of impact of air pollution are likely to come
- Emergency services for illness related to respiratory and cardiovascular illness
- Counselling and awareness generation for friends and families of the patients
- Enhancing functional capacity for emergency, beds, drugs and diagnostics, equipments, etc.
- Enabling community outreach activities to generate awareness
- Capacity building of health professionals and workers to address health impacts of air pollution
- Establishment of surveillance mechanisms
- Strengthening supply chain and logistics to make medicines, diagnostics and equipments available, including provision for buffer stock
- Enhancing capacity and availability of oxygen cylinders, nebulizers ventilators in case of increased demand and for intensive care.

CHAPTER 8

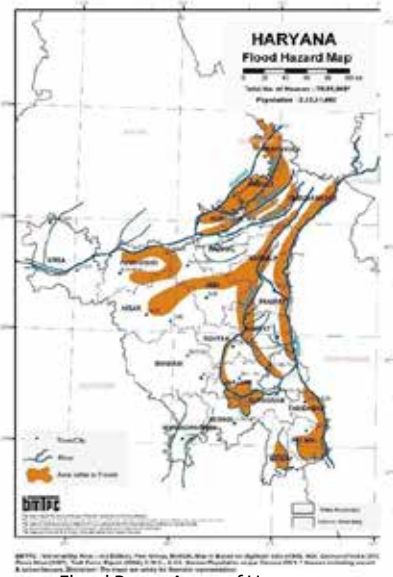
Health Action Plan on Extreme Weather Event-Related Health Issues

Introduction

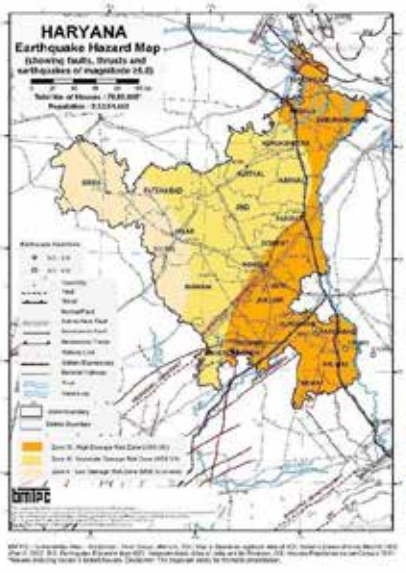
Haryana is a landlocked state which lies between 27°39′ to 30°35′ N latitude and between 74°28′ and 77°36′ E longitude. Most of the state sits atop the fertile Ghaggar Plain, a subsection of the Indo-Gangetic Plain. Northern Haryana has several northeast to west flowing rivers originating from the Sivalik Hills of Himalayas, such as Ghaggar, Chautang, Tangri river (tributary of the Ghagghar),Kaushalya river (tributary of the Ghagghar), Markanda River (tributary of Ghagghar), Sarsuti, Dangri, Somb river. The Yamuna, a tributary of the Ganges, flows along the state's eastern boundary.

Flood Vulnerability

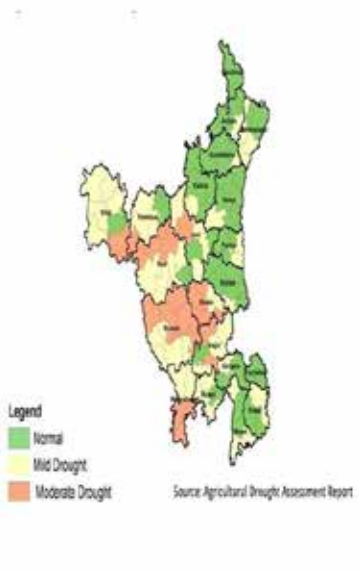
Flood is a natural phenomenon and it occurs due to heavy rains in the catchment area of river & heavy downpours in low lying pockets and poor drainage system of the state. State has also faced severe water logging due to which rain water accumulate in some parts of the towns and fields of the state. Many parts of the state are prone to flooding and devastating floods hit in 1977,1978,1980,1983,1988,1993 and 1995, 1996. The floods in Haryana can occur because of some natural reasons such as its physiographic situation which makes a depressional saucer shape zone around the Delhi-Rohtak-Hisar-Sirsa axis. According to assessment of Rashtriya Barh Ayog and as reported by states to the 11th plan working group, flood prone area in Haryana is 23.50 lakh hectares. In flood manual of Haryana, there are 102 vulnerable points in Haryana which need special attention during monsoon.



Flood Prone Areas of Haryana
Source: BMTPC



Earthquake Hazard Map
Source: BMTPC



Drought Prone Areas of Haryana
Source: Dept of Agriculture

Drought Vulnerability

Haryana has a semiarid climate in the southwest and a Gangetic plain environment in the rest of the state. Out of 12 districts in the state, 4 are drought-prone. The main problems with agricultural drought in this region are erratic rainfall; poor soil fertility; and limited, poor-quality irrigation water.

Earthquake Vulnerability

Ambala, Sonepat, Rohtak, Karnal, Gurgaon, Faridabad, Panipat, Rewari and Yamunanagar districts lie in Zone IV. The districts of Kurukshetra, Jind, Hissar, Bhiwani, Mahendragarh and Kaithal lie in Zone III while only Sirsa district lies in Zone II.

Themes underpinning the Plan

- Vulnerability assessment of various disasters in the State
- Measures to be taken for prevention, mitigation, preparedness and response of disasters
- Steps that to be adopted for main streaming disaster in development plans/programmes/projects
- Importance of addressing capacity building and preparedness measures
- Clear delivery of role and responsibilities of each department of the government and of stakeholders

Following hotspot districts are identified each event

- Drought: Bhiwani, Gurgaon, Mahendergarh, Rohtak
- Flood: Ambala, Yamunanagar, Karnal, Panipat

I. Awareness Generation

IEC Campaign (information motivation communication)

The Districts are aimed to create awareness through Information Education and Communication Activities (IEC) through development of locally and culturally more acceptable messages in posters, audio, video, organising public health events, issuing advisories related to disaster management.

The content for the IEC for the disaster management will be provided by the State NPCCHH division. The state will translate the content into the local or regional language (if required) and the role of the districts is to utilize these materials and disseminate at all levels.

Public Health Advisories

Health advisories are issued to alert population of disaster management. Advisories are issued at central level and forwarded to Districts through State/UTs for public dissemination.

District should ensure timely dissemination of health advisories

Advisory for Flood

Advisory in the anticipation of ill effect of flood may please be issued as under.

Before floods

1. Do not litter waste, plastic bags, plastic bottles in drains
2. Try to be at home if high tide and heavy rains occur simultaneously listen to weather forecast at All India Radio, Doordarshan. Also, messages by Municipal bodies from time to time and act accordingly.
3. Evacuate low-lying areas and shift to safer places
4. Make sure that each person has lantern, torch, some edibles, and drinking water, dry clothes and necessary documents while evacuating or shifting
5. Make sure that each family member has identity card.
6. Put all valuables at a higher place in the house.

In the Flood Situation

1. Obey orders by government and shift to a safer place.
2. Be at safe place and they try to collect correct information.
3. Switch of electrical supply and don't touch open wires.
4. Don't get carried away by rumours and do not spread rumours.

DO's

1. Switch off electrical and gas appliances, and turn off services off at the mains.
2. Carry your emergency kit and let your friends and family know where you are going.
3. Avoid contact with flood water it may be contaminated with sewage, Oil, chemicals or other substances
4. If you have to walk in standing water, use a pole or stick to ensure that you do not step into deep water, open manholes or ditches.
5. Stay away from power lines electrical current can travel through water, report power lines that are down to the power company.
6. Look before you step-after a flood, the ground and floors are covered with debris, which may include broken bottles, sharp objects, nails etc. Floors and stairs covered with mud and debris can be slippery.
7. Listen to the radio or television for updates and information.
8. If the ceiling is wet shut off electricity. Place a bucket underneath the spot and poke a small hole into the ceiling to relieve the pressure.
9. Use buckets, clean towels and mops to remove as much of the water from the afflicted rooms as possible.
10. Place sheets of aluminium foil between furniture wet carpets.

Don'ts

1. Don't walk through flowing water currents can be deceptive, and shallow, fast moving water can knock you off your feet.
2. Don't swim through fast flowing water you may get swept away or struck by an object in the water.
3. Don't drive through a flooded area - You may not be able to see abrupt drop offs and only half a meter of floodwater can carry a car away. Driving through floodwater can also cause additional damage to nearby property
4. Don't eat any food that has come into contact with floodwater.
5. Don't reconnect your power supply until a qualified engineer has checked it. Be alert for gas leaks - do not smoke or use candles, lanterns, or open flames.
6. Don't scrub or brush mud and other deposits from materials, this may cause further damage.
7. Never turn on ceiling fixtures if ceiling is wet. Stay away from ceilings those are sagging.
8. Never use TVs, VCRS, CRT terminals or other electrical equipment while standing on wet floors, especially concrete.
9. Don't attempt to remove standing water using your vacuum cleaner.
10. Don't remove standing water in a basement too fast. If the pressure is relieved too quickly it may put undue stress on the walls.

IEC dissemination plan for natural disasters under NPCCHH

IEC type	Material	Timeline	Mechanism
Advisory	bit.ly/NPCCHHPrg	Seasonal	By email to DNO for further dissemination to health facilities
Early warning	Bulletins/advisory by IMD, extreme weather, CWC (flood) sent by NPCCHH	Seasonal	• Health department/other government website/ application • Digital display of temperatures on public places and health facilities
Posters	• 6 posters on various EWE and health impacts (English & Hindi) bit.ly/NPCCHHIEC • Posters on heat and health impacts	Seasonal, as needed	• Printing of copies for state-level dissemination at health facilities, public places/buildings • By email to DNO for printing at district level and dissemination to health facilities, schools and other public/government buildings
Hoardings	Posters in English & Hindi (above)	Seasonal, as needed	• To be planned in High priority districts
Audio-Visual	• Audio Jingle • 5 Video messages (Hindi) bit.ly/NPCCHHIEC • Video message	Seasonal, as needed	• Played seasonally and around relevant extreme weather events
Digital display	• 5 GIF • Above mentioned video messages	Seasonal, as needed	• Display in health facilities • Public digital display boards in major cities
Social medial	All above material + Relevant activity updates	Seasonal	• Facebook and Twitter • WhatsApp groups (State DNO, Health facility group)

Observance of important environment-health days

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

II. Capacity Building

To strengthen capacity of healthcare system to disaster management

Training on disaster management is as follows:

Table 9: NPCCHH training plan at district level

Training Programme	Trainer	Participants	Training Content
Medical Officers	DNO	MO (DH, CHC, PHC)	Climate change and its impact on health, Disaster Management
Community Health Care Workers (HWC)	MO	Community Health Workers (CHO, MPHW, ASHA)	
Panchayati Raj Institutions	MO, MLHP	Panchayati Raj Institutions, communities	
Education Dept.	MO	School teachers	

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

Roles and Responsibilities

	Responsibilities
SNO	• Disseminate early warnings to 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 section of SAPCCHH with support from State Task Force • Create organizational support and strengthen Environmental Health cell to implement NPCCHH vision, Goal and Objectives • Organize sensitization workshops for other stakeholders and line departments • Collaborate with academic institute/s for support in updating SAPCCHH, Surveillance activity monitoring, training of health care professionals, vulnerability assessment and applied research • Submit reports of activities on EWE and health under NPCCHH
DNO	• Disseminate early warning to 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, 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 • Update DAPCCHH with support from District Task Force • Submit reports of activities on EWE and health under NPCCHH
Block health officer	• Conduct community level IEC activities • Ensure training of medical officers • Organize PRI sensitization workshop and training for vulnerable groups • Facilitate disaster vulnerability assessments in health facilities and maintain records of such assessment and health facility damage due to EWE

	Responsibilities
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

CHAPTER 9

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

Introduction: Vector Borne diseases

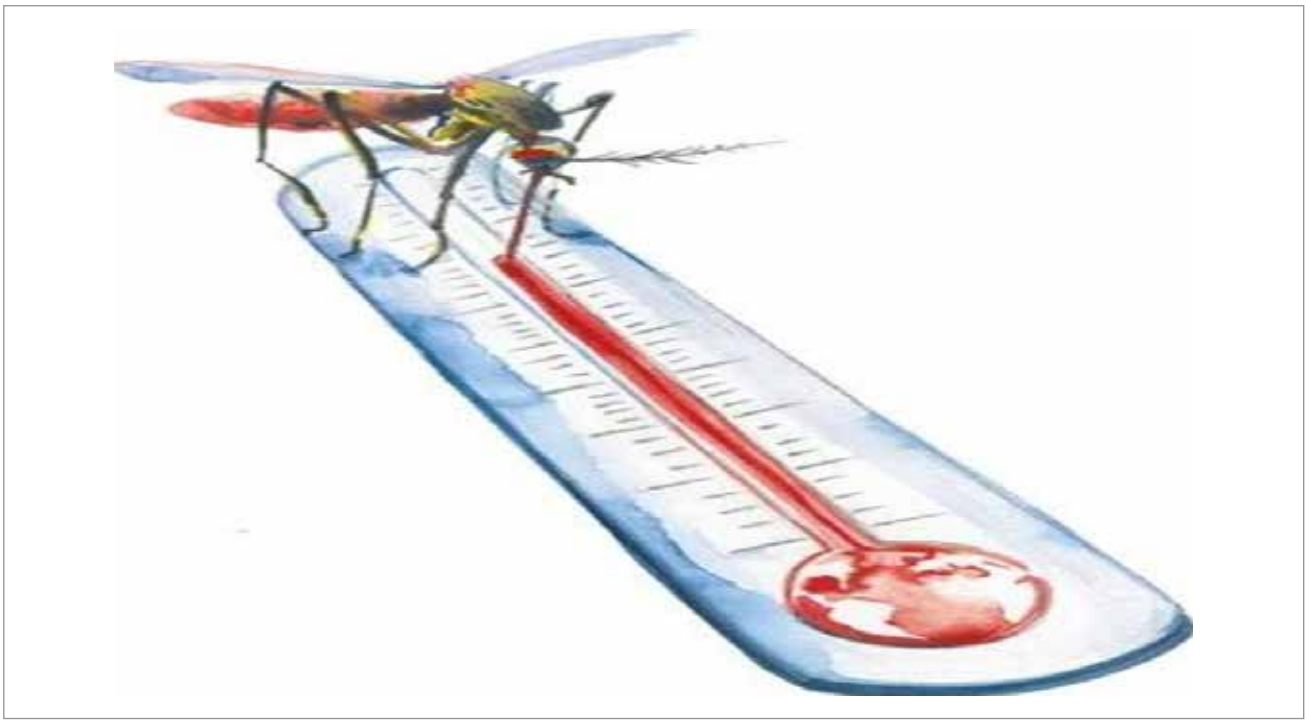
Effect of variation in climate has been well established for illnesses which are spread through vectors or which are transmitted from animals to humans. According to World Health Organization (WHO) climate change is considered as one of the paramount threat to human health. The cumulative rate of global warming over recent decades has been recorded over the past millennium [1].

Direct impact of climate changes on human health has been observed to be long-term changes in rainfall and temperature, climatic extremes (heat-waves, hurricanes, and flash floods), air quality, sea-level rise in lowland coastal regions, and multifaceted influences on food production systems and water resources. Infectious diseases of humans and animals are playing a significant role in consequences of climate change. The negative impact of infectious diseases on health and well-being is intrinsically linked to a combination of multiple stressors or drivers such as poor sanitation, access to clean water and food, the quality of public health services, political instability and conflict, drug resistance, and animal and/or human population movements.

The major vector for an infectious Vector Borne Diseases (VBDs) transmission is arthropods. These vectors are mostly ectothermic and highly sensitive to changes in climate especially temperature changes as internal temperature regulated by external environmental conditions. Their larval development stage generally requires the presence of humid conditions or availability of water bodies. Hence the sudden increase in the vector borne disease cases can be observed in rainy season. However adult arthropod serving as a vector in VBDs tends to have an increased biting rate with increase in temperature until temperature reaches up to an upper threshold, after which they decrease. Apart from vector biting rate, the extrinsic incubation period or EIP also seemed to be accelerate, resulting into fast development and replication of pathogens transmitted within vectors at high temperatures. Furthermore, vector development and survival is significantly affected by temperature conditions.

The entomological parameters affected by rainfall and temperature can be summarized using the maximum daily reproductive rate of the disease: the vectorial capacity. The optimal temperature range for disease transmission varies depending upon the vector–pathogen combination being studied; however, vectorial capacities of the most harmful tropical VBDs consistently peak at relatively high temperatures.

The evidence suggests that future climate change, if not mitigated, will very likely impact the length of the transmission season and the geographical range of a significant proportion of infectious diseases.



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. Apart from these effects, climate change can alter complete ecosystem comprising multiple habitats including urban habitats, in which vectors or non-human hosts may flourish or fail.

As arthropods and other vectors are ectotherms, increase in the temperature is directly proportional to vector abundance, survival and feeding activity and the rate of development of the pathogen within the vector.

The major global vector-borne diseases identified by World Health Organization and are observed in India are malaria, dengue, chikungunya, and Japanese Encephalitis (J.E.). However, in Haryana, Malaria, Dengue, Chikungunya, and J.E. these diseases are major vector borne diseases. Malaria and Dengue is observed throughout the state.

Causes of Different Vector Borne Diseases in the State

- Intermittent rains
- Traditional water storage practices
- Climatic condition variations

Factors Contributing to Increase of Respective Vector-borne Diseases in the Haryana State

- Increase in Vector density
- Increase in breeding sites
- Asymptomatic transmission

VBD Priority districts in Haryana

Based on the prevalence of key relevant VBDs in the state, Haryana has identified, Hisar, Jind, Punchkula, and Yamunanagar as priority districts. (Refer table below)

Table 10: District wise Morbidity and Mortality due to Dengue and Malaria

Sl. No.	District	Dengue						Malaria					
		2020		2021		2022		2020		2021		2022	
		Cases	Death	Cases	Death	Cases	Death	Cases	Death	Cases	Death	Cases	Death
1	Ambala	42	0	686	0	384	0	0	0	0	0	0	0
2	Bhiwani	49	0	356	0	123	0	1	0	0	0	1	0
3	Ch. Dadri	138	0	639	3	363	0	2	0	6	0	3	0
4	Faridabad	32	0	347	0	13	0	9	0	9	0	3	0
5	Fatehabad	35	0	993	1	162	0	0	0	1	0	0	0
6	Gurugram	51	0	327	1	440	0	4	0	2	0	0	0
7	Hisar	117	0	1009	3	1799	5	2	0	2	0	1	0
8	Jhajjar	26	0	323	0	109	0	11	0	6	0	16	0
9	Jind	28	0	622	0	535	0	0	0	0	0	0	0
10	Kaithal	114	0	1212	0	117	0	0	0	0	0	0	0
11	Karnal	93	0	304	2	335	2	2	0	0	0	1	0
12	Kurukshetra	5	0	129	0	104	0	2	0	0	0	0	0
13	Mahendergarh	6	0	161	0	72	0	0	0	5	0	3	0
14	Nuh	3	0	513	1	12	0	24	0	4	0	2	0
15	Palwal	7	0	56	0	7	0	33	0	3	0	0	0
16	Panchkula	78	0	906	1	2022	5	0	0	1	0	0	0
17	Panipat	232	0	233	1	281	0	1	0	2	0	1	0
18	Rewari	24	0	306	0	324	0	2	0	1	0	5	0
19	Rohtak	221	0	469	0	254	1	6	0	0	0	3	0
20	Sirsa	19	0	992	0	291	0	8	0	7	0	8	0
21	Sonipat	15	0	1011	0	317	1	1	0	1	0	4	0
22	Yamunanagar	42	0	241	0	932	4	3	0	4	0	1	0
	Total	**1377**	**0**	**11835**	**13**	**8996**	**18**	**111**	**0**	**54**	**0**	**52**	**0**

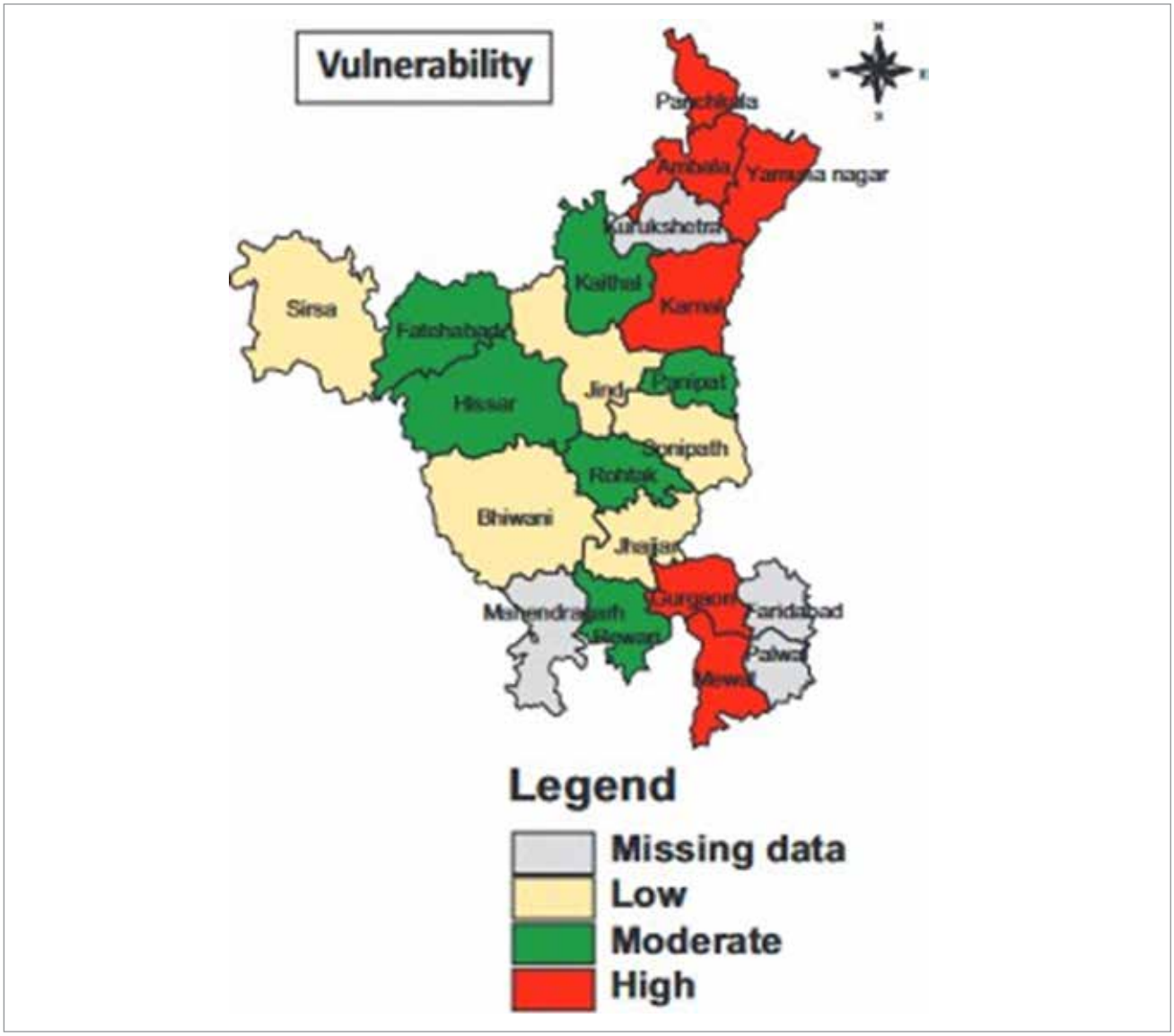
Table 11: District wise Morbidity and Mortality due to Chikungunya and Japanese Encephalitis

Sl. No.	District	Chikungunya						Japanese Encephalitis					
		2020		2021		2022		2020		2021		2022	
		Cases	Death	Cases	Death	Cases	Death	Cases	Death	Cases	Death	Cases	Death
1	Ambala	0	0	0	0	0	0	0	0	0	0	0	0
2	Bhiwani	0	0	0	0	0	0	0	0	0	0	0	0
3	Ch. Dadri	0	0	0	0	0	0	0	0	0	0	0	0
4	Faridabad	0	0	0	0	0	0	0	0	0	0	0	0
5	Fatehabad	3	0	5	0	0	0	0	0	0	0	0	0
6	Gurugram	0	0	0	0	0	0	0	0	0	0	0	0
7	Hisar	0	0	0	0	0	0	0	0	0	0	0	0
8	Jhajjar	0	0	0	0	0	0	0	0	0	0	0	0
9	Jind	0	0	1	0	1	0	0	0	1	0	1	0
10	Kaithal	0	0	0	0	2	0	0	0	0	0	0	0
11	Karnal	7	0	1	0	2	0	0	0	0	0	0	0
12	Kurukshetra	0	0	0	0	0	0	0	0	0	0	0	0
13	Mahendergarh	0	0	0	0	0	0	0	0	0	0	0	0
14	Nuh	0	0	0	0	0	0	0	0	0	0	0	0
15	Palwal	0	0	0	0	0	0	0	0	0	0	0	0
16	Panchkula	0	0	3	0	210	0	0	0	0	0	0	0
17	Panipat	4	0	0	0	0	0	0	0	0	0	0	0
18	Rewari	0	0	0	0	0	0	0	0	0	0	0	0
19	Rohtak	0	0	0	0	0	0	0	0	0	0	0	0
20	Sirsa	0	0	0	0	0	0	0	0	0	0	0	0
21	Sonipat	0	0	10	0	2	0	0	0	0	0	0	0
22	Yamunanagar	0	0	1	0	25	0	0	0	0	0	1	0
	Total	**14**	**0**	**21**	**0**	**242**	**0**	**0**	**0**	**1**	**0**	**2**	**0**

Vulnerability assessment

Weather variables: Temperature, rainfall, humidity, floods, drought, wind, daylight duration etc., Change in Vector/animal population due to change in growth, survival, feeding habits, seasonality, breeding sites, resistance etc., Change in interaction of vector/animal & pathogen due to change in susceptibility, Incubation period, or transmission, Change in demography, migration, land-usage practices, water projects, agricultural practices and Public health infrastructure and access to it.

Figure 3: Climate vulnerability map for Malaria



Source: Pilot Tool for Assessment of Health Vulnerability to Climate Change at the Sub-National Level in India, IIHMR Jaipur).

Population density and burdened health facility in urban area

Health Adaptation Plan for Vector Borne Diseases

Awareness Generation

The state environmental health cell is closely working with state National Vector Borne Disease Control Programme (NVBDCP) division. 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, Navaratri, 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	• Posters on VBD and climate change (English, Marathi) • Adopt posters made by state NVBDC	• Pre monsoon and Post monsoon	• 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	• 3 Audio Jingles	Pre monsoon and Post monsoon	Radio Channels
Digital display	• Available GIF • Above mentioned video messages	Seasonal	Display in health facilities Public digital display boards in major cities
Social medial	All above material + Relevant activity updates		• Facebook and Twitter handle of state NPCCHH, NHM • WhatsApp groups (State DNO, Health facility group)

Observance of important environment-health days

Observance of following days may be recommended for awareness on climate change and vector- borne diseases.

Day	Activities on VBD in context of climate change
• **World malaria day (April 25)** • **World mosquito day (August 20)** • **World Environmental Health Day (September 26)**	**IEC Campaigns** • Targeted awareness sessions: urban slums, schools, women, children • Street plays and local cultural activities, Rallies • Clinical management training for Dengue • Dengue awareness week

Capacity Building

The state has regularly conducting training for district level officers, medical officers and paramedical staff for surveillance and clinical management.

Training plan

Training Programme for	Trainer	Topics	Timeline
District level (DNO-CC, trainers)	State Level Trainers SNO-CC, Consultant	• Role of climate change impact in VBD burden, prevention measures • Tracking of VBD and Integrating rainfall, humidity and temperature parameters with VBD surveillance • Post-disaster VBD surveillance, prevention, management	June-July
Health facility level (MO of DH/RH/PHC)	District Level Trainers DNO-CC	• Role of climate change impact in VBD burden, prevention measures • Strengthen surveillance reporting • Post-disaster VBD surveillance, prevention, management in community and at relief camps	July-August or after extreme weather events/ natural disasters
Community Health care workers (MPH, ASHA, ANM etc)	District Level Trainers, MO	• Role of climate change impact in VBD burden, prevention measures • Post-disaster VBD surveillance, prevention, management in community and at relief camps	
Panchayati Raj Institutions	District level trainers, MO, Health care workers	• Role of climate change impact in VBD burden, prevention measures	

Strengthening Health Sector Preparedness

- Integrate weather parameters with VBD surveillance under NVBDC at District level
- Surveillance training: included under capacity building section
- VBD prevention and control measures
- Planning of indoor residual spray a month before peak of malaria cases based on historical data
- Management of new foci of transmission in endemic areas.
- Epidemic preparedness especially after extreme weather events or natural disasters

Roles and responsibilities (Govt & non-Govt)

Department/Agency	Area of Collaboration	Specifics
NVBDCP, Haryana	Overall guidance and policy formulation	• Guide and the state governments in resurgence and containment of any VBD
State Nodal Officer, Climate Change	To support the state govt. in control of VBDs particularly in climate sensitive states	• 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

Department/Agency	Area of Collaboration	Specifics
India Meteorological Department	To provide meteorological data as and when required	• To help the state govt. in collaboration with any research institute, in analysis of relationship between climatic factors and a particular VBD so as to forewarn the impending outbreaks.
NGO at state and district level for reach to community	Heath education at community level	• Conduct workshops for IEC activities for different level of staff in the identified areas in consultation with the state govts
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
Media	To be vigilant for report of any upsurge/outbreak of any VBD.	• Impart health education to masses through print and audiovisuals means

Surveillance

Mechanism of Generation of Alert system for the outbreak of Vector Borne diseases.

- State has developed daily reporting system for outbreaks
- District level Rapid Response teams are formed for prompt action.
- At state, staff from communicable disease sections, National vector Borne Diseases control and prevention (NVBDCP) and Integrated Disease Surveillance program (IDSP) all together formed a common section for Communicable diseases to strengthen Alert generation system for the outbreak through IHIP.
- Every member of this team shares news regarding vector borne diseases published in the various newspapers.
- State has also encouraged health department staff to generate an outbreak event on IHIP system

Roles and Responsibilities

State Climate Change & Human Health Cell

1. Prepare advisory and disseminate to district level.
2. Coordinate with other National health programmes like IDSP & NVBDCP for surveillance activities.
3. Coordinate with multisectoral task force members in developing State Action plan for Vector borne diseases.

4. Capacity building of DNO-CC and MOs in coordination with IDSP & NVBDCP.
5. IEC and awareness generation & dissemination planning in coordination with IDSP & NVBDCP.

District Climate Change & Human Health Cell

1. Disseminate advisory received from state level to block and health facility level
2. Coordinate with other National health programmes at district level like IDSP & NVBDCP for surveillance activities.
3. Coordinate with multisectoral task force members in developing State Action plan for Vector borne diseases.
4. Capacity building of MOs, LTs and other staff in coordination with IDSP & NVBDCP.
5. IEC and awareness generation & dissemination planning in coordination with IDSP & NVBDCP.

Block level

1. Disseminate advisory received from district level to health facility level
2. Capacity building of MOs, paramedical staff, Health care workers, CHOs and other departments.
3. Surveillance and Reporting.
4. IEC and awareness generation.

Health Facility level

1. Reporting of VBDs.
2. IEC and awareness generation.
3. Capacity building of frontline health care workers.
4. Hospital level preparedness.

Frontline Health Care Worker

1. Generate awareness among community.
2. Reporting and timely referral of suspected cases to nearest health facility.

CHAPTER 10

Action Plan for Green and Climate Resilient Health Care Facilities

Introduction

The aim of building climate resilient and environmentally sustainable health care facilities is: (a) to enhance their capacity to protect and improve the health of their target communities in an unstable and changing climate; and (b) to empower them to optimize the use of resources and minimize the release of pollutants and waste into the environment. Such health care facilities contribute to high quality of care and accessibility of services and, by helping reduce facility costs, also ensure better affordability.

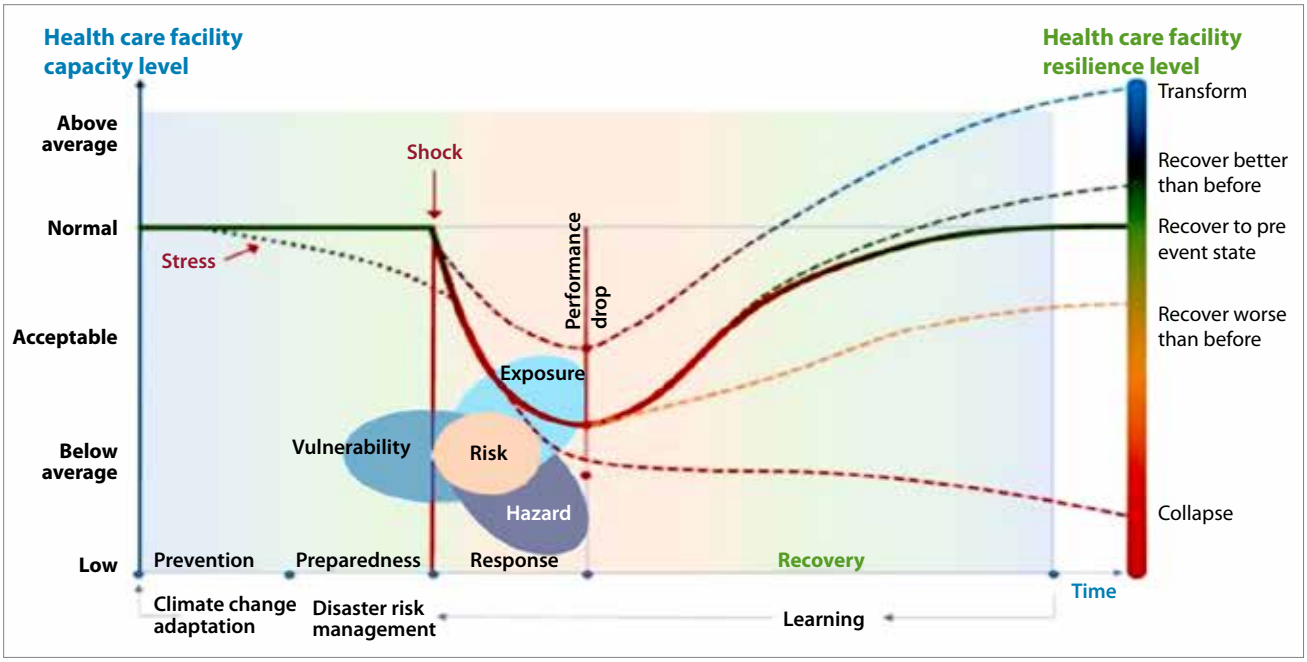
As the climate continues to change risks to health systems and facilities—including hospitals, clinics and community care centers—are increasing, reducing the ability of health professionals to protect people from a range of climate hazards. Health care facilities are the first and last line of defense to climate change impacts. They can be responsible for large emissions of greenhouse gases (GHGs), but also, they provide the needed services and care to people harmed by extreme weather and other climate hazards. Health care facilities can also produce large amounts of environmental waste and contamination (GHGs and other contaminants) which may be infectious, toxic or radioactive and therefore a threat to the health of individuals and communities. Health care facilities provide health treatments and related procedures to patients and vary in size from small health care clinics to very large hospitals. In many countries, they often lack functioning infrastructure, an informed and trained health workforce to address environmental challenges, and are subject to inadequate energy supplies, water sanitation and waste management services. Improving these is a priority and is key to building resilience and contributing to environmental sustainability.

Understanding Climate Resilience and Environmental Sustainability of Healthcare Facilities

There are several definitions that support our understanding of these subjects. Health systems include an ensemble of all public and private organizations, institutions and resources mandated to improve, maintain or restore health as well as incorporate disease prevention, health promotion and efforts to influence other sectors to address health concerns in their policies. Health system resilience is the capacity of health actors, institutions and populations to prepare for and effectively respond to crises; maintain core functions when a crisis hits; as well as stay informed through lessons learned during the crisis and reorganize if conditions require it. It is the ability to absorb disturbance, to adapt and to respond with the provision of needed services.

Climate resilient Health care facilities are those able to anticipate, respond to, cope with, recover from and adapt to climate-related shocks and stress, so as to bring ongoing and sustained health care to their target populations, despite an unstable climate. Figure 1 illustrates the important dynamics affecting the climate resilience of Health care facilities. Building on the concept of risk as a function of hazards, vulnerabilities and exposures (illustrated in the figure as a triangle, as defined by the Intergovernmental Panel on Climate Change (IPCC)), it depicts how hazards, in the form of a sudden event (a shock, such as a storm or sudden flood), or a slow-onset event (a stress, such as a drought, sea-level rise or high volume of cases of a climate-related disease), will reduce the Health care facilities level of performance and capacity (left axis). This would occur through a combination of impacts on key facility elements (for example, increasing—or adding to—the vulnerability of the health workforce, its infrastructure, its water, sanitation and energy systems), and therefore increasing risks. The level of resilience (right axis) indicates whether the facility will recover its pre-event state, recover but to a state worse than before (or even collapse and not recover) or recover and attain a level of resilience greater than before the event. The figure also highlights the risk management steps for prevention, preparedness, response and recovery.

Figure 4: Climate Resilience in Health Care Facilities



Strengthening Climate Resilience and Environmental Sustainability

Making HCFs climate resilient and environmentally sustainable would contribute to achieving SDGs related to climate change, sustainable consumption, water and sanitation, energy, employment, resilient infrastructure and health and well-being.

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
    a. Energy Auditing
    b. Installation of LED lighting at Health Care Facilities
    c. Installation of Solar panels
    d. Water Conservation Measures – Rain water Harvesting
2. Climate Resilient Infrastructure at Health Care Facilities including Retro Fitting of Existing Health Care Facilities

1. 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

Sample Interventions

	Objectives	Climate Resilience	Environmental Sustainability
Health workforce	Human resources	Identify minimum needs in terms of health care workers to ensure the operational sufficiency of every HCF department, in case of climate-related disaster or emergency	Increase human resources available to reduce or eliminate disease burden among vulnerable populations resulting from environmental hazards in HCFS
	Capacity development	Health workforce receives training and exercises for preparing for, responding to and recovering from extreme weather-related emergencies	Education and training provided to HCF staff and the community on environmental factors that contribute to the burden of disease
	Communication and awareness raising	Key messages for target audiences (such as patients, staff, public) drafted in preparation for the most likely extreme weather disaster scenarios	Increase knowledge and communication about the environmental impact of pharmaceuticals and their disposal
Water, sanitation and health care wastes	Monitoring and assessment	Develop climate resilient water safety plans	Implement and monitor a waste reduction program including waste management training for all staff
	Risk management	WASH climate risk management plan implemented	Wastewater is safely managed through use of on-site treatment or sent to a functioning sewer system
	Health and safety regulation	Sanitation technologies designed to be more resistant to climate hazards and able to Operate under a range of climate conditions	Harvested rainwater or gray water is safely used to flush toilets, clean outdoor pavement areas and water plants when possible
Energy	Monitoring and assessment	Assess that location of energy backup or renewable energy infrastructure can withstand extreme weather events (such as strong winds, hail, floods)	Assess the HCF to determine how and where energy use can be reduced (or increased in energy poor areas)
	Risk management	Plan developed for managing intermittent energy supplies or system failure	HCF fossil fuel consumption reduced by use of renewable energy sources, including solar (photovoltaic) power, wind power, hydro power and biofuels

	Objectives	Climate Resilience	Environmental Sustainability
	Health and safety regulation	Adequate lighting, communications, refrigeration and sterilization equipment are available during climate-related disasters or emergencies	Developed an energy management plan to measure energy consumption
Infrastructure, technology. Products	Adaptation of current systems and infrastructures	HCFs built or retrofitted to cope with extreme weather events, ensuring their resilience, safety and continuous operation	New (or retrofitted) HCFs designed and constructed based on low-carbon approaches
	Promotion of new systems and technologies	HCF uses proven smart materials and applications, sensors, low-power electronics, telemedicine and similar health care-appropriate technology	Substitute mercury-containing thermometers and blood pressure-measuring devices for affordable, validated device alternatives
	Sustainability of HCF operations	Anticipate the impact of the most likely disaster events on the supply of water, food and energy	Implement a clear environmentally sustainable procurement policy statement or protocol for all types of products, equipment and medical devices used in the HCF

Capacity Building

Health workers have a key role in building climate resilience and environmental sustainability of HCFs. Health care workers are the main actors in ensuring that interventions are effective for their own roles and activities, as well as for other components of the framework. Because building climate resilience and environmental sustainability are relatively new approaches for health workers, building awareness, training and empowering health workers are key requirements for the successful implementation of interventions.

Annual training plan for Climate resilience Hospitals, Haryana

Training Programme for	Trainer	Topics	Timeline
District level (DNO-CC, trainers)	State Level Trainers SNO-CC, Consultant	• Role Training on green and climate-resilient health care facilities in terms of climate impact • Assessments required for implementation • Coordination with supporting agencies	September
Health facility level (MO of DH/CHC/PHC)	District Level Trainers DNO-CC	• Role Training on green and climate-resilient health care facilities in terms of climate impact • Assessments required for implementation • Coordination with supporting agencies	September-October
Community Health care workers (MPW, ASHA, ANM etc.)	District Level Trainers, MO	• Role Training on green and climate-resilient health care facilitiesin terms of climate impact	October-November
Panchayati Raj Institutions	District level trainers, MO, Health care workers	• Role Training on green and climate-resilient health care facilitiesin terms of climate impact • Assembling support for implementation	December

Role and Responsibility

	Responsibilities
SNO	• Disseminate early warnings to district level • Finalization of IEC material and dissemination Plan • Organize training sessions for district level officers and trainers • Identify health facilities for priority implementation based on disaster and health facility vulnerability • Identify relevant state and district level nodal agencies and collaborate with them for assessment of health facilities for implementation of measures • Facilitate and monitor necessary assessments at health facility level • Facilitate implementation of structural and functional measures at health facility level • Submit report of activities on heat-health under NPCCHH • Advocate for reduction in source of greenhouse gas emissions
DNO	• Conduct training for block health officers, medical officers, with relevant training manuals • Support conduction for following assessment at health facility level • Energy audit • Water audit • Disaster-vulnerability assessment • Support following functional measures at health facility level • Water committee • Sustainable procurement committee • Operational measures to make health facility functioning during disasters or power cut • Coordinate with other agencies for assessment and implementation of identified structural and functional measures • Update DAPCCHH with support from District Task Force • Submit report of activities on heat-health under NPCCHH
Block health officer	• Ensure training of medical officers • Organize PRI sensitization workshop • 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
Panchayati Raj Institution	• Support retrofitting and new health facilities with local funding source and community involvement

PART III

Budget

CHAPTER 11
Budget

Tentative Plan of implementation of green measures in healthcare facilities for next 5 years

Green Measures in Healthcare Facilities	Units					Budget
	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Replace existing Lighting Non-LED with LED in CHC						
Replace existing Lighting Non-LED with LED in PHC						
Installing Solar panels at CHC						
Installing Solar panels at PHC						
Installing Rainwater harvesting System CHC						
Installing Rainwater harvesting System PHC						

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

PIP Budget

Name of Activity	Budget Head	Approved Budget Year 1 (Rs. In lakhs)	Approved Budget Year 2 (Rs. In lakhs)	Unit Cost (Rs)	Unit Cost (Rs. in Lakhs)	Quantity/ Target	Budget Proposed (Rs. Lakhs) in Year 3	Budget Proposed (Rs. Lakhs) in Year 4
Trainings of Medical Officers, Health Workers and Programme officers under NPCCHH	Capacity Building	12.65	12.65	55000	0.55	88	48.40	48.40
IEC on Climate Sensitive Diseases at Block, District and State level – Air pollution, Heat and other relevant Climate Sensitive diseases	IEC & printing	11.50	11.50	3200000	32.00	1	32.00	32.00

Name of Activity	Budget Head	Approved Budget Year 1 (Rs. In lakhs)	Approved Budget Year 2 (Rs. In lakhs)	Unit Cost (Rs)	Unit Cost (Rs. in Lakhs)	Quantity/ Target	Budget Proposed (Rs. Lakhs) in Year 3	Budget Proposed (Rs. Lakhs) in Year 4
Assessment of vulnerable health facilities of districts through medical colleges regarding health facility preparedness and reporting under NPCCHH	Surveillance, Research, Review, Evaluation (SRRE)	0.00	0.00	46200000	462.00	1	2.00	2.00
IT equipments	Planning & M&E			320000	3.20	1	3.20	0.00
Task force Meeting to draft health sector plan for Heat and Air Pollution	Planning & M&E	2.30	2.30	1030000	10.30	1	10.30	10.30
Sensitization workshop/Meeting of the State Program Officers and District level Health Officers	Planning & M&E	11.50	11.50	100000	1.00	3	3.00	3.00
Assessment of vulnerable health facilities of districts: As per the directions from NCDC state is engaging medical colleges, who will further adopt a district and technically support District level programme activities by providing expertise and guidance under NPCCHH	Planning & M&E						20.00	20.00
Total		**37.95**	**37.95**				**118.90**	**115.70**

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

Tentative budget plan for FY 2026-27 for various activities under NPCCHH

Budget Head		Budget
Capacity Building	With a tentative increase of 10%	53.00
IEC & printing		36.00
Surveillance, Research, Review, Evaluation (SRRE)		4.00
Planning & M&E		37.00
Other Operating Costs		
Energy Auditing	15 PHC, 5 CHC, 2 DH	5.0
Replace existing lighting (Non-LED) with LED	15 PHC, 5 CHC, 2 DH	11.50
Installation of Solar Panels	22 PHC	330.0
Installing Rainwater harvesting System	15 PHC, 5 CHC, 2 DH	135.0
Total		**611.50**

Annexures

Annexure 1: Role of different Ministries in control of Air Pollution

Ministry of Health & Family Welfare

- Develop/adapt health micro-plan for Respiratory diseases (case management, resources required like logistics, drugs, vaccines, and laboratories' role).
- Map vulnerabilities: population at risk, geo-climatic conditions, seasonal variation, exposure to pollens or allergens by change in types of crops or flower plants, change in population demography, migration (in & out), available resources, healthcare infrastructure, laboratories, burden of chronic illnesses in the community.
- Strengthen/Initiate Sentinel surveillance, real-time surveillance, evaluation and monitoring system for respiratory and cardio-vascular illnesses, hospital admission as well as Enhance vaccination programs and 'Vaccination Campaign' for vaccine-preventable air borne and respiratory diseases.
- Develop or translate IEC in local language, and make a communication plan for dissemination of health-related alerts/education materials.
- Capacity building and increasing awareness for individuals, communities, health care workers through involvement of various media as well as campaigns and training workshops.
- Ensure adequate logistic support, including equipment's and other treatment modalities and supplies for case management at all levels of health care and also under 'Emergency response Plan' in case of any disaster where air borne illnesses may occur as an outbreak.
- Inter-sectoral and stakeholders' coordination to monitor health outcomes with early warning system related to extreme weather events/Air Quality Index/ground level Ozone etc.

Ministry of Environment, Forests and Climate Change

- Ensure that State Pollution Control bodies set standards for industry-specific emission and effluent, monitor levels of pollutants and enforce penalties.
- Enforce strict air quality standards for pollution.
- Strict implementation of Environment Impact Assessments (EIA) to minimize the adverse impact of industrial activities on the environment.
- Effective implementation of 'National Green Tribunal' directives on trash burning/waste disposal from different sources.

- Take strict measures for unregulated sectors (such as brick kilns, trash burning, stone crushing) which contributes to ambient air pollution.

Ministry of Human Resource Development

- Regular screening of school children for early detection of diseases, this can be attributed to the existing air pollution.
- Inclusion of harmful health effects of environmental pollution (AAP and HAP) in the school curriculum (state board), including current policies and mitigation practices that are designed to reduce air pollution.
- Improve indoor air quality of educational institutions state wide.
- Improve walkability and access to educational institutions by non-motorised transport, thus minimizing the air pollution in the school surroundings.
- Sensitize students and teachers on using the Air Quality Index in planning outdoor school activities.

Ministry of Agriculture

- Policy in place to promote multiple uses of crop residues and prevent their on-farm burning.

Ministry of Rural Development

- Include health promotion (like clean air) guidelines as part of "Nirmal Gram Puraskar"/Model Villages evaluation criteria/create alternate awards with specific criteria based on air pollution at the state level.
- Under integrated rural development, develop and implement micro level planning policies/schemes with Panchayati Raj Institutions to address the social determinants of health for reducing the hazards of air pollution (lack of education, unemployment, poverty, poor housing conditions, etc.)

Ministry of Urban Development

- Formulate/revise urban transport policy which reduces vehicular pollution.
- Implement policies to reduce indoor air pollution (like dis-incentivizing diesel gensets and promoting clean cooking fuels thus 'making available clean and making clean available').
- Enforcement of ban on burning garbage or biomass (especially during winter months).
- Help cities develop air pollution alerts and emergency plans based on the Air Quality Index or CPCB continuous air monitoring data.

Ministry of New & Renewable Energy

- Implement policies for truly clean cook stoves and support research and development.
- Research and development of other non-conventional/renewable sources of energy and programmes relating thereto, including locally generated power to supply cooking appliances.
- Support and strengthen Integrated Rural Energy Programme (IREP) with emphasis on indoor air pollution.
- Create a consensus action plan for replacing biomass fuels with alternative clean fuels.

Ministry of Petroleum & Natural Gas

- Expand new initiatives to increase the availability of LPG and other cleaner fuels to the rural & tribal areas.
- Expand the piped natural gas network to reach out to a larger population.

Ministry of Power

- Promote/develop more efficient cooking devices.
- Evaluate the potential for electric cooking appliances to substitute for biomass and LPG.

Ministry of Road Transport and Highways

- Ensure effective implementation of New Motor Vehicles Act, once approved.
- Ensure proper engine checks for vehicles to assess pollution levels.

Ministry of Information and Broadcasting

- Develop hard hitting, high impact and cost effective media plans, strategies and conduct activities for awareness generation on harmful effects of air pollution and options for their mitigation.
- Ensure enforcement of relevant provisions in the Cable Television Networks Act to regulate advertisements of tobacco etc.
- Involvement of Songs & Drama division; Department of Field Publicity to promote health promotion activity for air pollution and its impact on respiratory and NCD risk factors.
- Develop policies to ensure that media houses allocate free airtime for health promotion messages as a corporate social responsibility activity.

Ministry of Communications & Information Technology

- Use of mobile phones to encourage healthy choices and warn people about air pollution (both AAP and HAP, using Air Quality Index).
- Establish Telemedicine linkages between different levels of health care in the state.

Ministry of Labour and Employment

- Regular health check- ups for early screening of pollution related diseases.
- Frame guidelines and conduct workshops for health promoting workplaces, (guidelines on indoor air quality).
- Showcase and support companies which employ workplace policies that can reduce vehicular travel such as telecommuting, or placing the workplace in sites that are accessible through public transportation (eg. Metro) or non-motorised transport.

Ministry of Women and Child Development

- Advocate through Self Help Groups and Mahila Mandals for protection of women and children from significant exposure to smoke from biomass while inside the house.

Ministry of Finance

- Analysis of the economic and financial implications of the health and other impacts of air pollution in the state.

Ministry of Law and Justice

- Support enforcement on bans of burning trash for heating or as a way of disposal

Roles and Responsibility of Task Force Members

Sl. No.	Task force Member	Role and Responsibility for Air Pollution control in state
1	SNO-CC	Overall responsibility to co-ordinate activities of assessing impact of Air Pollution on health and to suggest measures to reduce the same. **Co-ordinate with Directorate of Medical Education to** • To collect and compile data of patients with respect to Air Pollution effects on human health. • To assist research on Air pollution impact on Health initiated by central/state govt ministry, ICMR or any other agencies.
2	Director, from any research Institute	• To create evidence of Air Pollution impact on health by undertaking various studies, research for the same.
3	Director, Meteorological department of State/ UT	• To provide timely data of temperature, rainfall, wind speed or any other relevant meteorological factors having relation with increase or decrease of air pollution for particular city/district. • To give inputs for reducing air pollution in relation to meteorological factors.
4	Chairperson, State Pollution Control Board	• To provide Air Quality Data for the cities identified under the Sentinel Surveillance for assessing impact of Air Pollution. • To undertake measures to reduce the Air pollution and improve quality of air. • To monitor the progress of activities undertaken for reduction of Air Pollution.
5	Chairperson, State Disaster Management Authority	• To monitor the situation of the Air Pollution in different cities of state.
6	State Surveillance Officers	• To take necessary actions in regular data collection and analysis of data. • To prepare and disseminate IEC on regular basis to the cities where air pollution is the big issue for public health.
7	Environmental Engineer/Senior Scientist from MOEFCC	• To enlist & share probable causes of increase in air pollution within cities of the state. • To give necessary inputs to reduce air pollution as per the causes identified
8	Secretary, State Agriculture Ministry	• Prevent on-farm burning of crop residue.

Annexure 2: Roles and Responsibilities of health department and medical college in HRI

Roles and responsibilities of health department, medical colleges & hospitals, health centres and link workers

Department	Season	Roles and responsibilities
Health department State Nodal Officer	During Pre-Heat Season (Annually from January through March)	• Create list of high risk areas (heat-wise) of districts/block/cities • Update surveillance protocols and programs, including to track daily heat-related data • Develop/revise and translate IEC in local language • Make a communication plan for dissemination of heat related alerts or education materials • Check inventories of medical supplies in health centers • Identify cooling centers and barriers to access cooling centers • Capacity building of health care personnel to detect and treat heat related illnesses • Community involvement for workers and trainers' education • Issue health advisory to healthcare personnel based on IMD seasonal prediction or warning • Reassess 'Occupational Health Standards' for various types of Occupation. • Ensure Inter-sectoral convergence and coordination for improving architecture, design, energy efficient cooling and heating facility, increase in plantation i.e. Climate Resilient Green Building Design.
	During Heat Season (Annually from March through July)	• Ensure real-time surveillance and monitoring system in case of extreme event. • Prepare rapid response team • Distribute "Dos and Don'ts" to community • Effectively send a "Don't Panic!" message to community • Ensure access to Medical Mobile Van in the Red Zone • Ensure additional medical vans available • Ensure strict implementation of legislative/regulatory actions as per Occupational Health Standards. • Coordination with meteorological department for analysing cases and death data with meteorological variables like maximum temperature and relative humidity
	During Post-Heat Season (Annually from July through September)	• Participate in annual evaluation of heat action plan • Review revised heat action plan
Medical College and District Hospitals	During Pre-Heat Season (Annually from January through March)	• Adopt heat-focused examination materials • Get additional hospitals and ambulances ready • Update surveillance protocols and programs, including to track daily heat-related data • Establish more clinician education • Continue to train medical officers and paramedics

Department	Season	Roles and responsibilities
	During Heat Season (Annually from March through July)	• Adopt heat-illness related treatment and prevention protocols • Equip hospitals with additional materials • Deploy all medical staff to be on duty • Keep emergency ward ready • Keep stock of small reusable ice packs to apply to PULSE areas • Report heat stroke patients to DSU daily • Expedite recording of cause of death due to heat related illnesses
	During Post-Heat Season (Annually from July through September)	• Participate in annual evaluation of heat action plan • Review revised heat action plan
For health centres and link workers	During Pre-Heat Season (Annually from January through March)	• Distribute pamphlet and other materials to community • Sensitize link workers and community leaders • Develop and execute school health program • Dissemination of materials in slum communities • Coordinate outreach efforts with other community groups, non-profits, and higher education
	During Heat	Recheck management stock
	Season (Annually from March through July)	• Modify worker hours to avoid heat of day • Visit at-risk populations for monitoring and prevention • Communicate information on tertiary care and 108 service
	During Post-Heat Season (Annually from July through September)	• Participate in annual evaluation of heat action plan • Review revised heat action plan

Other Department's Roles and Responsibilities

Department	Season	Roles and responsibilities
Meteorological Department	Pre-Heat	Issue weather forecasts on Short/Medium/Long range duration
	Heat	• Issue Heat wave alerts • Coordination with health department for analysing cases and death data with meteorological variables like maximum temperature and relative humidity
	Post-Heat	• Participate in annual evaluation of heat action plan • Review revised heat action plan
Department of Drinking water & Sanitation	Pre-Heat	• Identify vulnerable places
	Heat	• Provide drinking water points at identified places and worksites
	Post-Heat	• Participate in annual evaluation of heat action plan • Review revised heat action plan
Public Health & Engineering Department	Pre-Heat	To construct cool shelters/sheds at public places, bus stands etc
	Heat	To maintain shelters/sheds, bus stands
	Post-Heat	• Participate in annual evaluation of heat action plan • Review revised heat action plan

Department	Season	Roles and responsibilities
Municipalities	Pre-Heat	Review the heat preparation measures.
	Heat	Ensure implementation of guidelines of heat action plan
	Post-Heat	Review the heat preparation measures and make a note of the lessons learnt for the next season
Department of Education	Pre-Heat	Train and Sensitise teachers and students towards health impact of extreme events and disseminate health ministry approved prevention and first-aid measures
	Heat	• Rescheduling school timing during summer • During extreme events keep a check on outdoor activities • Close teaching institutes in case of issue of alert from Government
	Post-Heat	• Participate in annual evaluation of heat action plan • Review revised heat action plan
Department of Labour & employment	Pre-Heat	• Reassess 'Occupational Health Standards' for various types of Occupation. • Utilize maps of construction sites to identify more high-risk outdoor workers • Heat illness orientation for factory medical officers and general practitioners • Communicate directly about heat season with non-factory workers
	Heat	• Encourage employers to shift outdoor workers' schedules away from peak afternoon hours (1 pm - 5 pm) during a heat alert or consider extended afternoon break or alternate working hours for workers. • Provide water at work sites
	Post-Heat	• Participate in annual evaluation of heat action plan • Review revised heat action plan
Department of Power supply	Pre-Heat	Maintenance of electrical lines
	Heat	Ensure uninterrupted supply of electricity
	Post-Heat	• Participate in annual evaluation of heat action plan • Review revised heat action plan Participate in annual evaluation of heat action plan • Review revised heat action plan
Department of Forest & Climate change	Pre-Heat	Develop/encourage projects to decrease the 'Urban Heat Island effect'
	Heat	Ensure implementation of guidelines of heat action plan
	Post-Heat	Review the heat preparation measures and make a note of the lessons learnt for the next season