Training Module
(Virtual Classroom Mode)

Heatwave Prevention and Management

GUJARAT INSTITUTE OF DISASTER MANAGEMENT
BUILDING RESILIENCE

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Virtual Classroom Mode Training Module on Heatwave Prevention and Management

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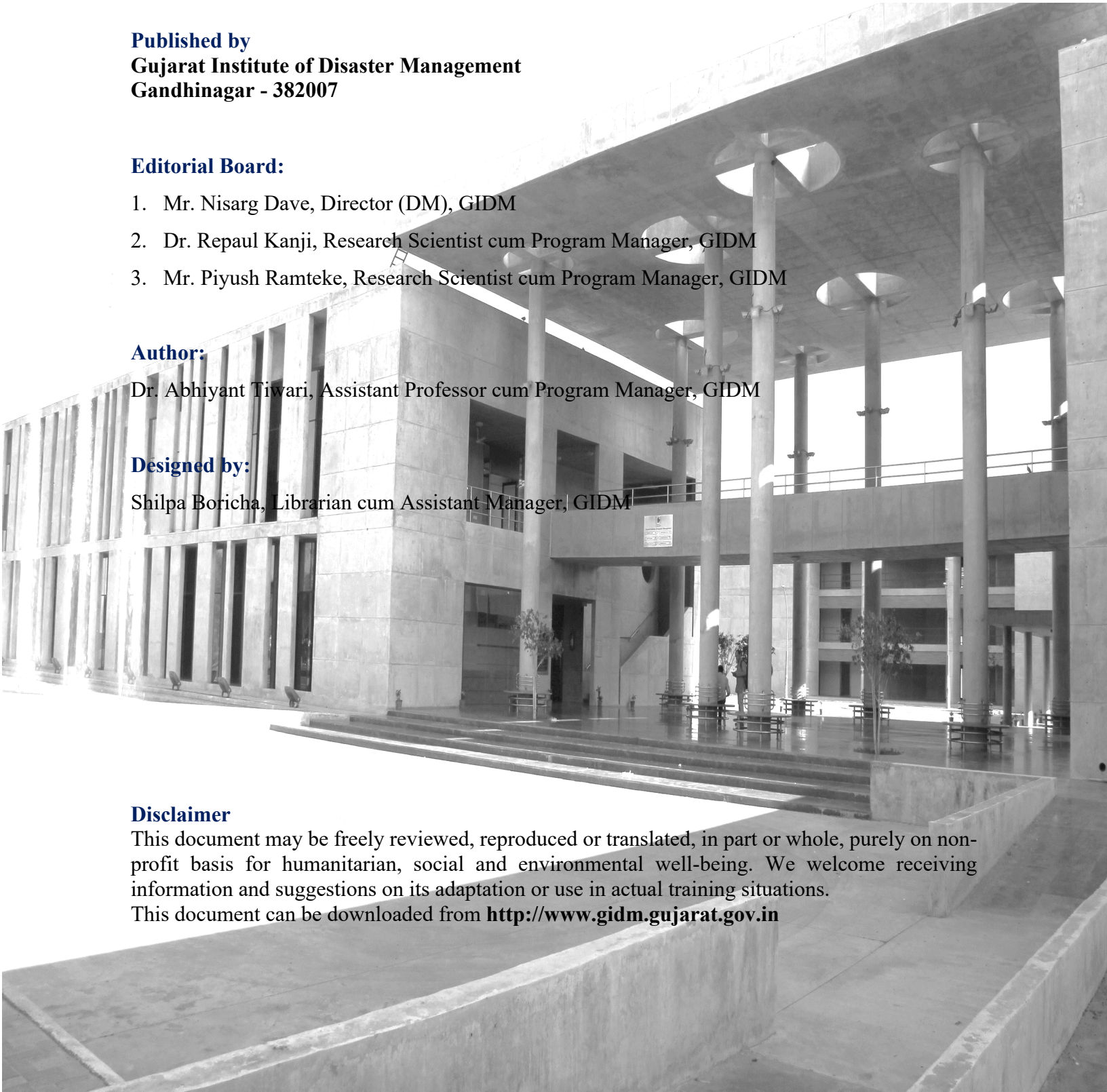

Message

Climate change has emerged as the biggest challenge to humanity in the 21st Century. It is imposing unprecedented damages on the environment, economies, and health of the people. And unfortunately, the impacts of climate change and global warming are further deepening the inequalities as the people at the bottom of the pyramid across the globe are facing higher consequences. On the other hand, the world seems to be failing on the 2015, CoP 21 Paris Agreement which aimed to limit the temperature increase to 1.5 °C above the pre-industrial era by end of the 21st Century as newer evidence coming in from the latest global climate studies are indicating that we may cross the threshold of 1.5 °C by mid of 21st century itself. This means, that the risk of occurrence of frequent, severe, and long-lasting extreme weather events like heatwaves will go further high...!

The encouraging part here is that governments, institutions, and communities all around the world are putting together efforts to minimize the ill impacts of heatwaves, especially on the health of the people. Learning from the disastrous extreme heat events in the past like the one in Europe in 2003 or South-Asia in 2015, many countries have developed their local Heat Action Plans to deal with any such devastating heatwave events in the future. I am happy to share that the city of Ahmedabad in Gujarat State has shown leadership by devising and implementing the first city-wide comprehensive Heat Action Plan of the South-Asia region since the year 2013 learning from which, numbers of cities and districts in several other states of India have developed their local Heat Action Plans.

Training is an integral part of disaster risk management as it empowers people to identify and understand the risk and then address it effectively. I appreciate the efforts of GIDM team especially Dr. Abhiyant Tiwari for coming up with the Virtual Classroom Mode Training Module on Heatwave Prevention and Management. I hope this module will help learners better understand the extreme heat from a disaster risk management lens. I am sure that learnings from this module will help in enhancing the awareness and add up to the heatwave risk reduction and management capacities of state and nation in long term.

(P. K. Taneja)
Director General

March, 2021
Gandhinagar

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Introduction

About this module

Scorching and sweltering hot weather has become a significant matter of concern for all, especially with its increased incidence, severity, and temporal span which is no longer a prediction but has already turned into the reality due to anthropogenic climate change and global warming all around the world. India has also observed a steep rise in temperatures in the past century and the rate of rising temperatures was higher in the past two decades compared to earlier as reported by the India Meteorological Department (IMD) recently. IMD in the same report also reported that 12 out of 15 warmest years in the history of India were between the year 2006 and 2020 and despite being under nationwide lockdowns due to the COVID-19 pandemic, the previous year 2020 turned out to be the 8th warmest year in the history of India since 1901. Different parts of India have seen an increasing trend in warming at different rates and have faced perils of heat accordingly.

A big part of the state of Gujarat has a largely hot semi-arid climate and because of that, spells of heatwave events during summer are no surprise in Gujarat. But, despite acclimatization to local climate and weather conditions, the immediate risks of adverse effects and impacts of heatwave on health and livelihood may go further high because of the growing population, increasing rate of urbanization, poor housing conditions, and phenomenon like urban heat island. The good part here is that these immediate risks of heatwave can be prevented, managed and minimized to great extent with proper short-term and long-term planning, preparedness, and management measures against heatwave.

Aim & Objectives

Gujarat Institute of Disaster Management has developed this virtual classroom-based training module with the aim to help the trainers use it for the training of participants working in various government and non-government organizations and have a direct or indirect role in protecting the health of people from heatwave.

This module is prepared to achieve the following objectives.

- Work as a standard guide for trainers of virtual classroom-based training on heatwave
- Develop basic understanding of heatwave as disaster among participants
- Acquaint participants with means to prevent and manage the risk of heatwave

Structure & Target Group

This virtual classroom-based training module is as a guiding template for the training of participants on the subject of heatwave prevention and management. Three sessions of approximately 60 minutes each in this training module are devised to develop a step-by-step understating among participants about heatwave, its disaster risk and its prevention and management. Excerpts of various topics and specific terminologies related to heatwave provided in each session of this module are not exhaustive. They are provided just to guide the trainer with the topics and flow required for virtual classroom-based training on heatwave prevention and management. The targeted group of participants to be trained using this virtual classroom-based training module should primarily be government officers and professionals working at sub-district levels in following departments/sectors.

- Health
- Disaster Management
- Women and Child Development
- Social Justice & Empowerment
- Education
- Urban Development
- Rural Development
- News Media

Sessions

Session 1: Heatwave and its Impact

Objectives of the session

- Explain the basis of definitions of heatwave and key terminologies used in it
- Explain the impacts of heatwave

Duration

60 minutes

Training aids

PowerPoint Presentations

Flow of the session

The World Meteorological Organization has defined heatwave as "a period during which the daily maximum temperature exceeds for more than five consecutive days the maximum normal temperature by 9 degrees Fahrenheit (5 degrees Celsius), the normal period being defined as 1961–1990."

According to the India Meteorological Department (IMD), a heatwave can be **qualitatively** defined as a condition of air temperature which becomes fatal to the human body when exposed. And, **quantitatively**, based on the temperature thresholds over a region in terms of actual temperature or its departure from normal. The criteria for the Quantitative definition of heatwave used by the India Meteorological Department are as follows,

Heat wave is considered if maximum temperature of a station reaches at least 40°C or more for Plains and at least 30 °C or more for Hilly regions.

1. **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

2. **Based on Actual Maximum Temperature**

   Heat Wave: When actual maximum temperature ≥ 45°C

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

   If above criteria met at least in 2 stations in a Meteorological sub-division for at least two consecutive days and it declared on the second day

For coastal regions: When maximum temperature departure is 4.5°C or more from normal, Heat Wave may be described provided actual maximum temperature is 37°C or more.

In India, heatwave conditions are mostly observed during the summer month i.e., from March to June, and rarely in July as well. The states that are largely affected by heatwaves in India are Punjab, Haryana, Delhi, Uttar Pradesh, Bihar, Jharkhand, West Bengal, Odisha, Madhya Pradesh, Rajasthan, Gujarat, parts of Maharashtra & Karnataka, Andhra Pradesh, Telangana, Tamilnadu, and Kerala. Participants can then be informed that there is no universally accepted definition of a heatwave.

The history of heatwave events is not recent in India. As per the India Meteorological Department, the highest ever temperature recorded in the history of India until 2016 was 50.6°C in Alwar City, Rajasthan on 10th May 1956, but this record was exceeded by scorching 51°C temperature recorded on 19th May 2016 in Phalodi Town again from Rajasthan. During both these record-high extreme temperature events, the mercury kept soaring high for several days making them the two hottest heatwave events of India. Despite being the hottest heatwave event in the history of India with 1111 deaths, as we can see in Figure 1, the 2016 heatwave wasn't the deadliest one so far in India. It's rather the heatwave event of 1998 that so far has been the deadliest one in India with more than 3000 deaths across India of which more than 2000 deaths occurred in the state of Odisha alone.

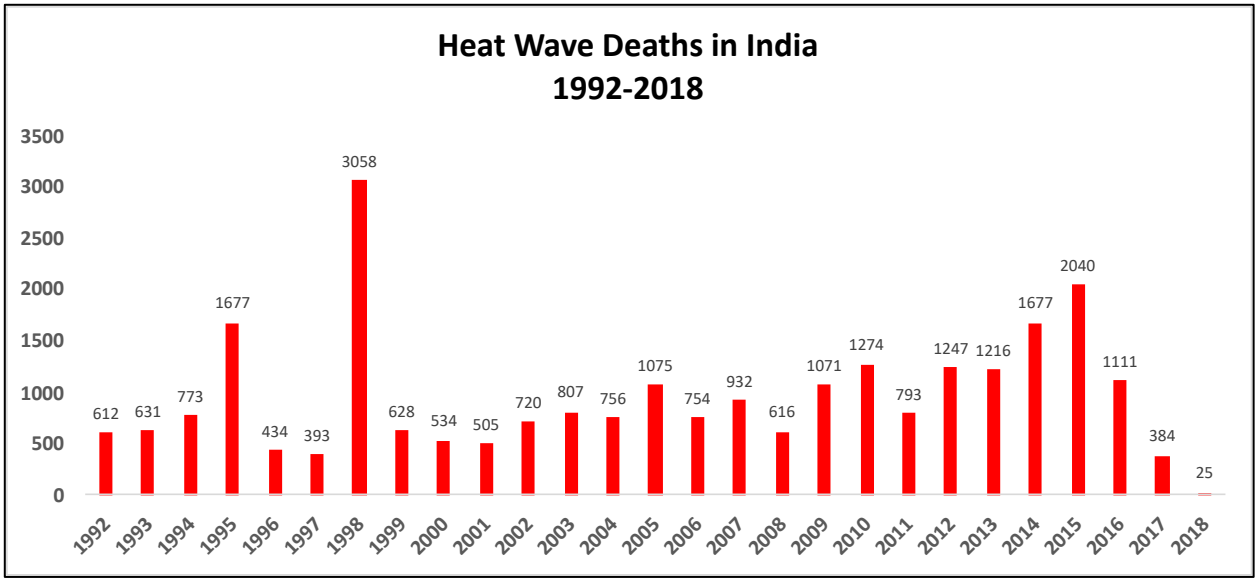

Figure 1: Year-wise Heatwave Death in India

Source: NDMA

After the year 1998, the deadliest heatwave that India has faced was during the year 2015 with the temperature hovering above 40°C during the last two weeks of May and the first two weeks of June in almost 13 states from all regions of India causing over 2000 deaths. The severe heatwave later continued in Pakistan also between 19th to 23rd June and succumbed nearly 1200 lives according to the Technical Report on Karachi Heatwave June 2015 issued by the Ministry of Climate Change, Government of Pakistan. According to the National Guidelines For Preparation Of Action Plan – Prevention And Management Of Heat Wave - 2019 issued by the National Disaster Management Authority (NDMA) of India, heatwaves have caused 25,743 deaths (Figure 1) in India between 1992 to 2018. And on the other hand, as shown in Figure 2, the number of states prone to heatwave and average heatwave days per year in India are mounting high with each passing year emphasizing the pressing needs for heatwave prevention and management planning.

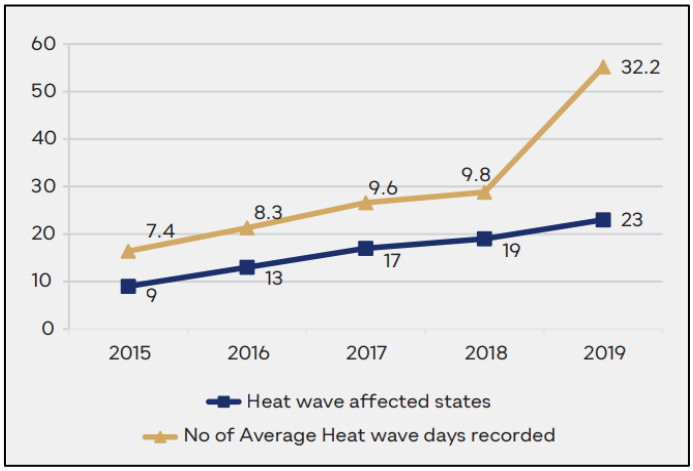

Figure 2: Year-wise Heatwave days and states in India

Source: NDMA, IMD

Session 2: Disaster Risk of Heatwave & DM Cycle

Objectives of the session

- Explain definition of disaster and disaster risk from the perspective of heatwave.
- Illustrate disaster (risk) management cycle phases in context of heatwave.

Duration

60 minutes

Training aids

PowerPoint Presentations

Flow of the session

The Disaster Management Act - 2005 of India has defined disaster as, "a catastrophe, mishap, calamity or grave occurrence in any area, arising from natural or man-made causes, or by accident or negligence which results in substantial loss of life or human suffering or damage to, and destruction of, property, or damage to, or degradation of, environment, and is of such a nature or magnitude as to be beyond the coping capacity of the community of the affected area." Whereas, the UNDRR has defined disaster as, "A serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity, leading to one or more of the following: human, material, economic and environmental losses and impacts."

The 2020 report of Lancet Countdown on Health and Climate Change estimated that "from 2000 to 2018, heat-related mortality in people older than 65 years increased by 53·7% and, in 2018, reached 2,96,000 deaths, the majority of which occurred in Japan, eastern China, northern India, and central Europe". The same report also mentioned that more than 300 billion work hours were lost in 2019 due to increasing heat as compared to 199 billion work hours lost in the year 2000 globally. With 118 billion hours, India alone accounts for more than 39% whereas, with 2 billion hours, the USA accounted for less than 1% of heat-related work hours lost globally during the year

2019. Unfortunately, the peril (risk) of heatwaves are not evenly distributed in different regions and countries across the globe or even in different socio-demographic groups within the same community, and therefore underdeveloped and developing countries, regions, and communities have to face higher consequences of heatwave as compared to the developed ones.

On the other hand, the world seems to be failing to keep the Paris Agreement – 2015 done during the 21st Conference of the Parties of the United Nations Framework Convention on Climate Change which aims to "Holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change." by the year 2100. There is newer evidence coming in from global climate studies that we may cross the threshold of 1.5 °C above pre-industrial levels by mid of 21st century itself. This means, that the probability of occurrence of frequent, severe, and long-lasting heatwave events will go further high...!

To take any measure to reduce the risk of any disaster, the first step is to understand what is disaster risk. The definition of "Disaster Risk" given by UNDRR to participants which is, "The potential loss of life, injury, or destroyed or damaged assets which could occur to a system, society or a community in a specific period of time, determined probabilistically as a function of hazard, exposure, vulnerability and capacity." The first set of keywords to notice in the disaster risk definition are that risk is "potential loss" which means it can be decreased or increased and the second set of keywords are "hazard, exposure, vulnerability and capacity" that are functional units of disaster risk which means modifying these factors will decrease or increase the risk of disaster (heatwave in this case).

Disaster risk can be explained using the standard illustrative equation of disaster risk given below,

$$\text{Disaster Risk} \propto \frac{\text{Hazard} \times \text{Exposure} \times \text{Vulnerability}}{\text{Coping Capacity}}$$

The UNDRR has defined hazard as "A process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation." And depending on their origin they are further classified as,

- Natural Hazards: originating from natural processes and phenomenon
- Anthropogenic Hazards: originating from man-made processes and phenomenon
- Socionatural Hazard: originating from a mix of natural and man-made processes and phenomenon such as climate change.

The National Disaster Management Plan of India – 2019 has classified natural hazards in following five categories,

1. Geophysical – Earthquake, mass movement of earth materials, tsunami, volcano etc.
2. Hydrological – Flood, landslides and wave actions etc.
3. Meteorological – Extreme temperature, heatwave, cold wave, cyclone, heavy rain etc.
4. Climatological – Drought, Wildfires, extreme hot or cold conditions etc.
5. Biological – Viral/Bacterial epidemics, insects' infestations, etc.

Hazards are further characterized based on their location of occurrence, magnitude or intensity, frequency of occurrence, and the probability of occurrence. Broadly speaking, hazards are characterized based on their spatiotemporal scale, intensity, and the probability of occurrence. And in case of heatwave events as a hazard, an increased frequency, intensity, and duration in most parts of the world including India has already been predicted, observed, and, documented in several global climate studies and reports including the ones published by the Intergovernmental Panel on Climate Change (IPCC) periodically.

The UNDRR has defined exposure as, "the situation of people, infrastructure, housing, production capacities and other tangible human assets located in hazard-prone areas."

Exposure holds certain dimensions depending of type of hazard, through which they vary. These dimensions of hazards can be broadly listed as,

- Environmental Dimensions - such as built environment, geography, settlement type, etc.
- Social Dimensions – such as demography, health, education, culture, etc.

- Economic Dimensions – such as working conditions and livelihood are among the most important drivers that can modify exposure to heat.

Vulnerability as defined by UNDRR is “characteristics determined by physical, social, economic and environmental factors or processes which increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards.” The definition gives a clear understanding that certain factors determine the vulnerability of an individual, community, or system towards any particular hazard. These different factors of vulnerability in context of heatwave hazard are,

- Physical factors – such as condition of infrastructures, geography, and land use, etc.
- Social factors – such as health, age, gender, culture, inequality, etc.
- Environmental and Economic Factors – such as livelihoods, industries, businesses, air quality, natural resources, etc.

Lastly, the definition of coping capacity given by UNDRR is, “the ability of people, organizations and systems, using available skills and resources, to manage adverse conditions, risk or disasters. The capacity to cope requires continuing awareness, resources and good management, both in normal times as well as during disasters or adverse conditions. Coping capacities contribute to the reduction of disaster risks.”

A very important subject in disaster risk management is the disaster (risk) management cycle. We can see in Figure 3, the disaster (risk) management cycle illustrates five different phases through

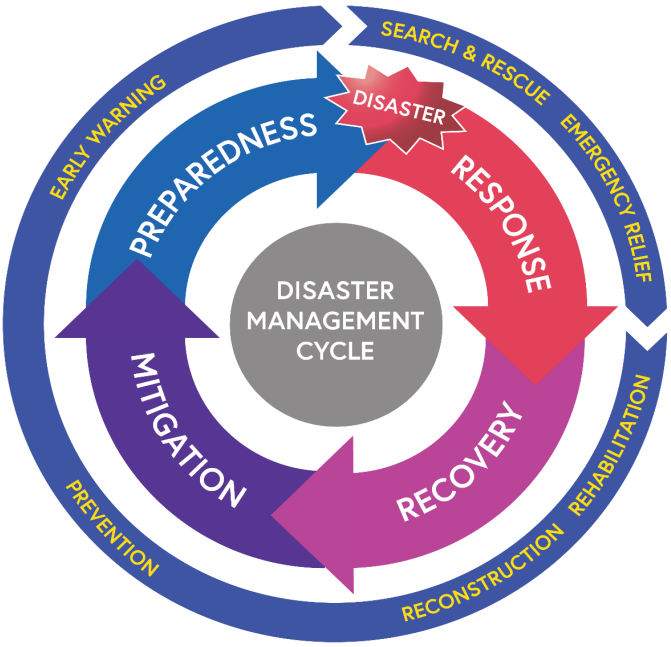

Figure 3: Disaster (Risk) Management Cycle

which disaster risk can be reduced and managed. The standard definitions given by the UNDRR for each of these five phases are.

Prevention: "Activities and measures to avoid existing and new disaster risks."
Example: Increasing Green Cover, Cool Roof, etc.

Mitigation: "The lessening or minimizing of the adverse impacts of a hazardous event."
Example: Public awareness and community outreach.

Preparedness: "The knowledge and capacities developed by governments, response and recovery organizations, communities and individuals to effectively anticipate, respond to and recover from the impacts of likely, imminent or current disasters."
Example: Heat action planning, capacity building, early warning systems.

Response: "Actions taken directly before, during or immediately after a disaster in order to save lives, reduce health impacts, ensure public safety and meet the basic subsistence needs of the people affected."
Example: Emergency relief to the affected people, medical care to heat affected patients

Recovery: “The restoring or improving of livelihoods and health, as well as economic, physical, social, cultural and environmental assets, systems and activities, of a disaster-affected community or society, aligning with the principles of sustainable development and “build back better”, to avoid or reduce future disaster risk.”

Example: Provision of better housing conditions, access to electricity, water and healthcare to those recovering from heatwave impacts.

Session 3: Planning and Management of Heatwave

Objectives of the session

- Illustrate the heat action plan, its component, and process of development
- Demonstrate heatwave vulnerability assessment and threshold development
- Highlight national and sub-national institutional mechanism to deal with heatwave

Duration

60 minutes

Training aids

PowerPoint Presentations, Videos

Flow of the session

Heat Health Action Plans more commonly known as Heat Action Plan (HAP) are a guide for multi-stakeholder comprehensive planning to take short and long-term measures to mitigate the impacts of heatwave, primarily on the health of the people. The short-term objectives of HAP are to reach out to people, especially those who are vulnerable to heatwave, in well advance with accurate heatwave forecast and take measures like keeping the hospitals and emergency health services prepared for any heat related health emergencies. Whereas the long-term objectives of HAP are to reduce exposure and vulnerability of people to heatwave by taking developmental planning measures like increasing green cover, water bodies, initiating cooling solutions such as "Coo-Roof" for houses and other buildings.

Components of HAP

1) Building Public Awareness and Community Outreach:

   The two main purposes of this component of HAP are,

   - Raise awareness among the general public about the dangers of heatwave and what are the Do's and Don'ts for heatwave.

- Reach out to communities that are at higher risk of heatwave like traffic police, slum dwellers, outdoor workers, etc. with targeted information.

Measures like raising awareness among the general public about the dangers of heatwave and what are the Do's and Don'ts through the dissemination of multilingual pamphlets, through billboards across the city, running awareness videos at cinema halls and digital display screens in the city, through talk shows at the television and FM radio channels, etc. Special sensitization workshops/sessions are also held for targeted communities that are at high risk. ASHA Workers who are the field health workers play a pivotal role in both raising general public awareness and reaching out to the targeted communities with information on heat health risk and safety.

2) Initiating an Early Warning System and Inter-Agency Coordination:

The purpose of this component of HAP is to ensure that the heatwave warning and alerts received from the meteorological department is effectively and timely communicated to all the stakeholders and citizens. The nodal officer of the nodal agency (health department of AMC in case of Ahmedabad HAP) on receipt of heatwave forecasts from the meteorological department communicates it further depending on the alert levels, lead time, and probability of occurrence of alert warning issued by the meteorological department. The alerts are further communicated by the nodal agency using several means of communication like press advisory for print media, announcements through television news and FM Radio channels, emails, bulk SMS, social media to ensure that it each reaches to all the stakeholders and citizens. Figure 4 which are color-coded signals for different temperature threshold levels used in the Ahmedabad HAP for heat alerts and warnings. Whereas Figure 5 is Communication Plan for Nodal agency to activate Heat alert described in the Gujarat State Heat Action Plan developed by the GSDMA.

Alert Category	Alert Name	Temperature Threshold (°C)
Red Alert	Extreme Heat Alert Day	≥ 45°C
Orange Alert	Heat Alert Day	43.1°C – 44.9°C
Yellow Alert	Hot Day Advisory	41.1°C- 43°C
White	No Alert	≤41°C

Figure 4: Color signals for heat alert.

Source: Ahmedabad HAP

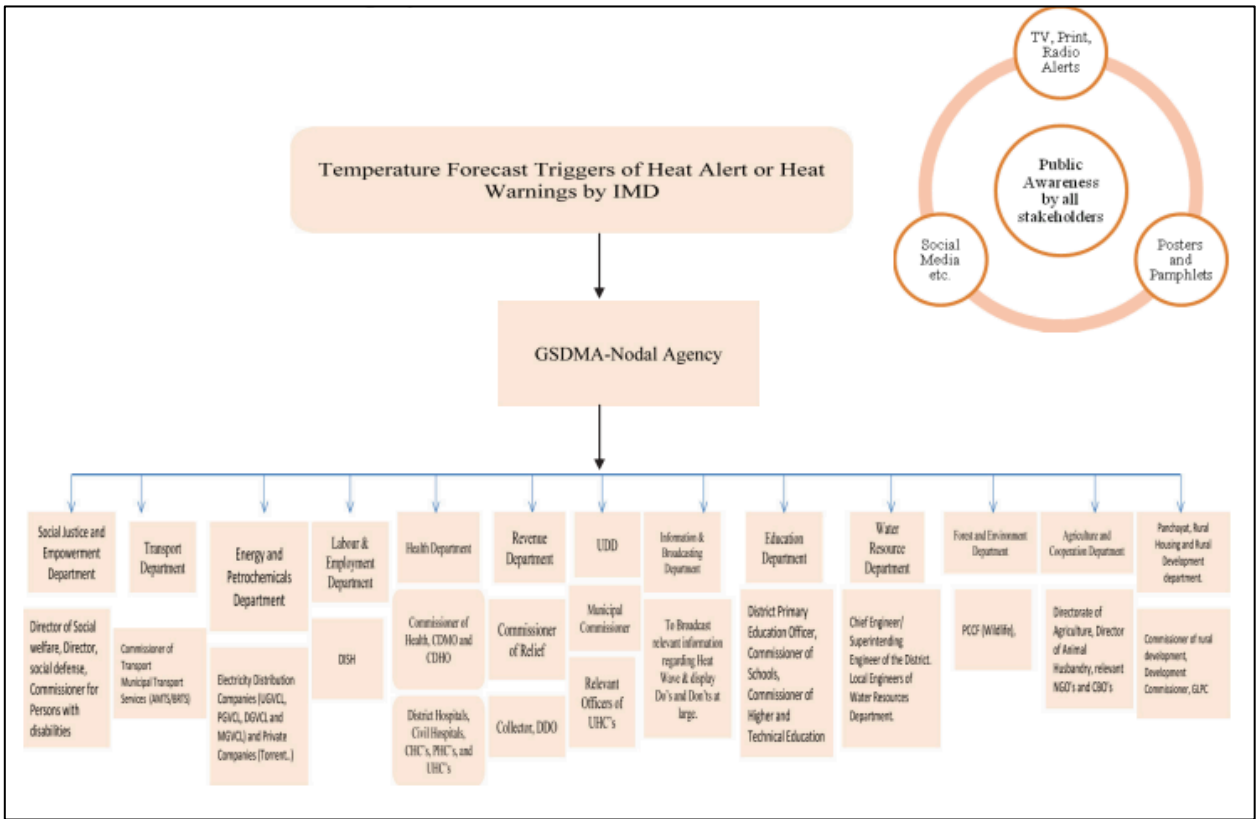

Figure 5: Communication Plan for Nodal agency to activate Heat alert.

Source: GSDMA

3) Capacity Building Among Health Care Professionals:

This primarily aims to train the medic and paramedic staff is to help them in rightly diagnosing and responding to heat-related illnesses from other conditions that may have similar manifestations during heat events. But the capacity building is not just limited to health professionals. The Ahmedabad Municipal Corporation in its later years of HAP started training other key stakeholders like school teachers also as they may not have a

direct role in responding to heat-related illnesses but they certainly have a role in preventing them during heatwave events.

4) Reducing Heat Exposure and Promoting Adaptive Measures:
   A series of measures like cool-roofs, enhancing green-cover, initiating mobile drinking water stations across the city during summer, keeping gardens open during afternoon hours for commuters to take rest in shades, keeping night shelters open during the daytime also, encouraging places like temples, mosques, malls to let people come in during afternoon hours for cooling, etc. are taken to encourage citizens to adopt measures that can reduce their direct heat exposure during heatwave events.

Development of HAP

Learning from the experience of Ahmedabad, the stakeholders of Ahmedabad HAP released a manual that provides step by step guide for developing a Heat Action Plan. The seven key steps mentioned in the manual for developing a heat action plan are,

1. City Engagement: Finding the local nodal department & officer, other key department, and stakeholders who have high influence and interest in HAP

2. Vulnerability Assessment and Establishing Heat-Health Threshold Temperatures: To understand who are at risk, what factors are modifying their risk, and when the risk increases.

3. Developing a Heat Action Plan: Writing down the whole plan with defined roles & responsibilities of all stakeholders and with time-bound activities and deliverables.

4. Team Preparation and Coordination: Carrying out capacity building exercises, mock-drills for better preparedness and coordination.

5. Implementation and Monitoring: Ensuring all the steps describes in the plan being taken when and wherever necessary and keep a watch for real-time corrective measures.

6. Evaluating and Updating the Plan: Reassess at what worked and what didn't to plan better for the future.

7. Strategies for Reducing heatwave and Adapting to Climate Change: Think of long term. Think of prevention over response. Think of reducing risk over managing risk. Think of increasing green and blue cover of the city over increasing beds in heat emergency rooms in hospitals.

Depending on the profiles of participants, the trainer may choose to explain in detail each of the seven steps given above. Although it is mentioned as "City Engagement" as the first step for developing a HAP, the operational unit (Megacity / City / Urban Agglomeration / District / Village) for development and implementation of HAP depends on the geospatial variation in the ambient air temperature profile and the population covered under the implementation unit of HAP. Ambient temperature doesn't vary much geographically within the district unless major differences in contour/weather systems are present. And therefore, the HAP implementation unit should be at Megacity (Population > 1 million) and District levels for which the temperature thresholds can be estimated.

Institutional mechanisms to deal with extreme

Heatwave has so far been given lesser importance as compared to other hazards like floods, earthquakes. They are often regarded or rather disregarded as "Silent Killers" because of slower and lesser dramatic onset and spatiotemporally spread of impacts as compared to other hazards like flood or earthquake. But the recent events like the 2003 Europe Heatwave, 2010 Russia Heatwave, and 2015 in India and Pakistan Heatwaves that succumbed thousands of lives in a shorter span have shown the world the destructive nature of heatwave events. And under the threats of global warming and climate change, the perils of extreme are ought to mount high. The days of frequent, intense, and long-lasting

heatwave events as predicted by IPCC climate scientists are no more forecast now, they are already here. We have witnessed the last decade as the warmest decade and the last five years as the warmest five years in the history of the world. But the good part is that the governments, institutions, communities all around the world have now started taking measures to deal with heatwave.

In India, after the development and implementation of South-Asia's first city-wide comprehensive Ahmedabad heat action plan in the year 2013, the NDMA and IMD have shown great leadership in advancing the actions to deal with heatwave across the nation. The NDMA in the year 2016 issued the first "National Guidelines for Preparation of Action Plan – Prevention and Management of Heat Wave" developed by an expert committee constituted by NDMA. The revised guidelines were issued in the years 2017 and 2019. The heatwave guidelines issued by NDMA are also covered in the National Disaster Management Plan – 2019. Series of national level and heatwave prone state-specific consultation workshops are held by NDMA every year before, during, and after the summer season to improve actions to deal with heatwave. Along with this, for the past few years, the IMD has also started providing five days advance temperature forecasts to hundreds of cities/districts in India to help them devise their HEWS. Under the guidance of NDMA and IMD at the national level and with the support of SDMA and other key departments in local governments, hundreds of cities and districts in several states of India have either developed their HAP or are in process of doing the same. Gujarat State Disaster Management Authority (GSDMA) in Gujarat has also developed "Gujarat State Action Plan: Prevention and Mitigation of Impacts of Heat Wave" during the year 2020.

As mentioned in the "National Guidelines for Preparation of Action Plan – Prevention and Management of Heat Wave" issued by NDMA in 2019, "Heat wave has not been notified as a disaster by the Government of India yet. It is not in the list of twelve disasters eligible for relief under National/ State Disaster Response Fund norms. However, a State Government may use up to 10 per cent of the funds available under the SDRF for providing immediate relief to the victims of natural disasters that they consider to be disasters "within the local context in the State and which are not included in the notified list of disasters of

the Ministry of Home Affairs subject to the condition that the State Government has listed the State specific natural disasters and notified clear and transparent norms and guidelines for such disasters with the approval of the State Authority." States like Odisha and Kerala considering the risk of heatwave events there have already considered heatwave in the list of state specific disasters.

Annexure 1: Symptoms and First Aid of Heat Illnesses

Heat Disorder	Symptoms	First Aid
Heat rash	Skin redness and pain, possible swelling, blisters, fever, headaches.	Take a shower using soap to remove oils that may block pores preventing the body from cooling naturally. If blisters occur, apply dry, sterile dressings and seek medical attention.
Heat Cramps	Painful spasms usually in leg and abdominal muscles or extremities. Heavy sweating.	Move to cool or shaded place. Apply firm pressure on cramping muscles or gently massage to relieve spasm. Give sips of water. If nausea occurs, discontinue.
Heat Exhaustion	Heavy sweating, weakness, Skin cold, pale, headache and clammy extremities. Weak pulse. Normal temperature possible. Fainting, vomiting.	Get victim to lie down in a cool place. Loosen clothing. Apply cool, wet cloth. Fan or move victim to air-conditioned place. Give sips of water slowly and if nausea occurs, discontinue. If vomiting occurs, seek immediate medical attention, call 108 and 102 for ambulance.
Heat Stroke (Sun Stroke)	High body temperature. Hot, dry skin. Rapid, strong pulse. Possible unconsciousness or altered mental status. Victim will likely not sweat.	Heat stroke is a severe medical emergency. Call 108 and 102 for ambulance for emergency medical services or take the victim to a hospital immediately. Delay can be fatal. Move victim to a cooler environment. Try spraying water, cold water on body & fan the wet body. If possible sponging or cool bath sponging to reduce body temperature. Use extreme caution. Remove clothing. Use fans and/or air conditioners. **DO NOT GIVE FLUIDS ORALLY if the person is not conscious.**

Source: NDMA

Annexure 2: Do's & Don'ts during heatwave

DO's

Must for All

- Listen to Radio; watch TV; read Newspaper for local weather news.
- Drink sufficient water - even if not thirsty.
- Use ORS (Oral Rehydration Solution), homemade drinks like lassi, torani (rice water), lemon water, buttermilk, etc. to keep yourself hydrated.
- Wear lightweight, light-coloured, loose, cotton clothes.
- Cover your head: Use a cloth, hat or umbrella.

Employers and Workers

- Provide cool drinking water near work place.
- Caution workers to avoid direct sunlight.
- Schedule strenuous jobs to cooler times of the day.
- Increasing the frequency and length of rest breaks for outdoor activities.
- Pregnant workers and workers with a medical condition should be given additional attention.

Other Precautions

- Stay indoors as much as possible.
- Keep your home cool, use curtains, shutters or sunshade and open windows at night. Try to remain on lower floors.
- Use fans, damp clothing and take bath in cold water frequently.
- If you feel faint or ill, see a doctor immediately.
- Keep animals in shade and give them plenty of water to drink.

DONT's

- Avoid going out in the sun, especially between 12.00 noon and 3.00 p.m.
- Avoid strenuous activities when outside in the afternoon.
- Do not go out barefoot.
- Avoid cooking during peak hours. Open doors and windows to ventilate cooking area adequately.
- Avoid alcohol, tea, coffee and carbonated soft drinks, which dehydrates the body.
- Avoid high-protein food and do not eat stale food.
- Do not leave children or pets in parked vehicles - as they may get affected by Heat Wave.

Source: NDMA

Annexure 3: Roles & Responsibilities for Managing Heatwave

Sl. No.	Tasks/ Activities	Central/ State Agencies & Their Responsibilities			
		Centre	Responsibility	State	Responsibility
1	Preparation of Heat Wave Action Plan	NDMA	Guideline on preparing a Heat Wave Action Plan	SDMA / DDMA/Municipal Corporation and Local Bodies	Preparing a Heat Wave Action Plan and implementing
2	Early Warning	IMD	Issue Heat wave alerts and weather forecasts on Short / Medium / Long range duration	State Governments/ District Administration	To disseminate the information received from IMD to the public at large
3	Mitigating Heat Wave	Ministry of Urban /Rural Development, Department of Drinking Water and Sanitation, Ministry of Surface Transport	To construct shelters/ sheds, bus stands and provide drinking water points at worksites.	Public Health and Engineering Department	To construct shelters/ sheds, bus stands and provide drinking water points in cities, worksites.
		Ministry of Health and Family Welfare	Stockpiling of ORS, Training of Human Resources, creating Medical posts at places of mass gathering,	Department of Health	Stockpiling of ORS, creating Medical posts at places of mass gathering
4.	Monitoring and Response	Ministry of Health and Family Welfare	• Surveillance • Deployment of Rapid Response Teams • Specific care for vulnerable groups	Health Department	• Surveillance • Deployment of Rapid Response Teams • Specific care for vulnerable groups
5.	Occupational Support and advisories	All Ministries/ Departments	Take necessary measures as indicated in the guidelines, wherever applicable	All Departments	Take necessary measures as indicated in the guidelines, wherever applicable
6.	Media campaign and IEC activities	Ministry of Information and Broadcasting	Extensive IEC campaigns to create awareness through print, electronic and social media	Department of Information and Broadcasting/ SDMAs/ Commissioners of Relief/ State Govt/ Health Department	Extensive IEC campaigns to create awareness through print, electronic and social media
7.	Documentation	Ministry of Health & Family Welfare through IDSP	Collecting Data from States as per guidelines and maintaining national level data base.	Revenue Departments/ SDMAs/ DDMAs/ Health Deptt.	Collecting Data and Information as per guidelines.
8.	Long Term Measures	Ministry of Urban Development, Ministry of Environment Forests and Climate Change	Collecting Data from States as per guidelines and maintaining national level data base.	Revenue Departments/ SDMAs/ DDMAs/ Health Deptt.	Improving the forest coverage and green areas Forest Department/ SDMAs and other concerned Department Improving the forest coverage and green area.

Source: NDMA

References & Resources:

1. "National Guidelines for Preparation of Action Plan – Prevention and Management of Heat Wave", 2019 - NDMA
2. Ahmedabad Heat Action Plan 2019
3. National Disaster Management Plan – 2019; India
4. Gujarat State Action Plan: Prevention and Mitigation of Impacts of Heat Wave 2020
5. The 2020 report of the Lancet Countdown on health and climate change: responding to converging crises
6. CITY RESILIENCE TOOLKIT Response to Deadly Heat Waves and Preparing for Rising Temperatures
7. Heatwaves and Health: Guidance on Warning-System Development
8. Heatwave Public Awareness YouTube videos playlist by NDMA
9. Training Module Extreme Heat Prevention and Management

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