Understanding of the Heat Wave

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Heat wave

- A *Heat Wave* is a period of abnormally high temperatures, more than the normal maximum temperature that occurs during the summer season (March to June)
If the maximum temperature of any place continue to be more than 45°C consecutively for two days, it is a heat wave condition.

Five or more consecutive days during which the daily maximum temperature exceeds the average temperature by five degree Celsius.
Rising Global Temperatures $1.5^\circ \text{C}$ and reduced span of winter

Factors attributable to Heat Wave
Heat Wave defined in India

a) Based on Departure from Normal
   Heat Wave: Departure 4.5°C to 6.4°C
   Severe Heat Wave: Departure >6.4°C

b) Based on Actual Maximum Temperature
   Heat Wave: Maximum Temperature ≥ 45°C
   Severe Heat Wave: Maximum Temperature ≥47°C

c) Criteria for describing Heat Wave for coastal stations
   – When Max Temp departure from normal is 4.5°C or more,
   – Heat wave considered only when the actual Max. temp. is 40°C or more for Plains, 30°C or more for Hilly regions, and 37°C or more for the Coastal stations.

Source: IMD, New Delhi, 2017
Heat Wave in India

Abnormally high temperatures were observed during April – June across the country.

Source: IMD, New Delhi, 2017
Extreme temperature combined with high humidity.

<table>
<thead>
<tr>
<th>Relative Humidity</th>
<th>Temperature °C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>27</td>
</tr>
<tr>
<td>40</td>
<td>27</td>
</tr>
<tr>
<td>45</td>
<td>27</td>
</tr>
<tr>
<td>50</td>
<td>27</td>
</tr>
<tr>
<td>55</td>
<td>28</td>
</tr>
<tr>
<td>60</td>
<td>28</td>
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<tr>
<td>65</td>
<td>28</td>
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<tr>
<td>70</td>
<td>29</td>
</tr>
<tr>
<td>75</td>
<td>29</td>
</tr>
<tr>
<td>80</td>
<td>30</td>
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<tr>
<td>85</td>
<td>30</td>
</tr>
<tr>
<td>90</td>
<td>31</td>
</tr>
<tr>
<td>95</td>
<td>31</td>
</tr>
<tr>
<td>100</td>
<td>32</td>
</tr>
</tbody>
</table>

Link between Global to Local

Sendai Framework for DRR

• In March 2015, India along with 186 other Countries ratified Sendai Framework for Disaster Risk Reduction (SFDRR), 2015-30, with 7 Global Targets to be accomplished under 4 priorities.

• The Sendai Framework is the first part of the post-2015 development agenda that provides a once-in-a-generation opportunity to implement development that is both resilient and sustainable.
Priorities for action under Sendai framework

• Understanding disaster risk.
• Strengthening disaster risk governance to manage disaster risk.
• Investing in disaster risk reduction for resilience.
• Enhancing disaster preparedness for effective response and to “Build Back Better.”
17 Goals
169 Targets
Indicators specified for each goal
Indian context

- 1.32 billion population, second most populous country in the world
- Multi-hazard prone, Increase heatwave intensity
- 19 out of 29 states are prone to heat waves
- The extreme temperatures combined with high relative humidity adversely affecting people

Threats of Heat wave

- The Elderly, women, children and poor are particularly vulnerable to Heat Wave related illnesses
- Direct and Indirect impact of heat wave on Food, Sanitation, Employment and Education
- Overall economy of the country is affected by heat wave
## Heat-Wave Vulnerability

<table>
<thead>
<tr>
<th>Year</th>
<th>No of Heat wave affected states</th>
<th>No of HW affected districts (total districts)</th>
<th>% of HW affected districts</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>9</td>
<td>191 (640)</td>
<td>29.84%</td>
</tr>
<tr>
<td>2016</td>
<td>13</td>
<td>225 (640)</td>
<td>35.16%</td>
</tr>
<tr>
<td>2017</td>
<td>17</td>
<td>271 (660)</td>
<td>41.06%</td>
</tr>
<tr>
<td>2018*</td>
<td>19</td>
<td>376 (718)</td>
<td>52.37%</td>
</tr>
</tbody>
</table>
# Heat-Wave Vulnerable States

<table>
<thead>
<tr>
<th>SN</th>
<th>State</th>
<th>Total District</th>
<th>Heat prone Dist.2016</th>
<th>Heat prone Dist.2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A.P.</td>
<td>13</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>2</td>
<td>Bihar</td>
<td>38</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>3</td>
<td>Chhattisgarh</td>
<td>27</td>
<td>8</td>
<td>12</td>
</tr>
<tr>
<td>4</td>
<td>Delhi (UT)</td>
<td>9</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>Gujarat</td>
<td>33</td>
<td>15</td>
<td>18</td>
</tr>
<tr>
<td>6</td>
<td>Karnataka</td>
<td>30</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>7</td>
<td>M.P.</td>
<td>51</td>
<td>15</td>
<td>26</td>
</tr>
<tr>
<td>8</td>
<td>Maharashtra</td>
<td>36</td>
<td>33</td>
<td>33</td>
</tr>
<tr>
<td>9</td>
<td>Odisha</td>
<td>30</td>
<td>17</td>
<td>17</td>
</tr>
<tr>
<td>10</td>
<td>Rajasthan</td>
<td>33</td>
<td>27</td>
<td>27</td>
</tr>
<tr>
<td>11</td>
<td>Telangana</td>
<td>10</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>12</td>
<td>Tamil Nadu</td>
<td>32</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>13</td>
<td>Uttar Pradesh</td>
<td>72</td>
<td>19</td>
<td>39</td>
</tr>
<tr>
<td>14</td>
<td>Jharkhand</td>
<td>24</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>15</td>
<td>Haryana</td>
<td>21</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>16</td>
<td>Punjab</td>
<td>20</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>17</td>
<td>West Bengal</td>
<td>19</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

**Sub Total**: 498, 209, 271

Follow up IMD Norms of Heat wave definition
Heat-Wave Vulnerability

Vegetable vendors, cab drivers, auto repair mechanics, construction workers, police...

... mostly weaker sections of the society
Deaths due to Heat Wave in India

<table>
<thead>
<tr>
<th>Year</th>
<th>No of Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>1075</td>
</tr>
<tr>
<td>2006</td>
<td>754</td>
</tr>
<tr>
<td>2007</td>
<td>932</td>
</tr>
<tr>
<td>2008</td>
<td>616</td>
</tr>
<tr>
<td>2009</td>
<td>1071</td>
</tr>
<tr>
<td>2010</td>
<td>1274</td>
</tr>
<tr>
<td>2011</td>
<td>793</td>
</tr>
<tr>
<td>2012</td>
<td>1247</td>
</tr>
<tr>
<td>2013</td>
<td>1216</td>
</tr>
<tr>
<td>2014</td>
<td>1677</td>
</tr>
<tr>
<td>2015</td>
<td>2040</td>
</tr>
</tbody>
</table>
Significant reduction of mortality (2015-2018)

Reduction of mortality due to Heat wave

* = provisional data up to 25.06.2018, Source: IDSP-NCDC, Ministry of Health & Family Welfare, GoI
# Reducing disaster impact (mortality and affected people)

<table>
<thead>
<tr>
<th>Year</th>
<th>Heat affected People</th>
<th>No of deaths due to Heat</th>
<th>% of Illness &amp; Deaths Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>28500</td>
<td>2040</td>
<td>7.16%</td>
</tr>
<tr>
<td>2016</td>
<td>35121</td>
<td>1111</td>
<td>3.16%</td>
</tr>
<tr>
<td>2017</td>
<td>39563</td>
<td>222</td>
<td>0.56%</td>
</tr>
<tr>
<td>2018*</td>
<td>5856</td>
<td>22</td>
<td>0.37%</td>
</tr>
</tbody>
</table>

* = provisional data up to 25.06.2018

Source: IDSP-NCDC, Ministry of Health & Family Welfare, GoI
Heat-Wave Early Warning & Communication

Temperature Forecast: Specific Range, Time, duration and area

Now casting
(Lead time/validity of 3 to 6 hours)

Short Range
(Lead time/validity of 1 to 3 days)

Medium Range
(Lead time/validity of 4 to 10 days)

Local Range
(Its intensity, frequency and time of occurrence is indicated)

Long Range/ Extended
(Lead time/validity beyond 10 days)

Also IMD issues Warning/Alert in Colour Coding
## IMD Warning/Alert in Colour Coding

<table>
<thead>
<tr>
<th>Green</th>
<th>Normal Day</th>
<th>Maximum temperatures are near normal</th>
<th>Comfortable temperature. No cautionary action required.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow Alert</td>
<td>Heat Alert</td>
<td>Heat wave conditions at district level, likely to persist for 2 days</td>
<td>Moderate temperature. Heat is tolerable for general public but moderate health concern for vulnerable people e.g. infants, elderly, people with chronic diseases. Avoid heat exposure.</td>
</tr>
<tr>
<td>Orange Alert</td>
<td>Severe Heat Alert for the day</td>
<td>(i) Severe heat wave conditions may persist for 2 days. (ii) With varied severity, heat wave is likely to persist for 4 days or more.</td>
<td>High temperature. Increased likelihood of heat illness symptoms in people who are either exposed to sun for a prolonged period or doing heavy work. High health concern for vulnerable people e.g. infants, elderly, people with chronic diseases. Avoid heat exposure – keep cool. Avoid dehydration.</td>
</tr>
<tr>
<td>Red Alert</td>
<td>Extreme Heat Alert for the day</td>
<td>(i) Severe heat wave may persist for more than 2 days. (ii) Total number of heat/severe heat wave days likely to exceed 6 days.</td>
<td>Very high likelihood of developing heat illness and heat stroke in all ages. Extreme care needed for vulnerable people.</td>
</tr>
</tbody>
</table>
NDMA Initiatives
NDMA issued Guidelines


- To facilitate the stakeholders in preparing a Heat Wave Management Plan.

- To help in mobilization and coordination of various stakeholders.
National Workshop on Heat wave in collaboration with State governments
Constitute Expert Committee

- Frequently meet with Expert Committee on Heat wave
- Technical Inputs
Reviewing Heat wave preparedness through Video Conference with states
Publicity & Awareness

क्या आप लु लैंडस्केप के लिए तैयार हैं?

- पश्चिम ग्रामीण में पानी पिएं - भले ही जल नहीं हो।
- बोलाओं (ओरल इंटरफेस्ट रोल्स्किन), जहां बने रखें जैसे तस्वीर, सोनाकौं (शाब्दिक कला) नीचे पानी, छाँट आदि का सेवन कर देखता है।
- फोन, टीवी, रेडियो आदि समाचार पत्रों के माध्यम से स्थानीय मामले की जानकारी दें।

- हल्के रंग के दीवार चुली कपड़े पहनें।
- अपना सिर बचाए रखें, कपड़े, हैट आदि का उपयोग करें।
- जानवरों को खाना में मॉनर और उन्हें पश्चिम ग्रामीण में चैनल का पानी दें।
- बच्चों अथवा पालतू जीवाणुओं को बाहर में छोड़कर न जाएं - उन्हें लू, लगाने का खतरा हो सकता है।

निम्नलिखित सावधानियां बर्तनें
Social media campaigns

Do’s & Don’ts
Facebook
Twitter
LinkedIn
TVCs Commercial
Print & Electronic Media

#BeatTheHeatIndia
TVCs Commercial film on Heat waves

Heat Wave Safety Tips
Initiatives by States
Heat-Wave Action Plan

- A framework for implementation, coordination and evaluation of extreme heat response activities
- Mobilization individuals and communities to help protect their neighbors friends, relatives and themselves
- Defined the role’s and responsibilities of departments concerned
- Multi-sectoral and multi dimensional administrative approach
• 13 states have prepared Heat wave Action Plan
• More than 90 district/cities have plan now.
Department are Involve in the effective Heat wave Management

<table>
<thead>
<tr>
<th>Department</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panchayati Raj</td>
<td>Municipal Administration</td>
</tr>
<tr>
<td>Rural/urban Development</td>
<td>Medical and Health</td>
</tr>
<tr>
<td>Rural Water Supply</td>
<td>Environment &amp; Forest</td>
</tr>
<tr>
<td>Education &amp; Literacy</td>
<td>Animal Husbandry</td>
</tr>
<tr>
<td>Labour</td>
<td>Revenue &amp; Disaster Management</td>
</tr>
<tr>
<td>Agriculture</td>
<td>Road Transport and Building</td>
</tr>
<tr>
<td>Electricity &amp; Power Supply</td>
<td>Information &amp; Broadcasting</td>
</tr>
<tr>
<td>Women and Child</td>
<td>Traffic Police</td>
</tr>
</tbody>
</table>
Action taken

**Early warning dissemination**
- Warnings by using mobiles, what's-app etc.
- Advisories for tourists.

**Preparedness**
- Implementation of Heat Wave Action Plans
- Stockpiling of Oral Rehydration Solution (ORS)
- Repairing Drinking Water hand pumps
- Capacity Building of Health personnel
Mitigation

• Early start and early closure of schools, colleges, institutions/department

• Drinking water kiosk/stall.

• Setting up special shelters for “Wage Employment” workers and rescheduling their working hours.

• Supply of water through tankers.

• Construction of Animal shelters with fodder banks
Awareness generation

• Disseminations Do’s and Don’ts and IEC material in local languages.
• Information dissemination in local newspapers
• Radio jingles and TVCs in regional language.
• Harnessing Social Media for outreach
• Mass mailing and text messages
Long term measures

- Adopting Cool roof as a Long term measure
- Improving Forest Coverage and green areas

Review and Monitoring

- Review of heat wave preparedness and implementation of Heat Action Plans
- Data collection and Analysis
- Documentation
Adopting Cool roof techniques as Long term measures
Awareness activity: Poster & Pamphlets

**Heat Alert**

**How to save yourself from heat waves**

- Drink water, juices, and other liquids (no soft drinks)
- Stay out of the sun
- Find a place to cool down
- Wear light clothing
- Check in with friends & family

**Drink Water**

For more information visit the AMC website: www.egovamc.com

In case of an emergency, call 108
उष्णतेचा इशारा

उष्णाच्या तडळ्यापासून कसे वाचवाल स्वःताळा

पाणी, ताक किंवा इतर पेय शीतपेय नाही सावलीत थांबा.

थंड ठिकाणी थांबा.

सुती कपडे घाला.

उन्हात जाणे टाळा.

उष्माधाताची लक्षणे.

- शरीरावर घामोळ्या येणे.
- खुप घाम येणे व अशक्ततपणा वाटणे.
- डोके दुखणे व जीव मल्लक करणे.

आपातकालीन सेवेकरीता
CALL :- 108

भरपुर पाणी त्या.

उष्माधातापासून सावधान

उष्माधातापासून सुरक्षितस्थी या दक्षता त्या
राजस्थान क्लाइमेट चेंज प्रोजेक्ट
हीट एक्शन प्लान

लू - तापघात जानलेवा हो सकता है, इससे बचाव संभव है

- बार बार पानी पीये
- पुदीना पानी पीये
- आमपन्ना पीये
- बेल ज्युस पीये
- नींबू पानी पीये
- छांट पीये

एवं

- प्लांट की इलाज न होने पर भी पानी पीये
- गर्मी पर जानलेवा से सुरक्षा करें
- SOAK गर्मी के दौरान पानी से साफ़ करें
- REST अधिक तापमान के माध्यम से राहत मजबूत करें
- EAT FRESH ठंडे उपद्रव छोड़ें और ठंडे खाएं
- SEEK SHADE छाया में रहें
- DRESS DOWN ठंडे समय में कपड़े कम करें
- BE COOL दाग का राहत दें और अधिक पानी पीएं
- AVOID तापमान और नहीं जाएं

हारेगी गर्मी जीतेगा राजस्थान
Heat wave Poster in (Telgu language)
Key steps in developing HAP

Plan and planning is dynamic ongoing process, there are always scope of improvisations.

• City, district, state government engagement
• Background data & analysis – weather and mortality/health – Determining threshold
• Understanding city and vulnerable groups
• Early warning system and setting thresholds
• Feasible interventions and its detailing – IEC
• Writing the plan and disseminating
• Implementing and monitoring the impact
• Revising the plan
Specific Target

- Effective Communication strategies
- Informational Pamphlets – for specific groups
- Drinking water supply
- Shelter home provision
- Public access to cool places
- Changing of cooking fuel pattern
- Chronic diseases and medication – more qualitative research
Key lessons on development of HAP at state and local level

• Involvement of administrative and health and political leadership
• Use of Local IMD and Heath data -death registration, OPD, Indoor admission, ambulance calls... data
• Facilitation by local and national institutions / experts
• Learning and adapted HAP developed in other countries / cities
• Measurement of process of implementation and Impact on mortality and morbidity
Adilabad district of Telangana reported Nil casualty in 2017 compare to 44 deaths in 2016 and 60 deaths in 2015 due to District Heat Action Plan and well implemented.
Key lessons learnt

- Political and administrative commitment
- Strengthening of Early warning System
- The developed local Threshold
- Preparation of Heat Action Plan & institutional Mechanism
- Horizontal integration – multi-sectoral approach
- Revised the formats for data collection
- Clear cut Role and responsibilities
Thanks