



# Action Plan : Prevention and Management of Heat Wave in Uttar Pradesh

Year- 2018-19



**Uttar Pradesh State Disaster Management Authority**

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## PREFACE

Global temperatures are continuing to increase. Heat-waves are projected to increase in number, intensity and duration over the most land area in the 21st century. There is a strong and global scientific consensus that extreme heat waves will become more common worldwide because of the climate change and this change will cause an increase in average global temperatures. Heat-waves are a significant cause of death and morbidity across the world, and the impacts of heat events are likely to increase due to changing frequency, severity, and intensity of heat-waves caused by climate change. Since the beginning of the 21st century, this has increased by nearly a degree Centigrade. This weather pattern, coupled with the El-Nino effect, is increasing the temperatures in Asia. Further, high humidity compounds the effects of the temperatures being felt by human beings. Extreme heat can lead to dangerous, even deadly, consequences, including heat stress and heatstroke. India too is feeling the impact of climate change in terms of increased instances of heat waves which are more intense in nature with each passing year, and have a devastating impact on human health thereby increasing the number of heat wave casualties.

Rising temperatures will lead to more floods, heat-waves, storms, rising sea levels and unpredictable farm yields. There is evidence that climate change is causing increase in extreme weather events as well as severity and frequency of natural disasters. Deforestation is also adding to the environmental instability and contributing to global warming and climate change. There has been an increasing trend of heat-wave in India over the past several years whereby several cities in India have been severely affected. The increased occurrences and severity of heat-wave is a wake-up call for all agencies to take necessary action in the State for prevention, preparedness and community outreach to save the lives of the general public and livestock. That is why the Heat Wave Action Plan of Uttar Pradesh has been prepared to spell out a standard action and operation mechanism for disaster management in district wide.

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# **CHAPTER-1**

## **Background & Status**

## 1.9 INTRODUCTION

### 1.9.1 GEO-PHYSICAL DETAILS OF UTTAR PRADESH:-

Uttar Pradesh is bounded Uttarakhand on the north-west, Haryana and Delhi on the west, Rajasthan on the south-west, Madhya Pradesh on the south, Chhattisgarh and Jharkhand on south-east and Bihar on the east. Situated between 23°52'N and 31°28'N latitudes and 77°3' and 84°39'E longitudes, this is the fourth largest state in the country in terms of area, and the first in terms of population. Uttar Pradesh can be divided into three distinct hypsographical regions:

1. The Shivalik foothills and Terai in the North
2. The Gangetic Plain in the centre - Highly fertile alluvial soils; flat topography broken by numerous ponds, lakes and rivers; slope 2 m/km
3. The Vindhya Hills and plateau in the south - Hard rock Strata; varied topography of hills, plains, valleys and plateau; limited water availability.

The climate of the state is tropical monsoon. The average temperature varies in the plains from 3 to 4 °C in January to 43 to 45 °C in May and June. There are three distinct seasons - winter from October to February, summer from March to mid-June, and the rainy season from June to September.

Heat-Waves is directly affecting the communities, undermining their livelihoods through gradual, insidious changes in temperature and rainfall patterns, and resulting in increased frequency and intensity of hazards such as floods, cyclones, droughts, unseasonal rains and hailstorms, causing extensive damage to crops and agro-rural economy.

Heat wave is a period of abnormally high temperatures, more than the normal maximum temperature that occurs during the pre-monsoon (April to June) summer season. Heat -waves typically occur between March to June, and in some rare cases even extend till July. Heat waves are more frequent over the Gangetic plains. On an average, 3-4 heat wave events occur every year over the all parts of the state. The most notable amongst the recent ones Allahabad (Uttar Pradesh) 47.8°C , in 2015.

### 1.9.2 Tropical monsoon climate marked by three distinct seasons:

1. **Summer** (March–June): Hot & dry (temperatures rise to 45 °C, sometimes 47-48 °C); low relative humidity (20%); dust laden winds.
2. **Monsoon** (June–September): 85% of average annual rainfall of 990 mm. Fall in temperature 40-45° on rainy days.
3. **Winter** (October–February): Cold (temperatures drop to 3-4 °C, sometimes below -1 °C); clear skies; foggy conditions in some tracts.

## 1.10 DEFINITIONS

### 1.10.1 HEAT WAVE

Climate change is leading to an increase in average temperatures and increased possibilities of severe heat waves. Extreme heat can lead to dangerous, even deadly, health consequences, including heat stress and heatstroke.

Heat Wave is defined as a condition of increased atmospheric temperature that leads to physiological stress, which sometimes can claim human life. Quantitatively Heat Wave can be defined as any increase from the normal temperature. Again, depending on the upper deviation from the normal temperature it can be moderate Heat Wave or Severe Heat Wave. If the maximum temperature of any place continues to be 45° C for consecutive two days, it is called as Heat Wave condition.

#### **Criteria for Heat Wave**

#### **(as defined by Indian Meteorological Department)**

Heat wave need not be considered till maximum temperature of a station reaches at least 40° C for Plains and at least 30° C for Hilly regions.

#### **When normal maximum temperature of a station is less than or equal to 40° C**

- Heat Wave Departure from normal is 5° C to 6° C
- Severe Heat Wave Departure from normal is 7° C or more

#### **When normal maximum temperature of a station is more than 40° C**

- Heat Wave Departure from normal is 4° C to 5° C
- Severe Heat Wave Departure from normal is 6° C or more

**When actual maximum temperature remains 45° C or more irrespective of normal maximum temperature, heat wave should be declared.**

Source: Indian Meteorological Department, <http://www.imd.gov.in>

There will be no harm to the human body if the environmental temperature remains at 37° C. Whenever the environmental temperature increases above 37° C, the human body starts gaining heat from the atmosphere. If humidity is high, a person can suffer from heat stress disorders even with the temperature at 37° C or 38° C. To calculate the effect of humidity we can use Heat Index Values. The Heat Index is a measure of how hot it really feels when relative humidity is factored in with the actual air temperature. As an example, if the air temperature is 34° C and the relative humidity is 75%, the heat index--how hot it feels--is 49° C. The same effect is reached at just 31° C when the relative humidity is 100 %. The temperature vs humidity chart is placed and the temperature actually felt is placed below:

Relative Humidity %	Temperature °C																
	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
40	27	28	29	30	31	32	34	35	37	39	41	43	46	48	51	54	57
45	27	28	29	30	32	33	35	37	39	41	43	46	49	51	54	57	
50	27	28	30	31	33	35	36	38	41	43	46	49	52	55	58		
55	28	29	30	32	34	36	38	40	43	46	48	52	54	58			
60	28	29	31	33	35	37	40	42	45	48	51	55	59				
65	28	30	32	34	36	39	41	44	48	51	55	59					
70	29	31	33	35	38	40	43	47	50	54	58						
75	29	31	34	36	39	42	46	49	53	58							
80	30	32	35	38	41	44	48	52	57								
85	30	33	36	39	43	47	51	55									
90	31	34	37	41	45	49	54										
95	31	35	38	42	47	51	57										
100	32	36	40	44	49	56											

Caution	Extreme Caution	Danger	Extreme Danger
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Source: Calculated °F to °C from NOAA's National Weather Service

Source: <http://www.imd.gov.in/Welcome%20To%20IMD/Welcome.php>

### Temperature/ Humidity Index

## 1.11 IMPACT OF HEAT WAVE ON LIFE AND LIVELIHOOD

The human thermoregulatory system has limits. Our muscles generate heat, which must be shed to the environment to maintain our core temperature of about 36.7°C. Evaporation of sweat helps human bodies to keep cool when it is hot, however, when there is excessive sweating it leads to dehydration with consequent rise in internal body temperature which is fatal. More or less, Uttar Pradesh population might be acclimatized to heat and humidity but there is an upper level of heat tolerance limit. However, acclimatization to heat can only offer limited protection. When temperature soars beyond the tolerance limit, precautionary measures like avoiding the sun and physical exertion, maintaining hydration, and resting in a cool place are suggested. However, serious challenges arise when extreme heat events linger for prolonged periods, as cessation of activities for weeks is often not an option.

## 1.12 IMPACT OF HEAT WAVE ON AGRICULTURAL

Apart from, impact on human life, the Heat Wave has also been found to profoundly affect crop production both in terms of quantity and quality. Primarily, crop loss happened due to flower drop and higher mortality in new plantations. Rabi and Jayad crops are more impacted. Any extreme change in temperature would affect the productivity.



## 1.13 Temperature distribution in UP in summer:-

Weather observed data of Uttar Pradesh on dated 08/05/2017-

S. No.	Name Of the Stations	Minimum Temperature (°C)	Dep from Normal (°C)	Maximum Temperature (°C)	Dep from Normal (°C)	Rainfall In mms 0830- 1730 Hrs IST
1.	GORAKHPUR	25.8	+2	37.4	-2	0.0
2.	VARANASI (AP)	27.4	+2	39.0	-1	0.0
3.	VARANASI (BHU)	27.7	+3	40.6	+1	0.0
4.	BAHRAICH	26.6	+2	37.6	0	0.0
5.	SULTANPUR	25.0	0	37.4	-4	0.0
6.	ALLAHABAD(PBO)	28.2	+2	42.0	+1	0.0
7.	LUCKNOW	28.1	+4	38.2	-2	0.0
8.	FURSATGANJ	22.6	-	39.4	-	0.0
9.	BAREILLY	25.3	+1	39.2	0	0.0
10.	JHANSI	31.4	+5	44.7	+3	0.0
11.	MEERUT	24.2	+1	40.7	+1	0.0
12.	BASTI	-	-	38.5	-	0.0
13.	GHAZIPUR	25.5	+2	-	-	0.0
14.	BALLIA	-	-	36.5	-2	0.0
15.	CHURK	21.4	-5	42.5	+3	0.0
16.	BARABANKI	26.5	-	-	-	-
17.	KANPUR IAF	26.2	-	40.2	-	0.0
18.	KANPUR CITY	28.0	+3	39.4	-2	0.0
19.	ETAWAH	-	-	43.2	-	0.0
20.	FATEHGARH	-	-	41.5	-	0.0
21.	KHERI	26.0	+2	38.0	-1	0.0
22.	HARDOI	28.2	+3	40.0	+1	0.0
23.	SHAHJAHANPUR	27.4	+4	38.0	-3	0.0
24.	NAJIBABAD	-	-	39.2	+2	0.0
25.	MORADABAD	26.7	+3	-	-	-
26.	BANDA	-	-	46.0	+3	0.0
27.	ORAI	27.5	+2	43.0	+1	0.0
28.	HAMIRPUR	28.2	-	42.6	-	0.0
29.	AGRA IAF	25.7	+1	43.4	+1	0.0
30.	ALIGARH	26.4	+2	42.0	+2	0.0
31.	MUZAFFAR NAGAR	-	-	39.1	+2	0.0

## 1.14 RATIONALE FOR HEAT WAVE ACTION PLAN

Many states are affected during the Heat wave season. In 2015, daily maximum temperature exceeded the average maximum temperature by more than 6°C to 8°C. There is a need of a coordinated multi-agency approach to the State/district's management of heat waves. Successful implementation of a Heat Action Plan requires

coordinated action between many diverse stakeholders and departments. Following the forecasting of an extreme heat event, this plan is activated.

Main objectives of this plan are to Map the current initiatives or activities undertaken by the Government of Uttar Pradesh to address the Heat Wave situation, Assess the magnitude and impact of Heat Wave related morbidity and mortality and examine their patterns and trends, Identify critical thresholds of temperature and humidity specific to the local climatic conditions which causes heat related mortalities and morbidities, Annual evaluation and monitoring of the Heat Action plan (HAP), etc.

## 1.15 KEY STRATEGIES

The heat-wave action plan is intended to mobilize individuals and communities to help protect their neighbors, 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. For this reason, Government agencies will have a critical role to play in preparing and responding to heat-waves at a local level, working closely with health and other related departments on long term strategic plan.

- **Establish Early Warning System and Inter-Agency Coordination** to alert residents on predicted high and extreme temperatures. Who will do what, when, and how is made clear to individuals and units of key departments, especially for health.
- **Capacity building / training programme** for health care professionals at local level to recognize and respond to heat-related illnesses, particularly during extreme heat events. These training programmes should focus on medical officers, paramedical staff and community health staff so that they can effectively prevent and manage heat-related medical issues to reduce mortality and morbidity.
- **Public Awareness and community outreach** Disseminating public awareness messages on how to protect against the extreme heat-wave through print, electronic and social media and Information, Education and Communication (IEC) materials such as pamphlets, posters and advertisements and Television Commercials (TVCs) on Do's and Don'ts and treatment measures for heat related illnesses.
- **Collaboration with non government and civil society:** Collaboration with non-governmental organizations and civil society organizations to improve bus stands, building temporary shelters, wherever necessary, improved water delivery systems in public areas and other innovative measures to tackle Heat wave conditions.

# **CHAPTER-2**

# **EARLY WARNING**

## 2.2 Heat Alert Warning Systems in State of Uttar Pradesh:

Early warning systems can enhance the preparedness of decision-makers and their readiness to harness favorable weather conditions. Early warning systems for natural hazards is based both on sound scientific and technical knowledge.

Accurate and timely alert systems are essential. Collaboration with India Meteorological Department (IMD) is needed to develop heat warning systems (HWS), trigger a warning, determine the threshold for action and communicate the risks.

The IMD provides warnings based on heat index (based on temperature and humidity). It disseminates information to Relief Commissioner (RC), District Magistrates and all other concerned authorities including Doordarshan, All India Radio (AIR) by email. Immediately upon receipt of such a warning, the state and district Emergency Operation Centers make necessary arrangements for flashing the warning through all forms of media. Simultaneously, departments of Health and Family Welfare, Education, Labour, Transport, & other related departments remain alert and put necessary emergency measures in place.

During a Heat Wave condition Relief Commissioner issues directives to all the concerned governmental organizations for a prompt action. Apart from this, Relief commissioner office is also involved in establishing the Heat Wave related mortality recording system.

Heat wave forecast is transmitted to Divisional Commissioners, District Magistrates and all other concerned authorities through email and fax by State Control Room. CUG phones have been given to all commissioner, DMs, ADMs, SDMs and Tehsildars. The warning is sent through mass SMS to all. Apart from this IMD gives this data to All India Radio and also to Doordarshan. AIR and Doordarsha widely displays this alert through their mediums.

Department of information publishes Do's and Dont's in various state level as well local Hindi/ English Daily News papers and other electronic media.

### 2.2.1 Color Signals for Heat Alert

The Heat alerts based on thresholds determined by the IMD using the following color signal system shall be issued:

<b>Red Alert (Severe Condition)</b>	<b>Extreme Heat Alert for the Day</b>	<b>Normal Maximum Temp increase 6° C to more</b>
<b>Orange Alert (Moderate Condition)</b>	<b>Heat Alert Day</b>	<b>Normal Maximum Temp increase 4° C to 5° C</b>
<b>Yellow Alert (Heat-wave Warning)</b>	<b>Hot Day</b>	<b>Nearby Normal Maximum Temp.</b>
<b>White (Normal)</b>	<b>Normal Day</b>	<b>Below Normal Maximum Temp.</b>

**CHAPTER-3**

**FINANCIAL PROVISIONS FOR**

**HEAT WAVE IN UTTAR**

**PRADESH**

## 3.1 Heat-wave and Disaster Management

Section 2 (d) of the Disaster Management Act 2005 defines “disaster” as a catastrophe, mishap, calamity or grave occurrence in any area, arising from natural or man-made causes, and is of such a magnitude to be beyond the coping capacity of the affected area. Heat-wave has not been notified as a disaster by Government of India yet. Heat wave is not notified 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

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संख्या- 303 /1-11-2016-4(जी)/16  
लखनऊ: दिनांक: 27 जून, 2016

### अधिसूचना

भारत सरकार द्वारा राज्य आपदा मोचक निधि और राष्ट्रीय आपदा मोचक निधि (2015-20) से व्यय के सम्बन्ध में मानक एवं दरों को निर्धारित करते हुये पत्र संख्या-32-7/2014- एन0डी0एम0-1, दिनांक 08.04.2015 के बिन्दु संख्या-13 में निम्न व्यवस्था दी गयी है:-

13.	State specific disaster within the local context in the State, which are not included in the notified list of disaster eligible for assistance from SDRF/NDRF, can be met from SDRF within the limit of 10% of the annual funds allocation of the SDRF.	<ul style="list-style-type: none"> <li>Expenditure is to be incurred from SDRF only (and not from NDRF), as assessed by the State Executive Committee (SEC).</li> <li>The norm for various items will be the same as applicable to other notified natural disaster, as listed above. or</li> <li>In these cases, the scale of relief assistance against each item for 'local disaster' should not exceed the norms of SDRF.</li> <li>The Flexibility is to be applicable only after the State has formally listed the disaster for inclusion and notified transparent norms and guidelines with a clear procedure for identification of the beneficiaries for disaster relief for such local disaster; with the approval of SEC.</li> </ul>
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2. राज्य में बेमौसम भारी बारिश, आंधी/तूफान, आकाशीय बिजली एवं लू-प्रकोप से प्रत्येक वर्ष बड़ी संख्या में जन-धन की हानि होती है। अतः भारत सरकार द्वारा दी गयी उक्त व्यवस्था के दृष्टिगत शासनादेश संख्या-249/1-11-2015-4(जी)/2015, दिनांक 15.04.2015 (यथा संशोधित दिनांक 16.04.2015) को निरस्त करते हुये श्री राज्यपाल महोदय बेमौसम भारी बारिश, आंधी/तूफान, आकाशीय बिजली एवं लू-प्रकोप को राज्य आपदा घोषित किये जाने की सहर्ष स्वीकृति प्रदान करते हैं।

3. उक्त राज्य आपदा से प्रभावित व्यक्तियों/परिवारों को भारत सरकार द्वारा राज्य आपदा मोचक निधि के लिये निर्धारित मानक एवं दरों के अनुसार राहत प्रदान की जायेगी।

4. उक्त राज्य आपदाओं के सम्बन्ध में होने वाला व्यय अनुदान संख्या-51 के अन्तर्गत लेखाशीर्षक "2245-प्राकृतिक विपत्ति के कारण राहत-05-स्टेट डिजास्टर रिस्पांस फण्ड-800-अन्य व्यय-06-स्टेट डिजास्टर रिस्पांस फण्ड से व्यय-09-राज्य सरकार द्वारा घोषित अन्य आपदाओं हेतु डिजास्टर रिस्पांस फण्ड से व्यय-42-अन्य व्यय" से वहन किया जायेगा।

5. प्रदेश सरकार द्वारा लिये गये उपरोक्त निर्णय के अनुसार कार्यवाही सुनिश्चित की जाय।

(सुरेश चन्द्रा)  
प्रमुख सचिव।

संख्या व दिनांक तदैव

प्रतिलिपि निम्नलिखित को सूचनार्थ एवं आवश्यक कार्यवाही हेतु प्रेषित:-

- 1- महालेखाकार, (लेखा एवं हकदारी) प्रथम, उ0प्र0, इलाहाबाद।
- 2- समस्त मण्डलायुक्त, उ0प्र0
- 3- समस्त जिलाधिकारी, उ0प्र0

(अनिल कुमार)  
सचिव एवं राहत आयुक्त।

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.

As per above mentioned clause State Govt of Uttar Pradesh has notified "Heatwave" as State Specific disaster. Thus now heat wave is also covered for relief from SDRF. Notification issued in this regard is given in the box.

All the concerned departments and District Magistrate's have been instructed to take required precautionary measures for mitigating the heat-wave situation.

### 3.2 Norms for Ex-Gratia Relief under State Disaster Response Fund to heat wave victims:

1.	Gratuitous Relief	Norms for Assistance
	a) Ex- Gratia payment to families of deceased persons.	Rs. 4.00 lakh per deceased person including those involved in relief operations or associated in preparedness activities, subject to certification regarding cause of death from appropriate authority.
	b) Ex- Gratia payment for loss of a limb or eyes.	Rs. 59100/- per person, when the disability is between 40 % and 60 %. Rs. 2.00 lakh per person, when the disability is more than 60 % Subject to certification by a doctor from a hospital or dispensary of Government, regarding extent and cause of disability.
	c) Grievous injury requiring hospitalization	Rs. 12,700/- per person requiring hospitalization for more than a week. Rs. 4,300/- per person requiring hospitalization for less than a week.

**CHAPTER-4**

**ROLES & RESPONSIBILITIES**

**FOR MANAGING HEAT WAVE**



### 4.3 Incident Commanders for Heat Wave:

Relief Commissioner as the Incident Controller and Nodal Officer for heat waves—is responsible for strategic management of the incident at the State Level. The District Collector is the Incident Controller and Nodal Officer at District Level.

### 4.4 The Heat Action Plan shall be implemented in 3 Phases annually.

#### Phase-I: – Pre -Heat Season (February to March)

Pre-Heat Season is devoted to develop early warning systems, communication plan of alerts to the general public, health care professionals and voluntary groups (care givers) with emphasis on training and capacity building of these groups.

#### Phase-II: - During the Heat Season (April to June)

High alert, continuous monitoring of the situation, coordination with all the departments agencies concerned on one hand and general public & media on the other hand is the focus of this phase.

#### Phase-III: – Post -Heat Season (July to October)

In Phase – III concentration is on evaluation and updation of the plan. It is important at the end of the summer to evaluate whether the heat health action plan has worked. Continuous updation of plan is a necessity. Global climate change is projected to further increase the frequency, intensity and duration of heat-waves and attributable deaths. Public health prevention measures need to take into consideration the additional threat from climate change and be adjusted over time.

### 4.5 Phase wise Responsibilities of Various Departments / Agencies

#### 4.5.1 Phase-I: - Pre Heat season (February to March)

1. Incident Controller / Nodal Officer at State Level (RC) and Nodal Officer at District Level (DMs)
  - i. Preparation of a list of High risk areas in the State / District vulnerable to Heat waves for more focus in planning to mitigate adverse affects of Heat wave.
  - ii. Identification of vulnerable groups of population.
  - iii. Convene meetings with the concerned Departments/ Agencies/ NGOs involved in response mechanism to Heat waves to review the action plan periodically.
  - iv. Designation of a single officer as point of contact for each department.

- v. Organize training for health workers, link workers, school children, and the local community in preventive measures and treatment protocol involving the Medical & Health Department
- vi. Distribute pamphlets and posters with tips to prevent heat stress in local language to hospitals, schools, and professional associations.
- vii. Establish Heat Action Web Page on Disaster Management / District Web site.

## **2. Information & PR Department**

- i. Identification of areas to post warnings and information during heat season.
- ii. Securing advertisement / scrolling slots for announcements regarding Heat waves.
- iii. Designing information and awareness material in the form of pamphlets, posters etc. on Heat waves in local language for distribution to the general public, especially focusing on identified high risk areas in the State and vulnerable groups of population.

## **3. Medical & Health Department and Medical Professionals**

- i. Designing and initiating targeted training programs, capacity building efforts and communication on heat illness for medical staff at Community Health Centers (CHCs), Public Health Centers (PHCs) / including nursing staff, paramedics, field staff and link workers (ANMs, ASHA Workers, etc.), while paying special attention to the susceptibility of particular wards.
- ii. Updation of admissions and emergency case records in Hospitals to track heat-related morbidity and mortality and also to create simple, user-friendly means to track daily heat-related data and behavioral change impacts. Train hospitals to record information on education & communication (IEC) efforts and to ensure recording of cause of death in death certificates.
- iii. Adopt heat-focused examination procedures at local hospitals and urban health centers.
- iv. Developing of SMS facility to reach the field level staff during emergency periods.
- v. Checking of inventories of medical supplies including ORS powder in PHCs and other Local Hospitals.
- vi. Purchase and distribute reusable soft plastic ice packs for the CHCs, 108 emergency centers, ambulances and hospitals.
- vii. Explore creation of ice pack dispensaries to increase access to vulnerable communities in high risk areas.
- viii. **To provide following services through 108 Emergency Service**
  - (a) Ensure adequate supply of IV fluids.
  - (b) Prepare handouts for paramedics about heat related illness.
  - (c) Create displays on ambulances to build public awareness during major local events.
  - (d) Identifying routes to high risk areas and to reach vulnerable sections of population in shortest time possible by utilizing the list of high-risk areas.

## **4. Urban Development Department / Municipal Corporations / Municipalities & Panchayati Raj Department / Panchayats**

- i. High Risk Area mapping and identification of vulnerable groups particularly destitute, homeless, beggar homes and old age homes to concentrate on mitigation efforts during heat alert period.
- ii. Identification of areas to provide shelters and drinking water during heat alert period.
- iii. Special care in restricting outdoor activities and functions during heat period.
- iv. Identification of NGOs / Rotary Clubs / Lions Clubs and Corporate houses (under Corporate Social Responsibility) to provide shelters, drinking water, medical supplies and temporary homes during heat days.
- v. Adequate drinking water supply.

#### **5. Labour & Employment Department**

- i. Organize training for employers, outdoor labourers and workers on health impacts of extreme heat and protective measures to be taken during high temperature periods.
- ii. Utilize maps of construction sites and outdoor work spots preferably overlaying with irradiation map from IMD or heat island map to identify more high-risk outdoor workers and to conduct publicity campaigns during high-risk days.
- iii. Preparing a list of factory medical officers, contractors and house side non-factory workers to include in heat alert and action communication.
- iv. Heat illness orientation planning for factory medical officers.

#### **6. Rural Development Department**

- i. Collecting information on the works sanctioned under MGNREGS programme and other schemes in High risk areas to plan for mitigation effort during heat period.
- ii. To ensure shade and supply of adequate drinking water at work spots.
- iii. Adequate drinking water supply.

#### **7. Animal Husbandry Department**

- i. Preparation of Posters & pamphlets with tips to take care of cattle and poultry during heat waves.
- ii. Publicity of protective measures to save cattle and poultry during heat periods through District heads and Farmers Training Centers.
- iii. Checking inventory of necessary medicines for treatment of cattle and poultry.
- iv. Preparation of plans to provide drinking water for cattle in case of scarcity.

#### **8. Transport Department & UPSRTC**

- i. Obtaining lists of risk areas and review of Bus timings and available shelters in the high risk areas.
- ii. Planning for shade / shelter, drinking water and fans in the waiting areas of passengers.
- iii. Review plan with cab operator / auto / transport associations and also Highway patrol
- iv. Display of precautionary measures ( Do's and don'ts) on busses, autos, in bus stations & auto stands and distribution of pamphlets to passengers.
- v. Planning to provide ORS, Ice packets etc. and medical services in Bus stations.

#### **9. Education Department**

- i. Designing child-friendly educational preventative trainings and distribute heat protection materials at local schools.
- ii. Training of school teachers to equip them with knowledge of heat protection tips and activities which they can disseminate in classrooms.
- iii. Scheduling of examinations before starting of Heat period normally.

#### **10. Fire Department**

- i. To check the readiness of vehicles and firefighting equipment to face any emergency.

#### **11. Forest Department**

- i. Plantation of trees.
- ii. Increasing forestation area.

#### **12. Community groups / Self help groups / ward level committees / NGOs**

- i. Conduct training programmes, workshops and outreach sessions with community / Self help groups and mobilizers such as ASHA workers, Anganwadis, and Ward Committees in Municipalities to help inform and get vulnerable communities more actively involved.
- ii. Identification of NGOs, Voluntary Organizations in reaching out to the Public, especially vulnerable groups.
- iii. Encourage discussions for finding early signs of heat exhaustion with local doctor or Health Centre.
- iv. Inform fellow community members about how to keep cool and protect oneself from heat.

### **4.5.2 Phase-II: - During the Heat Season (April to June)**

#### **1. Incident Controller / Nodal Officer at State Level (Relief Commissioner) and Nodal Officer at District Level (DM)**

- i. managing all response activities
- ii. establishing incident and emergency management teams
- iii. collecting, analyzing and disseminating information regarding the emergency
- iv. developing Heat wave action plans.
- v. Reporting to higher level.
- vi. Organizing meeting with concerned departments.
- vii. Awareness relating to heat-wave.
- viii. Advertisements on safety tips are also given through local newspapers, radio and television channels.
- ix. Issue of timely information and warnings when extreme heat events are forecast by IMD. All key Departments / Agencies, State Emergency Operation Center (SEOC), DEOC etc. may be notified.
- x. Monitor and increase the heat alert level to match the severity of the forecast.
- xi. Hold regular (daily, if necessary) conference to discuss reports and fresh developments during a heat alert. Special meetings with key agencies may be convened.

- xii. To ensure that communication channels with all Stakeholders are functional and operating.
- xiii. Communicate locations of emergency facilities and cooling centers / shaded areas with each Department / Organization.
- xiv. Inform power supply Companies to prioritize maintaining power to critical facilities (such as hospitals).
- xv. Notify all the stakeholders when the heat alert is over.
- xvi. Ex-Gratia Relief- After declaring heat wave as State Specific disaster vide notification no-303/1-11-2016-4(G)/ 2016 dated 27 June 2016, ex-gratia relief of Rs. 4.00 Lakh is given to the family of each deceased due to heat stroke from State Disaster Response Fund (SDRF). A person needs hospitalization due to heat wave is also eligible to get relief from SDRF.

## **2. Information & PR Department**

- i. Release of messages to the general public and vulnerable groups about the risks and dangers of heat-related illness by the nodal officer at the State and District levels through press conferences.
- ii. Wide circulation of Heat wave alerts through SMS or Whatsapp in collaboration with private sector Telecom companies in addition to traditional media during a heat alert.
- iii. Circulate heat alerts in bulk to the public via centralized email databases.
- iv. To send SMS alert messages directly to private practitioners in addition to the medical professionals at PHCs and CHCs.
- v. Utilize local radio and FM broadcasts to disseminate heat protection tips and high temperature warnings to the vulnerable sections of populations.

## **3. Medical & Health Department and Medical Professionals**

- i. Display of heat-related illness prevention tips and how to stay cool around hospitals, PHCs and CHCs.
- ii. Equip all hospitals/ PHCS/ CHCs with additional supplies of medicines and material.
- iii. Ensure adoption of Heat illness treatment and prevention protocols.
- iv. Deploy additional staff at hospitals and PHCs/CHCs to attend to the influx of patients during a heat alert, if feasible.
- v. Keep emergency wards ready in all PHCs / CHCs and Hospitals
- vi. Increase outreach of community health workers in at-risk neighborhoods during a heat alert, if feasible.
- vii. Report Heatstroke patients to Nodal Officer on daily basis and generate weekly reports on public health impacts of Heat wave for Nodal Officer, during a heat alert.
- viii. Expedite recording of cause of death in death certificates.
- ix. **Ensure that 108 /104 EMERGENCY SERVICE:**
  - (a) Activate dynamic strategic deployment plan for ambulances.
  - (b) Adequate supply of ice packs, IV fluids and medicines.
  - (c) Keep accurate records of pre-hospital care.
  - (d) Adequate staff on duty and restrict leave if necessary.

#### **4. Urban Development Department / Municipal Corporations / Municipalities & Panchayati Raj Department / Panchayats**

- i. Disseminate SMS text messages to warn residents of high risk areas and vulnerable sections of population during a heat alert.
- ii. Activate “cooling centers,” such as public buildings, malls, temples, schools and State Government or Local body, run temporary night shelters for those without house or access to water and/or electricity at home.
- iii. Expand access to shaded areas for outdoor workers, slum communities, and other vulnerable sections of population.
- iv. Keep open the parks for a longer duration during evenings.
- v. All non-essential uses of water (other than drinking, keeping cool) may be suspended, if necessary.
- vi. Distribution of fresh drinking water to the public by opening water centers at people congregation points like market places, labour addas, etc. Water may be distributed through pouches to the poor in the identified high-risk areas.
- vii. Actively involve NGOs, Lions Club, Rotary Club and Corporate houses in providing shelter and drinking water facilities.

#### **5. Labour & Employment Department**

- i. Encourage employers to shift outdoor workers schedules away from peak afternoon hours (12 – 4pm) during a heat alert.
- ii. Ensure provision of shelters/ cooling areas, water and supply of emergency medicines like ORS, IV fluids etc. at work sites by employers.

#### **6. Rural Development Department**

- i. Reschedule of working hours to avoid intense heat timings in all the works sanctioned under MGNREGS.
- ii. Provision of drinking water
- iii. Shelters / cooling areas wherever necessary.

#### **7. Animal Husbandry Department**

- i. Display posters and distribute pamphlets on the precautionary measures to be taken to safeguard cattle and poultry birds during heat period in villages and important junctions.
- ii. Ensure adequate stock of medicines in all veterinary hospitals.
- iii. Ensure visit of field staff during heat wave to villages for follow up action in treatment of cattle / poultry birds.

#### **8. Transport Department & UPSRTC**

- i. Display posters & distribute pamphlets on prevention of heat related illness in bus stands, auto stands etc.
- ii. Ensure availability of shade / shelters, drinking water, ORS packets etc., in bus stands, auto stands etc.
- iii. Ensure availability of water and ORS packets in long distance buses.

- iv. Do not run buses as far as possible during peak hours (12-4 pm) when Heat wave is declared.

#### **9. Education Department**

- i. Ensure supply of water for students and teachers if school is functioning.
- ii. If school is not functioning, permit use of school premises as shelter during day time.
- iii. Rearrange school timing to morning shifts.

#### **10. Fire Department**

- i. Ensure presence of staff during heat alert period, if necessary by restricting leaves.
- ii. Ensure functioning of communication equipment to receive messages / alerts of occurrence of fire.
- iii. Ensure adequate supply of water and foam to fight fire.

#### **11. PWD Department**

- i. Avoid taking work from laborers during peak heat wave hours.
- ii. Shelter homes for laborers.
- iii. Providing drinking water in work sites.

#### **12. Community groups / Self help groups / ward level committees / NGOs**

- i. Take all precautions to avoid Heat related illness.
- ii. Keep cool and hydrated during the heat season by drinking water, staying out of the sun, and wearing light clothing.
- iii. Check on vulnerable neighbours, particularly during a heat alert.
- iv. Limit heavy work in direct sun or indoors, if poorly ventilated, especially during a heat alert.

### **4.5.3 Phase-III: – Post -Heat Season (July to October)**

#### **1. Incident Controller / Nodal Officer at State Level and Nodal Officer at District Level**

- i. Review of quantitative and qualitative data for process evaluation and improvements.
- ii. Annual evaluation of Heat Action Plan by organizing a meeting with key Departments / agencies and relevant stakeholders.
- iii. Evaluate the Plan process basing on the reach and impact.
- iv. Revision of Plan basing on the performance feedback.
- v. Revision and posting of Revised Action Plan online well ahead of summer season next year for information of all stakeholders.

#### **2. Information & Public Relation Department**

- i. Evaluate reach of advertising / public messages and other means of communication like social media (face book, twitter etc.) to target groups.
- ii. Participate in annual evaluation in Heat Action Plan.

#### **3. Medical & Health Department and Medical Professionals**

- i. Perform an epidemiological case review of heat-related mortalities during the summer.
- ii. Conduct and gather epidemiological outcomes from the data on heat risk factors, illness and death, based on average daily temperatures.
- iii. Measure mortality and morbidity rates based on data before and after the Plan's interventions.
- iv. Incorporate data and findings into future versions of the Heat Action Plan.
- v. Participate in annual evaluation of Heat Action Plan review the revised Heat Action Plan.
- vi. Review the revised Heat Action Plan.
- vii. To ensure 108 Emergency Service
- viii. Provide data to key Agency / Department.
- ix. Participate in annual evaluation of Heat Action Plan review the revised Heat Action Plan.
- x. Review the revised Heat Action Plan.

**4. Urban Development Department/Municipal Corporations / Municipalities & Panchayati Raj Department/Panchayats/Education Department, Animal Husbandry Department, Transport Department & UPSRTC**

- i. Collect data related to implementation of Action Plan and provide feedback to key agency / department.
- ii. Participate in annual evaluation of Heat Action Plan.
- iii. Review the revised Heat Action Plan.

**Conclusion**

All the departments / agencies shall take necessary timely action to implement the Heat Wave Action plan to mitigate the adverse effects of heat wave.



# **CHAPTER-5**

## **Dealing with Heat Related Illness**

## 5.7 Identification of Heat Wave Illness and Recording of Casualties

- Heat-related illness occurs when the body is unable to adequately cool itself. The setting for Heat illness involves hot environment; +/- exertion; +/- insulating clothing or swaddling.
- Extreme heat events can also exacerbate / aggravate pre-existing conditions, with the risk of heat-related mortality (death) and morbidity (disease, illness) increasing for people with illnesses—including cardiovascular disease, diabetes and cancer.
- Heat-waves characterized by long duration and high intensity have the highest impact on mortality.
- The impact of heat waves characterized by longer duration (more than four days) was 1.5 to 5 times higher than for short heat-waves.
- The health impacts of hot weather and heat-waves depend upon the level of exposure (frequency, intensity and duration) to heat; the size of the exposed population; the characteristics of the population (susceptibility) and the prevention measures in place.
- The adverse health effects of heat-waves are largely preventable.

**Typical presentations and case definition are as follows:**

Clinical Entity	Age Range	Cardinal Symptoms	Cardinal Signs	Pertinent Negatives	Prognosis	Case definition
Heat Rash	All mainly Children	Small, red, itchy papules with sometimes filled with clear or white fluid.	Diffuse maculopapular rash, occasionally pustular, at hair follicles; pruritic	Not focally distributed like a contact dermatitis; not confluent patchy; not petechial	Full recovery with elimination of exposure and supportive care	Diffuse, pruritic, maculopapular or vesicular rash in the setting of heat exposure, often with insulating clothing or swaddling.
Heat cramps	All	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	Full recovery with elimination of exposure and supportive care	Painful contractions of frequently used muscle groups in the setting of heat exposure, often with exertion
Heat exhaustion	All	Feeling overheated, lightheaded, exhausted and weak unsteady nauseated, sweaty & 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 aphasia/dysarthria; no overdose history	Full recovery with elimination of exposure and supportive care; progression if continued exposure	Syndrome of generalized weakness & or exhaustion, often with lightheadedness, limiting functioning in a hot environment without history of recent infection. May or may not be exertional.

Heat syncope	Heat syncope Typically adults	Feeling hot & weak; lightheadedness followed by 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 aphasia/dysarthria	Full recovery with elimination of exposure and supportive care; progression if continued exposure	Brief loss of consciousness in the setting of heat exposure without evidence of heat seizure activity, stroke or medication overdose
Heat stroke	All	Severe overheating; profound weakness; disorientation, obtundation, seizures or other altered mental status.	Flushed, dry skin (not always), core temperature $\geq 40^{\circ}\text{C}$ ; altered mental status with disorientation, possibly delirium, coma, seizures; tachycardia; +/- hypotension	No coincidental signs and symptoms of infection; no focal weakness; no aphasia/dysarthria; no overdose history	25-50% mortality even with aggressive care; significant morbidity if survive	Altered mental status (including disorientation, delirium, seizure, obtundation) with elevated core body temperature $\geq 40^{\circ}\text{C}$ in the setting of heat exposure, without signs of stroke, history of infection, or signs of medication overdose. May or may not be exertional

## 5.8 Prevention of Heat Related Illness

General Treatment protocol applicable to all patients in any setting, where there is a potential concern for heat illness with slight variations according to the setting (EMS, health center, clinic, hospital emergency department, etc.).

1. Initial patient assessment – primary survey (airway, breathing, circulation, disability, exposure), vital signs, including temperature.
2. Consider heat illness in differential diagnosis if:
  - a. Presenting with suggestive symptoms and signs (see table in Health Impacts of Heat Waves).
  - b. Patient has one or more of the following risk factors:
    - i. Extremes of age (infants, elderly)
    - ii. Debilitation/physical de-conditioning, overweight or obese
    - ii. Lack of acclimatization to environmental heat (recent arrival, early in summer season)
    - iii. Any significant underlying chronic disease, including psychiatric, cardiovascular, neurologic, hematologic, obesity, pulmonary, renal, and respiratory disease
    - iv. Taking one or more of the following:
      1. Sympathomimetic drugs
      2. Anticholinergic drugs
      3. Barbiturates
      4. Diuretics
      5. Alcohol
      6. Beta blockers

3. Remove from environmental heat exposure and stop physical activity.
4. Initiate passive cooling procedures:
  - a. Cool wet towels or ice packs to axillae, groin, and around neck; if patient is stable, may take a cool shower, but evaluate risk of such activity against gain and availability of other cooling measures.
  - b. Spray cool water or blot cool water onto skin.
  - c. Use fan to blow cool air onto moist skin.
5. If temperature lower than 40°C, repeat assessment every 5 minutes; if improving, attempt to orally hydrate (clear liquids, ORS can be used but not necessary; cool liquids better than cold) and observe.
6. If temperature is 40°C or above, initiate IV rehydration and immediately transport to emergency department for stabilization.

## 5.9 EMERGENCY TREATMENT

If Heat Stroke is suspected, call Ambulance immediately. While waiting for the ambulance:

- Take the person's temperature
- If possible move the affected person to somewhere cooler / shaded area
- Give a cool shower by sprinkling with water or Wrapping in a damp sheet and using a fan to create an air circulation
- Encourage to drink fluids, if they are conscious
- Do not give aspirin or paracetamol

## 5.10 Heat Illness – Treatment Protocol

General Treatment protocol applicable to all patients in any setting, where there is a potential concern for heat illness with slight variations according to the setting (EMS, health center, clinic, hospital emergency department, etc.).

1. Initial patient assessment – primary survey (airway, breathing, circulation, disability, exposure), vital signs, including temperature.
2. Consider heat illness in differential diagnosis if:
  - a. Presenting with suggestive symptoms and signs (see table in Health Impacts of Heat Waves).
  - b. Patient has one or more of the following risk factors:
  - c. Extremes of age (infants, elderly)
  - d. Debilitation/physical de-conditioning, overweight or obese
  - e. Lack of acclimatization to environmental heat (recent arrival, early in summer season) Any significant underlying chronic disease, including psychiatric, cardiovascular, neurologic, hematologic, obesity, pulmonary, renal, and respiratory disease
  - f. Taking one or more of the following:
    1. Sympathomimetic drugs
    2. Anticholinergic drugs

3. Barbiturates
  4. Diuretics
  5. Alcohol
  6. Beta blockers
3. Remove from environmental heat exposure and stop physical activity.
  4. Initiate passive cooling procedures :
    - a) Cool wet towels or ice packs to axillae, groin, and around neck; if patient is stable, may take a cool shower, but evaluate risk of such activity against gain and availability of other cooling measures.
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  5. If temperature lower than 40°C, repeat assessment every 5 minutes; if improving, attempt to orally hydrate (clear liquids, ORS can be used but not necessary; cool liquids better than cold)and observe.
  6. If temperature is 40°C or above, initiate IV rehydration and immediately transport to emergency department for stabilization.

## 5.11 Data Collection regarding heat wave causalities

As Heat Wave is not a notified disaster at the National level, but declared by State of Uttar Pradesh as state specific disaster, accurate information and data related to heat wave deaths and illnesses are not available. In order to prepare, and take necessary mitigative action we need data on the age group, sex and occupation of those who die of heat wave. We also need to collect data on whether the deaths occurred indoor or outdoor, and also about the economic status of the people who died. Hence, a format for collecting data is given below-

District	Details Death reported in 2018										Remarks
	Age group	Urban		Rural		Economic Status		Location of Death		Occupation of the Deceased	
		Male	Female	Male	Female	APL	BPL	Indoor	Outdoor		
Tehsil	< 1 year										
	1-4 years										
	5-9 years										
	10-14 years										
	15-24 years										
	25-34 years										
	35-44 years										
	45-54 years										
	55-64										

	years										
	65-74 years										
	75-84 years										
	85 +										
District											
State											

## 5.12 Do's and Don'ts for Heat Wave

Heat Wave conditions can result in physiological strain, which could even result in death. To minimize the impact during the heat wave and to prevent serious ailment or death because of heat stroke, the following measures are useful:

### DO's

- Listen to Radio, watch TV, read News paper for local weather forecast to know if a heat wave is on the way
- Drink sufficient water and as often as possible, even if not thirsty
- Wear lightweight, light-colored, loose, and porous cotton clothes. Use protective goggles, umbrella/hat, shoes or chappals while going out in sun.
- While travelling, carry water with you.
- If you work outside, use a hat or an umbrella and also use a damp cloth on your head, neck, face and limbs.
- Use ORS, homemade drinks like lassi, torani (rice water), lemon water, buttermilk, etc. which help to re-hydrate the body.
- Recognize the signs of heat stroke, heat rash or heat cramps such as weakness, dizziness, headache, nausea, sweating and seizures. If you feel faint or ill, see a doctor immediately.
- Keep animals in shade and give them plenty of water to drink.
- Keep your home cool, use curtains, shutters or sunshade and open windows at night.
- Use fans, damp clothing and take bath in cold water frequently.
- 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.

### DONT's

- Do not leave children or pets in parked vehicles.
- Avoid going out in the sun, especially between 12.00 noon and 3.00 p.m.
- Avoid wearing dark, heavy or tight clothing.
- Avoid strenuous activities when the outside temperature is high. Avoid working outside between 12 noon and 3 p.m.
- 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.

# Information, Education & Communication material regarding Heat Wave.

## Summer Heat : The Silent Killer

### How Heat Affects the Human Body

Human bodies dissipate heat by varying the rate and depth of blood circulation, by losing water through the skin and sweat glands, and as a last resort—by panting, when blood is heated above 98.6 degrees. The heart begins to pump more blood, blood vessels dilate to accommodate the increased flow, and the bundles of tiny capillaries threading through the upper layers of skin are put into operation. The body's blood is circulated closer to the skin's surface, and excess heat drains off into the cooler atmosphere. At the same time, water diffuses through the skin as perspiration. The skin handles about 90 percent of the body's heat dissipating function.

Sweating, by itself, does nothing to cool the body, unless the water is removed by evaporation, and high relative humidity slows evaporation. The evaporation process itself works this way: the heat energy required to evaporate the sweat is extracted from the body, thereby cooling it. Under conditions of high temperature (above 90 degrees) and high relative humidity, the body is doing everything it can to maintain 98.6 degrees inside. The heart is pumping a lot of blood through dilated circulatory vessels; the sweat glands are pouring liquid, including essential dissolved chemicals, like sodium and chloride onto the surface of the skin.



### Heat Wave Safety Tips



**Slow down.** Strenuous activities should be reduced, eliminated, or rescheduled to the coolest time of the day. Individuals at risk should stay in the coolest available place, not necessarily indoors.



**Dress for summer.** Lightweight light-colored clothing reflects heat and sunlight, and helps your body maintain normal temperatures. Cover all exposed skin with a high SPF sun screen, and wear a wide brimmed hat to protect your face and head.



**Drink plenty of water or other non-alcoholic fluids.** Drink plenty of fluids even if you don't feel thirsty. Avoid coffee and tea because they contain caffeine, which increases water loss through urination. Alcoholic drinks also dehydrate by increasing urination. Soda and fruit juices contain more sugar than needed, so they aren't absorbed as easily or quickly as water or commercial sports drinks. Eat frequent small, lower protein meals (fruits, vegetables & salads).



**Spend more time in air conditioned places.** Air conditioning in homes and other buildings markedly reduces danger from the heat. If you cannot afford an air conditioner, spending some time each day (during hot weather) in an air conditioned environment affords some protection. Keep your electric fans running.



**Don't get too much sun.** Sunburn makes the job of heat dissipation that much more difficult.

**Check on the elderly, infants, young children and people with chronic health problems or disabilities.** They are more vulnerable to the effects of heat.

**Keep pets indoors,** or provide them with shade and plenty of cool water. Refill their water bowls frequently. Do not leave pets, or anyone else, in a closed, parked vehicle.



One of the biggest weather hazards that affects our region during the summer is heat. Many people do not realize how deadly heat can be. In contrast to the visible, destructive, and violent nature of floods and tornadoes, heat is a "silent killer". The Center for Disease Control (CDC) reports that an average of 350 people die each year due to the effects of heat.

A heat wave is a period of excessive heat lasting 2 days or more that can lead to illnesses in people with prolonged exposure to these conditions. High humidity, which often accompanies heat in our region, can make the effects of heat even more harmful. While heat related illnesses and death can occur with exposure to heat in just one afternoon, heat stress on the body does have a cumulative effect.



The National Weather Service, as part of its mission for protecting life and property, has a measure of how the hot weather "feels" to the body. This table uses relative humidity and temperature to produce the "apparent temperature" or the temperature the body "feels" or what we call the **Heat Index** value. These values are for shady locations only. Exposure to full sunshine can increase heat index values by up to **15°F**. Also, strong winds, particularly with very hot, dry air, can be extremely hazardous as the wind adds heat to the body. The Heat Index Chart is below.



Heat disorders have to do with a decrease in the body's ability to shed heat by circulatory changes and sweating, or a chemical (salt) imbalance caused by too much sweating. When heat gain exceeds the level the body can remove, or when the body cannot compensate for the fluids and salt lost through sweating, the temperature of the body's inner core begins to rise and heat related illness may develop. Ranging in severity, heat disorders share one common feature, the person has overexposed or overexercised for his or her age and physical condition in the existing thermal environment.

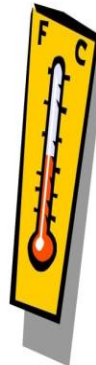
#### Heat index/Heat disorders

Possible heat disorders for people in higher risk groups:

Heat index of 130° or higher: heatstroke/sunstroke highly likely with continued exposure.

Heat index of 105° - 130°: sunstroke, heat cramps or heat exhaustion likely, and heatstroke possible with prolonged exposure and/or physical activity.

Heat index of 90° - 105°: sunstroke, heat cramps and heat exhaustion possible with prolonged exposure and/or physical activity.



#### How the National Weather Service alerts you to extreme heat conditions:

The National Weather Service in Paducah will highlight heat indices at or above 100 degrees in its forecasts.

Whenever the heat index is forecast to be at least 105 degrees, a Heat Advisory will be issued.

Whenever the heat index is forecast to be at least 110 degrees for at least 2 days, an Excessive Heat Warning will be issued.

## HEAT DISORDERS

**SUNBURN:** The symptoms of sunburn include redness and pain. In severe cases, swelling of skin, blisters, fever and headaches can result. To treat sunburn, ointments usually work for mild cases and if blisters appear but do not break. If blisters do break, apply dry sterile dressing. More serious extensive cases should be seen by a doctor.

**HEAT CRAMPS:** Muscular pains and spasms due to heavy exertion. They usually involve the abdominal muscles or the legs, and can be very painful. If you are caring for a person who has heat cramps, have them stop activity and rest. Have them drink sips of water or a diluted sports drink, at the rate of one-half cup every 15 minutes. Gently stretch the cramped muscle and hold the stretch for about 20 seconds, then gently massage the muscle. Repeat if needed. If there is heavy sweating, cramps will reoccur. If the victim has no other signals of heat-related illness, they may resume activity after the cramps stop, but should avoid any strenuous exercise for at least 24 hours.

**HEAT EXHAUSTION:** Due to prolonged and profuse sweating, the body loses large quantities of salt and water. When salt and water are not replaced, blood circulation diminishes and affects the heart, brain and lungs. With heat exhaustion, sweat does not evaporate, due to high humidity or layers of clothing, so the body is not cooled properly. Symptoms include cool, moist, pale, flushed or red skin, heavy sweating, headache, nausea or vomiting, dizziness and exhaustion. Body temperature will be near normal. Get the person to a cool place in a comfortable position. Give a half glass of cool water every 15 minutes. Remove or loosen clothing and apply cool, wet cloths. Call 9-1-1 if the person refuses water, vomits or loses consciousness. If not treated, the victim's condition will worsen, the body temperature will keep rising, possibly leading to heat stroke.

**HEAT STROKE:** The victim's temperature control system, which produces sweating to cool the body, stops working. The body temperature can rise so high that brain damage and death may result if the body is not cooled quickly. Signals include hot, red and dry skin, changes in consciousness, rapid, weak pulse, rapid, shallow breathing, very high body temperature, dilated pupils, decreased blood pressure, increasing dizziness and weakness, headache, nausea or vomiting, loss of appetite, and mental confusion. Call 9-1-1. Move the person to a cool place and cool the body. Wrap wet sheets around the body and fan it. Wrap ice packs in a cloth and place them on each of the victim's wrists and ankles, in the armpits and on the neck to cool the large blood vessels. If patient starts to shiver, slow down your cooling process, as shivering produces heat. Watch for signals of breathing problems and make sure the airway is clear. Keep the person lying down. Be prepared for convulsions, which occur with body temperatures at around 104 degrees Fahrenheit and produce great body heat.





# सावधानी बरतें, लू से बचें

## क्या करें, क्या न करें



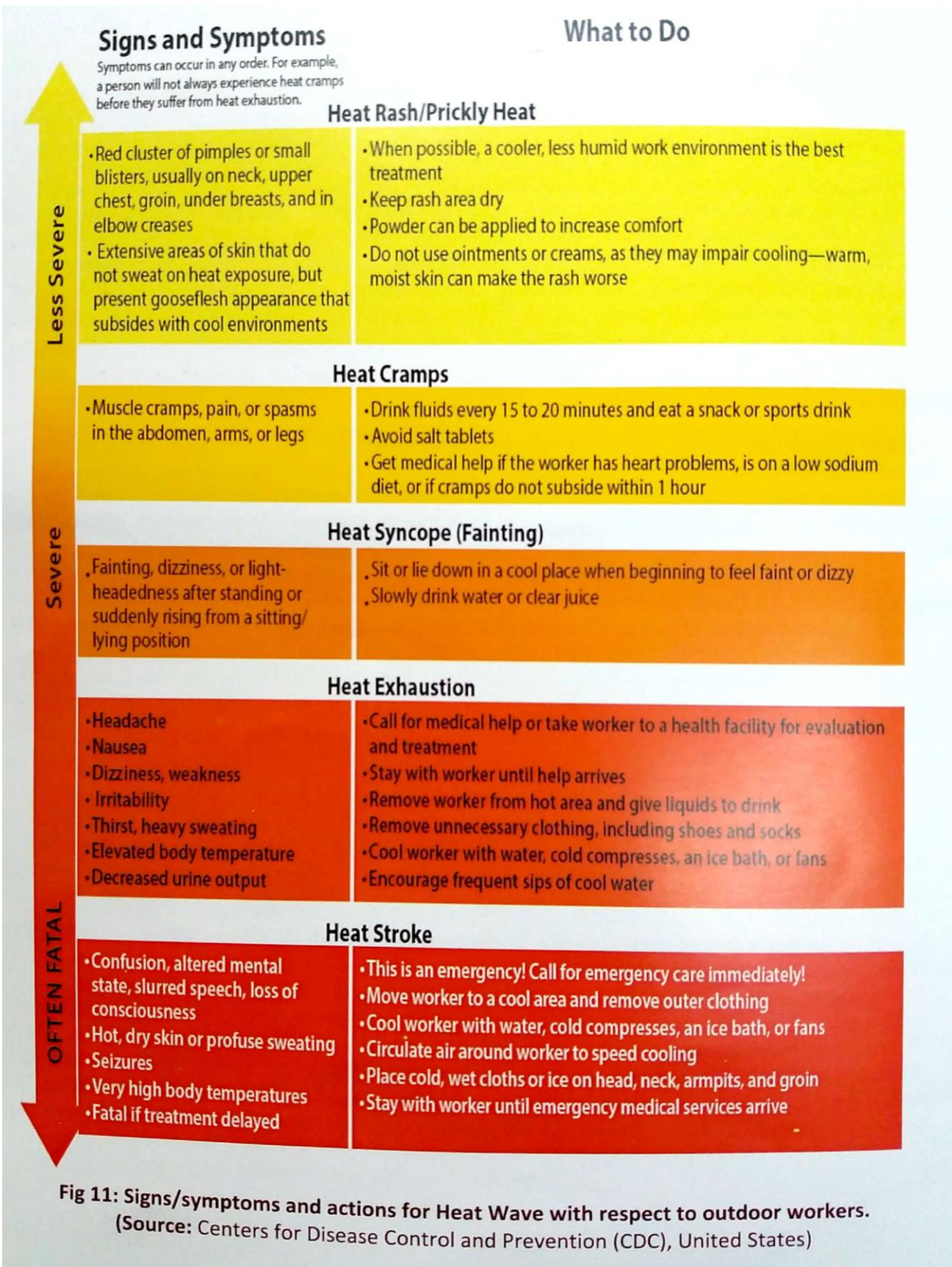
1. पर्याप्त मात्रा में पानी/तरल पदार्थ जैसे छाछ, नींबू का पानी, आम का पना का उपयोग करें।
2. यात्रा करते समय पानी साथ रखें।
3. निर्जलीकरण से बचने के लिए O.R.S. का प्रयोग करें।
4. संतुलित, हल्का व नियमित भोजन करें।
5. अधिक प्रोटीन वाले तथा बासी खाद्य पदार्थ खाने से बचें।



1. हल्के रंग के सूती एवं ढीले कपड़े पहने एवं सर को ढकें एवं कड़ी धूप से बचें।
2. विशेष तौर पर 12.00 बजे से 3.00 बजे अपराह्न के बीच सूर्य के ताप से बचने हेतु बाहर जाने से बचें एवं कड़ी मेहनत से बचें।
3. स्थानीय मौसम के पूर्वानुमान को सुनें और आगामी तापमान में होने वाले परिवर्तन के प्रति सतर्क रहें।
4. बच्चों व पालतू जानवरों को कभी भी बंद वाहन में अकेला न छोड़ें।
5. जहाँ तक संभव हो घर में ही रहें और सूर्य के सम्पर्क से बचें।
6. सूर्य के ताप से बचने के लिए जहाँ तक संभव हो घर की निचली मंजिल पर ही रहें।
7. जानवरों को छाया में बांधे और उन्हें पर्याप्त पानी पिलाएं।



1. लू से प्रभावित व्यक्ति को छाया में लिटाकर सूती गीले कपड़ों से पोछें अथवा नहलाएं तथा चिकित्सक से सम्पर्क करें।
2. लू लगने के लक्षणों को पहचानें, यदि कमजोरी लगे, सिर दर्द हो, उल्टी महसूस हो, तेज पसीना और झटका जैसा महसूस हो, चक्कर आए तो तुरन्त चिकित्सक से सम्पर्क करें।
3. बीमार और गर्भवती महिला कामगारों को अतिरिक्त सावधानी बरतनी चाहिए।
4. आपात् स्थिति से निपटने के लिए प्राथमिक उपचार का प्रशिक्षण लें।



**Fig 11: Signs/symptoms and actions for Heat Wave with respect to outdoor workers.**  
 (Source: Centers for Disease Control and Prevention (CDC), United States)