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# Medical Stakeholders Training Module

on

## Management of Heat Related Illness & Orientation to Heat Stress Action Plan

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Mr Rohit Magotra  
Deputy Director, IRADe

## PREFACE

The Medical Stakeholders Training Module On Management of Heat Related Illness & Orientation to Heat Stress Action Plan has been developed in collaboration with IIPH and is supported by the International Research Development Centre, (IDRC), Canada.

The Training Module provides an insight for the Medical stakeholders and practitioners into how heat stress can trigger gender specific health issues and enable them to understand how to identify the individual health impacts of heat stress and be able to more efficiently relay these concerns more effectively. The overall theme being, to raise awareness for the implications of heat stress amongst medical stakeholders and citizens while being informed on how to deal with this growing issue.

This Module is divided into 15 chapters. Chapters 1 and 2 deal with objectives and outcomes of the model, respectively, and chapter 3 provides an introduction into global climate change and rising temperatures with more specificity provided for India.

Additionally, chapter 5 assesses the vulnerability of certain social groups within India to heatwaves by looking at its impact on the less urbanized, those with minimal access to water and sanitation, and urban household amenities. Generally, it is the economically less fortunate who are disproportionately impacted. Chapter 8 highlights how medical facilities should navigate situations that may worsen the impacts of heat stress, and how to handle emergency situations resulting from heat stress that may burden their operational systems.

Moreover, Chapter 9 provides a framework to implement a Heat Action Plan and highlights the roles and responsibilities of medical officers and the health department. Chapter 11 examines the issues of heat exhaustion and heat stroke specifically while providing an in-depth chart on how to differentiate between the two and how to treat the respective issues. Chapter 12 provides insight on the methods by which the most vulnerable groups can manage heat related illnesses.

Chapter 13 provides a health advisory in order to prevent and manage heat stress by listing relevant do's and don'ts that should be followed. Finally, chapter 15 discusses Information Education and Communication (IEC) and highlights how hospitals can better utilize facilities and systems that already exists to expose individuals to impacts of heat stress and how to deal with it.

We hope that the in-depth analysis of this topic is appreciated as this project is a culmination of years of research and analysis. We hope that with this project medical stakeholders within the nation have access to an appropriate and viable framework that will allow them to educate and disseminate information regarding the externalities of rising temperatures and climate change to their patients and their families.

Mr Rohit Magotra  
Deputy Director, IRADe



## FOREWORD

With the ongoing and exponential threats to the environment, heat stress as an onset of climate change is an issue that will persist in India for many years to come. Developing a system by which critical medical stakeholders, patients and citizens have the necessary information to handle to mitigate the implications of climate change and heat stress is critical.

This module provides an insight into the effects of heat stress and the ways to deal with them. The increasing levels of urbanization coupled with externalities from industrial processes that contribute to climate change have made heat stress a significant issue. It is necessary to analyze the implications of heat stress which disproportionality effect people from economically lower strata that make up a large portion of the Indian population and have in place measures to deal with it.

The primary objectives of this module are to understand early warnings of heat waves, risks associated with it and the means by which information can be effectively disseminated. The manual tells how gender specific health effects arise due to heat waves. It focuses and how to implement effective heat wave management protocols during, before, and after a heat wave occurs. It provides insight on ways to prevent morbidity and mortality in heat stress patients while informing, educating, and training medical stakeholders on health externalities. Lastly, it aims to increase participation of medical stakeholders in addressing heat wave challenges.

The results of this module are the product of intense research on the impacts of heat stress on individual health, health systems and its stakeholders. This has been done by conducting vulnerability assessments, inspecting physical localities and social groups that are most at risk. Additionally, by addressing and examining the different degrees of sickness caused by heat stress, and providing remedies, a comprehensive action plan for medical stakeholders is presented. This action plan is the result of surveys conducted in three cities. The most vulnerable areas were detected through thermal mapping and questionnaires. Within the most vulnerable regions, a stratified random sampling technique was employed and three surveys, two fortnightly and one primary were conducted .

The overarching goal of this manual is to provide a framework that can be practically implemented by medical stakeholders to effectively treat heat stress related sickness while increasing awareness amongst citizens.

Prof. Jyoti Parikh  
Executive Director, IRADe

## EXECUTIVE SUMMARY

### Background

Heat stress is a significant issue that is only set to increase with detriments to the climate and the environment only developing from facets such as CO<sub>2</sub> emissions from industrialization and urbanization. The Intergovernmental Panel on Climate Change reported that all inhabited regions will face an increase in the frequency of hot extremes (IPCC, 2018). It is estimated that by 2100, 85 per 100,000 deaths globally will be induced by heat stress, this figure is 100 per 100,000 for lower income groups (Climate Impact Lab, 2019).

### Heatwaves

A period of 5 or more consecutive days where the daily maximum temperature exceeds the average maximum temperature by five degrees Celsius

World Meteorological Organization

### Objectives

1. Comprehend early warning alerts on heat wave, its risks and effectively communication
2. Understand that heat waves have gender specific health effects
3. Gain competence to Set up better heat wave management protocols in pre- heat wave, during heat wave and post heat wave
4. Prevent morbidity and mortality of the heat stress patients
5. Sensitise and train more medical professionals on heat waves and its health effects
6. Enhance participation of medical stakeholder in addressing heat wave challenges

Rising temperatures is a determinant of climate change and global warming, the impacts of such events span far and wide, from rising water levels to hindering global food security, but the impact of heat itself is morbid enough to be cause for concern. A significant portion of the population is susceptible to heat stress every day over the summer months, so large that with rising temperatures dealing with individual health impacts of heat stress could cause the healthcare system to collapse. Between 2010 to 2019 over 10,200 deaths have been recorded as a result of heat waves in India, this issue is exacerbated not only for India but other developing nations as well (NDMA).

Excessive periods of heat are denoted as heatwaves according to set standards that are dependent on their respective area. Vulnerability assessments allow for nodal officers and Urban Local Bodies to assess which localities and groups around them are most susceptible to heat stress. Through this, and by determining the degree of risk to that population, they will be able to adequately plan such that their medical infrastructures are not at risk of failing.

Within India, there are a plethora of social groups that are at a disproportionate risk as compared to the same social groups in more developed countries, such social groups include the economically less fortunate, elderly citizens, chronic disease patients, women, and working individuals. Certain areas that are susceptible include slums and low-income group neighborhoods. Moreover, creating a preventative framework is essential in mitigating risk to the individual and medical systems.

The module recommends that during the pre-heat season, hospitals should re-locate all vulnerable wards on high floors to cooler areas of the building, ensure that the hospital is always equipped with beds within the emergency wards to handle heat related illness. It also guides an increase of awareness and competency amongst staff for heat related issues by implementing multiday training modules on how to identify and treat the onsets of heat stress. Furthermore, during a heatwave, medical institutions should postpone non-emergency hospitalizations and surgeries, increase liquid oral and intravenous intake of patients, add a brief system in which patients are routinely checked for heat related illnesses, especially during the summer months. Finally, once the heatwave ends, hospitals should provide feedback on the module, and highlight key issues during heatwaves along with how they were, or can be, tackled to make them apart of institutional memory.

Conclusively, with the nature of heat stress being such that it is difficult to avoid, one of the key strategies within this module is to build public awareness and community outreach, thereby providing individuals with information on how to prevent and temporarily treat the heat related illnesses. Additionally, utilizing an Early Warning System will alert individuals on when to be more cognizant to the symptoms of heat stress and allow them to take appropriate action. Building the capacity of health care professionals to better treat and recognise the issue is required in combatting the heat stress on an institutional level. Also, collaboration between governments, hospitals, and NGOs can be utilized in order to map out the most vulnerable areas of the city and ensure the population has sufficient access to preventive measures such as cool, clean, drinking water.





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## LIST OF ABBREVIATIONS

ASHA	Accredited Social Health Activist
ACE	Angiotensin-converting-enzyme
ADH	Antidiuretic Hormone
DIC	Disseminated intravascular coagulation
IEC	Information Education and Communication
IMD	India Meteorological Department
GoI	Government of India
HAP	Heat Action Plan
HSAP	Heat Stress Action Plan
NDMA	National Disaster Management Authority
ORS	Oral Rehydration Salt
STGs	Standard Treatment Guidelines
UHC	Urban Health Center
ULB	Urban Local Body
UTI	Urinary Tract Infections
WMO	World Meteorological Organization

## 1. OBJECTIVES OF THE MODULE

The prime objective of training module is to improve knowledge of medical stakeholders on the aspects of heat waves and its implications on human health. It seeks to enhance enduring and efficient participation of medical sector in addressing heat wave.

This training module is designed for hospitals and the health care professionals engaged as health care practitioners (doctors/ nurses/ para medics etc.), involved in management and decision making process during heat waves. This module will also equip the non-medical professionals (public health departments/hospital administration/ volunteers) in addressing the health challenges emerging due to heat waves.

On completion of the module, the participants will

1. Comprehend early warning alerts on heat waves, its risks and effectively communicate it further
2. Understand that heat waves have gender specific health effects
3. Gain competence to Set up better heat wave management protocols in pre- heat wave, during heat wave and post heat wave
4. Prevent morbidity and mortality of the heat stress patients
5. Sensitise and train more medical professionals on heat waves and its health effects
6. Enhance participation of medical stakeholder in addressing heat wave challenges

## 2. OUTCOMES OF THE MODULE

After the completion of this module the participants will have:

1. Awareness about heat waves and its associated health impacts and build knowledge on the "epidemiologic methods" to treat heat stress patients especially women
2. Knowledge in planning and preparing for heat stress in hospitals/ health centres
3. Capacity to deal with the heat wave associated to other stakeholders in the medical sector.
4. Disseminate knowledge on heat wave and its impacts with other stakeholders in the medical sector.



Awareness



Planning &  
Preparedness



Capacity  
Building



Dissemination

### 3. INTRODUCTION TO CLIMATE CHANGE AND RISING TEMPERATURES

Climate Change is increasing in severity and frequency of extreme weather events and disasters. Extreme temperatures are among the most dangerous natural hazards, that seldom receives adequate attention. Extreme temperatures combined with high humidity and resultant atmospheric conditions adversely affect people living in these regions leading to physiological stress, sometimes even death. The Intergovernmental Panel on Climate Change (IPCC) projects that the frequency of heat waves (HWs) is likely to increase over most land areas in the twenty-first century. The recent special report on Global Warming of 1.5°C by IPCC concluded that the frequency of hot extremes will increase in all inhabited regions due to climate change (IPCC, 2018). The frequency and intensity of the extreme events have increased in the past decades and is likely to intensify in future due to human-induced climate change (Kunkel et al., 1999; Cowan et al., 2014; IPCC, 2014; Lau and Nath, 2014; Chapman et al., 2017). The World Meteorological Organization (WMO) records the six years since 2015 have been the warmest on record, with 2011-2020 being recorded as the decade<sup>1</sup>.

Heat stress induced deaths in 2100 are estimated to be about 85 per 100,000 globally<sup>2</sup> and above 100 per 100,000 in lower-income groups. According to the *Global Climate Risk Index 2020*<sup>3</sup>, countries in South Asia are among the most vulnerable globally to the impacts of climate change. India has recorded over 10,200 deaths between 2010 to 2019 due to heat waves<sup>4</sup>, but this is most likely the tip of an iceberg. Therefore, the actual deaths related to heat waves could be much more than estimated. The 2020 Lancet Countdown Report on Health and Climate Change reported that Vulnerable populations were exposed to an additional 475 million heatwave events globally in 2019, which was, in turn, reflected in excess morbidity and mortality. During the past 20 years, there has been a 53.7% increase in heat-related mortality in people older than 65 years, reaching a total of 296000 deaths in 2018<sup>5</sup>.

In India heatwaves typically occur between March to June, and in some rare cases even extend till July. Heat waves are more frequent over the Indo-Gangetic plains of India. The temperatures in excess of 46°C have been recorded in many parts of the country in the past, especially over north and central India. ( Implementation Report, IMD, 2019 <sup>6</sup>) In this season, it is an utmost priority to prevent heat related illnesses in the vulnerable population especially women children and elderly as well as the slum population. The need of the moment is to have a plan to help them for adaptation to the temperature changes.



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1. <https://public.wmo.int/en/media/press-release/climate-change-indicators-and-impacts-worsened-2020>  
2. Climate Change and Heat-Induced Mortality in India, Climate Impact Lab 2019  
3. Global Climate Risk Index 2020, Germanwatch  
4. Guidelines for Preparation of Action Plan – Prevention and Management of Heat-Wave 2017 by NDMA and Gol  
5. <https://www.thelancet.com/action/showPdf?pii=S0140-6736%2820%2932290-X>

With temperatures breaking records around the globe, cities and regions across the country are taking concrete action to be better prepared and protect local communities from deadly heat. There are a number of evidences suggesting that heat related risks could be reduced through systematic development of Heat Action Plans which include early warning system, community awareness and capacity building strategies of various stakeholders.

## 4. INTRODUCTION TO HEAT WAVES AND INTERPRETATION OF HEAT ALERTS

World Meteorological Organization (WMO) defines a heat wave as five or more consecutive days during which the daily maximum temperature exceeds the average maximum temperature by 5°C.

### 4.1 Criteria for Heat Wave

*Indian Meteorological Department, (IMD)*<sup>7</sup> considers heat wave conditions if maximum temperature of a station reaches at least 40°C or more for the plains, 37°C or more for coastal stations and at least 30°C or more for the hilly regions.

#### i. 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

#### ii. Based on Actual Maximum Temperature (for plains only)

- Heat Wave: When actual maximum temperature  $\geq 45^\circ\text{C}$
- Severe Heat Wave: When actual maximum temperature  $\geq 47^\circ\text{C}$

To declare a heat wave, the above criteria should be met at least in 2 stations in a Meteorological sub-division for at least two consecutive days and it will be declared on the second day.

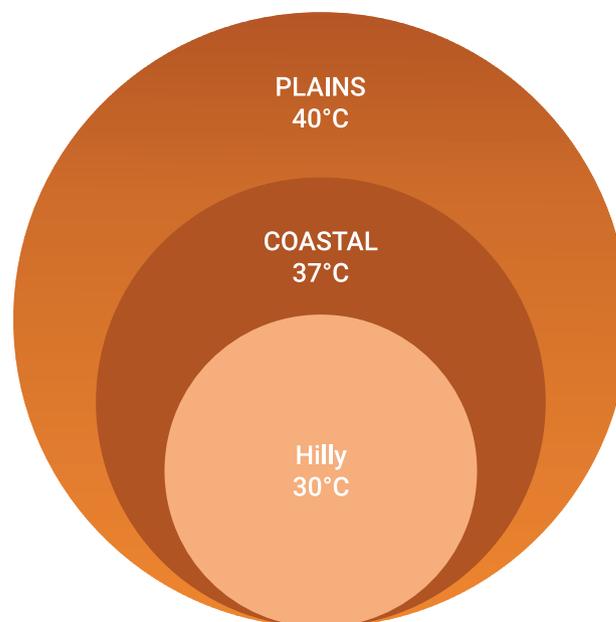


Figure 1: Regional Criteria for Heatwaves

6. <https://internal.imd.gov.in/section/nhac/dynamic/fdpheatreport2019.pdf>

7. <http://imd.gov.in/section/nhac/termglossary.pdf>

## 4.2 Colour Signals for Heat Alert

Based on the criteria for declaration of heat wave, the Heat Action Plan (HAP) has developed the early warning system with three colour based heat alerts.

These alerts are issued by the Nodal officer at the city level, based on the data received from IMD. Various departments then activate their channels and perform predefined activities(see details in the next section).

The health centres / hospitals appoint a **Nodal Officer** to head the Heat Action Plan. The officer is responsible for coordinating and communicating before and during extreme heat events, and support staff are provided. The Urban Local Bodies (ULB) issue heat alerts, based on thresholds determined by themselves, as an additional means of communication by using the following colour signal system.

Heat- Health Alerts

Green (No Action)	Normal Day	Maximum temperatures are near normal		
		Delhi	Bhubaneswar	Rajkot
Yellow (Be updated)	Hot day advisory	$\geq 40^{\circ}\text{C}$	$36.2^{\circ}\text{C}$	$40.5 - 43^{\circ}\text{C}$
Orange Alert (Be prepared)	Heat alert day	$\geq 45^{\circ}\text{C}$	$39.1^{\circ}\text{C}$	$43.1 - 44.9^{\circ}\text{C}$
Red Alert (Take Action)	Extreme heat alert day	$\geq 47.4^{\circ}\text{C}$	Above $41.4^{\circ}\text{C}$	$>45^{\circ}\text{C}$

Table 1: Heat Alert for the city of Delhi, Bhubaneswar and Rajkot

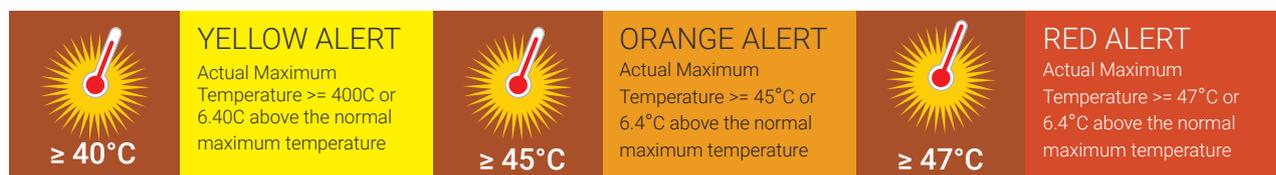


Figure 2: Colour System for Heat Alert

When actual temperature remain  $45^{\circ}\text{C}$  or more irrespective of normal maximum temperature, heat wave should be declared.

### 4.3 Heat Stress

Heat stress includes a series of conditions where the body is under stress from overheating. Heat-related illnesses include heat cramps, heat exhaustion, heat rash, or heat stroke, each with its own symptoms and treatments.

Heat Stress occurs not only due to high Day time temperatures (Maximum Temperature) but also above normal night temperature (Minimum Temperature) of 29°C. Health impacts of heat are more severe in urban areas, where residents are exposed to higher and nocturnally sustained temperatures due to the Urban Heat Island (UHI) effect (Climate Council of Australia, 2016).

#### Heat stress

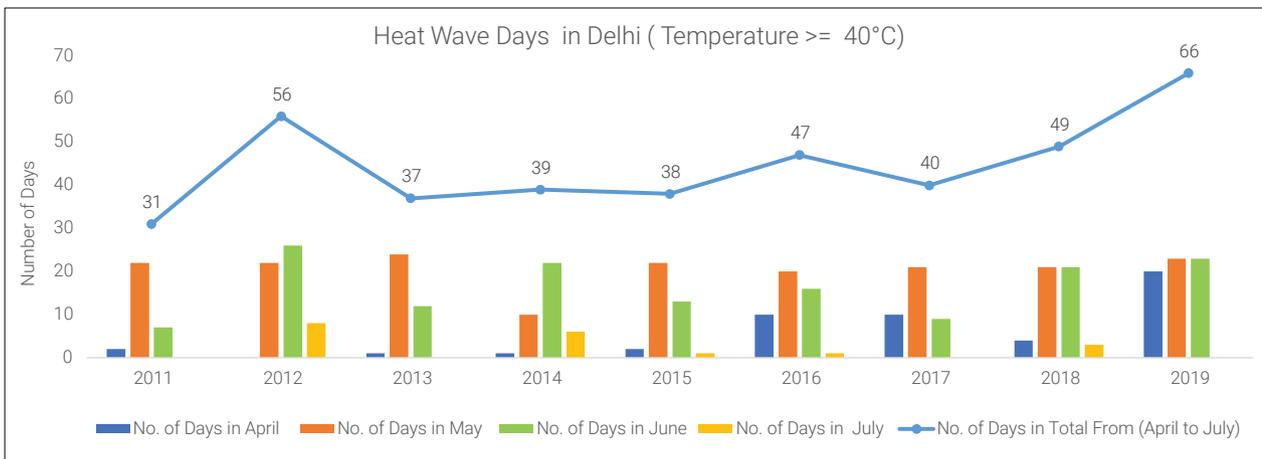
- Hot conditions put your body under a lot of stress.
- Heat stress is commonly associated with warm weather.
- When heat is combined with physical activity, loss of fluids, fatigue, and other conditions it can lead to a number of heat-related illnesses and injuries. Death is even possible.



Apart from the Maximum and Minimum Temperatures, Relative Humidity also influences the impact of heat wave. The temperature-humidity / Heat Index developed by US National Weather Services, measures of how hot it feels when relative humidity is factored in with the actual air temperature<sup>8</sup>.

#### Increase in Heat Wave Days

Heatwaves have increased in intensity, frequency and duration, along with the increased temperature and Relative Humidity, the number of Heat Wave days have also increased. For instance in case of Delhi the number of Heat wave days have increased by 35% from 49 days in 2018 to 66 days in 2019.



- Highest heat wave days have been recorded in 2012 and 2019
- The number of heat wave days have increased from 49 days (2018) to 66 days (2019) in 3 months (April, May, June) – increased by 35%

<sup>8</sup> <https://www.weather.gov/safety/heat-index>

### 4.4 Early Warning Systems

Heatwave Early Warning Systems with response plans are an approach to reduce the human health consequences of heatwaves. This involves forecasting the heatwave event, predicting possible health outcomes, triggering effective and timely response plans targeting vulnerable populations, notification of heatwave events, communication of prevention responses and evaluation and revision of systems<sup>9</sup>.

According to the WMO-WHO – Heat, Health Guidelines, 2015, there are two or three separate warning categories: a low-level announcement to warn the population of impending stressful weather; a higher-level issuance to warn people of the dangers to health, and the highest level of warning wherein variety of measures are adopted. In all cases, warnings must be disseminated rapidly to the public and responsible stakeholders or the effectiveness of the HHWS is greatly diminished (WMO, 1999). The early warning system can work on some parameters like the HI or Humidex thresholds, heat-budget model, based on the perceived temperature, Synoptic-based systems, in which multiple parallel systems are run simultaneously.

The Indian Meteorological Department, GoI, has also initiated Heat Wave Warning Services to monitor, predict and provide impact-based forecast and risk-based warnings and support the implementation of the Heat Action Plans, while supporting R&D to improve heat wave forecasting and warning. Refer to Weblink <https://mausam.imd.gov.in> for more details.

The various prediction and warning mechanisms include:

Warning Mechanisms	Information Provided / Temperature Forecast	Information For
Seasonal Outlooks	Provides Information on maximum and minimum temperatures for Summer Months (March, April & May)	Country level
Extended Range Forecasts	Provides Information on maximum and minimum temperatures for 2 weeks	Country Level
Medium Range Forecasts	Colour coded warning issued daily for up to 5 days	36 Meteorological sub-divisions and 739 districts
City Forecast for ~ 470 cities/ towns	Maximum and Minimum temperatures and Heat Wave for up to 5 days	470 cities/ towns

The following image (Figure 3) provides a sample for the City Forecast for Rajkot city

<sup>9</sup> Ebi K.L., Teisberg T.J., Kalkstein L.S., Robinson L., Weiher R.F. Heat watch/warning systems save lives: Estimated costs and benefits for Philadelphia 1995–98. Bull. Am. Meteorol. Soc. 2004;85:1067–1073.



## 5. VULNERABILITY ASSESSMENT

A heat wave may lead to both direct or indirect impacts on human health. These impacts are influenced by interactions between medical, environmental, demographic and geographical factors, which may further compound health related effects.

While it is clear that all people are at risk of illness and deaths due to exposure to hot temperatures, there are certain sub-groups that are highly vulnerable in comparison. Similarly, some areas of a city bear the brunt of heat waves more than remaining parts. Vulnerability assessment for heat waves have to take into account both geographical area and vulnerable populations.

A heat wave health vulnerability assessment allows health department/ medical stakeholders to better understand and identify people and places that are more likely to face adverse health impacts. It further helps in implementing targeted public health interventions and minimize health-heat risks.

The table below illustrates vulnerability mapping and its essential components.

Vulnerability Mapping	
Vulnerable areas include	Vulnerable groups include
Less urbanized	Economically weaker sections
Minimal access-water and sanitation,	Elderly, Children, Women
Minimal household amenities	Working individuals – construction workers, factory workers, transport, sweepers, laborers and vendors/street hawkers



Figure 4: Vulnerability Mapping for Heat Wave

## 6. VULNERABLE AREAS IN CITY DURING HEAT WAVE

Hot temperatures during a heat wave often result in some parts getting much hotter than rest the city. The air, surface and soil temperatures influence the overall temperature Hence, it is important to identify beforehand such areas to minimize any potential health impact.

The spatial documentation of heat related health risks in addition to the biophysical vulnerabilities will help policy, planners, medical stakeholder etc. in developing heat preparedness plans at local scale /ward level.

Vulnerable areas within the city are classified as under:

### 6.1 Slums Pockets & Squatter Settlements

The economically weaker section of people in these areas are affected much more due to their poor coping mechanisms and limited ability of the inhabitants especially women to respond to health challenges during hot temperatures. The nighttime outdoor microclimatic conditions along with poor housing structure and no access to services make it extremely difficult for people to cope with heat stress. Consequently, acutely affecting the health of people living in these areas. The women of these areas face its brunt the most as they not only have to deal with heat wave but also have to make arrangement for services such as water etc.

### 6.2 Low-income group Areas

People living in these areas constantly suffer from heat stress due to poor built up environment, limited access to basic services and housing material that are good at absorbing and storing the sun's heat. It has been observed that people living in higher floors with poor ventilation and bad housing material are more vulnerable to heat related impacts. People with disabilities and chronic diseases are worst sufferers. Women cannot even leave their front door open for safety and security reasons.

### 6.3 Heat Wave Vulnerable Hotspots

The hotspots identified during the vulnerability assessment of heatwaves undergo significant rise in temperatures as compared to rest of the city. These areas are most likely to have higher number of inhabitants being affected during heat waves and experiencing huge heat-health implications.

## 7. VULNERABLE GROUPS DURING HEAT WAVE

A heat wave has varied health outcomes, with specific group of people being more vulnerable to heat related mortality and morbidity. Among these are, infants, children, woman, elderly, construction workers and people from economically weaker sections.

Identifying such groups is important as it allows medical professionals to prioritize actions to treat heat related illnesses effectively in order to minimize potential threats.

The vulnerable groups are as follows:



Figure 5: Vulnerable groups during heat wave

## **7.1 Infants (0-1 years)**

They are particularly sensitive to heat due to different metabolism and poor ability to adjust to changes in temperatures. The infants sweat less which considerably decreases their ability to cool their body. Infants are more susceptible to heat related deaths due to their high metabolism rate and inability to remove sheets or clothing.

## **7.2 Children (1-14 Years)**

They are physiologically more vulnerable to heat stress unlike adults. Heat related illnesses are associated with their physical activity, production of more metabolic heat/ kilogram, in comparison to their body weight, dehydration and lower cardiac output. Henceforth, strict vigilance is required during a heat wave to avoid any heat related sickness and overheating among them.

## **7.3 Woman**

They are more at risk for heat related mortality. They are vulnerable to heat stress as their ability to thermoregulate is compromised. There are increasing evidences of still birth among pregnant women due to Heat Stress. Their heat related illnesses are further intensified due to social norms and gender discrimination.

## **7.4 The Elderly**

They are at a great risk to morbidity and mortality during heat wave. With growing age there is considerable reduction in the cardiac output and capacity to circulate blood to skin, intestinal and renal circulatory beds. Aging compounds these problems which reduces the efficiency of heat dissipation in them.

## **7.5 Working Individuals**

They perform activities both indoors and outdoors in farms, manufacturing and construction and hence are at greater risk to dehydration and heat stress. Their capacity to thermoregulate exceeds on a regular basis and exposure to heat for long duration leads to dehydration, compromises abilities to carry out normal activities, chronic kidney disease, cardiovascular and pulmonary illnesses. The cultural aspects such as clothing and use of Personal Protective Equipment (PPE) may also hinder a worker's ability to cool through sweat.

## **7.6 Economically Weaker Sections of Society**

They often lack awareness and the means to undertake any measures for protecting themselves against heat related illnesses. Most suffer from chronic diseases which often get aggravated during heat wave. Poor quality housing, lack of access to basic services such as water, health services and sanitation, compounds their vulnerability during.

## **7.7 People with Disabilities**

They are highly vulnerable to heat waves as their ability to receive or respond to heat alerts is substantially reduced. In certain cases, such as spinal cord injury, the body does not sweat, inhibiting the body's ability to cool from overheating. Besides, any form of physical or mental disability adds to their vulnerability. In addition, high social risk factors, such as household pattern, poor health conditions, food insecurity and housing instability, likewise further adds to these challenges. It

has been observed that heat wave messages are not always designed in a way that makes it easy for people with disabilities to comprehend. For example, people with hearing impairment, visually challenged or reduced mental health have to depend on their caregivers.

## **7.8 Chronic Disease Patients**

They are most likely to face the heat stress. Their medication not only impacts their ability to gauge changes in temperatures but also can make effect of hot temperatures even worse. Patients with conditions of heart diseases, mental illnesses, poor blood circulation and obesity are more at the risk of heat related illnesses. Overweight people often tend to retain body heat which makes them vulnerable to heat stress and its associated impacts.

## **8. PREPAREDNESS FOR HEAT STRESS RELATED EMERGENCIES**

### **8.1 Need for an emergency preparedness**

Heat waves precipitate emergency situations in people that require urgent medical attention to avoid fatality. Such situations inevitably lead to a rapid increase in demand for hospital services which ultimately has a crippling effect on operational capacities. This calls for deployment of a quick response plan that works to deal with such emergencies effectively while not overwhelming the general health facility.

### **8.2 Understanding emergency preparedness**

Emergency preparedness for heat waves in hospitals refers to the steps taken to respond effectively during heat wave emergency situations by giving adequate emergency medical care. This would require continuous planning, coordination, capacity building, monitoring, appraising, and acting in accordance with the procedures laid down along with collaborative efforts of all the stakeholders.

The hospital emergency preparedness plan should generally take into account all aspects of heat waves including protocols to be followed before, during and after a heat wave.

### **8.3 Pre- Heat Season**

1. Create and implement gender- sensitive heat health guidelines on the recognition and treatment of heat stress, heat exhaustion, and heat stroke to reduce and prevent mortality and morbidity.
2. Set up a steering committee to supervise, monitor emergency preparedness, dealing with inflow of patients during heat wave and post heat wave evaluation.
3. Ensure adequate storage of IVs, ORS, and other medicines.
4. Ensure bed availability, especially in emergency departments and special wards for heat related illness, especially among women.
5. Establish Cool Wards within the hospital Identify and relocate the most vulnerable hospital wards (e.g., the maternity or neonatal ward) from the top floor , where temperature build up is usually the highest. Move patients to cooler floors/parts of the building.
6. Measure wards' morbidity and mortality rates before and after location change to evaluate the effectiveness of intervention.

7. Increase staffing--medical doctor and paramedical staff to ensure preparedness in case of increase in admissions.
8. Extensive use of IEC materials including posters and pamphlets, Heat Advisories for training and communication regarding heat warnings and provide advisories to prevent heat stress.
9. Develop training modules or multiday trainings for health care providers, ward leaders, and paramedics on extreme heat and health, as well as specific heat case management and diagnosis, especially during heat waves.
10. Organizing a Training of Trainers for primary medical officers so they can offer heat-specific advice (symptoms, diagnosis, and treatment including self-monitoring hydration) to their medical staff.
11. Conduct workshops for link workers/frontline health workers (ASHA; Anganwadi workers, community health workers) to increase gender sensitive outreach and community-based surveillance for heat illness in slum communities. Link workers should receive informational materials with ways to counsel patients especially women, threshold temperatures to be apply for different levels of treatment, and following surveillance protocols.
12. Collaborate with the medical service providers/ research institutes to train emergency service professionals on responding to extreme heat emergency cases.
13. Increase heat stress outreach and education for women in maternity wards before they leave the hospital, since newborns are particularly vulnerable to heat stress.
14. Update heat wave monitoring and management protocols and programs, including tracking of daily gender-based heat-related data as per the monitoring sheet template shared in Annexure.

#### **8.4 During Heat Season**

1. Adopt gender specific heat-focused examination procedures at local hospitals and Urban Health Centres (ASHA; Anganwadi worker; community health workers). Make it a routine to examine admitted patients for signs and symptoms of heat related illnesses adding a brief procedure during the peak-heat summer months. The basic statistics of such patients should be recorded to identify the locations, occupations, gender and socioeconomic status of city's residents most vulnerable to heat stress and illness.
2. If possible, postpone non-emergency hospitalizations and surgeries.
3. Ensure high risk patients are placed in rooms with air conditioning; less critical patients should at least have access to an area with air conditioning/air circulation during the hottest hours of the day.
4. Increase liquid oral and intravenous intake of patients.
5. Modify diet with increased intake of fruit and vegetables.
6. Adjust patient bed and personal clothing according to need.
7. Start special and adequate health and social assistance for hospital discharge of high risk patients, especially new mothers with babies or postpone discharge till heat wave subsides.
8. Ensure availability of adequate number of Medical Mobile Vans in high risk areas
9. Maintain records of heat wave patients and report to Urban Local Body (ULB) on a daily basis according to monitoring sheet.
10. Expedite recording of causes of deaths mentioned / documented on death certificates.

## 8.5 Post-Heat Season

1. Share final gender disaggregated data based hospital admissions as per indicators set for reporting during heat wave with the Urban Local Body (ULB)
2. Give feedbacks in annual evaluation of heat action plan
3. Prepare a set of key learnings during heat wave to build on institutional memory and share it with other stakeholders

Pre-Heatwave	During a Heatwave	Post-Heatwave
<ul style="list-style-type: none"> <li>• Create and implement gender-based heat health guidelines on the diagnosis and treatment of heat stress, heat exhaustion, and heat stroke to reduce and prevent mortality and morbidity</li> <li>• Ensure adequate storage of IVs, ORS and other medicines for heat stress treatment.</li> <li>• Establish Cool Wards within the hospitals</li> </ul>	<ul style="list-style-type: none"> <li>• Adopt gender specific heat-focused examination procedures at local hospitals and Urban Health Centers</li> <li>• Ensure availability of adequate number of Medical Mobile Van in high-risk areas of heat waves</li> <li>• Ensure high risk patients are placed in rooms with air conditioning; less critical patients should at least have access to an area with air conditioning during the hottest hours of the day</li> </ul>	<ul style="list-style-type: none"> <li>• Share final data of gender based hospital admissions as per indicators set for reporting during heat wave with the Urban Local Body (ULB)</li> <li>• Give feedbacks in annual evaluation of heat action plan</li> <li>• To prepare a set of key learnings during heat wave to build on institutional memory and share it with other stakeholders</li> </ul>

## 9. IMPLEMENTATION OF HEAT STRESS ACTION PLAN

### ROLES AND RESPONSIBILITIES OF HEALTH DEPARTMENT AND MEDICAL OFFICER

'Heat wave' is not a notified disaster at national level in the country. , Accurate information and data related to heat wave deaths and illnesses is not available. In order to take appropriate action, both mortality data and weather data should be gathered, compared and correlated. Development of a heat action plan guides officials to get clarity on their role for developing coordinated response.

The Heat-Wave Action plan aims to provide a framework for implementation, coordination and evaluation of extreme heat response activities in cities/town that reduce negative impact of extreme heat. The Plan's primary objective is to alert citizens, especially vulnerable groups, at risk of heat-related illness in places where extreme heat conditions are prevalent or imminent to take appropriate precautions. Preventive heat management and the administrative action needs to be taken by the concerned departments. Cities can learn from their experience and develop a plan to deal with Heat waves to reduce negative health impacts of extreme heat. In addition, along with the city level, Heat Stress Action Plans needs to be adapted at state level to combat Heat wave.

Extreme heat planning includes<sup>11</sup>:

1. Identifying heat wave hotspots and vulnerable populations, especially woman, and the health risks specific to each group;
2. Developing effective strategies, agency coordination, and response planning to addresses heat-health risks;
3. Implementing Heat Action Plan and activating heat alerts; and
4. Evaluating and updating the Heat Action Plan regularly.

#### 9.1 Key Strategies

Heat Stress Action Plans are intended to mobilize people and communities to help protect themselves, their neighbours, friends, and relatives against health problems during hot weather spells. Broadcast media and alerting agencies may find it useful. Severe and extended heat-waves can result in disruption of general, social and economic services. For this reason, government agencies have a critical role to play in preparing and responding to heat-waves at the local level, working closely with health and other related departments on a long term strategic plan.

1. ***Building Public Awareness and Community Outreach*** to communicate the risks of heat waves and implement practices to prevent heat-related deaths and illnesses. Disseminating public messages to protect people against extreme heat through media and informational materials, such as pamphlets and advertisements on heat stress prevention. Efforts should include use of SMS, and social media application such as WhatsApp, , email, and radio. Special efforts have to be made to reach out to vulnerable populations, including women, through inter-personal communication as well as other outreach means.
2. ***Utilizing an Early Warning System and Inter-Agency Coordination*** to alert residents of forecasted high/extreme temperatures. The IMD shares a daily five-day forecast with the Heat Action Plan Nodal Officer during the heat season. This will create formal communication channels to alert governmental agencies, the Meteorological Centres, health officials and

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11. State of Victoria Department of Human Services, "Heatwave Planning Guide: Development of heatwave plans in local councils in Victoria [Australia]," 2009, <http://www.health.vic.gov.au/environment/climate/heatwave.htm>.

hospitals, emergency responders ( like the officers at the Municipal Health Department, city level Disaster Management cells likewise), local community groups, and media.

3. **Capacity Building Among Health Care Professionals** to recognize and respond to heat-related illnesses, particularly during extreme heat events. The trainings focus on primary medical officers, paramedical staff, and community health workers so that they can effectively prevent, manage heat-related cases, and reduce mortality and morbidity.
4. **Reducing Heat Exposure and Promoting Adaptive Measures** by undertaking new efforts like mapping of high-risk areas of the city, increasing outreach and communication of preventive measures, and ensuring access to potable drinking water and cooling spaces. Collaboration with non-governmental organizations is a means to expand outreach and communication with the city's most at-risk communities.

## 9.2 Implementation of Heat Action Plan:

### i. Phase 1: Pre-Heat Season (Annually from January through March)

#### ULB Nodal Officer:

1. Convene leaders of key agencies to respond to extreme heat events.
2. Engage state and local agencies to facilitate smooth internal communications.
3. Organize preventative trainings and outreach for health workers, link workers, school children, and the local community with the Health Department.
4. Distribute multilingual pamphlets and posters with tips to prevent heat stress in hospitals, schools, and professional associations (see pamphlets attached).
5. Create a list of the high-risk areas vulnerable to heat waves in the city for more targeted activities of heat prevention.

#### ULB Health Department and Medical Professionals

1. Enhance gender targeted training programs, capacity building and communication on heat illness for medical staff at local hospitals and Urban Health Centres (UHCs), based on the Framework of ULB Medical Professionals and Health Workers. These efforts should include nursing staff, paramedics, field staff and link workers, and considering the susceptibility of particular wards.
2. Have hospitals update their admissions and emergency case records to track heat-related morbidity and mortality. Train hospitals to record the of cause in the death certificates. Explore creation of simple, user-friendly means to track daily heat-related data and behavioral change. The training could include use of information education and communication (IEC) efforts.
3. Adopt heat-focused examination procedures at local hospitals and urban health centres.
4. Purchase and distribute reusable soft plastic ice packs for Urban Health Centres (UHC), 108 Emergency Service, ambulances and hospitals.
5. Explore creation of ice pack dispensaries to increase access to vulnerable communities.



## 108 Emergency Service

1. Create displays on ambulances before and during local events to build public awareness.
2. Identify at-risk areas of vulnerable populations, in part by utilizing the list of high-risk areas.

### ii. **Phase 2: During the Heat Season** (Annually from March through July)

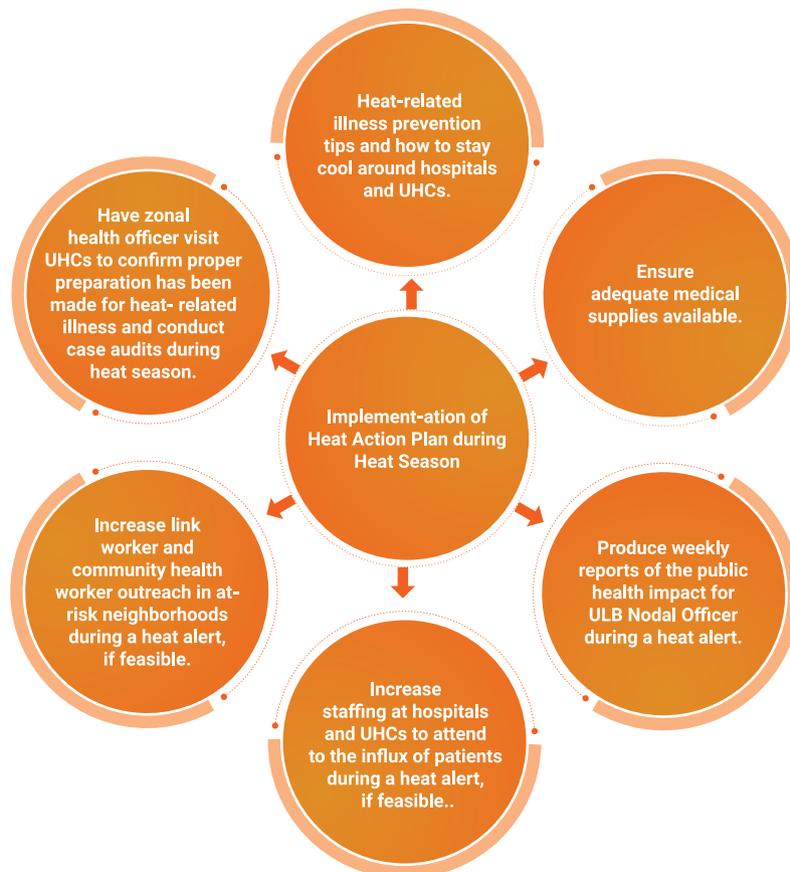
#### ULB Nodal Officer

1. Activate a **heat alert** and the local response citywide when extreme heat events are forecast by notifying the leaders of key agencies, Deputy Municipal Commissioners in the ULBs and state agencies, in accordance with the Communication Framework. Special measures should be taken to ensure that heat alerts reach people with disabilities and women.
2. Monitor and increase the **heat alert** level when necessary to match the severity of the forecast and established threshold, and have Municipal Commissioner convene a special meeting with key agency leaders.
3. Activate “cooling centres,” such as temples, public buildings, malls, during a **heat alert** and/or the ULB run temporary night shelters for those without access to water and/or electricity.
4. Expand access to shaded areas and shelters for outdoor workers, slum communities, and other vulnerable populations. For example, ensure that night shelters stay open all day and not only during the night for migratory populations during a **heat alert**.
5. Hold frequent, possibly daily, meetings to discuss reports and breaking developments during a **heat alert**, and ensure that communication channels remain operational.

6. Display current temperatures and forecasts publicly using LED electronic scrolling boards.
7. Continue monitoring temperature data and forecasts.
8. Communicate suspension of all non-essential uses of water (other than for drinking and cooling purposes) via the ULB's Water Project's protocol procedures during water shortage.
9. Increase access to fresh drinking water for the public. For example, expand potable water access during a **heat alert** at religious places like temples and mosques, hand out drinking water bottles to the needy in the high-risk areas (identified by the mapping of high-risk areas) and also encourage community to set up drinking water stations or kiosk across the city.
10. Communicate the Urban local bodies and electricity supply departments to prioritize and maintain power supply to critical facilities (such as hospitals and UHCs).
11. Notify the Urban Local Bodies and relevant agencies when the **heat alert** is over.

### ULB Health Department and Medical Professionals

1. Share heat-related illness prevention measures in hospitals and UHCs.
2. Ensure adequate medical supplies are available.
3. Produce weekly reports for the ULB Nodal Officer during a **heat alert**.
4. Increase staffing in hospitals and UHCs to attend to influx of patients during a **heat alert**.
5. Increase outreach through link workers and community health workers in at-risk neighborhoods during a **heat alert**.
6. Have zonal health officer visit UHCs to ensure preparations are in place for heat-related illness and conduct case audits during the heat season (Template provided in Chapter 08).



## 108 Emergency Service

1. Ensure adequate supply of ice packs and IV fluids.
2. Disseminate SMS / WhatsApp text messages to warn local residents during a **heat alert**.

### **Phase 3: Post-Heat Season** (Annually from July through September)

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#### **Nodal Officer**

1. Organize an annual Heat Action Plan evaluation meeting with key agency leaders and relevant stakeholders.
2. Evaluate the Planning process based on performance and revise accordingly.
3. Evaluate the reach and impact of the Plan and revise accordingly.
4. Evaluate effectiveness of the IEC material on heat waves in the communities. Explore other ways of reaching out to citizens for information dissemination. Posts revised Plan on the ULB website before the heat season.
5. Build "Green Cover" through tree-plantation campaigns in hotspot areas such as roadsides and during Vanamahotsav, the annual one-week tree planting festival in observed in the first week of July.
6. Incorporate student volunteers or incentivize builders to plant trees to help effect this effort.
7. Discuss establishing cooling centers facilities in high-risk areas around city.

#### **ULB Health Department and Medical Professionals:**

1. Perform an epidemiological case review of heat-related mortalities during the summer.
2. Conduct and gather epidemiological outcomes from the data on heat risk factors, illness and death, based on average daily temperatures.
3. Incorporate data and findings into future versions of the Heat Action Plan.
4. Measure mortality and morbidity rates based on data before and after the Plan's interventions.



## 10. CLASSIFICATION OF HEAT STRESS - CLINICAL SYMPTOMS AND TREATMENT

Heat-related stress range from minor to life-threatening, depending upon health status of individual (physiological condition) and exposure (intensity, frequency and duration). Heat Stress can be classified in the following five<sup>12</sup> types.

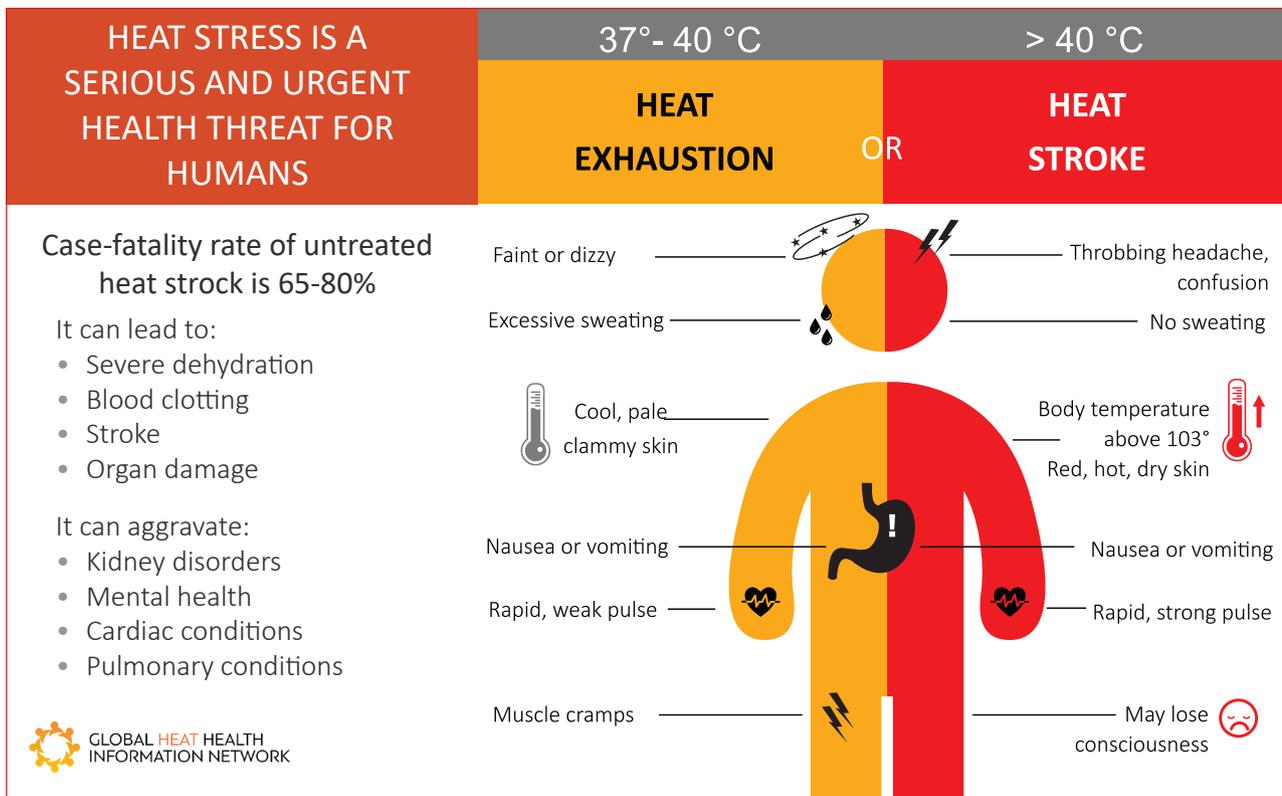
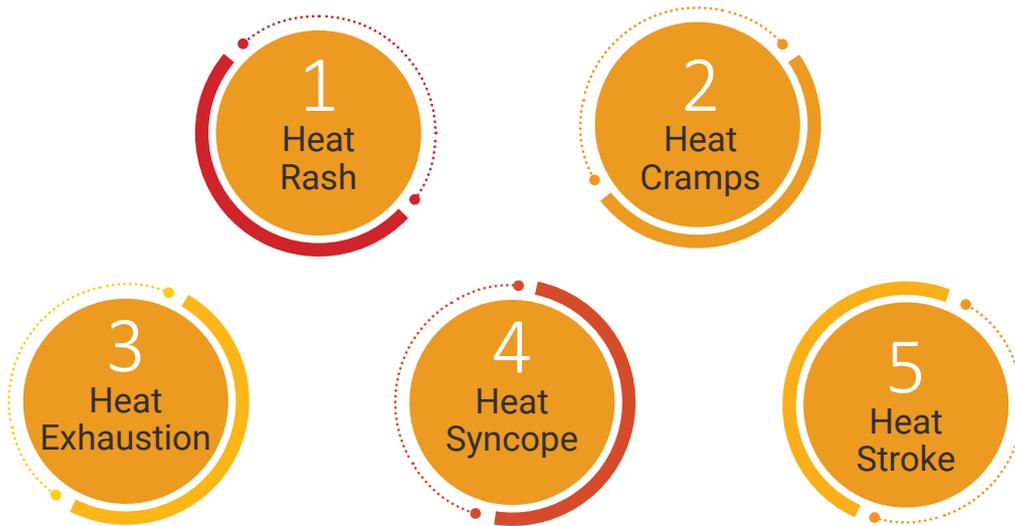


Figure 6: Heat Exhaustion and Heat Stroke due to Heat Stress

## 10.1 Heat Rash

Heat rash is a skin irritation caused by excessive sweating during hot, humid weather. Usually appears on the neck, upper chest, groin, under the breasts, and in elbow creases.



Figure 7: Heat Rashes

**Signs:** Diffuse, pruritic, maculopapular or vesicular rash in the setting of heat exposure, often with insulating clothing or swaddling.

**Symptoms:** Itchy Rash with small red bumps at pores in setting of heat exposure; bumps can sometimes be filled with clear or white fluid.

**Prognosis:** Full recovery with elimination of exposure and supportive care.

**Treatment:** Avoid hot, humid environments and try to move to cooler, less humid conditions. Keep the affected area dry, and wear light, loose clothing. Talcum powder may be used to increase comfort and avoid using ointments or creams because they keep the skin warm and moist and may make the condition worse. Treating heat rash is simple and usually does not require medical assistance.

## 10.2 Heat Cramps

Heat Cramps are painful muscle cramps occurs due to low salt level in muscles. Excessive sweating and dehydration results in low salt level.



Figure 8: Heat Cramps

**Signs:** Painful contractions of frequently used muscle groups in the setting of heat exposure, often with exertion.

**Symptoms:** Uncomfortable appearance may have difficulty fully extending affected limbs /joints with pain.

**Prognosis:** Full recovery with elimination of exposure and supportive care.

**Treatment:** Stop physical activity and move to cool place. Drink plenty of water with ORS (Oral rehydration salts). Gently massage on the contracted muscle. Use analgesic medicines if pain is severe and persistent.

### 10.3 Heat Exhaustion

Heat Exhaustion is body's response to excessive water and salt loss through excessive sweating due to heavy physical exertion in hot environment.



Figure 9: Heat Exhaustion

**Signs:** Sweaty/Diaphoretic; Flushed skin; hot skin; normal core temperature; +/- dazed, +/- generalized weakness, slight disorientation.

**Symptoms:** Feeling overheated, lightheaded, exhausted and weak, unsteady, nauseated, sweaty and thirsty, inability to continue activities. A normal or mildly elevated body temperature, heavy sweating, pallor (paleness), muscle cramps and muscle pain, fatigue, weakness, dizziness and lightheadedness, headache, and nausea.

**Prognosis:** Full recovery with elimination of exposure and supportive care; progression if continued exposure.

**Treatment:** Move to a cool place, loosen your clothes, put on cool, wet clothes on your body or take a cool bath, Sip plenty of water with ORS.

### 10.4 Heat Syncope

Syncope means fainting or dizziness that occurs due to heat, either during prolonged standing, exercising, or when rapidly standing up from a lying or sitting position. It typically occurs in individuals who are not acclimatized to heat. Dehydration can also contribute to this condition.



Figure 10: Heat Syncope

**Signs:** Brief generalized loss of consciousness in hot setting, short period of disorientation if any.

**Symptoms:** Feeling hot and weak; light-headedness followed by brief loss of consciousness dizziness or lightheadedness, and fainting.

**Prognosis:** Full recovery with elimination of exposure and supportive care, progression if continued exposure.

**Treatment:** Sit and rest in a cool place. Lie down and elevate the legs above the level of the heart. Drink water or a sports beverage (like Tang, Electrolyte powder, likewise). Seek immediate medical attention for repeated episodes of fainting, or if experiencing chest pain, seizures, or confusion.

## 10.5 Heat Stroke

Heat Stroke is most severe form of heat related illness which can sometimes lead to death or permanent disability if not treated at the right time. It is a medical emergency, requires immediate hospitalization. When heat stroke occurs, the body temperature can rise to 106°F or higher within 10 to 15 minutes. It occur when thermoregulatory mechanisms fails.



Figure 11: Heat Stroke

**Signs:** Flushed dry skin (not always), core temperature  $\geq 40$ -degree C, (103°F or higher), altered mental status with disorientation, possibly delirium, coma, seizures, tachycardia, +/- hypotension

**Symptoms:** Severe overheating, profound weakness, disorientation, obtundation, seizures or other altered mental status. High body temperature Hot red dry or damp skin, fast strong pulse, headache, dizziness, nausea, confusion, lack of sweat in armpits, losing consciousness (passing out) The classic symptoms of heat stroke are high fever, lack of sweat, and loss of consciousness.

**Prognosis:** 25-50% mortality even with aggressive care, significant morbidity if survived  
**Treatment:** Immediate hospitalization, plenty of IV fluids, sponging with ice packs and cold water, if possible patient should be in air conditioned room. Treatment according to complications. Details on required treatment is given in following section.

Table 4: Heat Illness- Typical Presentations

Clinical Entity	Age Range	Setting	Cardinal Symptom	Cardinal Signs	Pertinent Negatives	Prognosis
Heat Rash	All, But frequently children	Hot environment; +/- insulating clothing or swaddling	Itchy Rash with small red bumps at pores in setting of heat exposure; bumps can some-times be 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 hemorrhages	Full recovery with elimination of exposure and supportive care
Heat Cramps	All	Hot environment typically with exertion; +/- insulating clothing or swaddling	Painful spasms of large and frequently used muscle groups	Uncomfortable appearance may have difficulty fully extending affected limbs /joints	No contaminate wound/tetanus exposure; no seizure activity	Full recovery with elimination of exposure and supportive care
Heat Exhaustion	All	Hot environment; +/- exertion; +/- insulating clothing or swaddling	Feeling overheated, lightheaded, exhausted and weak, unsteady, nauseated, sweaty and thirsty, inability to continue activities	Sweaty/Diaphoretic; flushed skin; hot skin; normal core temperature; +/- dazed, +/- generalized weakness, slight disorientation	No coincidental signs and symptoms of infection, no focal weakness, no aphasia, / dysarthria, no overdose history	Full recovery with elimination of exposure and supportive care; progression if continued exposure
Heat Syncope	Typically, adult	Hot environment; +/- exertion; +/- insulating clothing or swaddling	Feeling hot and weak; light-headedness 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
Heat Stroke	All	Hot environment; +/- exertion; +/- insulating clothing or swaddling	Severe overheating, profound weakness, disorientation, obtundation, seizures or other altered mental status	Flushed dry skin (not always), core temperature $\geq$ 40-degree 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

## 11. HEAT EXHAUSTION AND HEAT STROKE- DIAGNOSIS AND TREATMENT PROTOCOL

### 11.1 Heat illness –treatment protocol <sup>13</sup>

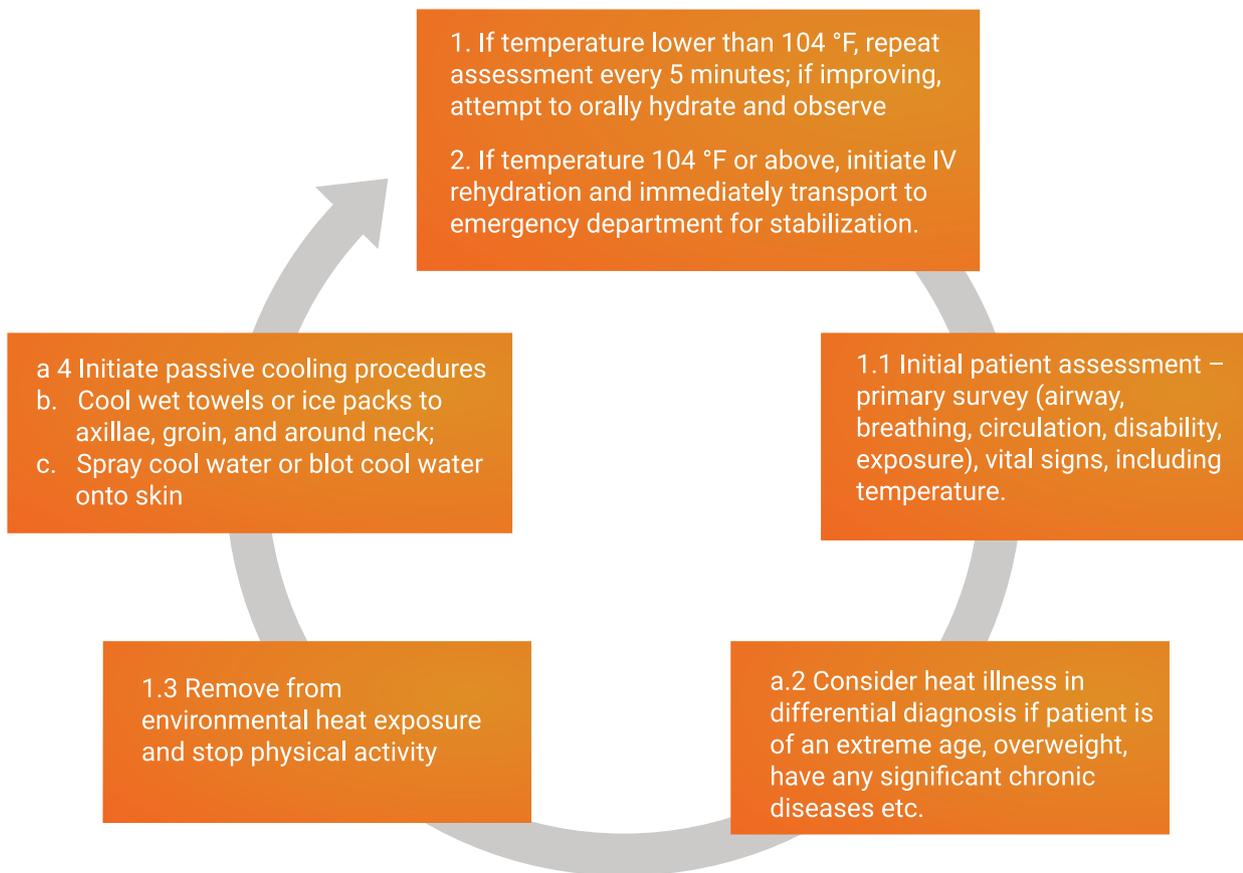
Risk factors existing for the heat related illnesses should be considered for primary assessment as given in following chart / Schematic Diagram.

Recognizing that treatment protocols may vary slightly according to the setting (EMS, health centres, clinic, hospital emergency department, etc.), the following should apply generally to any setting and to all patients where there is a potential concern for heat illness.<sup>14</sup>

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 3)
  - b. Patient has one or more of the following risk factors:
    - i. Extremes of age (infants, elderly)
    - ii. Debilitation/physical deconditioning, overweight or obese
    - iii. Lack of acclimatization to environmental heat (recent arrival, early in summer season)
    - iv. Any significant underlying chronic disease, including psychiatric, cardiovascular, neurologic, hematologic, obesity, pulmonary, renal, and respiratory disease renal, and respiratory disease
    - v. 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
  - d. Use fan to blow cool air onto moist skin
5. If temperature lower than 104 °F, 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 104 °F or above, initiate IV rehydration and immediately transport to emergency department for stabilization.

13. Wexler R K. Evaluation and Treatment of heat related illnesses. American Family Physician 2002; 65(11):2307-2314

14. Dr. Arthur Yancey and Nee-Kofi Mould-Millman of Grady Emergency Medical Services, Emory University Department of Emergency Medicine, Atlanta, GA USA



## 11.2 Heat Exhaustion

1. In the case of heat exhaustion, the skin may appear pale associated with tachycardia or hypotension.
2. Headache, dizziness, nausea, vomiting as well as diarrhea and loss coordination may occur.
3. Such patients are advised to be in supine position with elevation of legs.
4. Remove excess clothing and are moved in cool shaded environment.
5. Oral fluids are recommended for rehydration.
6. Vital signs should be monitored with the transport to emergency department if symptoms do not improve after 20-30 minutes of onset.

## 11.3 Heat Stroke

### 1. Diagnosis (Mayo Clinic, USA)<sup>15</sup>

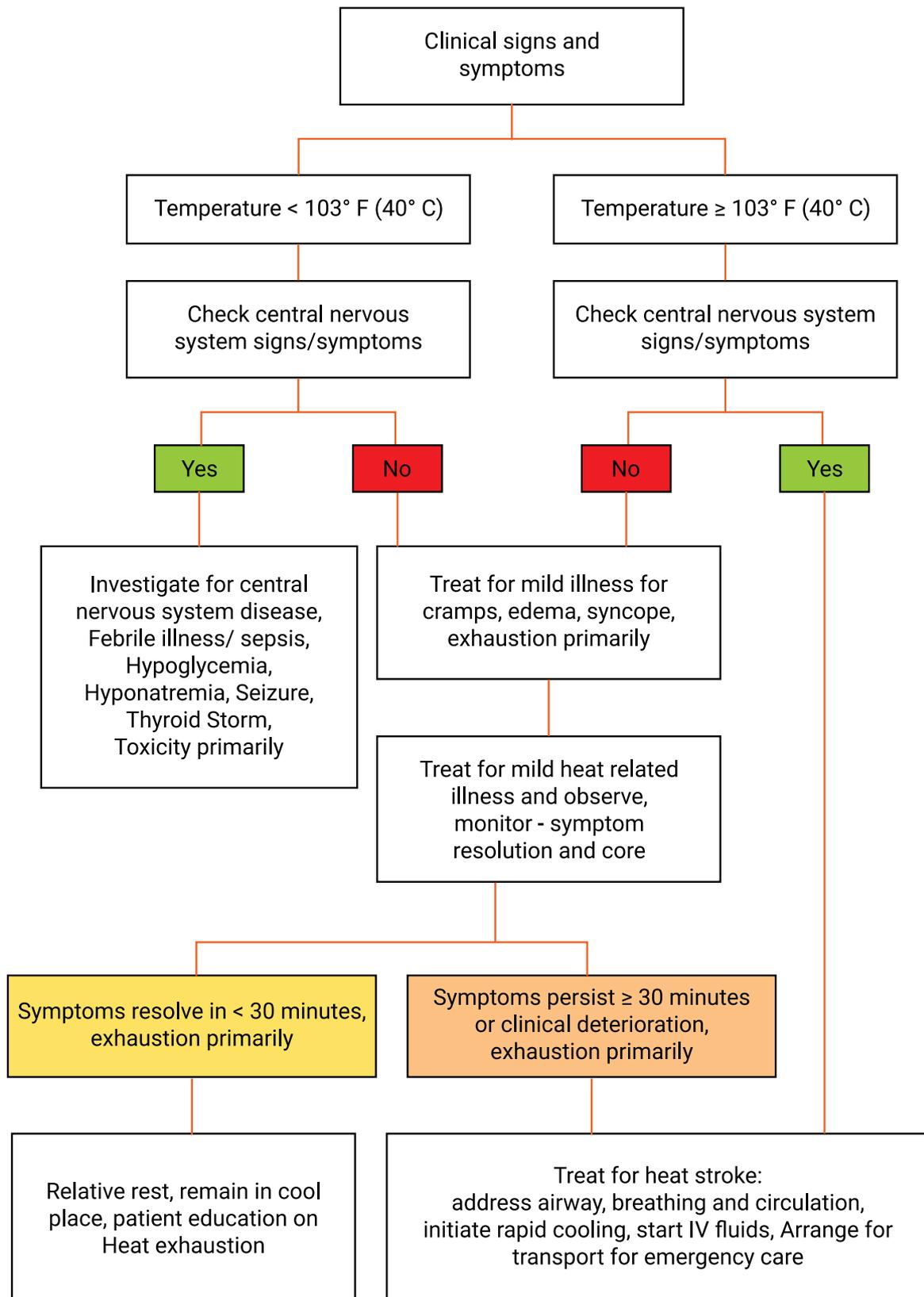
- i. It' is usually apparent to doctors if you have heatstroke, but laboratory tests can confirm the diagnosis, rule out other causes for your symptoms and assess organ damage. These tests include: Rectal temperature to check your core body temperature.
- ii. A rectal temperature is the most accurate way of determining your core body temperature and is more accurate than mouth or forehead temperatures.
- iii. A blood test to check blood sodium or potassium and the content of gases in your blood to see if there's been damage to your central nervous system.
- iv. A urine test to check the colour of your urine, because it's usually darker if you have a heat-related condition, and to check your kidney function, which can be affected by heatstroke.
- v. Muscle function tests to check for serious damage to your muscle tissue (rhabdomyolysis). X-rays and other imaging tests to check for damage to your internal organs.

### 2. Treatment

- i. Immediate hospitalization, plenty of IV fluids, sponging with ice packs and cold water, if possible patient should be in air conditioned room.
  - ii. Treatment according to complications. Early effective treatment is the key to determining the prognosis. The crucial points in effective treatment are rapid lowering of the core temperature, blood purification, and disseminated intravascular coagulation (DIC) prevention.
  - iii. Specific treatment measures are "nine early and one ban," that is, early cooling, early expansion, early blood purification, early sedation, early intubation, early correction of coagulation dysfunction, early resistance to infection, early enteral nutrition, early immune regulation, and a ban on surgical operations during the period of coagulation dysfunction.
  - iv. Cooling: Rapid cooling is the most important treatment measure. The case fatality rate is closely related to hyperthermia and its duration. If cooling is delayed, the fatality rate increases significantly. As soon as a patient is removed from the hot environment, immediately begin cooling and continue to monitor core temperature. Cooling targets are to quickly cool the core temperature to 39°C or below within 10–40 min and to 38.5°C or below within 2 hrs.
    - On-site cooling:
    - Quickly move the patient from a hot and humid environment to a shady and breezy place, make the patient lie down, and remove all clothing
    - use a cold water spray or wet towels to wipe the entire body
    - use fanning to accelerate evaporation and convection cooling
    - continue to monitor body temperature
    - Cooling en- route
1. Turn on the air conditioning in the ambulance or open the windows;
  2. Use cold water to wipe the entire body;
  3. Administer an intravenous infusion. Continue to monitor body temperature
    - Cooling in the sickroom:
      1. Adjust the room temperature to 20–24°C
      2. administer an intravenous infusion quickly
      3. use cooling blankets,
      4. place ice cubes on areas that dissipate heat faster (on either side of the neck, groin, and armpits)
      5. use 200–500 ml of 4°C saline to perform gastric lavage and/or rectal enema,
      6. purify the blood
      7. use a lytic cocktail in combination, and
      8. if conditions allow, use an intravascular cooling apparatus or immerse the patient in a cold water bath (water temperature at 15–20°C).

15. <https://www.mayoclinic.org/diseases-conditions/heat-stroke/diagnosis-treatment/drc-20353587>

Table -4 Algorithm for the initial evaluation of a patient with suspected heat related illness. <sup>16</sup>



16. Feeling the heat child survival in a changing climate. International Save the children alliance 2009;

## 12. MANAGEMENT OF HEAT ILLNESS IN VULNERABLE GROUPS

### 12.1 Risks, Diagnosis And Treatment for Vulnerable Groups :

Vulnerable groups relate to those that have more risks of getting heat related illnesses than the others, including Diabetic, Hypertension, Pregnant Women, Infants And Children. Heat-waves and extreme hot weather can cause death and also aggravate existing health conditions. Health effects of heat waves can appear in all age and social groups and as a result of a wide range of factors; however, some people are more at risk of heat-related illness and death than others. We should consider following risk factors for identification of vulnerable group.<sup>17</sup>

- i. Individual risk factors (age and sex, existing illness, use of medication, being overweight, dehydration, reduced ability for acclimatization and pregnancy)
- ii. Individual risk factors (age and sex, existing illness, use of medication, being overweight, dehydration, reduced ability for acclimatization and pregnancy)
- iii. Living environment risk factors (housing, urban heat island effect, internal cooling capacity, air pollution and working environment and work place conditions)
- iv. Social risk factors (Loneliness, lack of access to information systems and emergency services)

Based on the above risk factors we can broadly classify vulnerable groups as following-

1. **Diabetic Patients:** Heat stress can increase the risk to hyperglycemia. Risk of dehydration is higher in case of diabetic people due to high levels of glucose in the blood which makes kidneys work harder and as it removes sugar by excreting urine. Along with the excess glucose, they also lose water and electrolytes which increases risk of dehydration. Lower blood volumes increase glucose concentration and induces transient insulin resistance that makes cells unable to metabolize glucose which may further increase blood sugar levels. The dosage may also need adjustment depending on their exposure to heat stress.
2. **Elderly/Old age group:** Aging slows the thermoregulatory process. The capacity to tolerate heat decreases, thirst sensation is delayed, sweating process is diminished. The elderly often suffers from comorbidity, physical and cognitive impairment and require to take multiple medications. Heat and sweating can lower the amount of fluid in the body, which can reduce blood volume and lead to dehydration. This may create strain on the heart.
3. **People with chronic diseases:** The medicines which exacerbate dehydration and heat exhaustion, as well as diuretics, anti-inflammatory medicines, antibiotics like sulphonamide antiviral medicines like indinavir, neuroleptics and antidepressants, benzodiazepines, amphetamines, analgesics, beta-blockers, Angiotensin-converting-enzyme (ACE) inhibitors
4. **People taking certain medications:** The medicines which exacerbate dehydration and heat exhaustion, as well as diuretics, anti-inflammatory medicines, some antibiotics (sulphonamide), some antiviral medicines (indinavir), neuroleptics and antidepressants, benzodiazepines, amphetamines, analgesics, beta-blockers, Angiotensin-converting-enzyme (ACE) inhibitors and many more;
5. **Overweight people:** They are prone to difficulties caused by heat-waves because of the tendency to retain more body heat; and prone towards high metabolic rate.
6. **People in certain occupations:** Those who work outdoors are more exposed to heat-waves, including those who are exposed to high temperatures and heat radiation in the workplace, or people who lose fluid during work may get dehydrated and be more sensitive to heat illnesses.
7. **Socioeconomic status:** Socioeconomic status of some people may make them more vulnerable, because of ethnicity, occupation, education, social isolation, etc. Homeless people, those living in substandard conditions, children on the streets, internally displaced people, refugees, etc., are more vulnerable to heat-waves.

17. Heat-health action plans. Guidance WHO/Europe, 2008

## 12.2 Risks to Pregnant Women, Children and Elderly People

### 12.2.1 Pregnant Women

#### Why at risk?

1. During pregnancy and in extreme heat, body works to cool both mother and the baby.
2. Heat causes the mother's blood vessels to contract in order to cool down, which then reduces the amount of nutrients that reach the foetus.
3. Blood volume greatly increases during pregnancy, which makes it more difficult to distribute fluids through the body.
4. Pregnant women naturally experience higher body temperature and periods of lower blood pressure which is exacerbated due to heat
5. Heat stress stimulates the release of maternal antidiuretic hormone or oxytocin, which reduces uterine blood flow. Increased Antidiuretic Hormone (ADH) leads to dehydration in the body.

#### What are the risks involved?

1. For women in their second and third trimesters, the hottest months of the year can be almost unbearable, especially in humid climates, and face higher risk of being dehydrated. Temperatures above 39°C can result in neural tube defects in the fetus.
2. Overheating can cause chills, clamminess, dryness in mouth, excessive thirst, and excessive sweating.
3. Overheating after the first trimester can cause fatigue, dizziness, and nausea, with heat rash.
4. Increased risk of Urinary Tract Infections (UTI).
5. Heat stroke during pregnancy can also cause preterm labour, lower birth weight, miscarriages and maternal death

### 12.2.2 Children

#### Why at risk?

1. The body's ability to regulate its temperature is not fully developed in the young.
2. Children are more susceptible to heat illness than adults due to greater surface area to body mass ratio (greater proportion of surface area than his overall weight), lower rate of sweating, and slower rate of acclimatization.
3. Children generate more heat because they have a higher metabolic rate
4. Children also rely on others to regulate their thermal environments and provide adequate fluid intake.

### 12.2.3 Elderly People

#### Why at risk?

- Older people appear to be more vulnerable to heat possibly due to fewer sweat glands. Their bodies may not adjust well to sudden or prolonged temperature changes. because the elderly are at risk of social isolation and may be living alone.

## 12.3 Specific Management

### 12.3.1 Elderly/Old age group:

- Special attention to ongoing medication and preexisting disease.
- Should travel with company
- Knowledge and awareness regarding heat stress and vulnerability.

### 12.3.2 Infant and children up to four years:

- Special attention to hyperactive children.
- Continuous hydration (oral/IV).
- Health promotion by sensitizing parents regarding heat stress and its impact.
- Reduce exposure to direct heat during summer.

### 12.3.3 People with chronic diseases:

- Close monitoring of patients with endocrine and cardiac disorders.
- Altering medications if required.
- Health education and promotion regarding heat stress
- Avoidance of excessive physical exertion and exposure to heat waves.

### 12.3.4 People in certain occupations:

- Educate labourers (Those involved in physical labour and working outdoors) and workers regarding heat stress
- Encourage hydration-- drinking water, chaas (buttermilk) etc.
- Encourage workers to seek medical attention, in case of discomfort
- Change in shift timings and working hours
- Encourage wearing light clothing's and self-protecting gears ( caps, turban, cover-ups, hand gloves likewise)
- Labour law enforcement and coordination, to restrict working long hours directly exposed to heat, restricting pregnant women to work during heat periods, etc)
- Cooling incentives for local/outdoor businesses.

### 12.3.5 Socioeconomic status:

- Accessibility to pure potable water
- Public access to cool places
- Availability and accessibility of health care services
- Cool roof solutions wherever possible
- Health education and promotion regarding Heat Stress and Preventive measures.

## 13. Health Advisory for prevention and management of heat stress

To prevent and manage the heat stress certain dos and don'ts should be followed.

### DO'S

1. Follow weather forecasts on TV/ radio/newspapers to know if a heat wave is on the way.
2. Drink water, as often as possible, even if not thirsty.
3. Wear light weight, light coloured, loose and porous cotton clothes. Use protective goggles, umbrella/hat, shoes or chappals while going out in the sun.
4. Carry water with you while travelling.
5. If working outdoors use a hat or an umbrella, use a damp cloth on your head, neck, face and limbs.
6. Use ORS, homemade drinks like lassi, torani (Rice water), lemon water, buttermilk to remain hydrated.
7. Recognize the signs of heat stroke/heat rash/ heat cramps such as weakness, dizziness, headache, nausea, sweating and seizures. If you feel faint or ill, see a doctor immediately.
8. Keep animals in shade and give them plenty of water to drink.
9. Keep your home cool, use curtains, shutters or sunshade and open windows at night.
10. Keep cool, using fans, damp clothing, take baths in cold water frequently.
11. Provide cool drinking water in the work place.
12. Caution workers to avoid direct sunlight.
13. Schedule strenuous jobs to cooler times of the day.
14. Increasing the frequency and length of rest breaks for outdoor activities.
15. Pregnant workers and workers with medical condition require additional attention.

### DON'TS

1. Do not leave children or pets in a parked vehicle
2. Avoid getting out in the sun, especially between 12.00 pm to 3.00 pm.
3. Avoid wearing dark, heavy or tight clothing
4. Avoid strenuous activities when the outside temperature is high
5. Avoid cooking during peak hours. Open doors and windows to ventilate cooking area adequately.
6. Avoid alcohol, tea, coffee and carbonated soft drinks, which dehydrates the body.

Special Strategies for Vulnerable Groups		
<p><b>Communication Strategies</b></p> <ul style="list-style-type: none"> <li>• Temperature and forecast display,</li> <li>• Proper communication during heat alerts,</li> <li>• lec activities that reaches to all the vulnerable groups,</li> <li>• Help line centers</li> </ul>	<p><b>Cooling Strategies</b></p> <ul style="list-style-type: none"> <li>• Public access to potable water and cool spaces</li> <li>• Development of public parks</li> <li>• Shaded bus stops</li> <li>• Community resource map</li> <li>• Greening and tree plantation campaigns</li> <li>• Cool roof campaigns.</li> </ul>	<p><b>Occupational Strategies</b></p> <ul style="list-style-type: none"> <li>• Outdoor laborer education</li> <li>• Labor law enforcement and coordination</li> <li>• Cooling incentives for local/ outdoor businesses</li> </ul>

## 14. Emergency Preparedness for the hospitals/clinics/health centers

### 14.1 Need for an emergency preparedness

Heat waves create an emergency situation in people that makes their medical attention urgent for treatment and also avoid any fatality. Such situations inevitably lead to a rapid increase in demand for hospital services which ultimately have a crippling effect on their operational capacity. This urgently calls for deployment of a quick response plan that works towards such emergency preparedness and effectively responds to health emergency along with maintaining its regular health facility. The impacts of a heat wave are felt by many people in an area during the same time—which can rapidly precipitate medical emergency in a city requiring a range of health and hospital services. As the demand for services surges, operational capacities of health facilities could be compromised leading to an increase in fatalities. Quick response plans are critical to deal with emergencies in terms of having communication channels, response and treatment protocols, personnel, medical supplies so that health systems respond to the emergency, do not get burdened and regular operations effected.

### 14.2 Understanding emergency preparedness

Emergency preparedness for heat waves in a hospital refers to the steps taken by it to be ready with response during emergency situation by giving adequate and emergency medical care. This would require continuous planning, coordination, capacity building, monitoring, appraising, and acting in accordance with the laid down procedures in a collaborative manner by all the stakeholders. The hospital's emergency preparedness plan should generally take into account all aspects of heat waves including the pre, during and post heat waves.

#### **Pre- Heat Season**

1. Create and implement heat health guidelines on the diagnosis and treatment of heat stress, heat exhaustion, and heat stroke to reduce and prevent mortality and morbidity. Use materials extensively for training and communication, including posters and pamphlets that inform patients about upcoming heat warnings and offer tips to prevent heat stress
2. Identify and relocate the most vulnerable hospital wards (e.g., the maternity or neonatal ward) from the top floor of hospitals, where the temperatures are highest. Move patients to cooler parts of the building
3. Measure wards' morbidity and mortality rates before and after location change to evaluate the effectiveness of intervention
4. Set up steering committee to supervise, monitor the emergency preparedness, dealing with inflow of patients during heat wave and post heat wave evaluation
5. Establish Cool Wards within the hospitals
6. Ensure bed availability especially in emergency departments and special wards for heat related illness
7. Ensure adequate storage of IVs, ORS and other medicines for heat stress treatment
8. Increase medical doctors, nursing staff to ensure full coverage in case of an increase in admissions
9. Development of training modules or multiday training for health care providers, ward leaders, and paramedics on extreme heat and health, as well as specific heat case management and diagnosis, especially during heat waves
10. Organizing a training of trainers workshops for primary medical officers so they can offer heat-specific advice (symptoms, diagnosis, and treatment including self-monitoring hydration) to their medical staff

11. Conduct workshops for link workers/front line health workers (ASHA; Anganwadi worker; community health workers) to increase outreach and community-based surveillance for heat illness in slum communities. Link workers should receive informational materials that cover how to counsel patients, what threshold temperatures apply for different levels of treatment, and surveillance protocols
12. Collaborations with the medical service provider/ research institutes to train emergency service professionals on responding to extreme heat emergency cases
13. Increase heat stress outreach and education for women in maternity wards before they leave the hospital, since newborns are particularly vulnerable to heat stress
14. Update heat wave monitoring and management protocols and programs, including tracking of daily heat-related data as per the monitoring sheet template shared below

### **During Heat Season**

1. Adopt heat-focused examination procedures at local hospitals and Urban Health Centres. Examination of admitted patients for signs and symptoms of heat related illnesses could become routine, adding a brief procedure during the peak-heat summer months at a minimum. The basic statistics of such patients should also be recorded to identify the locations, occupations, and sociodemographic of city's residents who are most vulnerable to heat stress and illness.
2. Adapt pharmacological treatments according to Standard Treatment Guidelines (STGs).
3. If possible, Postpone non-emergency hospitalizations and surgeries.
4. Ensure high risk patients are placed in rooms with air conditioning; less critical patients should at least have access to an area with air conditioning during the hottest hours of the day.
5. Increase liquid oral and intravenous intake of patients.
6. Modify diet accordingly with increased fruit and vegetables.
7. Adjust patient bed and personal clothing according to need.
8. Start and special and adequate health and social assistance for hospital discharge of high risk patients or postpone discharge till post- heat wave.
9. Ensure availability of adequate number of Medical Mobile Van in high risk areas of heat waves
10. Maintain record of heat wave patients and report to Urban Local Body (ULB) daily according to monitoring sheet
11. Expedite recording of cause of death certificates

### **Post-Heat Season**

1. Share final data of gender based hospital admissions as per indicators set for reporting during heat wave with the Urban Local Body (ULB)
2. Give feedbacks in annual evaluation of heat action plan
3. To prepare a set of key learnings during heat wave to build on institutional memory and share it with other stakeholders

## 15. Monitoring framework for data collection Heat morbidity and mortality

### 15.1 Need for Heat Wave Monitoring System

There is now a greater understanding towards mitigating the impacts of heat wave and adapting to changing temperatures. While some elements are incorporated into heat-health planning for heat waves, there is limited knowledge on better heat wave management. Hence, there is a strong need to embed these aspects in the planning and monitoring systems for heat wave.

### 15.2 Monitoring systems for Heat- Health Management

Monitoring systems in hospitals will routinely help in gathering information on all aspects of heat wave management. This process includes systematic observations; lay down checks on progress of activities and be targeted in approach. It helps hugely in better heat wave planning, improvising the monitoring processes further and making informed changes for better implementation of stated goals and objectives in the Heat Stress Action Plan (HSAP).

Here is a template that can be adapted by hospitals for better heat- health management

Template for daily Heat Mortality/Morbidity data collection

Name of the Urban Primary Health Centre/ hospital Ward Number:									
Health Issues	No of cases	Gender				Age Group (Years)			
		No of male	No of Female	Others	Pregnant women if any	0-14	15-35	35-60	Above 60
Heat Cramps									
Heat Exhaustion									
Heat Stroke									
Mortality due to heat stroke									

## 16. Information Education and Communication (IEC)

### 16.1 Communication and Dissemination for Heatwaves

Heat wave IEC provides information and key messages– what, how, to whom and when–with each stakeholder. With the hospital having a high number of people visiting it daily, reaching out to them becomes relatively easier and the chance of key messages reaching out to friends and family is high.

IEC drives should be monitored at the Steering Committee level for its due implementation and ensuring mid-course correction.

The communication channels in hospitals that could be of potential use during heat waves are:

1. **Use of display screens in the lobby:** A TV screen in the lobby to display information on do's and don'ts during a heat wave.
2. **Patient's prescription:** Prescription slips should carry information of safety measures to be taken during a heat wave.
3. **IEC display:** The IEC should be displayed at prominent places in the hospitals such as waiting areas, drinking water areas, water taps, lifts/stairs and notice boards.
4. **Distribution of leaflets:** Volunteers/ staff could distribute leaflets/phamphlets to visitors.
5. **Events:** Hospitals may host health promotion events during heat waves.

### 16.2 IEC in Local Language

To ensure wider outreach to communities, dissemination of information, it is very important that IEC is in the local language. See examples.

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# Beat The Heat: Heat Wave Advisory

15<sup>th</sup> Integrated Research and IRADe Action for Development

**≥40°C** **YELLOW ALERT**  
Actual maximum temperature ≥40°C or 4.5°C to 6.4°C above the normal maximum temperature

**≥45°C** **ORANGE ALERT**  
Actual maximum temperature ≥45°C or 4.5°C to 6.4°C above the normal maximum temperature

**≥47°C** **RED ALERT**  
Actual maximum temperature ≥47°C or 26.5°C above the normal maximum temperature

## Highly Vulnerable Groups

- Infants and children
- Senior citizens
- Outdoor workers
- Pregnant women
- Traffic policemen

## Symptoms of Heat Stress

**HEAT SYNCOPES**

- Light-headedness
- Brief loss of consciousness
- Dizziness
- Fainting

**HEAT EXHAUSTION**

- Feeling overheated
- Light-headedness; headache
- Nausea
- Sweaty and thirsty
- Mildly elevated body temperature
- Muscle cramps
- Fatigue, dizziness

**HEAT STROKE**

- Throbbing headache
- Difficulty in breathing
- Rapid and strong pulse rate
- Nausea and vomiting
- Dry red skin
- High temperature but no sweating
- Fever above 104°F, which does not recede with paracetamol/ibuprofen
- Unconsciousness

## First Aid

- 1 Take the patient indoors and place him or her under a fan/cooler/AC
- 2 Lay the patient down and raise the legs and hips
- 3 Loosen clothes
- 4 Cover the body with a wet cloth
- 5 Sponge with ice packs and cold water
- 6 If conscious, give him or her cool water to sip
- 7 Give plenty of IV fluids and electrolytes
- 8 Immediate hospitalisation if body temperature does not go below 104°F after taking paracetamol or ibuprofen



Call 102 for emergency

## PREVENTIVE MEASURES

**Drink six litres of cold water**

**Drink chacha, shikanji, ORS frequently**

**Wear loose cotton clothes**

**Shower with cool water**

**Avoid going outdoors during peak hours (12 pm to 4 pm)**

**Use limestone as paint or wet gunny bags on rooftops**

**Run cold water on your wrists**

**Take shelter during peak hours**

**Cover your face, head and carry an umbrella**

**Avoid intense physical activities**

**Do not leave children or pets in a parked car**

**Hang wet curtains on windows and doors**

Figure 12.: Heat Advisory in Englis

# गर्मी/लू के प्रकोप से बचाव



**येल्लो अलर्ट**  
सर्वाधिक अधिकतम तापमान  
≥40°C या तापमान  
अधिकतम तापमान से 4.5°C से  
6.4°C तक उभार



**ऑरेंज अलर्ट**  
सर्वाधिक अधिकतम तापमान  
≥45°C या तापमान  
अधिकतम तापमान से 6.4°C तक उभार



**रेड अलर्ट**  
सर्वाधिक अधिकतम तापमान  
≥47°C या तापमान  
अधिकतम तापमान से  
≥6.5°C उभार

## गर्मी/लू से बचाव के उपाय



ठंडे जल से  
4-5 लीटर  
ठंडा पानी पीएँ



ठंडे जल से  
स्नान करें



छाछ, शिकजी,  
ORS बार बार पीएँ



दोपहर 12 बजे से 4 बजे तक  
बाहर न निकले



ढीले-ढाले सूती  
कपड़े पहनें



छत पर चूने का पेंट करें या गीले  
बोरों का उपयोग करें



छाया में बैठें



सिर और चेहरा ढककर रखें  
और छाता लेकर चलें



अपनी कलाई को ठंडे पानी  
के नीचे रखें



बच्चों या पालतू जानवरों को  
पार्क की गई कार में न छोड़ें



खिड़कियों/दरवाजों पर  
गीले पर्दे लटकाएँ

## अत्यधिक सवेदनशील समूह



शिशु और  
बच्चे



बुजुर्ग



मजदूर



गर्भवती  
महिलाएँ



ट्रेफिक  
पुलिस

## गर्मी/लू लगने के लक्षण

गर्मी से  
बेहोशी

- सिर चकराना
- बेहोशी
- चक्कर आना
- मूर्च्छा

गर्मी से  
थकान

- बेहद गर्मी महसूस होना
- सिर चकराना; सिरदर्द
- उबकाई
- पसीना और प्यास
- शरीर का तापमान बढ़ जाना
- माँस-पेशियों में ऐंठन
- थकान, चक्कर

लू लगना/  
हीट स्ट्रोक

- तेज सिरदर्द
- साँस लेने में कठिनाई
- तेज नब्जा
- उबकाई और उल्टी
- खुश्क ताल त्वचा
- बुखार बढ़ने पर पसीना न आना
- बुखार 104°F से ऊपर, जोकि पैरासिटामोल/इबुप्रोफेन से कम नहीं हो रहा
- बेहोशी

## फर्स्ट एड

- 1 व्यक्ति को अंदर ले जाएँ और पखे/कूलर/AC रूम में रखें
- 2 रोगी को नीचे लिटाएँ और उसकी टांगें और कूल्हें को ऊँचा रखें
- 3 कपड़े ढीले करें
- 4 शरीर को एक गीले चादर से ढकें
- 5 बर्फ और ठंडे पानी से पोछें
- 7 प्रचुर मात्रा में आईवी फ्लूइड और इलेक्ट्रोलाइट दें
- 8 फौरन अस्पताल में भर्ती करवाएँ अगर बुखार 104°F से ऊपर है, जोकि पैरासिटामोल/इबुप्रोफेन से कम नहीं हो रहा



6 यदि सवेत है तो थोड़ा थोड़ा ठंडा पानी पिलाएँ

102 आपात चिकित्सा  
सहायता हेतु कॉल करें

Figure 13: Heat Advisor in Hindi

# રાજકોટ ક્લાઈમેટ એક્શન પ્રોજેક્ટ

## રાજકોટ હીટ એક્શન પ્લાન

વૂ જીવલેણ નીવડી શકે છે, પણ તેનાથી બચવું શક્ય છે.

### વૂ થી બચવા માટેના ઉપાયો



વારંવાર પાણી પીવું



વડકામાં ખાસ કરીને બપોરના ૧:૩૦ થી ૩:૩૦ ના ગાળામાં બહારજવાનું ટાળો



આછા/સફેદ રંગના ખુલા કપડા પહેરવા



બાળકો, ઘરડા અને ગર્ભવતી મહિલાઓનું ખાસ ધ્યાન રાખવું



ઠંડક આપે તેવા પીણા જેમકે ઓ. આર. એસ, છાસ, જ્યુસ, શરબત, શિર્કણ નુ સેવન કરવું



અગર ઘરની બહાર છો તો છાંયડામાં રહેવાનું રાખો



ઘરના છાપરાને ચૂનો/સફેદ રંગથી પેન્ટ કરવું.



માથા પર ભીનું કપડું અથવા શરીરને કપડાથી ટાંકીને બહાર જવું



ગરમી માં ભારે શારીરિક પ્રવૃત્તિઓ ટાળો



કાંડા પર ઠંડુ પાણી રેડવું જેથી શરીરનું તાપમાન ઓછું રહે



પાર્ક કરેલી કારમાં બાળક/પાલતુ જાનવર ને છોડશો નહી

### વૂ ના લક્ષણો



શ્વાસ લેવામાં થવો પણ પરત્વેનો ન છુટવો મુશ્કેલી થવી



શરીરના તાપમાનમાં વધારો થવો પણ પરત્વેનો ન છુટવો મુશ્કેલી થવી



માથાનો દુખાવો અથવા માથુ ભારે લાગવું



ચામડી શુષ્ક અને લાલ થવી



ઉલ્ટી થવી



બેભાન થઈ જવું



રનાચુઓમાં તણાવ

### વૂ માટેની પ્રાથમિક સારવાર

( 8 )

શરીરને ઠંડુ રાખવા ઠંડી હવા આપે તેવા ઉપકરણોનો ઉપયોગ કરવો

( 1 ) વ્યક્તિને ઠંડા અથવા છાંયડો હોય એવી જગ્યાએ લઈ જવું

( 2 ) નજીકના આરોગ્ય કેન્દ્રમાં લઈ જવું અથવા ઓમ્યુલન્સને ફોન કરવો(૧૦૮)

( 5 )

બની શકે તેટલા ટીલા અને પાતળા કપડાં પહેરવા

( 4 )

અગર બેભાન ના હોય તો ઠંડુપાણી પીવડાવવું

( 7 ) ભીનું કપડું રાખવું



( 3 )

વ્યક્તિને પગ ઉપરની તરફ રાખીને સુવડાવવું

( 6 )

શરીર પર પાણી છાંટવું



કૃપા કરીને આ માહિતીને વધુમાં વધુ લોકો સુધી પહોંચાડવી અને આ પેમ્ફલેટને ઘરમાં ચોંટાડવું

Figure 14: Heat Advisory in Gujarati



# Rajkot Climate Action Project

## Rajkot Heat Action Plan

Heat wave can be fatal, but it is possible to tackle it

### Measures to reduce heat wave effects



Drink water frequently



Avoid going outside during peak hours - 1.30 – 3.30pm



Wear light coloured and loose fitting clothes



Give attention toward Elderly, Children & Pregnant women/sick people



Drink liquids like ORS, Chaach, juice, Sharbat, Shikanji etc



Rest in shade, if outdoors during peak Hours



Use lime or sun reflective paints for keeping house cool,



wet cloth on head or cover your body with cotton cloth while going outdoor,



Avoid High Physical Activity in the sun



Run Cold water over wrist to reduce body temperature



Don't Leave Children/pets in parked car

### Symptoms of Heat Stress



Difficulty in Breathing



Increase in body temperature but no sweating,



Headache



Dry skin and red patches on skin



Vomiting



Unconsciousness



Muscle cramps

### First Aid for heat wave affected person

- (1) Take affected person in shade
- (2) Take affected person to nearby health centre or call ambulance (108)
- (3) Keeping a person's feet in upward direction
- (4) If not unconscious, give cold water for drinking



- (5) Sprinkle water on body
- (6) Keep wet cloth on head while going outdoor.
- (7) Use appliances to keep body cool



Kindly share this information with everyone

Figure 14: Heat Advisory in English

## About IRADe

IRADe is an independent advanced research institute that aims to conduct research and policy analysis to engage stakeholders such as government, non-governmental organizations, corporations, academic and financial institutions. Energy, Climate Change, Urban Development, Poverty, Gender Equity, Agriculture and Food Security are some of the challenges faced in the 21st century. Therefore, IRADe research covers these, as well as policies that affect them. IRADe's focus is effective action through multidisciplinary and multi-stakeholder research to arrive at implementable solutions for sustainable development and policy research that accounts for the effective governance of techno-economic and socio-cultural issues. For more details, check [www.irade.org](http://www.irade.org).

## About IDRC

IDRC was established by an act of Canada's parliament in 1970 with a mandate "to initiate, encourage, support, and conduct research into the problems of the developing regions of the world and into the means for applying and adapting scientific, technical, and other knowledge to the economic and social advancement of those regions." As part of Canada's foreign affairs and development efforts, IDRC champions and funds research and innovation within and alongside developing regions to drive global change. IDRC is governed by a board of up to 14 governors, whose chairperson reports to Parliament through the Minister of International Development. Learn More <https://www.idrc.ca/en>

## About IIPH

The Public Health Foundation of India (PHFI) is a public private initiative that has collaboratively evolved through consultations with multiple constituencies including Indian and international academia, state and central governments, multi & bi-lateral agencies and civil society groups. PHFI is a response to redress the limited institutional capacity in India for strengthening training, research and policy development in the area of Public Health. Learn More <https://phfi.org>