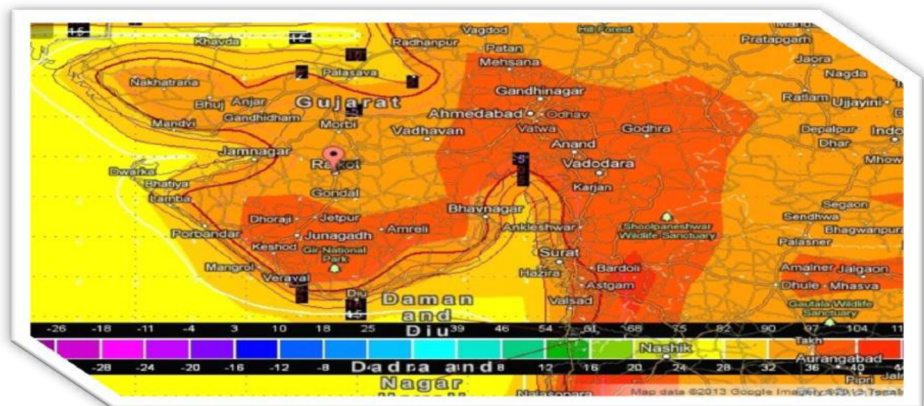




HEAT WAVE



HEAT WAVE ACTION PLAN 2022-23



VADODARA MUNICIPAL CORPORATION

FIRE AND EMERGENCY SERVICES

GUJARAT STATE DISASTER MANAGEMENT AUTHORITY

FOREWORD

As climate change intensifies, disruption to traditional global atmospheric circulation system, such as the jet stream in the earth atmosphere, as expected across the planet leading to more frequent and intense extreme climate events. In particular, smaller differences in temperature between the poles and the equator can show the jet stream, leading to a buildup of high or low pressure weather system, resulting in more persistent hot-dry extreme in mid- latitudes. As average global temperatures rise, so too does the probability of more extreme hot temperature anomalies, resulting in earlier, longer and more frequent heat waves. Heatwaves now pose a recurring challenge on all inhabited continents and generates an increasing range of threats to human lives and well-being, particularly in cities where built environments magnify heat exposures.

Heat wave can be defined as Silent Hazard and extreme heat can lead to dangerous, even deadly, health consequences, including heat stress and heat stroke. Impact of rising temperatures and increasing frequency, duration and intensity of hot spells poses challenge to human safety and sustainability. As our country is prone to much disastrous condition in the past and losing of many lives in every distressful condition similarly heat stroke leads to maximum death of humans as well as animals.

As per NDMA Guideline Heat Wave action plan 2022-23 aims to facilitate the stakeholders in preparing a Heat Wave Management plan by providing insight into the heat related illness and the necessary mitigative and response actions to be undertaken. It would also help in mobilization and co-ordination of various departments, individuals and communities to focus on heat reduction aspects to help and protect their neighbors, friends, relatives and themselves against avoidable health problems during spell of very hot weather.

PREFACE

It is expected that extreme heat waves will become more common worldwide because of rising average global temperature. Since the beginning of the 21st century, this has increased by nearly a degree Centigrade. This weather pattern, coupled with the El-Nino effect, is increasing the temperatures in Asia. Further, high humidity compounds the effects of the temperatures being felt by human beings.

Extreme heat can lead to dangerous, even deadly, consequences, including heat stress and heatstroke. India is also vulnerable to the impacts of climate change. Experts have been warning that the rising temperatures will lead to more floods, heat-waves, storms, rising sea levels and unpredictable farm yields. There is evidence that climate change is causing increase in extreme weather events as well as severity and frequency of natural disasters. Deforestation is also adding to the environmental instability and contributing to global warming and climate change. There has been an increasing trend of heat-wave in India over the past several years whereby several cities in India have been severely affected. Heat wave killed about 3000 people in 1998 and more than 2000 in 2002. Heat wave caused over 2000 deaths in 1998 in Odisha and more than 1200 deaths in 2002 in southern India. Approximately 2000 people died in the heat wave of 2015. Heat wave also caused death of cattle and wildlife besides affecting animals in various zoos in India.

The increased occurrences and severity of heat-wave is a wake-up call for all agencies to take necessary action for prevention, preparedness and community outreach to save the lives of the general public, livestock and wild life.

CONTENTS

Sr. No.	Chapter Details	Specifications	Page No
1		Foreword	1
2		Preface	2
3	Chapter 01	Introduction	
		1.1 Brief Introduction on Heatwave status	5
4	Chapter 02	Introduction on Heat wave	
		2.1 Heat wave Climatology	7
		2.2 Objective of Heat wave	7
		2.3 Heat wave in India	9
		2.4 Rational for Heat wave action Plan	10
		2.5 Indian scenario heat wave effect-2022	10
5	Chapter 03	Preparing a Heat wave action Plan	
		3.1 Heat wave and Disaster Management	11
		3.2 Past Experience on Heat wave Plan Implementation	11
		3.3 Purpose of Heat wave Action Plan	12
6	Chapter 04	Strategies to Implement Heat wave action Plan	
		4.1 Key strategies on Heat wave plan Implementation	13
		4.2 Early warning and communication	15
		4.2.1 Indicators of Heat Wave	15
		4.2.2 Forecast and Issuance of Heat Alert or Heat Warning	15
7	Chapter 05	Heat wave Mechanism and dealing with illness	16
		5.1 Dealing with heat related Illness	16
		5.1.1 Identification of Heat Wave Illness and recording its Casualties	16
		5.2 Prevention of Heat Illness	16
		5.3 Acclimatization	16
		5.4 Type of Body Illness	19
		5.5 Cooling Mechanism of the body	20
		5.6 Heat Cramps	21
		5.7 Heat Exhaustion	21
		5.8 Heat stroke	25
8	Chapter 06	Conclusion	
		6.1 List of PHC in Vadodara Municipal Corporation	26
		6.2 Cooling Techniques for Heat Injury	28

		6.3 Do and Don't s of Heat wave	30
9	Chapter 07	Annexures and IEC Materials on Heat Wave Prevention	32

List of Figures

Sr. No.	Specifications	Page No
1	Temperature Forecast	15
2	Color based Temperature Variance	18
3	Heat related Illness	19

List of Tables

Sr. No.	Specifications	Page No
1	Temperature Humidity Index	8
2	No of Death due to eat wave in past years in India	9
3	Symptoms and First Aid for various Heat Disorders	17
4	Vadodara City Climate status-2021	18

CHAPTER 01

INTRODUCTION

India, with approximately 1.32 billion people is the second most populous country in the world with considerably high levels of population density. India is among the worst disaster prone countries of the world. As per 2011 census, 31% of India's population live in urban areas and 69% live in rural areas. The trend shows that the number of persons living in urban areas will continue to grow at a faster rate than the population in the rural areas due to migration and increasing urbanization.

The World Meteorological Organization century, this is directly affecting the communities; (WMO) statements on global climate during 2011 and 2012 indicate that the global temperatures are continuing to increase.

Heat -waves are projected to increase in number, intensity and duration over the most land area in the 21st undermining their livelihoods through gradual, insidious changes in temperature and rainfall patterns, and resulting in increased frequency and intensity of hazards such as floods, cyclones, droughts, unseasonal rains and hailstorms, causing extensive damage to crops and agro-rural economy. Heat wave is a period of abnormally high temperatures, more than the normal maximum temperature that occurs during the pre-monsoon (April to June) summer season. Heat –waves typically occur between March to June, and in some rare cases even extend till July. Heat waves are more frequent over the Indo-Gangetic plains of India. On an average, 5- 6 heat wave events occur every year over the northern parts of the country.

The most notable amongst the recent ones are Hyderabad (Andhra Pradesh) 46 °C, Khammam 48 °C , Jharsuguda (Odisha) 45.4°C, Bhubaneshwar (Odisha) 44°C, Allahabad (Uttar Pradesh) 47.8°C , Delhi 46.4°C, Jashpur (Chattisgarh) 44.5°C, Kolkatta (West Bengal) 44.5°C, Gaya (Bihar) 46.3°C, Nagpur (Vidarbha region in Maharashtra) 47.1°C, Kalburgi (Karnataka) 44.1°C and Churu (Rajasthan) 48.0°C in 2015. The extreme temperatures combined with high humidity and resultant atmospheric conditions adversely affect people living in these regions leading to physiological stress, sometimes even death. This unusual and uncomfortable hot weather can impact human and animal health and also cause major disruption in community infrastructure such as power supply, public transport and other essential services.

Heat wave is also called a “silent disaster” as it develops slowly and kills and injures humans and animals nationwide. Higher daily peak temperatures of longer duration and more intense heat waves are becoming increasingly frequent globally due to climate change.

India too is feeling the impact of climate change in terms of increased instances of heat wave with each passing year. Importantly, the adverse impact of heat wave are preventable by educating the public on the preventive actions, following the Do’s and Don’ts , reporting early to health facilities and timely diagnosis and treatment

CHAPTER 02

INTRODUCTION TO HEAT WAVE

2.1 Heat wave Climatology:

As spring marching in to replace winters the maximum temperature in India shows a rising trend after the winter solstice, starting from southern parts then central India, and then northern states. Heat wave is considered if maximum temperature of a station reaches at least 40°C or more for Plains and at least 30°C or more for Hilly regions. Qualitatively, heat wave is a condition of air temperature which becomes fatal to human body when exposed. Quantitatively, it is defined based on the temperature thresholds over a region in terms of actual temperature or its departure from normal. In certain countries it is defined in term of the heat index based on temperature and humidity or based on extreme percentile of the temperature.

2.2 Objective of Heat wave:

Heat-wave is a condition of atmospheric temperature that leads to physiological stress, which sometimes can claim human life. Heat-wave is defined as the condition where maximum temperature at a grid point is 3°C or more than the normal temperature, consecutively for 3 days or more. World Meteorological Organization defines a heat wave as five or more consecutive days during which the daily maximum temperature exceeds the average maximum temperature by five degrees Celsius. If the maximum temperature of any place continues to be more than 45° C consecutively for two days, it is called a heat wave condition.

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

Table 1: Temperature/ Humidity Index

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

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

(A) Based on Departure from Normal

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

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

- Heat Wave: When actual maximum temperature $\geq 45^{\circ}\text{C}$
- 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 at two stations in a Meteorological sub-division for at least two consecutive days. A heat wave will be declared on the second day.

2.3 Heat wave in India:

Extreme positive departures from the normal maximum temperature result in a heat wave during the summer season. The rising maximum temperature during the pre-monsoon months continues till June and in rare cases till July, over the northwestern parts of the country. In recent years, heat wave casualties have increased. Abnormally high temperatures were observed during April –June during 2010 to 2015 across the country. In India the heat wave took 3028 lives in 1998 and more than 2000 lives in 2002. In Odisha, heat wave caused 2042 deaths in 1998 and more than 1200 deaths in 2002 in southern India. In India heat-wave caused 22562 deaths since 1992 to 2015 at various states (Table 2).² Heat wave also caused death of wildlife, birds, poultry in states and most of the zoos in India. Vadodara Municipal Corporation having Zero Death in last 10 years on span according to VMC Health department reports. As precaution and awareness has been done widely to avoid such Criticality in Vadodara Municipal Corporations.

Table 02: No of Death due to eat wave in past years in India

Sr. No	Year Details	Recorded deaths caused by heat waves	Sr. No	Year Details	Recorded deaths caused by heat waves
01	1992	612	16	2007	932
02	1993	631	17	2008	616
03	1994	773	18	2009	1071
04	1995	1677	19	2010	1274
05	1996	434	20	2011	793
06	1997	393	21	2012	1247
07	1998	3058	22	2013	1216
08	1999	628	23	2014	1677
09	2000	534	24	2015	2040
10	2001	505	25	2016	700
11	2002	720	26	2017	375
12	2003	807	27	2018	33
13	2004	756	28	2019	498
14	2005	1075	29	2020	2
15	2006	612			

Source: NDMA Heat wave Death details

2.4 Rational for Heat wave Action Plan (HAP):

Many states are affected during the Heat wave season, such as State of Andhra Pradesh, Telangana, Odisha, Gujarat, Rajasthan, Madhya Pradesh, UttarPradesh, Vidarbha region of Maharashtra, Bihar, Jharkhand and Delhi.

In 2015, daily maximum temperature exceeded the average maximum temperature by more than 6°C to 8°C, which resulted in death of 2422 people in India due to heat-wave.

However, it is likely that the death figure is much higher as heat related illness is often recorded inaccurately and figures from rural areas are hard to attain. The combination of exceptional heat stress and a predominantly rural population makes India, vulnerable to heat waves. Vegetable vendors, auto repair mechanics, cab drivers, construction workers, police personnel, road side kiosk operators and mostly weaker sections of the society have to work in the extreme heat to make their ends meet and are extremely vulnerable to the adverse impacts of heat waves such as dehydration, heat and sun strokes. Therefore, it is not surprising that these workers, homeless people and the elderly constitute the majority of heat wave casualties in India.

It is time to devise a national level strategy and plan to combat this disaster. A comprehensive heat preparedness and response requires involvement from not only government authorities but also non-governmental organizations and civil society. The local authorities should carry out a vulnerability assessment in order to identify these areas.

2.5 Indian Scenario Heat wave effect (Year 2022):

The latest heatwave stretched from Jammu to Kutch -Saurashtra region covering Uttarakhand, Madhya Pradesh last week. The heatwave was for a prolonged period and then spread to Gujarat, North Maharashtra, and then to the interiors of Gujarat. As per IMD, the southerly winds took heatwaves to the south and southwest of Rajasthan. Active western disturbances that bring cold winds were also not witnessed. Hence temperature of Jammu, Rajasthan, and neighboring states remained higher than normal.

CHAPTER 03

PREPARING A HEAT WAVE ACTION PLAN

3.1 Heat-wave and Disaster Management:

Section 2 (d) of the Disaster Management Act 2005 defines “disaster” as a catastrophe, mishap, calamity or grave occurrence in any area, arising from natural or man-made causes, and is of such a magnitude to be beyond the coping capacity of the affected area. Heat-wave has not been notified as a disaster by Government of India yet. But the data of the casualties it has been causing suggests that it is time that the various stakeholders realize the damaging repercussions that heat wave can cause to the health of humans and animals. Heat wave is not notified in the list of twelve disasters eligible for relief under National/ State Disaster Response Fund norms.

However, a State Government may use up to 10 per cent of the funds available under the SDRF for providing immediate relief to the victims of natural disasters that they consider being “disasters” within the local context in the State and which are not included in the notified list of disasters of the Ministry of Home Affairs subject to the condition that the State Government has listed the State specific natural disasters and notified clear and transparent norms and guidelines for such disasters with the approval of the State Authority.

3.2 Past experience on Heat-wave plan Implementation:

Ahmedabad was among the first city to prepare a Heat wave Action Plan in 2015. This plan provides a framework for other Indian cities to emulate and help protect their citizens from the extreme heat. The Heat Wave Action Plan of Ahmedabad concluded that Smart Cities are Heat wave Safe Cities. The following are key lesson learnt from Ahmedabad Heat Wave Action Plan:

- Recognize Heat Wave as a major Health Risk.
- Map out the 'High Risk' Communities.
- Setting up of 'Public Cooling Places'.
- Issue Heat wave alerts through different media.

3.3 Purpose of Heat-wave Action Plan:

The Heat-Wave Action plan aims to provide a framework for implementation, coordination and evaluation of extreme heat response activities in cities/town in India that reduces the negative impact of extreme heat. The Plan's primary objective is to alert those populations at risk of heat-related illness in places where extreme heat conditions either exist or are imminent, and to take appropriate precautions, which are at high risk. Preventive heat management and the administrative action need to be taken by the concerned ministries/departments are enumerated in Table 5. All cities can learn from their experience and develop a plan to deal with Heat wave in their specific cities/town and thus reduce the negative health impacts of extreme Heat. In addition the State Governments should also prepare a comprehensive plan to combat Heat wave.

CHAPTER 04

STRATEGIES TO IMPLEMENT HEAT WAVE ACTION PLAN

4.1 Key strategies on Heat wave plan Implementation:

The heat-wave action plan is intended to mobilize individuals and communities to help protect their neighbors, friends, relatives, and themselves against avoidable health problems during spells of very hot weather. Broadcast media and alerting agencies may also find this plan useful. Severe and extended heat-waves can also cause disruption to general, social and economic services. For this reason, Government agencies will have a critical role to play in preparing and responding to heat-waves at a local level, working closely with health and other related departments on long term strategic plan.

- ***Establish Early Warning System and Inter-Agency Coordination*** to alert residents on predicted high and extreme temperatures. Who will do what, when, and how is made clear to individuals and units of key departments, especially for health.
- ***Capacity building / training programme*** for health care professionals at local level to recognize and respond to heat-related illnesses, particularly during extreme heat events. These training programmes should focus on medical officers, paramedical staff and community health staff so that they can effectively prevent and manage heat-related medical issues to reduce mortality and morbidity.
- ***Individuals, community groups, and the media*** are also essential in fighting the effects of extreme heat. Individuals can take specific preventative steps to protect themselves, their families, and their communities from harmful heat waves including
 - Talking with their doctor or Health Centre about early signs of heat wave
 - Limiting heavy work during extreme heat
 - Drinking water
 - Staying out of the sun
 - Wearing light clothing
 - Checking on neighbors
 - Informing their fellow community members about how to keep cool and protect themselves from heat.

The media plays an essential awareness-building role by sharing news about health threats, and increases public protection by running ads and providing local resources information.

While summer is defined as spanning March, April, and May, Gujarat's hottest temperatures can run from March through June, with temperatures generally peaking in May and warm days through November.

Across India, higher daily peak temperatures and longer, more intense heat waves are becoming increasingly frequent globally due to climate change; thus the deadly extreme heat events already impacting Vadodara are expected to increase in intensity, length, and frequency in the coming decade.

- ***Public Awareness and community outreach*** Disseminating public awareness messages on how to protect against the extreme heat-wave through print, electronic and social media and Information, Education and Communication (IEC) materials such as pamphlets, posters and advertisements and Television Commercials (TVCs) on Do's and Don'ts and treatment measures for heat related illnesses.
- ***Collaboration with non-government and civil society:*** Collaboration with non- governmental organizations and civil society organizations to improve bus stands, building temporary shelters, wherever necessary, improved water delivery systems in public areas and other innovative measures to tackle Heat wave conditions.

4.2 Early Warning & Communications

4.2.1 Indicators of heat-wave:

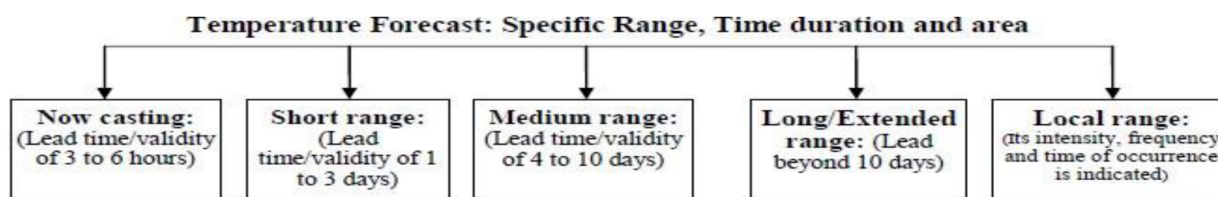
Early warning systems can enhance the preparedness of decision-makers and their readiness to harness favorable weather conditions. Early warning systems for natural hazards is based both on sound scientific and technical knowledge. In response to the devastating mortality and morbidity of recent heat-wave events, many countries have introduced heat- wave early warning systems. Heat-wave early warnings are designed to reduce the avoidable human health consequences from heat-waves through timely notification of prevention measures to vulnerable populations.

4.2.2 Forecast and Issuance of Heat Alert or Heat Warning:

India Meteorological Department (IMD):

The IMD is mandated to meteorological observations and provides current and forecast meteorological information for optimum operation of weather-sensitive activities. It provides warning against severe weather phenomena like tropical cyclones, dust storms, heavy rains and snow, cold and heat waves etc. It also provides real time data and weather prediction of maximum temperature, Heat-wave warning, Heat-alert for the vulnerable cities/rural area of the severity and frequency. As a part of every year Cycle this year IMD has issued guidelines for severe impact of heatwave on few states of India in which impact expected and action suggested due to heat wave to severe heat wave conditions over West Rajasthan during 29th -30th March, 2022.

IMD provides following range and validity of time forecast:



3.3 Identification of Color Signals for Heat Alert³:

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

CHAPTER 05

HEAT WAVE MECHANISIM AND DEALING WITH ILLNESS

5.1 Dealing with Heat Related Illness

5.1.1 Identification of Heat-Wave illness and recordings of casualties:

In the past, when the Government declared ex-gratia compensation for heat-wave affected families, it was observed that some people who were aware of the provision of direct cash relief reported natural deaths as the heat wave deaths. In the event of false reporting, the following procedures can be used for verifying and ascertaining the real cause of death.

- Recorded maximum temperature on the particular time periods and place.
- Recording incidents, panchnama or others witnesses, evidence or verbal – autopsy.
- Postmortem/medical checkup report with causes.
- Local authority or Local body enquiry/verification report.

5.2 Prevention of Heat Related Illness:

Heat-related illness is largely avoidable. The most crucial point of intervention concerns the use of appropriate prevention strategies by susceptible individuals. Knowledge of effective prevention and first-aid treatment, besides an awareness of potential side-effects of prescription drugs during hot weather is crucial for physicians and pharmacists.

5.3 Acclimatization:

People at risk are those who have come from a cooler climate to a hot climate. When such visitors arrive during the heat wave season, they should be advised not to move out in open for a period of one week till the body is acclimatized to heat and should drink plenty of water. Acclimatization is achieved by gradual exposure to the hot environment during heat wave.

Table No 03: Symptoms and First Aid for various Heat Disorders

Heat Disorder	Symptoms	First Aid
Sunburn	Skin redness and pain, possible swelling, blisters, fever, headaches.	Take a shower, using soap, to remove oils that may block pores preventing the body from cooling naturally. If blisters occur, apply dry, sterile dressings and get Medical attention.
Heat Cramps	Painful spasms usually in leg and abdominal muscles or extremities. Heavy sweating.	Move to cool or shaded place. Apply firm pressure on cramping muscles or gentle massage to relieve spasm. Give sips of water. If nausea occurs, discontinue.
Heat Exhaustion	Heavy sweating, weakness, skin cold, pale, headache and clammy. Weak pulse. Normal temperature possible. Fainting, vomiting.	Clothing. Apply cool, wet cloth. Fan or move victim to air-conditioned place. Give sips of water slowly and If nausea occurs, discontinue. If vomiting occurs, seek immediate medical attention. Or call 108 and 102 for Ambulance.
Heat Stroke (Sun Stroke)	High body temperature (106°F). Hot, dry skin. Rapid, strong pulse. Possible unconsciousness. Victim will likely not sweat.	Heat stroke is a severe medical emergency. Call 108 and 102 for Ambulance for emergency medical Services or takes the victim to a hospital immediately. Delay can be fatal. Move victim to a cooler environment. Try a cool bath or sponging to reduce body temperature. Use extreme caution. Remove clothing. Use fans and/or air conditioners. DO NOT GIVE FLUIDS.

The past few summers have shown that the risk of heat illness from high temperatures is one of the most serious challenges to the safety and health of peoples. This action plan guide you plan how to prevent heat illness among you and provide training to our citizens.

Heat illness can be a matter of life and death. Workers die from heat stroke every summer and every death is preventable.

- When heat stroke doesn't kill immediately, it can shut down major body organs causing acute heart, liver, kidney and muscle damage, nervous system problems, and blood disorders.
- Having a serious injury or death occur
- People suffering from heat exhaustion are at greater risk for accidents, since they are less alert and can be confused.



YELLOW ALERT	Hot Day Advisory	41.1°C – 43°C
ORANGE ALERT	Heat Alert Day	43.1°C – 44.9°C
RED ALERT	Extreme Heat Alert Day	≥ 45°C

Table No 04: Vadodara City Weather Status 2021

Sr. No.	Name of the Month	Average Temperature		Average rainfall	Average Humidity
		Highest	Lowest		
1	January	29.5°C	12.5.0°C	2.2 mm	45 %
2	February	31.9 °C	14.2 °C	0.7 mm	43 %
3	March	36.2 °C	18.4 °C	0.7 mm	35 %
4	April	39.2 °C	23 °C	1.4 mm	33 %
5	May	40.1 °C	26.6°C	6.1 mm	49 %
6	June	36.8 °C	27 °C	118.9 mm	67 %
7	July	32.5 °C	25.8 °C	274.6 mm	80 %
8	August	31.4 °C	25 °C	242.4 mm	75 %
9	September	33°C	24.5°C	124.2 mm	73 %
10	October	35.5°C	21.4 °C	26.4 mm	62 %
11	November	33.4 °C	16.9 °C	1.3 mm	58 %
12	December	30.7°C	13.7 °C	3.7 mm	54 %

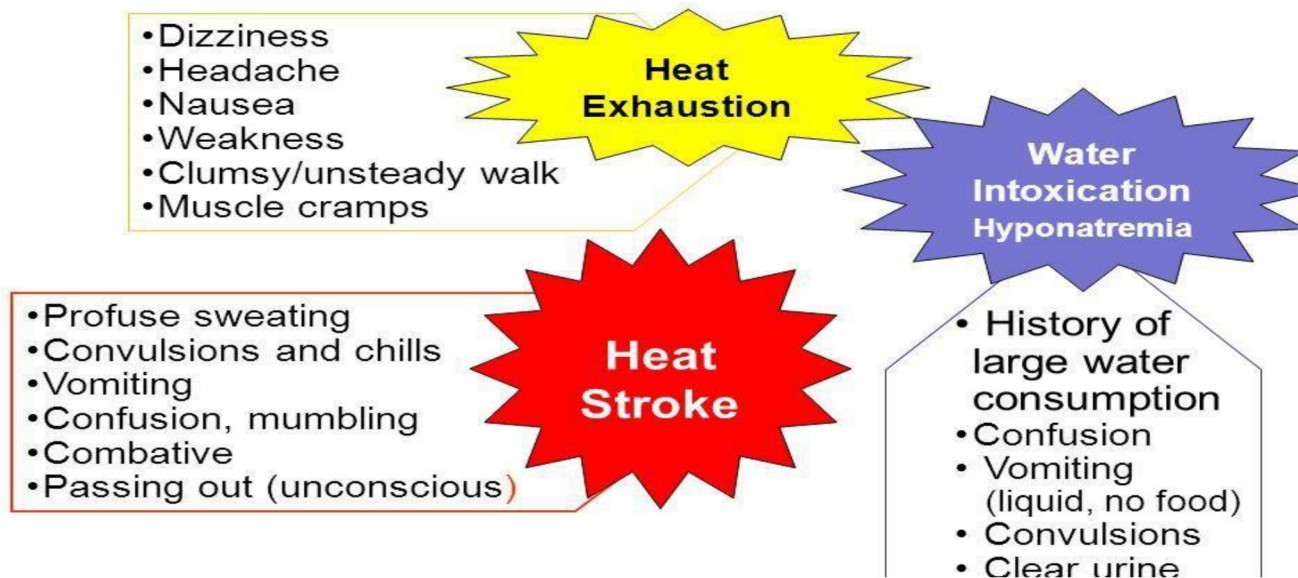
Source: IMD weather details 2021

5.4 Type of Heat Illness

There are mainly three categories of heat injuries:-

- Heat Cramps.
- Heat Exhaustion.
- Heat Stroke.
- Hot weather.
- Humid weather.
- Sun – you absorb more heat if you are in the sun.
- Heat our bodies generate when we are physically active and doing hard work
- Too little fluid.
- Too few electrolytes (Salt or minerals)

Recognizing Heat-Related Illnesses



5.4.1 Factors on exposure to heat wave

A. Situations Where Heat Injury Is likely

- Prolonged exposed to extreme heat from the sun or high temperatures.
- Wearing too much clothing in hot climates.
- Work to rest cycle

B. Individual risk factor

- History of prior heat injury.
- Poor fitness.
- Large body mass.
- Minor illness.
- Recent alcohol use.
- Skin conditions.
- Improper conditioning.
- Poor diet.
- Age over 40.

5.5 Cooling Mechanisms of the body

The body maintains its temperature by balancing heat gain with heat loss regulated by the hypothalamus. As the major heat dissipating organ, the skin can transfer heat to the environment through conduction, convection, radiation, and evaporation.

Factors that interfere with heat dissipation

- Inadequate intravascular volume
- Cardiovascular dysfunction
- Abnormal skin.
- High temperatures and humidity
- Drugs
- Hypothalamic dysfunction

5.6 Heat Cramps

Heat cramps are painful muscle spasms most often caused by loss of electrolytes from physical exertion in extreme heat, or prolonged exposure to heat without adequate hydration. Muscles most often affected are those in the lower legs, arms, abdominal wall, and back.

Prevention:

- Acclimate prior to strenuous activity.
- Wear appropriate clothing.
- Hydrate and maintaining diet rich in sodium.

Signs and symptoms:

- Muscle spasms
- Thirst and Sweating.
- Fatigue & Dizziness.

Treatment:

- Move people to a cool or shaded area to rest.
- Loosen the soldiers clothing
- Hydrate people orally
- Ice massages affected muscle.

5.7 Heat Exhaustion

Heat exhaustion is caused by loss electrolytes without proper fluid replacement. Heat exhaustion can affect even those who are not identified as having risk factors for heat injury. Otherwise fit individuals can be affected when involved in strenuous physical activity in a hot climate, especially if they haven't been acclimated.

Prevention:

- Acclimate prior to strenuous activity.
- Wear of appropriate clothing.
- Hydrate and maintaining diet rich in sodium.
- Following work / rest cycle.
- Use shaded areas when available.

Signs and symptoms:

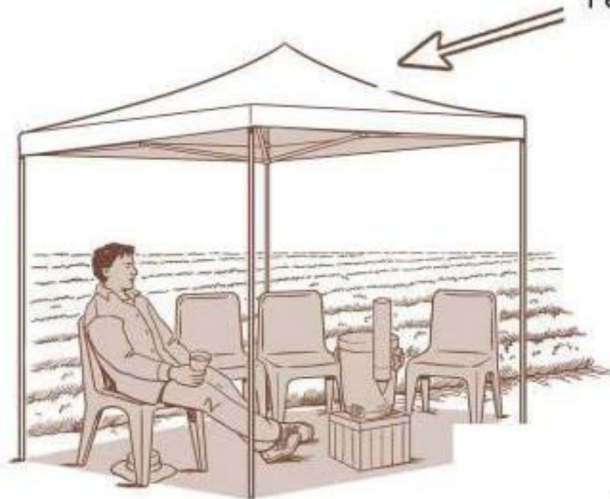
- Excessive sweating & fatigue.
- Headache & dizziness.
- Loss of appetite & cramping.
- Nausea and vomiting.
- Chills
- Tingling in hands or feet
- Altered mental status.

Treatment:

- Move peoples to a cool or shaded area to rest.
- Loosen the peoples clothing.
- Hydrate people orally with cool water.
- Elevate the legs.



Feel sweaty and tired



A) prevention: shade, water, rest



B) back at work

Diagram 01: Preventing Health Illness



Feel sweaty and tired



C) heavy sweating,
cramps, rapid pulse,
headache, nausea,
vomiting



D) dry, red, hot skin,
high body temperature,
disoriented, confused

NEED MEDICAL HELP

Diagram 02: Health Effect of Heat

5.8 Heat Stroke

Heat stroke (also known as hyperthermia) is the most severe form of the heat related illnesses.

There are two forms of heatstroke.

- Exertional heatstroke
- Non-exertional heat stroke.

Prevention:

- Acclimate prior to strenuous activity.
- Wear appropriate clothing.
- Hydrate.
- Use work/ rest cycle.

Signs and symptoms:

- Weakness.
- Headache & dizziness.
- Loss of appetite.
- Cramping & nausea.
- Seizures
- Weak pulse.
- Tachycardia & altered mental status.

Treatment:

- Heatstroke is a medical emergency and can be fatal. Peoples should be medevacked to the nearest hospital.
- Position the victim in the shade and begin cooling immediately.
- Elevate the legs.
- Massage the limbs to promote blood flow.

CHAPTER 06 **CONCLUSION**

6.1 Detail of Medical Officer- UHC- VMC

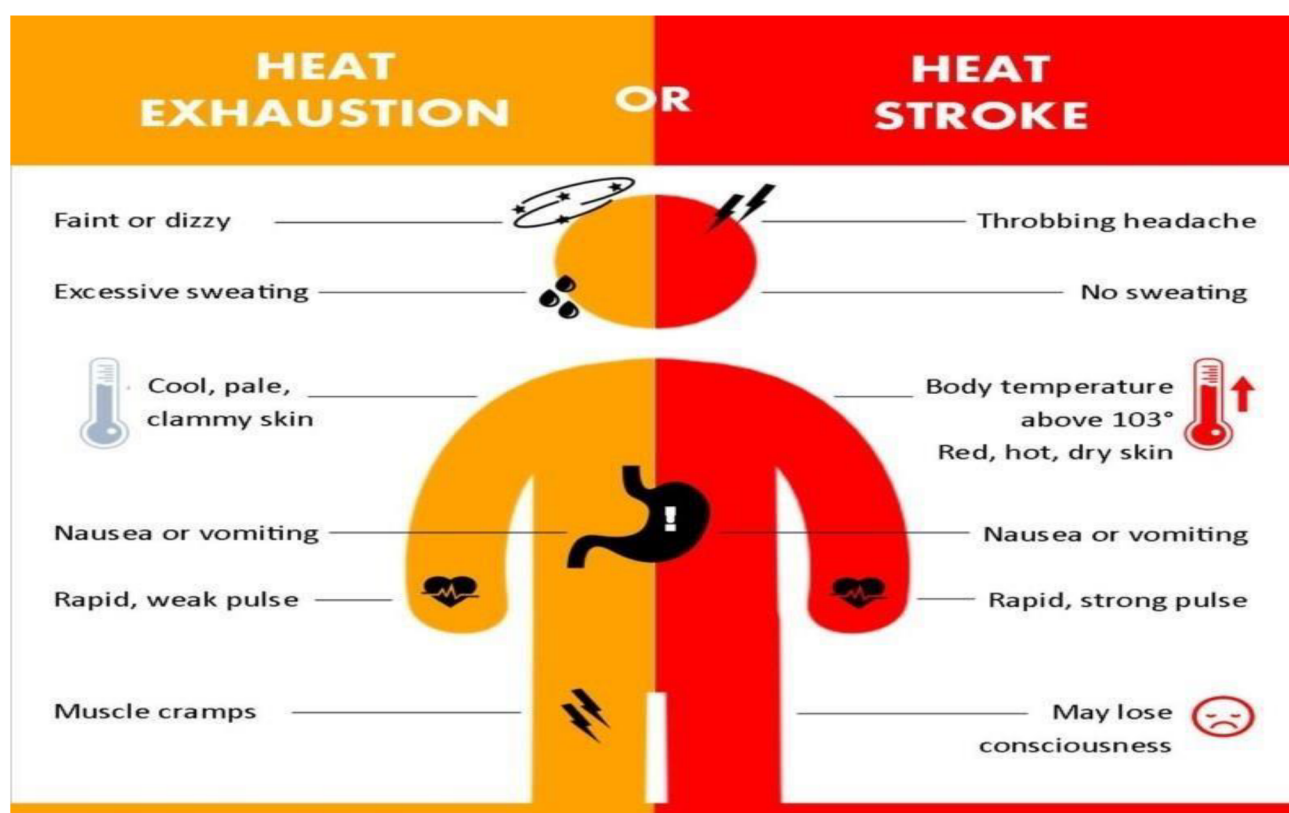
Sr. No.	Zone	U-PHC	Name of Doctor	Contact Detail	DYHO/PHM Name & Contact No
1	East	Bapod	Dr Bhavna Parmar	9909519649	Dr Roma shah 9909927416 Dr. Santosh Machhi 9979896869
2			Dr Manishaben Paramar	9825163881	
3		Panigate	Dr Ekta Shah	9909927430	
4			Dr. Vipul Shrimali	9413419131	
5		Kishanwadi	Dr Ashish Gamit	9909915368	
6			Dr. Manisha Rathva	9714417967	
7		Ramdevnagar	Dr. Ashishkumar Rathva	9574974419	
8			Dr. Soham Patel	9408432725	
9		Sawad	Dr. Parthiv Shah	9909927425	
10		Sudamapuri	Dr Abhisek Charel	9979773186	
11		Warasiya	Dr. Nilamben Patel	9429230675	
12			Dr. Sama Mansuri	79849 44217	
13		Harni	Dr. Krishna Patel	8200953598	
14	West	Diwalipura	Dr Aadityendra Arya	9099925730	Dr. Sejal Soni 9909927418 Dr. Mohsin Jujara 7990387171
15			Dr. Arman Vora	8141288851	
16		Atladra	Dr. Tejas Patel	9712045618	
17			Dr. Kevin Lalani	8347820428	
18		Tandalja	Dr Parul Tank	9909927426	
19			Dr. Marval Dave	9106943863	
20		Jetalpur	Dr. Shashank Suthar	7600994868	
21		Akota	Dr.Kamaxi Jonwal	9978836100 8849492558	
22		Subhanpura	Dr Namrata Chauhan	9824021956	
23		Gorwa	Dr. Pujan Joshi	9328603323	
24		Gotri	Dr Dipak Solanki	8238018689	
25		Gokulnagar	Dr. Akshay Patel	9638150978	
26		Bhaily	Dr. Shivangi Inamdar	8140522867	
27		Undera	Dr. Mohammad Saiyad	9586688395	

28	North	Ektanagar	Dr. Parth Joshi	9426747669	Dr. Jayshree Khubchandani 99099 27417 Dr. Arvind Parsakar 8238018706
29			Dr. Hetal Patel	9712285880	
30			Dr. Mohit Maurya	79841 77441	
31		Navayard	Dr Nital Thakkar	9909927436	
32			Dr. Rajshri Devmurari	7359049663	
33		Navidharti	Dr Jyoti Gadkari	9712971523 7874388875	
34			Dr. Vinit pathak	9662520793	
35		Karelibagh	Dr Anjana Maheta	9825329355	
36		Chhani	Dr Sakshi Kulkarni	9909927431	
37			Dr. Piyush Rathod	7874578248	
38		Siyabagh	Dr Abhisek Rathod	9924038613	
39		Navapura	Dr. Purvika Patel	9979105450	
40			Dr. Khushbu Parmar	9978036501	
41		Sama	Dr mahendra Mokani	9727767333	
42			Dr. Puja Kharvad	7016450093	
43			Dr. Yesha Rajput	90164 28119	
44		Fatepura	Dr. Nirmal Gohel	9909927429	
45			Dr. Ashok Rajpurohit	7567557625	
46	South	Yamunamill	Dr. Vallari Parmar	7984646307 9601086155	Dr. Seema Tripathi 9825076369 Dr. Pinal Shah 8238018683
47			Dr. Jagruti Solanki	9979281408	
48		Gajrawadi	Dr. Dipen Chaudhari	8306710320 9408781344	
49			Dr. Hiral Rana	8160481730	
50		Kapurai	Dr Prakash Prajapati	9909911719	
51		Danteswar	Dr. Vyoma Rana	8460419520	
52			dr. Anand popat	7359054502	
53		Tarsali	Dr Mausami Kothari	9825856172	
54			Dr. Dhaval Patel	91062 95204	
55		Maneja	Dr. Jay Nilak	99250 77734	
56			Dr. Sadiya Mansuri	9726587277	
57		Makarpura	Dr Chetna Patel	9909927415	
58			Dr. Dipti Chaudhari	8141333179	
59		Manjalpur	Dr. Hiral Kharva	9974003023	
60		Vadsar	Dr. Ronak M. Patel	7069071748	
61			Dr. Kalpesh Rathva	9574859302	

62		Vishvavitri	Dr. Sweta Rajnikant Patel	9978400231	
63		Health main office	Dr. Nevil Katariya	8460887566	
64		Health main office	Dr. Smita Vasava	9825503817	
65		RNTCP	Dr. Himanshu Machhaliya	9998004029	
66		Add. Moh	Dr. Jayesh Khushalani	8007972255	

* Emergency Contact No 108 ambulance (Toll Free)

6.2 Cooling Techniques for Heat Injury



Evaporative Cooling

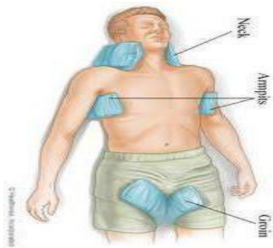
- Remove excess clothing
- Mist the skin constantly and fan.
- Complications: None.

Ice Sheets

- Remove excess clothing
- Wrap soldier in cold wet sheet. Include the head.
- Monitor the soldier closely.
- Complications: discomfort or shivering, hypothermia.

Strategic Ice Packing

- Remove excess clothing
- Place ice packs in the patient's groin, in the axillae, and around the anterior neck.
- Complications: discomfort or shivering.



Strategic Ice Packing



Heat emergencies are of three types: heat cramps (caused by loss of salt), heat exhaustion (caused by dehydration) and heat stroke (shock). Remove the victim from the heat and have him lie down. Apply cool compresses, elevate the feet, drink fluids and use a fan to blow cool air. Get medical help if needed.

6.3 Do and Don'ts of Heat wave

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

- Avoid going out in the sun, especially between 12.00 noon and 3.00 p.m.
- Drink sufficient water and as often as possible, even if not thirsty
- Wear lightweight, light-coloured, loose, and porous cotton clothes. Use protective goggles, umbrella/hat, shoes or chappals while going out in sun.
- Avoid strenuous activities when the outside temperature is high.
- While travelling, carry water with you.
- Avoid alcohol, tea, coffee and carbonated soft drinks, which dehydrates the body.
- If you work outside, use a hat or an umbrella and also use a damp cloth on your head, neck, face and limbs
- Do not leave children or pets in parked vehicles
- If you feel faint or ill, see a doctor immediately.
- Use ORS, homemade drinks like lassi, torani (rice water), lemon water, buttermilk, etc. which helps to re-hydrate the body.
- Keep animals in shade and give them plenty of water to drink.
- Keep your home cool, use curtains, shutters or sunshade and open windows at night.
- Use fans, damp clothing and take bath in cold water frequently.

TIPS FOR TREATMENT OF A PERSON AFFECTED BY SUNSTROKE:

- Lay the person in a cool place, under a shade. Wipe her/him with a wet cloth/wash the body frequently. Pour normal temperature water on the head. The main thing is to bring down the body temperature.
- Avoid heat exposure– keep cool. Avoid dehydration, Drink sufficient water- even if not thirsty.
- Give the person ORS to drink or lemon sarbat/torani or whatever is useful to rehydrate the body.
- Take the person immediately to the nearest health centre. The patient needs immediate

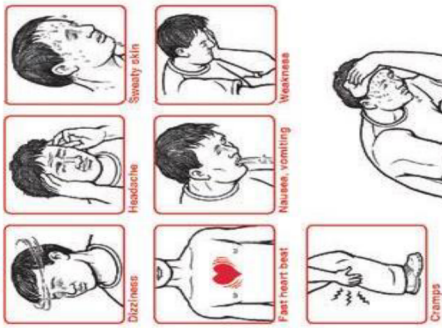
hospitalization, as heat strokes could be fatal.

ACCLIMATISATION

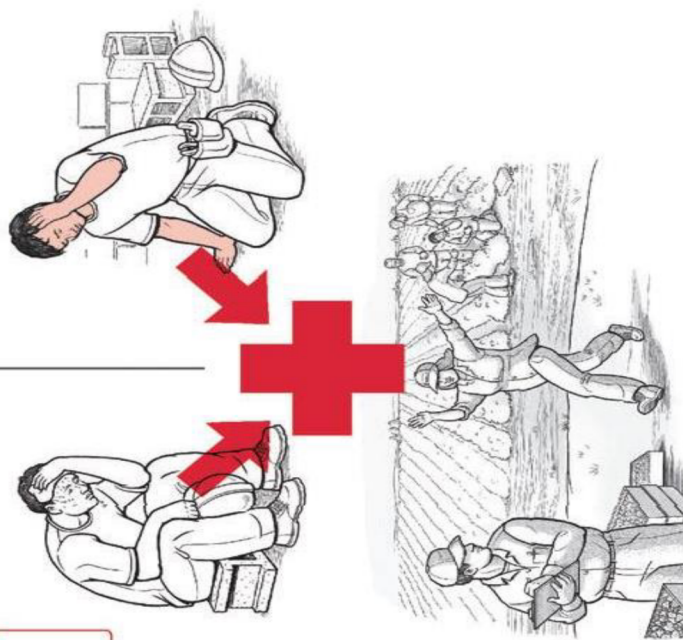
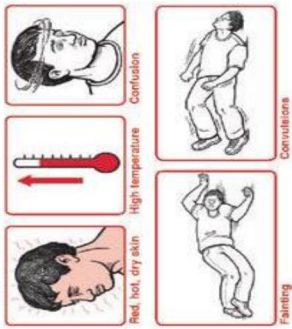
- People at risk are those who have come from a cooler climate to a hot climate. You may have such a person(s) visiting your family during the heat wave season. They should not move about in open field for a period of one week till the body is acclimatized to heat and should drink plenty of water. Acclimatization is achieved by gradual exposure to the hot environment during heat wave.

Two types of heat illness:

Heat Exhaustion



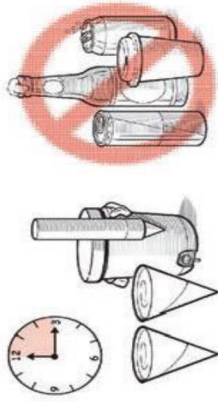
Heat Stroke



Heat kills – get help right away!

Stay safe and healthy!

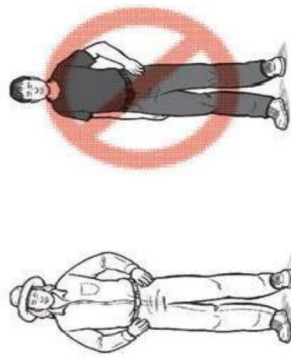
Drink water even if you aren't thirsty – every 15 minutes



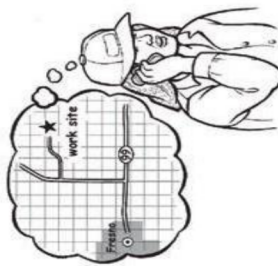
Watch out for each other



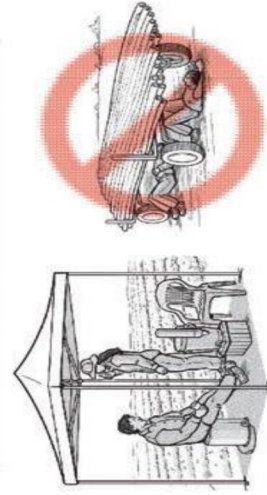
Wear a hat and light-colored clothing



Know where you are working in case you need to call 911



Rest in the shade





Health effects of heat

Two types of heat illness:

Heat Exhaustion



Heat Stroke



Watch out for early symptoms. You may need medical help.
People react differently — you may have just a few of these symptoms, or most of them.

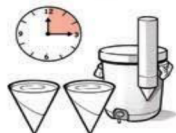
1



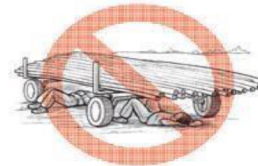
Stay safe and healthy!

WATER. REST. SHADE. The work can't get done without them.

Drink water even if you aren't thirsty — every 15 minutes.



Rest in the shade.



Watch out for each other.



Wear hats and light-colored clothing.



"Easy does it" on your first days of work in the heat. You need to get used to it.
Rest in the shade — at least 5 minutes as needed to cool down.

2



ગરમીથી કેવી રીતે બચીશું?

- વધુ પ્રમાણમાં પાણી, છાશ અથવા અન્ય પ્રવાહી પીવું.
- લાંબો સમય તડકામાં નહીં રહીએ
- આખું શરીર અને માથું ઢંકાએ તે રીતે સફેદ સુતરાઉ ખુલતા કપડાં પહેરવા
- ઠંડકવાળા સ્થળ પર સમયાંતરે આરામ કરવો
- નાના બાળકો વૃદ્ધો અને સગર્ભા સ્ત્રીઓનું ખાસ ધ્યાન રાખવું
- બજારમાં મળતો ખુલ્લો, વાસી ખોરાક ખાવો નહીં, બજારમાં માળતા બરફનો ઉપયોગ ટાળવો, લગ્ન પ્રસંગે દૂધ, માવાની આઈટમ ખાવી નહીં.

લૂ લાગવા (હીટ સ્ટ્રોક) ના લક્ષણો

- ગરમીની અળાઇઓ નિકળવી
- ખૂબ પરસેવો થવો અને અશક્તિ લાગવી
- માથાનો દુખાવો, ચક્કર આવવા
- ચામડી લાલ, સૂકી અને ગરમ થઈ જવી
- સ્નાયુઓમાં દુખાવો અને અશક્તિ
- ઊબકા અને ઉલ્ટી થવી
- અતિગંભીર કિસ્સામાં ખેંચ આવવી