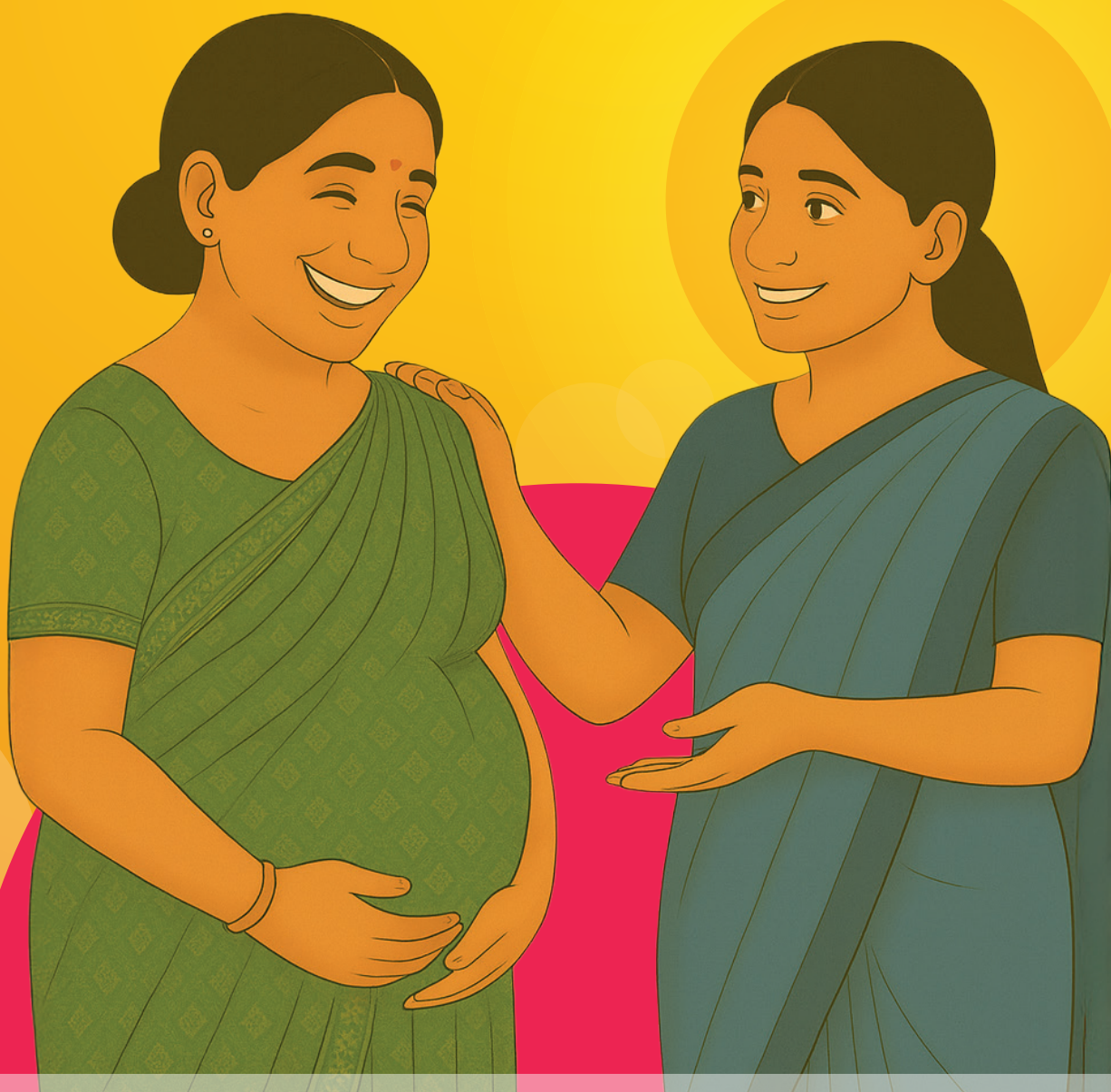




सत्यमेव जयते

Ministry of Health & Family Welfare
Government of India

Heat and Pregnancy: Guidance for Healthcare Professionals and Community Health Workers



National Programme
on Climate Change
and Human Health

How heat exposure impacts maternal and fetal health outcomes



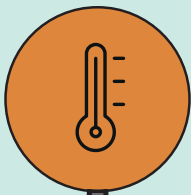
Extreme environmental heat exposure during pregnancy can lead to higher health risks for pregnant women and the fetus.



High-intensity and prolonged heat exposure raises the risk of adverse pregnancy outcomes, while even a single extremely hot day can be harmful.

Specific impacts documented from global and Indian research are as follows:

Maternal health outcomes



Extreme heat exposure increases the risk of severe maternal complications, mainly because of cardiovascular stress. This risk is high with long-term exposure during pregnancy (especially in the third trimester) and even higher with short-term exposure in the last week



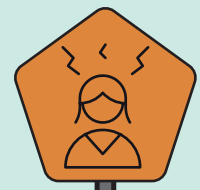
Heat exposure in early pregnancy (first 20 weeks) is linked to a higher risk of hypertensive disorders such as gestational hypertension, pre-eclampsia, and gestational diabetes



Maternal emergency visits and hospital admissions increase due to heat exposure, leading to a rise in all-cause maternal morbidity



Seasonal variation shows that there are more cases of miscarriages during summer months, while pregnancies that begin in winter are linked to higher maternal morbidity



Heat exposure leads to an increase in anxiety, psychological stress, sleep disturbance, fatigue, irritability, and contribute to perinatal depression

Fetal outcomes



Neonatal admissions and morbidity increase with heat exposure, with stronger evidence for admissions than for morbidity.



Heat exposure at any stage of pregnancy increases the risk of preterm birth, and can also cause stillbirth, low birth weight, and congenital anomalies.

Pregnancy outcomes



- Work-related heat exposure (in $\geq 30\text{ }^{\circ}\text{C} + \geq 35\%$ humidity) in occupational or household settings combined with moderate to intense physical activity raises the risks related to pregnancy:
 - The risk of miscarriage during the first trimester is three times higher.
 - The risk of adverse pregnancy outcomes doubles.
- Exposure to high heat and air pollution (due to high ozone, dust, particulate matter or wildfire) further increases the risks of adverse pregnancy outcomes, especially preterm birth.

Guidance for healthcare professionals

Be aware of the temperature in your area, especially if heatwave alerts are issued or if maximum temperature exceeds $30\text{ }^{\circ}\text{C}$ with high humidity.

A Clinical assessment (heat-risk checklist): Flag high-risk patients and educate them

Patient history checklist	Assess for
<p><input type="checkbox"/> Chief complaint/s: Heat exposure caused due to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Outdoors: sitting/traveling in a closed vehicle/non-exertional activities <input type="checkbox"/> Outdoors: working/sports activity <input type="checkbox"/> Near heat sources: fire/furnace/hot engines/machines <input type="checkbox"/> Indoors: at work/school/office/household work <input type="checkbox"/> Mass gathering/special event or show/rally/tourist place <p><input type="checkbox"/> Pre-existing health conditions:_____</p> <p><input type="checkbox"/> Medication use (affecting heat-health vulnerability, see page 6)</p> <p><input type="checkbox"/> Risk factors</p> <p>Type of house and housing conditions: Adequate ventilation <input type="checkbox"/> Tin/asbestos roofing <input type="checkbox"/> Overcrowding <input type="checkbox"/> GI sheets/Plastic polythene materials <input type="checkbox"/></p> <p>Access to: Safe drinking water <input type="checkbox"/> Cooling appliances: fans/coolers <input type="checkbox"/> Power supply <input type="checkbox"/> Transport <input type="checkbox"/> Functional toilet facilities <input type="checkbox"/></p>	<ul style="list-style-type: none"> <input type="checkbox"/> Heat strain <input type="checkbox"/> High-risk pregnancy <input type="checkbox"/> Hypertensive disorders <input type="checkbox"/> Gestational diabetes <input type="checkbox"/> Fetal wellbeing <input type="checkbox"/> Fetal growth

Environmental risk factors:

Recorded maximum temperature $>30\text{ }^{\circ}\text{C}$ Relative humidity $>35\%$ Heatwave alert issued

B Facility preparedness

Be aware of heatwave alerts and high temperatures in your area and ensure preparedness of healthcare facilities.

Basic Amenities



Ensure shaded, well-ventilated waiting areas and OPD spaces



Ensure access to safe, cool drinking water (through water dispensers, earthen pots, or jugs) at all points of care



Ensure uninterrupted electricity supply through appropriate backup power solutions if required



Offer OPD services during early mornings or late evenings to avoid peak heat hours



Display IEC materials on heat stress and hydration tips

Medical Preparedness



Maintain an adequate stock of:

- ORS and essential medicines required for high-risk pregnancy management
- Ice cubes/ice packs/ice towels/cold compresses for fast cooling (*some active cooling measures may require clinical judgment before application*)



Ambulance Readiness:

- Ensure that ambulances and other referral systems (ambulances, helplines, contact points) are functional and available
- Ambulances should have provisions for active cooling of patients on-site and during transfer, especially for those with moderate to severe heat-related illnesses

For pregnant women during summer and extreme heat

Capacity building of the healthcare workforce:

Sensitize all Medical Officers (MOs), Community Health Officers (CHOs), Auxiliary Nurse Midwives (ANMs) and Accredited Social Health Activists (ASHAs) on:



Counselling on home cooling measures and nutritional needs of pregnant women



Early identification of concerning symptoms and availability of first aid measures



Primary assessment and timely referral of pregnant women with warning signs in healthcare facilities

Reporting of heatstroke cases and deaths:

Health professionals/MOs should ensure reporting of heatstroke cases and deaths to the National Heat-Related Illness and Death Surveillance system on the Integrated Health Information Platform (IHIP), with daily reporting from their health facility.



Guidance for healthcare professionals

Be aware of the temperature in your area, especially if heatwave alerts are issued or if the maximum temperature exceeds 30°C with high humidity.

A Early identification of serious signs in pregnant women by ASHAs, Anganwadi Workers (AWW), ANMs and CHOs:

Immediately call 108/102 and refer the patient to the nearest Ayushman Arogya Mandir Community Health Centre (CHC), Sub-District Hospital (SDH) and District Hospital (DH), if any of the following is observed:

- | | |
|---|--|
| <input type="checkbox"/> Confusion/fainting with unresponsiveness | <input type="checkbox"/> Sudden or extreme headache or vision changes |
| <input type="checkbox"/> Seizures/coma | <input type="checkbox"/> Severe nausea or vomiting |
| <input type="checkbox"/> Rapid heartbeat with heavy breathing | <input type="checkbox"/> Excessive sweating and pale skin |
| <input type="checkbox"/> Body temperature >38°C and rising | <input type="checkbox"/> No sweating, yet skin feels hot and flushed |
| <input type="checkbox"/> No urination for more than eight hours | <input type="checkbox"/> Intense thirst or loss of appetite and feeling sick |
| <input type="checkbox"/> Cramps in arms, legs, and stomach | <input type="checkbox"/> Severe anxiety or panic attack |
| <input type="checkbox"/> Dark-colored urine, signs of dehydration | <input type="checkbox"/> Suicidal thoughts |
| <input type="checkbox"/> Early contractions | <input type="checkbox"/> Delirium or hallucinations |
| <input type="checkbox"/> Swelling of face or any general swelling | |

*In case of a mental health issue, refer Tele MANAS toll-free number- 14416/1-800-891-4416

B Field/community-level support while awaiting transport:




- Immediately shift the person under a shaded or cooler area.
- Reach out to the ANM or nearest Ayushman Arogya Mandir (AAM)/Sub Health Centre (SHC)/Primary Health Centre (PHC) immediately and call for ambulance transport.
- Apply cold water/ice/ice packs on large areas of the body/clothes, use a fan to cool the patient down. Use normal water if cold water is not available. Loosen clothes if possible, considering the dignity of the patient.
- Offer cold water/ORS to the patient if they are conscious.
- Maintain patient's hydration and monitor their vitals (if possible).

During transit, ensure cooling and monitor the signs while accompanying the patient

If the patient shows serious signs as above, take her to the nearest CHC/SDH/DH	If the patient is conscious, take her to the nearest AAM/SHC/PHC
<p>Management at CHC/SDH/DH/PMSMA sites:</p> <ul style="list-style-type: none"> • Admit to the emergency obstetric unit/IPD. • Initiate full maternal and fetal monitoring that includes measuring temperature, blood pressure, hydration status, fetal heart rate and relevant clinical management. • Initiate immediate external cooling if clinical assessment suggests heat exposure. • Use the evaporative method of cooling: Ice cubes/packs, cold towels/sponge, water spray, direct fanning. Avoid cold water immersion. • Keep the obstetrician informed for delivery preparation in case the fetal condition is compromised. 	<p>Management at PHC/SHC/AAM:</p> <ul style="list-style-type: none"> • Conduct clinical assessment including the heat-risk checklist: Measure temperature, blood pressure, hydration status, fetal heart rate. • Initiate external cooling methods and administer cold IV fluids if the clinical assessment indicates severe dehydration or heat exhaustion. • Continue observation for at least 2–4 hours. <p>If the patient's condition worsens and leads to severe headache, convulsions, coma, inability to reduce body temperature or regain hydration, or signs of fetal distress or preterm labour, refer to a higher health facility immediately.</p>

Guidance for healthcare professionals

(Provide patient education pamphlet)

General prevention and cooling measures	Pregnancy-specific care	Postpartum & breastfeeding care	Infant care
<p> Communicate risk: How heat exposure can impact pregnancy and its outcomes</p> <p>B.E.A.T. the Heat</p> <p> B – Be hydrated: Drink water frequently and avoid dehydration</p> <p> E – Escape the heat: Stay in cool, shaded or well-ventilated spaces, avoid peak heat hours</p> <p> A – Adjust activities: Reduce strenuous work and rest more often</p> <p> T – Take help early: Seek medical care promptly if warning signs appear (dizziness, headache and reduced fetal movements)</p>	<p> Discuss clinical observations, pregnancy progress and warning signs</p> <p> Review/adjust medications</p> <p> Adjust water intake</p> <p>Advice</p> <p> Ensure adequate hydration</p> <p> Sleep on the left side</p> <p> Rest frequently</p> <p> Cool down frequently</p> <p> Up to 45 minutes of moderate-intensity exercise at 32°C and 45% relative humidity can be performed safely</p> <p> Monitor fetal movements</p> <p> Watch for symptoms of heat strain and take corrective action</p> <p> Know when to seek medical care</p>	<p> Increase fluid intake to compensate for fluid loss while breastfeeding</p> <p> Take energy rich food like khichdi, milk with jaggery, roasted chana, etc, for additional 500 kcal extra per day</p> <p> Ensure adequate rest—at least 8 hours at night and 2–3 hours during the daytime</p> <p> Breastfeed frequently, no extra water is needed for infants</p> <p> Bathe regularly or wipe down with a wet cloth to stay cool</p>	<p> Bathe the baby regularly in lukewarm water</p> <p> Avoid wrapping baby tightly; dress them in light cotton layers</p> <p> Keep the baby in a shaded, airy place</p> <p> Avoid plastic sheets, heavy blankets, or tight clothing</p> <p> Use wet clothes with a fan for cooler air during dry and hot conditions</p>

Important
Maintain newborns' temperature between 36.5–37.5°C/97.7°F–99.5°F, protect from drafts, and ensure proper thermal care

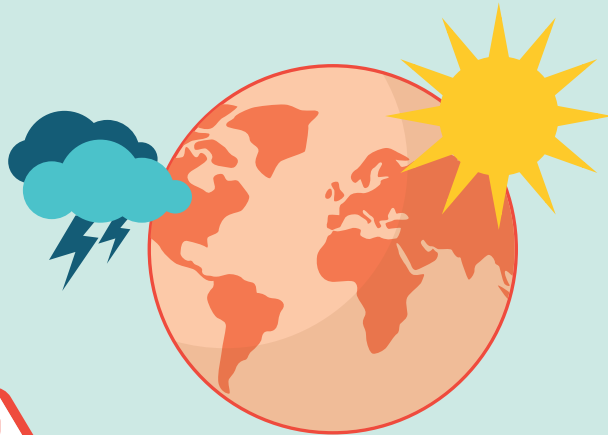


Medications that may increase risks during hot days

Check with pregnant women and lactating mothers if they are on any of the medicines that are listed below. The listed below (not comprehensive) are common medicines that have a direct impact on patient's health due to extreme heat. The impact is due to change in thirst level, thermoregulation, sweating, volume depletion, vasodilatation, drug/electrolyte imbalance and cognitive function.

Medication		Body mechanisms affected due to heat exposure
Antihypertensives	Diuretics: Furosemide Hydrochlorothiazide, Acetazolamide	Electrolyte imbalance, volume depletion, dehydration and increased risk of fainting and falls reduced thirst
	Beta blockers: Atenolol, Metoprolol, Propranolol	Reduced superficial vasodilation, decreased sweating, reduced blood pressure, increased risk of fainting and falls
	Calcium channel blocker: Amlodipine, Felodipine, Nifedipine	Decreased blood pressure, increased risk of fainting and falls, electrolyte imbalance
	Angiotensin Converting Enzyme Inhibitor (ACEi): Enalapril, Lisinopril, Ramipril Angiotensin II Receptor blockers (ARBs): Valsartan, Losartan	Decreased blood pressure, increased risk of fainting and falls, reduced thirst sensation
	Angiotensin Receptor-Nepriylsin Inhibitors (ARNIs): Sacubitril/Valsartan Combination drug including ARB	
Anti-platelet medications	Clopidogrel, Aspirin	Reduced superficial vasodilation
Antianginals	Nitrates: Glyceryl Trinitrate, Isosorbide Mononitrate	Worsened hypotension
Psychiatric medications	Mood stabilizer: Lithium	Diabetes insipidus induced water loss and risk for fainting, falls, electrolyte imbalance, risk of toxicity in dehydrating environment because of a narrow therapeutic index
	Antipsychotics: Haloperidol, Olanzapine, Quetiapine, Risperidone	Impaired sweating, impaired temperature
	Selective Serotonin Reuptake Inhibitors (SSRI): Fluoxetine, Sertraline Serotonin and Norepinephrine Reuptake Inhibitors (SNRI): Duloxetine, Venlafaxine	Increased sweating
	Tricyclic antidepressants (TCAs): Amitriptyline, Clomipramine	Decreased sweating
Antiseizure	Topiramate Oxcarbazepine Carbamazepine	Decreased sweating
		Increased sweating, increased urination
		Dizziness and weakness, especially after increased dose
Antihistamines with anticholinergic properties	Promethazine, Doxylamine, Diphenhydramine	Decreased sweating, Impaired thermoregulation
Analgesics	Nonsteroidal anti-inflammatory drugs (NSAIDs)	Kidney injury with dehydration
	Aspirin	Increased heat production with overdose, kidney injury along with dehydration
	Aspirin	Heat related liver injury increase risk for acetaminophen hepatotoxicity
Antibiotics	Sulfonamides	Kidney injury risk with dehydration
Antiretrovirals	Indinavir	Kidney injury risk with dehydration
Thyroid replacement	Levothyroxine	Excessive sweating
Stimulants	Cocaine Amphetamine, Methylphenidate	Reduced sweating, reduced dilation of skin blood vessels, impaired heat perception
		Increased body temperature
Hallucinogens	Methylenedioxy-methamphetamine (MDMA) (and alternatives)	Reduced sweating, reduced skin blood vessel dilation, impaired heat perception
Alcohol	Alcoholic drinks	Increased sweating, increased urination, impaired heat perception

Impact of extreme heat on maternal, newborn and child health



Heat hazards:

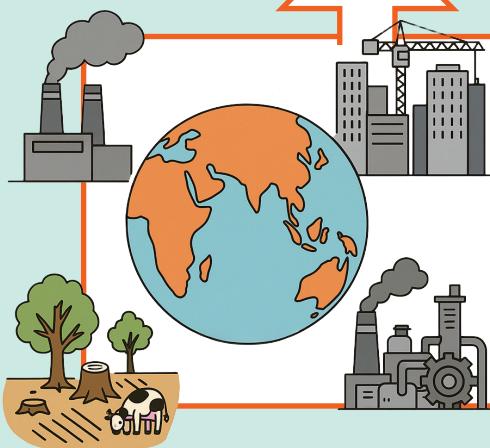
- **Increased intensity, duration and frequency of heat events and heatwaves**
- **Seasonal timing of events**
- **Rise in average temperatures including night temperatures**

Leading to chronic heat stress, increased risk of dehydration and heat related illnesses, especially for pregnant women, older adults, outdoor workers and children

Critical windows of exposure

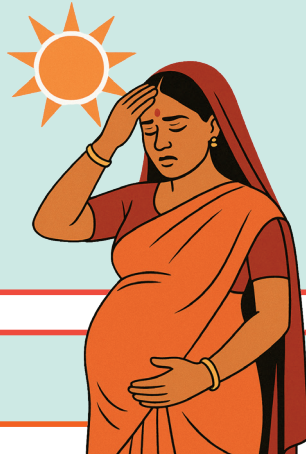
Vulnerability factors:

- **Physiological:** Very young and elderly pregnant women, and those with pre-existing illnesses.
- **Socio-economic:** Poverty, inadequate housing, social isolation, and prolonged exposure to outdoor work.
- **Environmental:** Urban heat exposure, high humidity, and limited access to cooling or shaded spaces.
- **Behavioural:** Poor heat acclimatization, low awareness, dehydration, and substance use.



Drivers:

- Rising temperature due to climate change
- Increased greenhouse gas emissions
- Rapid urbanization
- Deforestation and less of green cover
- Changing land use and reduced natural cooling
- Increased energy demand



Direct impacts:

- Dehydration
- Endocrine system dysfunction
- Vasodilation
- Increased skin blood flow
- Heat strain
- Release of stress hormones
- Elevation of body temperature
- Hyperventilation/hypotension (low BP)
- Sleep disturbances

Indirect impacts:

Individual level

- Work conditions
- Self-care and family care practices
- Lactation and sub-optimal feeding practices
- Care-seeking
- Social interaction
- Food security
- Risk and patterns of transmission of food, water and vector-borne diseases

Family and community level

- Family stress
- Lack of local plans to prepare for dealing with extreme heat
- Food security
- Increased risk of transmission of food, water and vector-borne diseases
- Domestic violence/community violence
- Migration

Health worker and facility level

- Health worker performance
- Impaired cold chain and safe storage of drugs
- Effects on service delivery, quality of care and response times
- Power outages
- Lack of shaded, well ventilated waiting area
- Non availability of drinking water, transport

Health impact on pregnant women, new born and children

Maternal health

- Gestational hypertension
- Pre-eclampsia
- Gestational diabetes
- Miscarriages

Fetal and perinatal health

- Stillbirths
- Congenital disorders

Newborn health

- Preterm birth
- Low birthweight
- Increased hospital admissions

Child Health and development

- Lead to increased risk of infant mortality
- Respiratory diseases
- Wasting, stunting, weight loss and underweight
- Heat stroke, heat related illness
- Infections, including vector-borne diseases
- Gastrointestinal conditions, including diarrhoea
- Increased hospital admissions
- Lower educational attainment

“

A warming world calls for stronger care in pregnancy—to protect mothers and nurture new life

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