Health vulnerability to heat stress in rural communities of the semi-arid regions of Maharashtra, India

ASSAR
Adaptation at Scale in Semi-Arid Regions

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The five-year ASSAR project (Adaptation at Scale in Semi-Arid Regions, 2014-2018) uses insights from multi-scale, interdisciplinary work to inform and transform climate adaptation policy and practice in ways that promote the long-term wellbeing of the most vulnerable and those with the least agency.

KEY POINTS

Summer temperatures in India have been rising over the last few decades, resulting in increased heat-related mortalities. Future climate projections indicate an increase in the duration and frequency of heat waves.

Rural communities are vulnerable to heat stress, particularly during peak heat hours: men in the age group 31-60 years working outdoors; individuals engaged in hard physical work, such as farmers and labourers; those residing in tin roof houses; and those having pre-existing health conditions, are particularly vulnerable.

The rural health infrastructure needs to be capacitated and upgraded to effectively handle heat stress related illnesses.

The development of a health surveillance mechanism to monitor heat-related morbidity and mortality is required for quick action.

Priority should be given to the development of a comprehensive state-level heat action plan for Maharashtra, which addresses the urban and rural communities.

Introduction

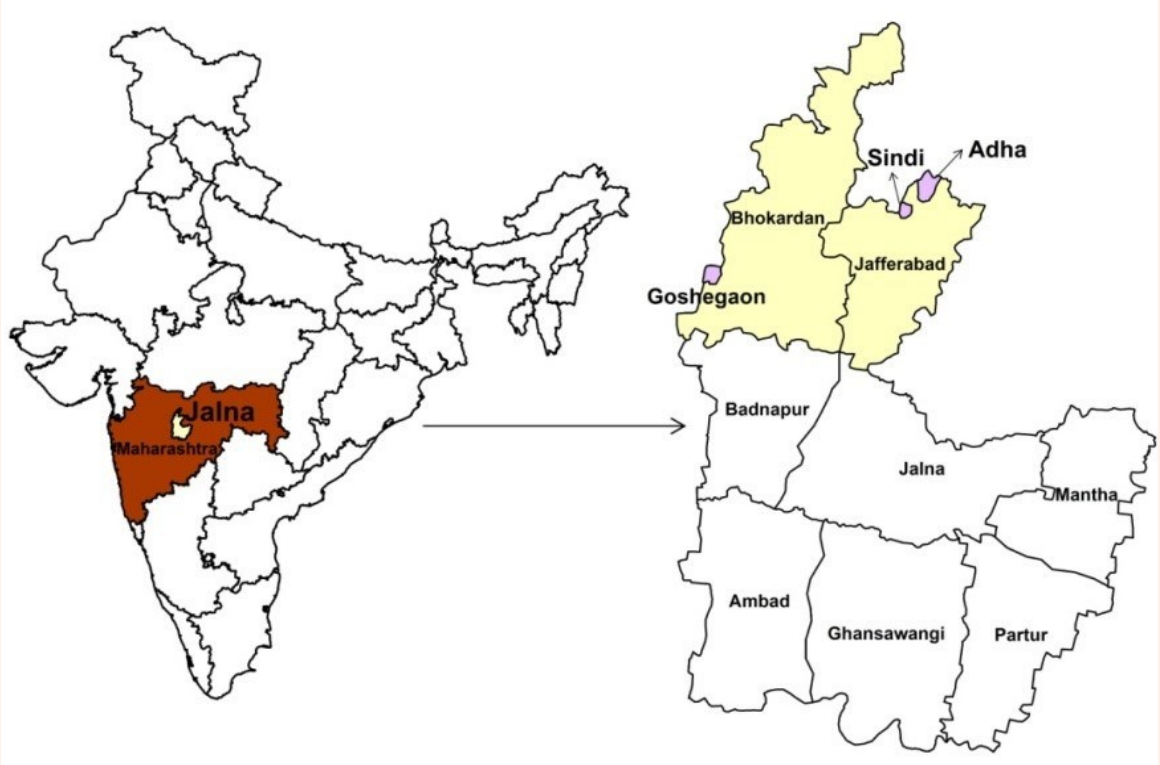
Increasing summer temperatures are likely to impact human health. In India, an increase in severe heat wave days per year has been observed over the past few decades (see graph on page 2).[1] This is associated with a steady increase in mortality over the decades. Heat-related mortality increased from 612 in 1992 to 2422 in 2015.[2] As a matter of fact, 40% of all the deaths related to extreme weather in 2016 were due to severe heat waves. Future climate projections for India indicate that heat waves will likely be more intense, have longer durations, and occur more often and earlier in the year.

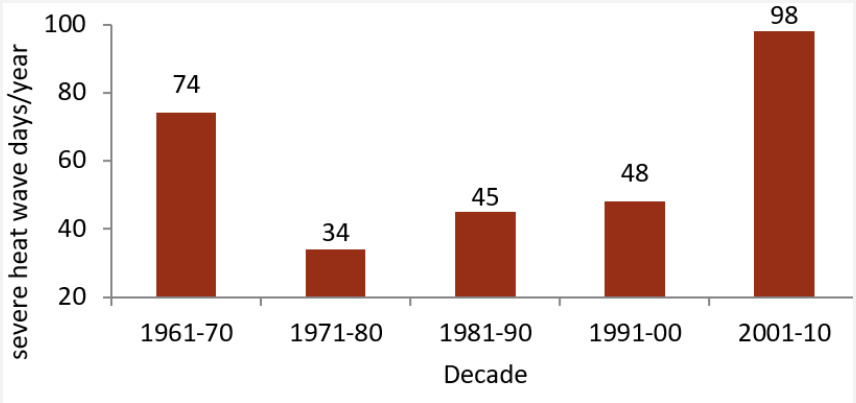
In India, it is only in the recent years that heat action plans have been prepared at state level (e.g. Uttar Pradesh, Andhra Pradesh, Orissa and Telangana), city level (e.g. Ahmedabad, Nagpur) and district level (e.g. Hazaribaug in Jharkhand state). At present, to understand the impact of heat stress, most studies have been concentrated in urban areas and few occupational settings. However, there is little evidence of the heat stress experience, impact of heat exposure, and adaptation measures to heat and heat waves in the rural context.

This policy brief highlights the varied risks and responses to heat stress among the different social categories in the rural communities in the semi-arid region of Maharashtra, thereby identifying the vulnerable groups as well as the important factors that affect vulnerability to heat stress.

Study location

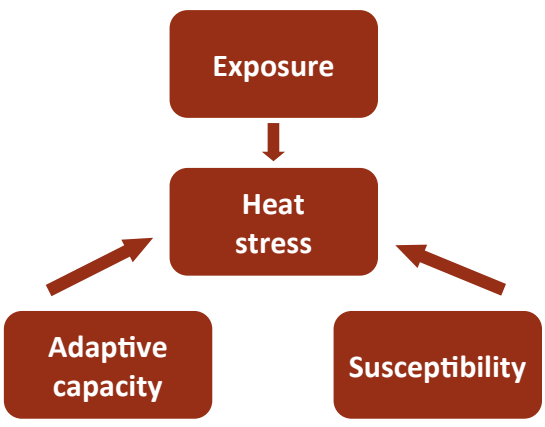
The findings are based on a study conducted in Jalna district, which is located in the central part of Maharashtra state in northern Marathwada region. Three villages from Jafrabad and Bhokardan blocks in Jalna district were selected. From each of the three villages, a sample of 20% of total households was selected based on stratified random sampling. A total of 215 households were surveyed.





All India: severe heat wave days/year

Vulnerability to heat stress



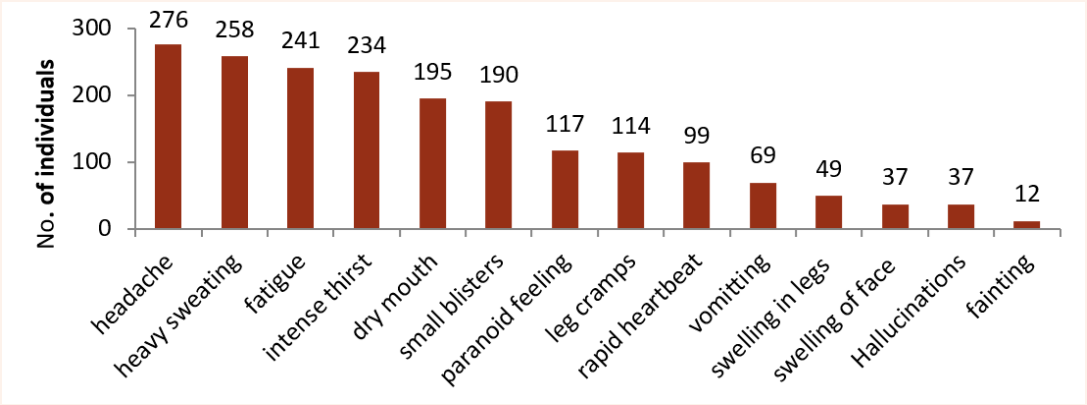
Vulnerability is conceptualised as a function of the interacting biophysical and socioeconomic determinants that can be broken down into heat hazard probability, as well as factors associated with population exposure, susceptibility and adaptive capacity (see figure on left).[3]

Vulnerability is seen in the context of occurrence of heat-related symptoms (HRS). The occurrence of at least one HRS was the health outcome of interest.

HRS can be considered as mild (small blisters or pimples, dry mouth, fatigue, leg cramps, heavy sweating, intense thirst, rapid heartbeat, headache, leg swelling, paranoid feeling and swelling of face) or severe (hallucinations, fainting and vomiting).

Key findings

The types of heat-related symptoms (HRS) considered in the study and the number of individuals experiencing these symptoms are shown in the graph below:



The following graph highlights the percentage of individuals across various categories (gender, age, wealth ranking and occupation) affected by occurrence of HRS during the summer months of April and May 2016. (Note: The dark red colour indicates the most affected categories.)

Reported experience of HRS across various socio-demographic categories

Individuals engaged in manual work during summer.

Susceptibility factors

Susceptibility components included gender, age, economic status and pre-existing health conditions.

Susceptibility factors	Findings
Gender (Men and Women)	Men are found to be more affected than women due to longer exposure to outdoor heat.
Age (Children (< 4 years), 5- 14 years, 15- 30 years, 31- 59 years, elderly (>60 years old))	Adults between 31-59 years of age, who are engaged in manual work related livelihood activities, are more affected than other age groups.
Wealth Category (Very poor, poor, middle class and better off)	Higher number of individuals from the 'very poor' and 'poor' categories experience HRS as compared to the others.
Pre-existing health conditions	Individuals suffering from pre-existing chronic health condition are disproportionately affected as compared to those not having any pre-existing health condition.

Woman exposed to hot indoor temperatures while cooking.

Exposure factors

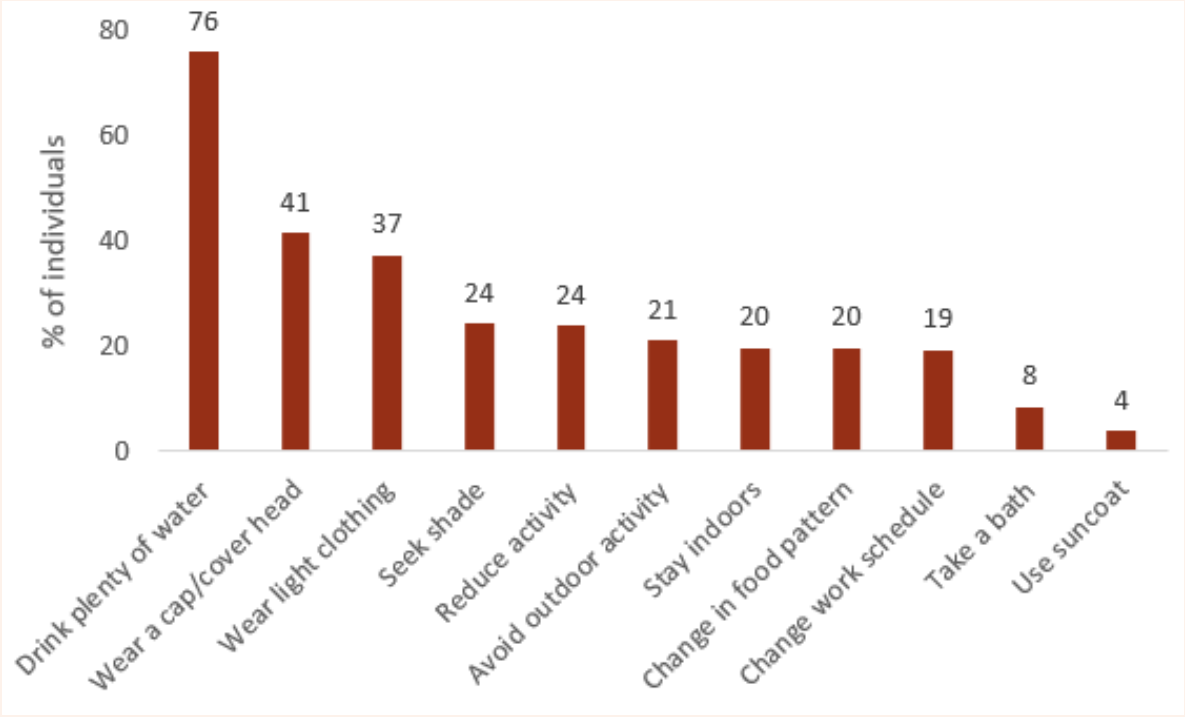
Exposure can be affected by hazard factors, amplifying factors and protective factors.[3] A hazard factor is considered to be exposure to peak heat hours (11am to 5pm). Amplifying factors include type of occupation and type of roofing. Protective factors are coping strategies.

The majority of households has tin roofs.

Exposure Factors	Findings
Exposure to Heat (Indoor and outdoor)	The manual work population of adults is exposed to direct sunlight outdoors, whereas elderly and children are exposed to hot indoor environments during afternoons, due to faulty building designs and material. Women are exposed to high indoor temperatures during cooking and performing household chores.
Type of Livelihood (Farming, agricultural and non-agricultural labour, Mahatma Gandhi Rural Employment Guarantee Scheme (MGNREGS) labour etc.)	Individuals engaged in manual labour (agriculture and non-agriculture), MGNREGS and farming are more affected.
Type of roofing (Tin, cement and others)	Those living in households with tin roofs are more affected than those living in houses with cement roofs.

Adaptive factors

The graph below lists the various steps individuals, families and the community take to cope with heat and its impacts. The use of ceiling fans and table fans is the most common way to manage heat during summer. These coping strategies address the immediate problem at hand but may not be adequate in the long run.



Percentage of individuals using different coping strategies

People taking shelter under a tree on a hot summer's day.

Policy recommendations

- Heat-related symptoms can serve as useful indicators of early heat stress. They are easily recognised by the ordinary person and can be used for early identification and prevention of more serious impacts such as heat stroke.
- Effective planning through the development of a surveillance mechanism in rural areas to monitor heat-related morbidity and mortality, will help in mitigating and avoiding heat-related stresses and deaths in the future.
- Improving health systems will benefit all – not just in the context of heat-related illnesses, but all illnesses – hence this will be a no-regret intervention. Infrastructure in primary health centres should be upgraded to respond to heat stress in peak summer months.
- Improving housing designs using low-cost measures, particularly that aim at improving ventilation and reducing indoor heat exposure due to tin roofs, should be given priority, especially through existing government housing schemes.
- Outdoor labour work during peak heat hours, such as at MGNREGS and construction sites, should be avoided. The work could be rescheduled at early morning or late evening.
- There is a need for pre-emptive strategies to ensure that people in areas where heat waves are not yet a phenomenon, are adequately supported to reduce their vulnerability. Community awareness to heat stress should be improved so that they can take adequate precautionary measures.
- Maharashtra does not have a state-level heat action plan. Therefore, priority should be given to the development of a comprehensive state-level heat action plan which addresses the urban and rural communities.

References

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ABOUT ASSAR

ASSAR uses insights from multiple-scale, interdisciplinary work to improve the understanding of the barriers, enablers and limits to effective, sustained and widespread climate change adaptation out to the 2030s. Working in seven countries in Africa and South Asia, ASSAR's regional teams research socio-ecological dynamics relating to livelihood transitions, and the access, use and management of land and water. One of four consortia under the Collaborative Adaptation Research Initiative in Africa and Asia (CARIAA), ASSAR generates new knowledge of climate change hotspots to influence policy and practice and to change the way researchers and practitioners interact.

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