



BEATING THE HEAT

HOW INDIA SUCCESSFULLY REDUCED MORTALITY DUE TO HEAT WAVES



REFORMS THAT TRANSFORMED



NATIONAL DISASTER MANAGEMENT AUTHORITY
MINISTRY OF HOME AFFAIRS, GOVERNMENT OF INDIA

HOW INDIA SUCCESSFULLY REDUCED MORTALITY DUE TO HEAT WAVES

The Issue

Heat waves – the silent killer

Heat waves do not fetch as much public attention as more dramatic disasters such as earthquakes and floods, but until more recently they were taking a substantial toll of lives in India. Between 1992 and 2015, they caused 24,223 deaths across the country (see Table 1). Despite these numbers, there had been no national-level strategy or vision to tackle the heat wave as a disaster. Until 2015, the deaths and diseases heat waves brought were not accorded due recognition at the national level as hazards. That was unfortunate, as annual deaths in India due to heat-wave conditions were high and could have been avoided with effective planning, coordination and implementation.

Table 1 : Year-wise details of recorded deaths caused by heat waves in India

Year	Recorded deaths caused by heat waves	Year	Recorded deaths caused by heat waves	Year	Recorded deaths caused by heat waves
1992	612	2000	534	2008	616
1993	631	2001	505	2009	1071
1994	773	2002	720	2010	1274
1995	1677	2003	807	2011	793
1996	434	2004	756	2012	1247
1997	393	2005	1075	2013	1216
1998	3058	2006	754	2014	1677
1999	628	2007	932	2015	2040

Source : Compiled from the Revenue and Disaster Management Departments of several state governments and from IMD reports, as per the National Guidelines for Preparation of Action Plan—Prevention and Management of Heat Wave, published in October 2019.

Heat-wave victims are the poor and vulnerable

The casualties of heat-wave conditions were mostly the poor and vulnerable in the unorganised sectors, such as daily-wage labourers, street hawkers, etc. They are compelled to work outdoors out of economic necessity, to earn their livelihood. Being unable to avoid the outdoors, they are particularly vulnerable to the dangers of heat-wave conditions.

Heat-waves mean tragedy and loss for both families and nation

Heat-wave deaths and illnesses mean tragedy and loss, not only for the families of the victims, but also for the nation, for whom any avoidable loss of life is lamentable. Deaths and illness also mean productivity loss for the nation.

Heat-waves not notified as disaster at national level

Previous governments had been criticised by the media for failing to take concrete action at the national level to combat the hazard of heat waves. Prior to 2015, the primary responsibility for disaster risk management rested with the state governments. Chhattisgarh, Odisha, Kerala, Rajasthan, Andhra Pradesh, Maharashtra and Karnataka had declared heat waves as a local disaster. Heat waves were not notified as a disaster at the national level under the existing disaster relief policies. State governments can spend up to 10% of funds under



Two- three years ago, thousands of people would lose their lives every year due to heat-wave. After that, NDMA organized workshops on heat wave management as part of a campaign to raise awareness among people. Mass participation led to good results.



- **Shri Narendra Modi**, Prime Minister
Mann Ki Baat, Telecasted on 28 Feb 2018



the State Disaster Response Fund (SDRF) on tackling a disaster within the local context of the state. Until 2015, the approach of the central and state governments towards heat waves had been response-centric, and due importance to risk reduction was not given.

What has the government done?

Vision

Reduction of heat-wave deaths in India to zero has been the vision adopted by the present Central government. This vision has been followed since 2015.

To this end, the government's priorities for action are:

- a. Understanding disaster risk;
- b. Strengthening disaster risk governance to manage disasters;
- c. Investing in disaster risk reduction for resilience; and
- d. Enhancing disaster preparedness for effective response and to 'build back better' in recovery, rehabilitation and reconstruction under the Sendai Framework for Disaster Risk Reduction (adopted at the Third UN World Conference on Disaster Risk Reduction in Sendai, Japan).

The other objective is to bring about a change in approach, from 'response-centric' management to holistic management of disasters. The emphasis would be on prevention, preparedness and mitigation. Climate change issues and sustainable development were also given due importance in the vision.



“ The Heat Action Plans help in building up the resilience of Indians, particularly those vulnerable to severe heat waves. In fact, the Heat Action Plan helps millions avoid killer heat. It sets out strategies that help to prevent heat-related mortality.”

- Dr. Lipika Nanda,

Vice President, Multisectoral Planning in Public Health,
Public Health Foundation of India



“ The ward level Heat Action Plans have improved the capacities of cities and states in managing heat stress and meeting heat wave related emergencies. We thank NDMA for showing exemplary leadership in guiding the cities, states and other stakeholders in developing heat wave resilient cities.”

- Rohit Magotra

Deputy Director, IRADe

Commitment

As soon as Hon'ble Prime Minister & Chairman of the National Disaster Management Authority (NDMA) Shri Narendra Modi assumed charge of the Authority, he gave due importance to management of this hazard and initiated various measures, which have resulted in significant reduction in loss of life due to heat waves. The decline in deaths due to heat waves has been remarkable—from 2,040 in 2015 to 4 in 2020.

The government also committed itself to work according to the priorities for action it had set so that India could contribute successfully towards achievement of the seven global targets set by the Sendai Framework.

Framing of approach towards tackling heat waves

In order to implement its vision, policies and strategies at the ground level, the government adopted a multi-stakeholder approach and has initiated work on several fronts since 2015. The key initiatives undertaken by the government are as follows:

a. Preparation of national guidelines for heat-wave management:

In April 2016, it drew up national guidelines under the title 'Preparation of Action Plan—Prevention and Management of Heat Wave'. The guidelines were twice revised, first in 2017 and then in 2019. They were enriched with recommendations for more specific actions, based on scientific inputs derived from various research papers, reports and best practices in heat-wave assessment and mapping techniques. The

revisions in 2019 included a new section, 'Built Environment'; the revisions focused on short-term, medium-term and long-term measures for heat-wave risk reduction.

The heat-wave guidelines were created with the intention of providing a framework for states to develop their own Heat Wave Action Plans for implementation. This framework provided for prevention, preparedness, mitigation measures, inter-agency coordination and impact evaluation of heat-wave response activities in cities and towns.



b. Setting of roles and responsibilities in the National Guidelines and National Disaster Management Plan

The National Guidelines on Heat Wave clearly mentions the roles and responsibilities of the Central and state government agencies, district administrations, local self-governments, NGOs, civil society organizations and other stakeholders in a matrix format. The National Disaster Management Plan (NDMP), which was first prepared in 2016 and revised in 2019, also contains a dedicated chapter titled 'Heat Wave Risk Mitigation', which clearly mentions the roles and responsibilities of the various stakeholders in a matrix format.

c. Ground-level implementation of policy, guidelines and strategies

To ensure that the National Guidelines on Heat Wave and the actions to be taken for heat-wave management, as per NDMP, are implemented at the ground level and that states are better prepared to deal with heat-wave conditions, NDMA started conducting heat-wave

workshops in collaboration with one or the other of the heat-wave affected states every year since 2017.

NDMA has so far conducted four such workshops. The first such workshop was held in association with Government of Telangana in February 2017; the second with Government of Andhra Pradesh in February, 2018; the third with Government of Maharashtra in February 2019; and the fourth with Government of Karnataka in December 2019.

These workshops helped sensitise states about the need to prepare and implement their Heat Wave Action Plans. They were also an opportunity for state governments to share their best practices on heat-wave management and to prepare themselves for the upcoming heat-wave seasons.

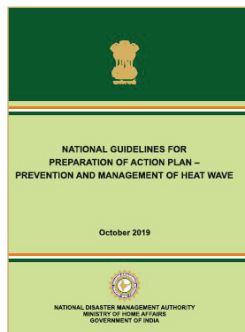


Figure 2 - National workshop at Hyderabad, Feb 2017



Figure 3 - National workshop at Vijayawada, Feb 2018



Figure 4 - National workshop at Nagpur, Feb 2019



Figure 5 - National Workshop at Bengaluru, Dec 2019



“ The 'National Guideline for preparation of Action Plan - Prevention and Management of Heat Wave' has facilitated various stakeholders, Government departments and communities across the country for mitigating impacts of heat waves. NDMA partnered with various institutions to counter the deadly heat in cities and across States in India to build resilience in the communities.”

- Dr Dileep Mavalankar,
Director - IIPHG

d. Study on heat-wave related issues

NDMA conducted a preliminary study to estimate the temperature threshold for 103 cities in India for heat-wave conditions, and the resulting report was released in September 2019. The objective of this study was to determine preliminary thresholds of the lower level of the maximum temperature beyond which there was a noticeable increase in all-cause mortality. By using the preliminary thresholds in early warning systems for extreme heat waves, cities prone to extreme heat can improve their existing mechanisms to deal with an impending heat disaster as soon as their specific thresholds are breached. Precise city-specific thresholds will help improve the effectiveness and impact of the various mitigation measures in the city-specific Heat Wave Action Plans. These thresholds will also help improve the long-term heat-mitigation interventions for adaptation and resilience to extreme heat. The study provides city-specific heat-wave warnings to enable the necessary preparedness and mitigation measures in states, districts, cities and towns that are prone to this disaster.

Eventually, all this will also strengthen communication and outreach measures so that relevant information reaches the people, especially the vulnerable sections.

This study also identified the gaps in quality and availability of data, especially with regard to mortality rates. Cities need to strengthen the quality and availability of their data in this respect so that more robust studies can be done in the future. The study focuses not only on humans but also on animals.



NDMA, in partnership with academic institutions, is also conducting specific studies on heat-wave related issues. Specifically, the studies entail (i) Development of a Framework for Heat Vulnerability Mapping and a model Heat Wave Action Plan for Indian Cities, and (ii) Assessment of Vulnerability and Threshold of Heat-related Hazards in four cities.

e. Advisories for heat-wave management

In order to sustain the momentum of disaster risk management with respect to heat waves, NDMA has been regularly issuing advisories on heat waves to all heat-wave prone states and union territories. The advisories also contain provisions for safeguarding animals.

f. Community sensitisation

NDMA is focusing on community sensitisation and awareness generation through social media, print/electronic media, advertisements, and short TV commercial films on heat-wave protection. Do's and don'ts for tackling heat waves are widely circulated through these media as well as on the NDMA website. NDMA has also created many audio-visuals for creating awareness about heat waves; these have been shared with all the heat-wave prone states for wider dissemination. Additionally, a panel discussion on the subject was broadcast on Doordarshan.



g. Review meetings

NDMA holds regular video conferences with heat-wave prone states to review their preparedness to deal with heat-wave conditions.

h. Technical assistance

NDMA provides technical assistance to states for operation of their Heat Wave Action Plans and development of institutional mechanisms to prevent, mitigate and respond to heat waves. Assistance is also provided for regular review and monitoring of implementation of these plans.

i. Heat-wave warnings

The India Meteorological Department (IMD) has been issuing impact-based warnings so that states can take the necessary mitigation measures and conduct Information Education Communication (IEC) activities for awareness of Do's and Don'ts among the public. These measures also focus on livestock/animal issues.



The National Disaster Management Authority (NDMA) has demonstrated tremendous leadership in scaling heat action plans across India. In the last five years, under NDMA's leadership and guidance, key stakeholders have come together to develop and implement effective heat action plans at the district and city levels.”

- Anjali Jaiswal,

Senior Director

Natural Resources Defense Council (NRDC)

Impact

Preparation of Heat Wave Action Plans by states

The measures taken by the government led to preparation of Heat Wave Action Plans by heat-wave prone states on a large scale in the country. In the last five years, 17 heat-wave prone states have prepared their Heat Wave Action Plans. And more than 120 districts/cities from 14 states have also prepared their own Action Plans. These plans help the state governments to develop measures and strategies for heat-wave assessment, forecast, preparedness and mitigation through coordinated efforts with multiple agencies. In this way, states and local authorities are able to undertake long-term mitigation measures to reduce the negative impacts of heat-wave conditions.

Measures taken under Heat Wave Action Plans

Based on the Action Plans prepared by the state governments and district administrations, in line with the heat-wave guidelines issued at the national level, states/districts take all possible measures to prevent mortalities due to heat waves. Awareness generation activities are conducted by states to make their citizens aware of the preventive measures. States are also undertaking capacity-building activities for the various stakeholders involved in heat-wave management.



“ Heat wave guidelines issued by NDMA have been very useful for the State to draft their Heat Action Plan. Accordingly the districts are able to prepare for the hot weather, measures to be taken to mitigate effects of heat and to decrease morbidity and mortality.”

-Shri K.K. Sharma,

Director (Public Health),

Medical & Health Services, Government of Rajasthan

The other measures that have been taken include rescheduling of working hours for outdoor workers to avoid their exposure to extreme hot weather, creation of drinking water kiosks, supply of water through tankers, erection of special shelter homes, increase in health facilities, stocking of ORS packets at health centres and the nearest anganwadi centres, placement of cooling systems and construction of gaushalas with fodder banks, etc.

Inter-agency coordination

Inter-agency coordination among the IMD, Ministry of Earth Science, Integrated Disease Surveillance Program (IDSP) of the National Centre for Disease Control (NCDC), Ministry of Health and Family Welfare (MoH&FW), and other concerned ministries/departments has been mobilised. Despite heat waves being a major challenge, the combined action taken by the Central and state governments, district administrations, the forecast department, the health department and civil society in a planned way to monitor the situation has resulted in significant reduction in casualties.



Not only did NDMA prepare the 'National Guidelines for preparation of Action Plan - Prevention and Management of Heat Wave,' but also provided their expertise through various meetings and other means of active engagements with stakeholders from district to highest level. This has helped us to mitigate the effects of extreme heat and decrease mortality. 🙏

- Dr. A. K. Sahai,

Project Director - Monsoon Mission,
Extended Range Prediction Group (ERPAS)



“ The 'National Guidelines for preparation of Action Plan - Prevention and Management of Heat Wave,' have gone a long way in creating awareness and better coordination among the stakeholders across states to take concrete steps. They provide a structured framework for researchers to identify issues in the current heat management plans and locate heat-hotspots or vulnerable areas.”

- **Rajashree Kotharkar,**
-Professor, Architecture and Planning,
Visvesvaraya National Institute of Technology

Transparency in reporting of heat-wave related deaths

The National Guidelines on Heat Wave brought out by the government introduced the concept of a committee system to verify/confirm deaths resulting from heat waves. This brought transparency to authentication of deaths due to heat waves. With this, over-reporting of heat-wave deaths—done for the purpose of seeking monetary compensation for the families of the dead—has been nearly brought to an end.

Process of data collection

Heat-wave illness and casualty data are being collected in heat-wave prone states by a data monitoring cell—the Integrated Disease Surveillance Programme (IDSP) under the National Centre for Disease Control (NCDC) of the Ministry of Health and Family Welfare (MoH&FW). The objective is to standardise collection of granular data at the block, district and state levels and to maintain the data at the national level.

IDSP-NCDC developed a proper weekly data-sharing strategy for use by all stakeholders. The information collected by the state governments, which includes data on mortality, is verified by a three-member committee at the district level before it is shared with the national authority.

Table 2 : Number of heat wave affected states

Year	Number of states
2015	9
2016	13
2017	17
2018	19
2019	23
2020	23

Decrease in deaths even after increase in heat-wave affected states from 9 to 23

A trend of increasing heat wave phenomena has been recorded in the country over the past several years, whereby several states, districts and cities have been severely affected. There has also been an

Chart 1: Heat-wave vulnerability

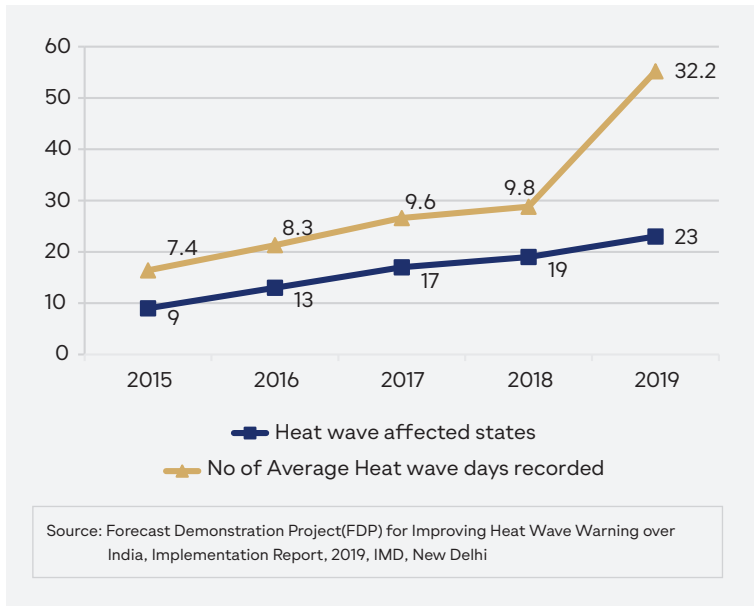
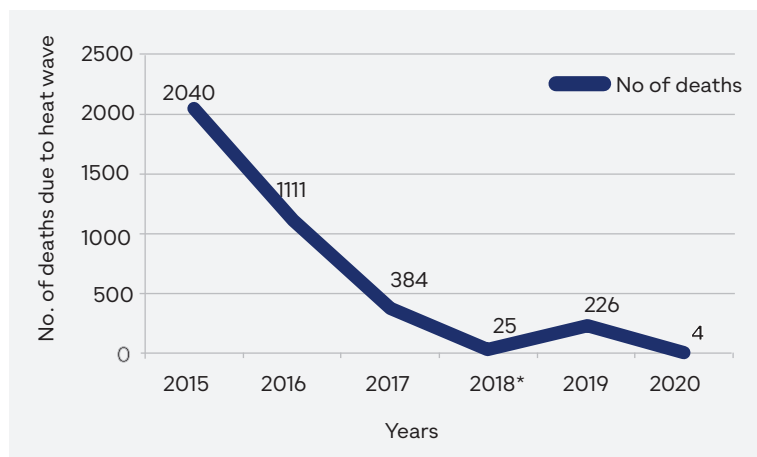


Chart 2: Heat-wave mortality in India



increasing trend in terms of the number of heat-wave days in India. In 2015, 9 states were affected by heat waves. In 2020, as many as 23 states have been affected by heat waves (see Table 2).

The World Meteorological Organization's 2020 statement on global climate indicates that global temperatures will continue to increase. The years 2015, 2016, 2017, 2018 and 2019 have been confirmed as the five warmest years on record (see Chart 1). In 2019, unlike in earlier years, even night temperatures were high. The government has recognised the urgency for evaluation of the impact of heat waves. Accordingly, it has planned adaptation and mitigation strategies to safeguard the human population, livestock and wildlife. The mitigation strategies are aimed at prevention of death due to heat waves, preparedness and community outreach. These actions, and the various measures taken by the present government since 2015 at the national level, have resulted in a significant reduction in heat-wave-related casualties. As mentioned earlier, deaths due to heat waves fell from 2,040 in 2015 to 4 in 2020 (see Chart 2).



“India's motto is
'Reform, Perform, Transform'.”

Prime Minister **Shri Narendra Modi**