Why Heat Action Plans failed to save lives?

A case study of Delhi

International Forum for Environment, Sustainability & Technology (iFOREST)
New Delhi, India

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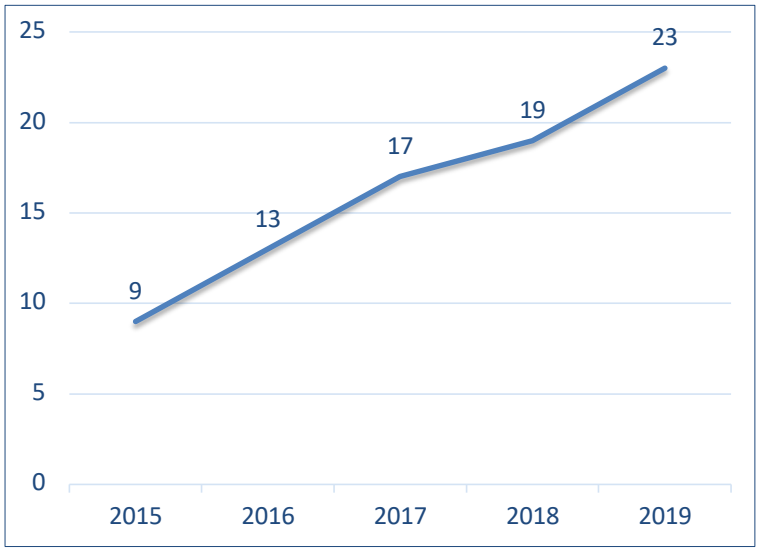
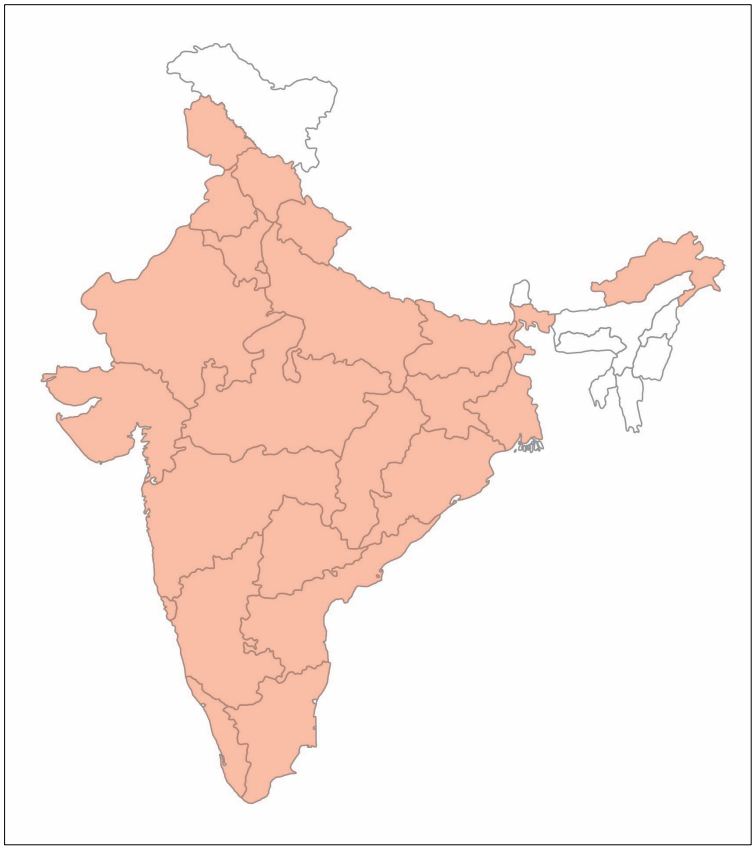
Heat wave affected states

From 2015 to 2019, the number of states affected by heat waves has increased from 9 to as many as 23 (95% of India's population)

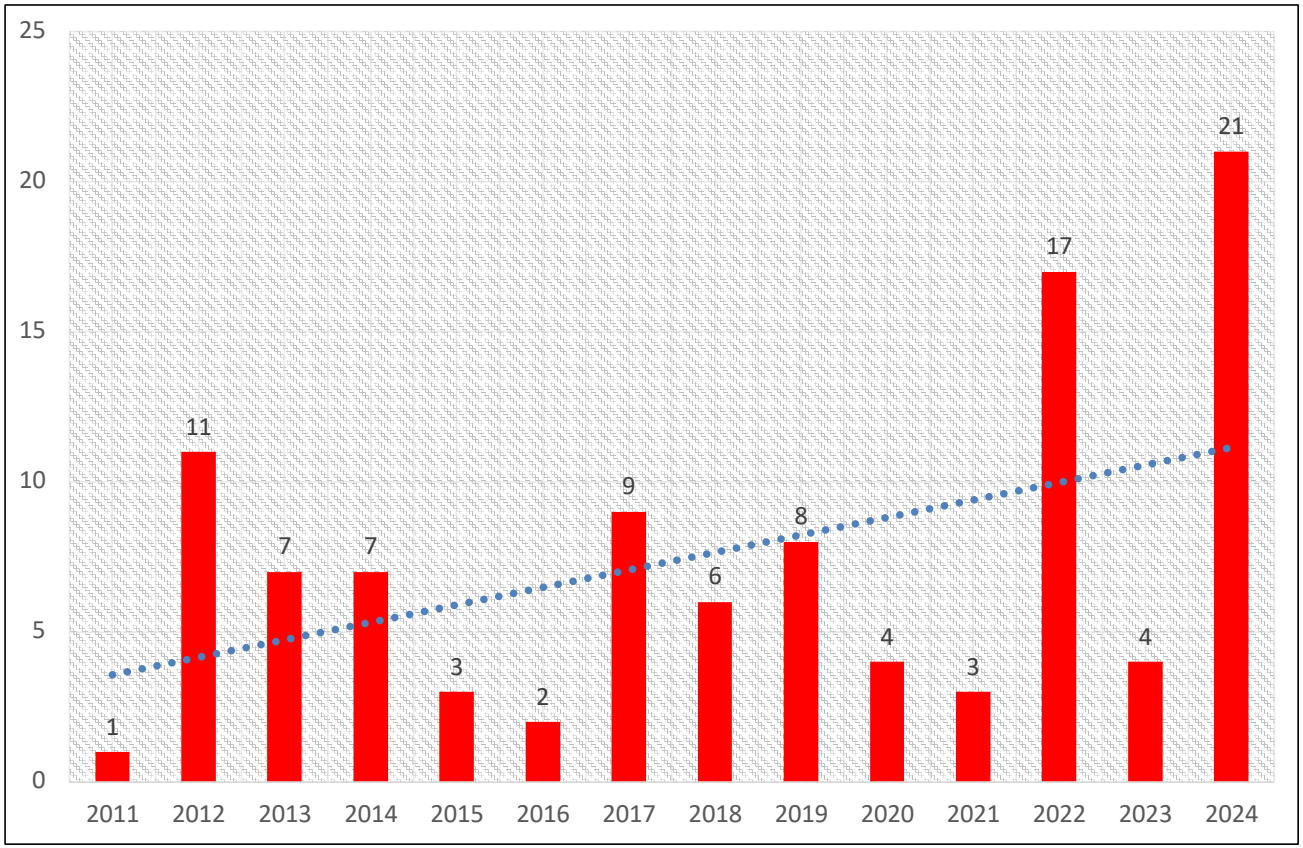


The increasing trend of states being affected by heat waves



The states affected by heat waves in India

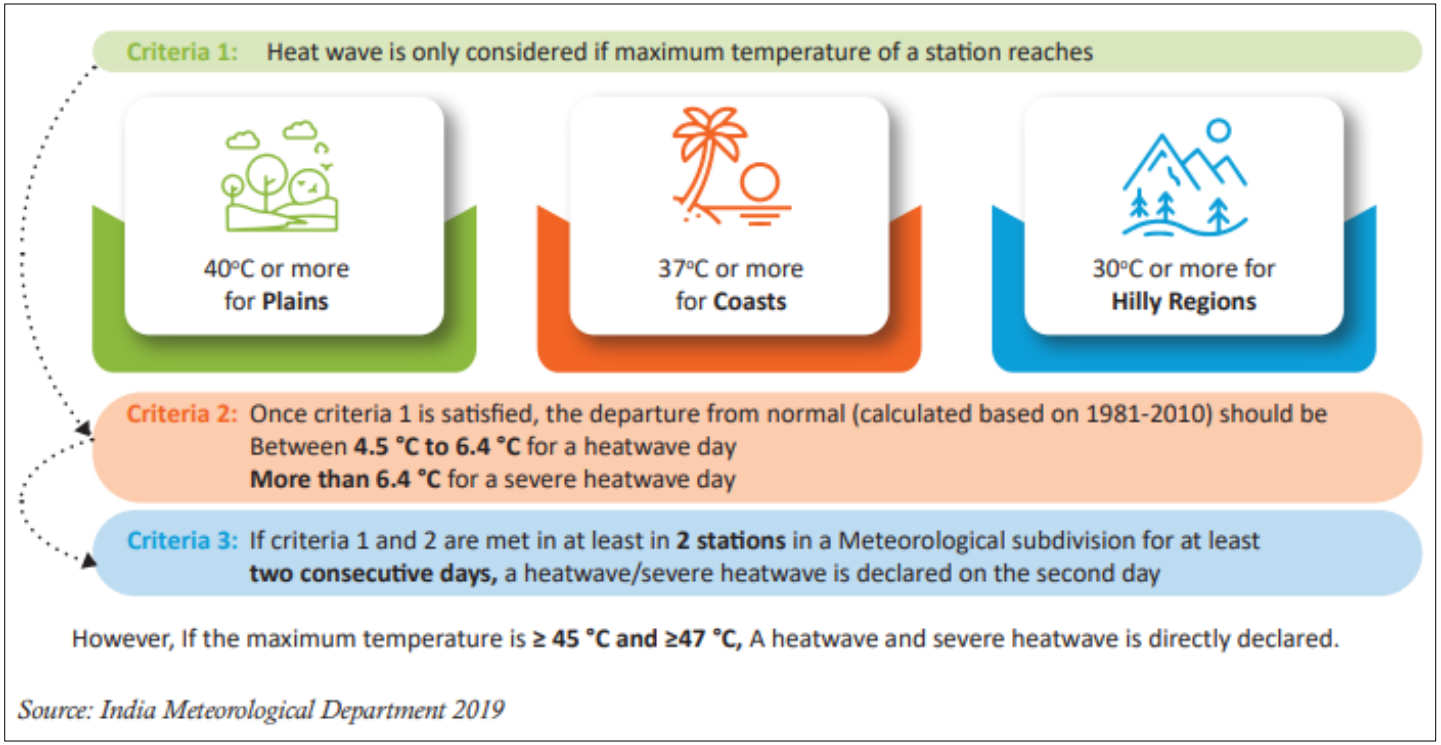
Heat wave days in Delhi



The increasing trend of heat wave days in Delhi

Definition of Heatwaves in India

IMD follows a multi-layered criterion considering **maximum temperatures (T_{max})** for declaring heat waves in India.



“Feels Like” Temperature

IMD has started releasing the ‘Feels Like’ temperature which is calculated from the humidity and temperature of a place.

IMD uses the **same equation developed by the National Weather Service of the National Oceanographic and Atmospheric Administration (NOAA)**.

- Green: < 35^{o}C
- Yellow: 36-45 ^{o}C
- Orange: 46-55 ^{o}C
- Red: >55 ^{o}C

Heat Index = -42.379 + 2.04901523*T + 10.14333127*R - 0.22475541*T*R - 6.83783x10-3*T^2 - 5.481717x10^{-2} *R^2 + 1.22874 x 10^{-3}*T^2*R + 8.5282x10-4*T*R^2 - 1.99x10-6*T^2*R^2

Where, T= Ambient dry bulb temperature (°F) and R= Relative Humidity (Integer percentage).

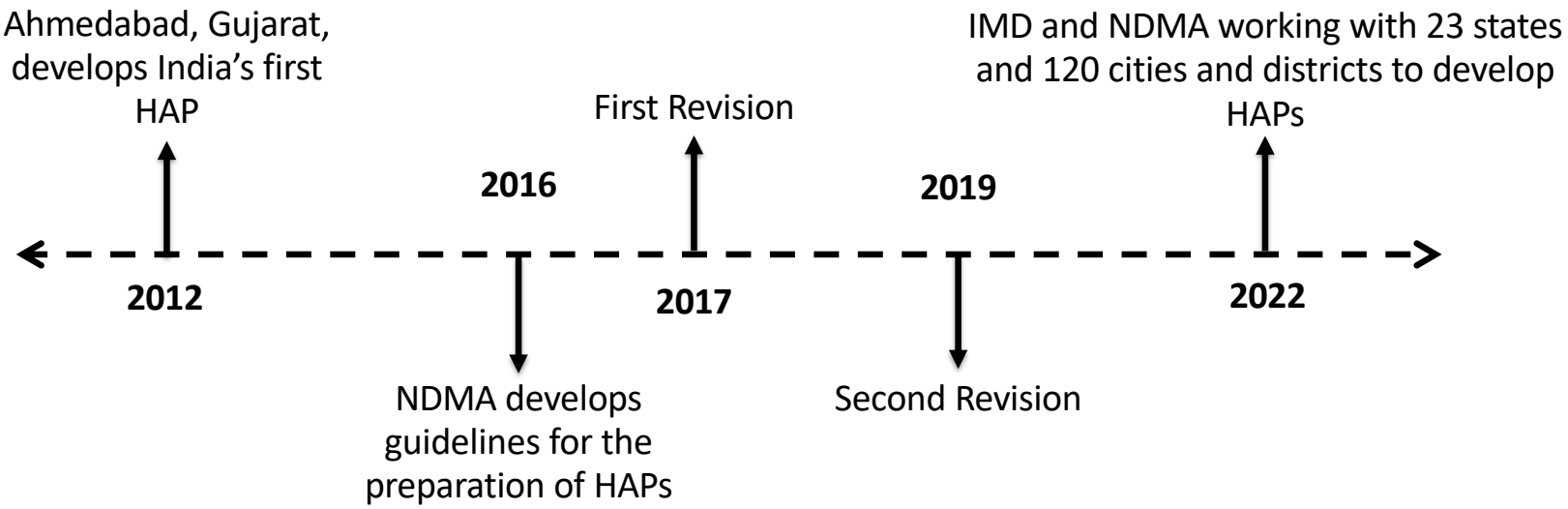
What is a HAP?

HAP is a plan document developed by state, district, and city governments to establish a framework for **preparing, responding to, recovering from, and learning from heat waves**.

The key elements of a HAP for safeguarding communities from extreme heat are:

1. Identifying vulnerable areas and populations
2. Developing an action plan for vulnerable areas and populations
3. Early warning system
4. Establishing nodal agency, defining agency-wise responsibility and inter-agency coordination
5. Public Awareness and community outreach
6. Capacity building and training program
7. Implementing short-, medium-, and long-term heat reduction strategies
8. Financial allocation for implementing HAP
9. Integrating HAP in city plans
10. Post-heatwave assessment and learnings, and revision of HAP.

Timelines of Heat Action Plans in India



Current Status of HAPs in India

State Level

The IMD and NDMA have been working collectively with the following state governments to prepare a HAP.

S.N.	States	S.N.	States
1	Andhra Pradesh	13	Kerala
2	Arunachal Pradesh	14	Maharashtra
3	Bihar	15	Madhya Pradesh
4	Chhattisgarh	16	Odisha
5	Delhi	17	Punjab
6	Gujarat	18	Rajasthan
7	Goa	19	Tamil Nadu
8	Haryana	20	Telangana
9	Himachal Pradesh	21	Uttarakhand
10	Jharkhand	22	Uttar Pradesh
11	Jammu and Kashmir	23	West Bengal
12	Karnataka		

City/District Level

The exact number of HAPs at the district/city level is unknown in India. However, as per NDMA, more than 120 districts/cities from 14 states have prepared a HAP.

Considering that there are close to 5000 ULBs (including 268 municipal corporations and 1874 municipalities), **less than 2.5% of ULBs have developed HAPs**.

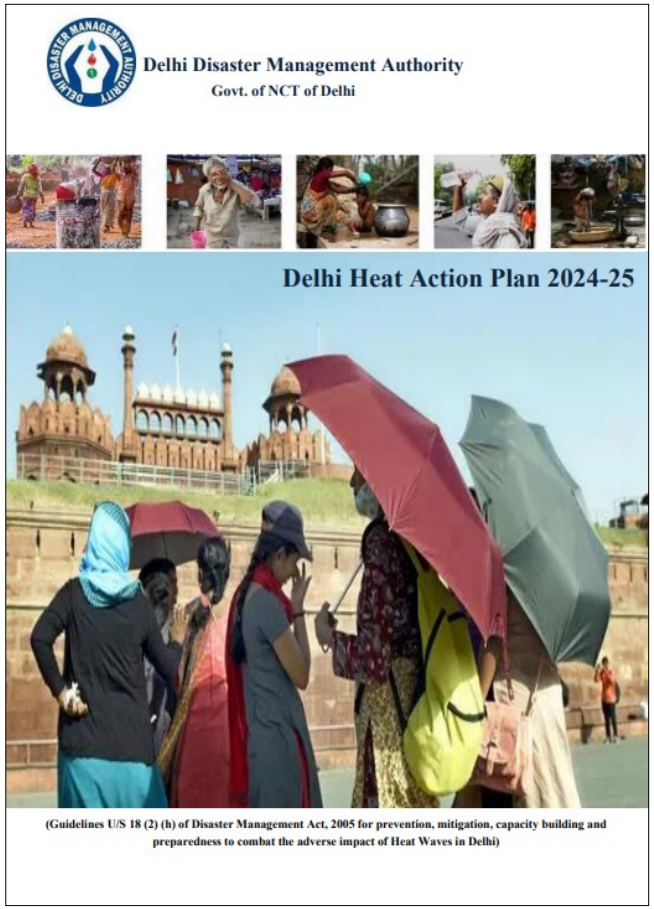
Study Scope

A comprehensive assessment of 9 city and 5 district HAPs was undertaken to determine whether the current framework is sufficient for adapting to and mitigating heat risk.

Further, a detailed case study of Delhi HAP is provided to illustrate the gaps in the current HAPs.

Table: List of heat action plans reviewed in this study

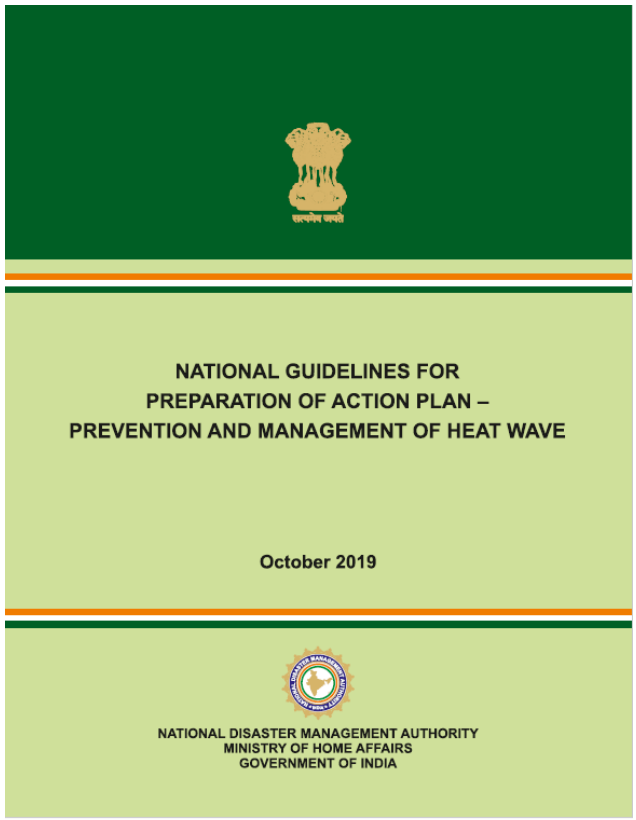
S No	City HAP	District HAP
1	Ahmedabad 2019	Ferozepur 2023
2	Bhubaneswar 2020	Gorakhpur 2019
3	Chandrapur 2022	Hazaribagh 2016
4	**Delhi 2024-25**	Patiala 2022
5	Jodhpur 2023	Vellore 2018
6	Rajkot 2020	
7	Surat 2018	
8	Thane 2024	
9	Vadodara 2024	



Cover page of Delhi HAP 2024-25 released earlier this year

NDMA HAP Guidelines

1. NDMA latest guidelines better than the past. But still many drawbacks.
2. The guidelines have set the same framework for the development of HAPs at state, district, and city Level. Thus, does not consider how adaptation and mitigation to heat waves would differ at the different levels.
3. Weak guidance on heat reduction strategies.
4. No guidance on integration of HAP into City Planning, including building bye-laws.
5. Lacks actionability as no guidance provided for financial provisions for HAPs.



Cover page of latest NDMA guidelines

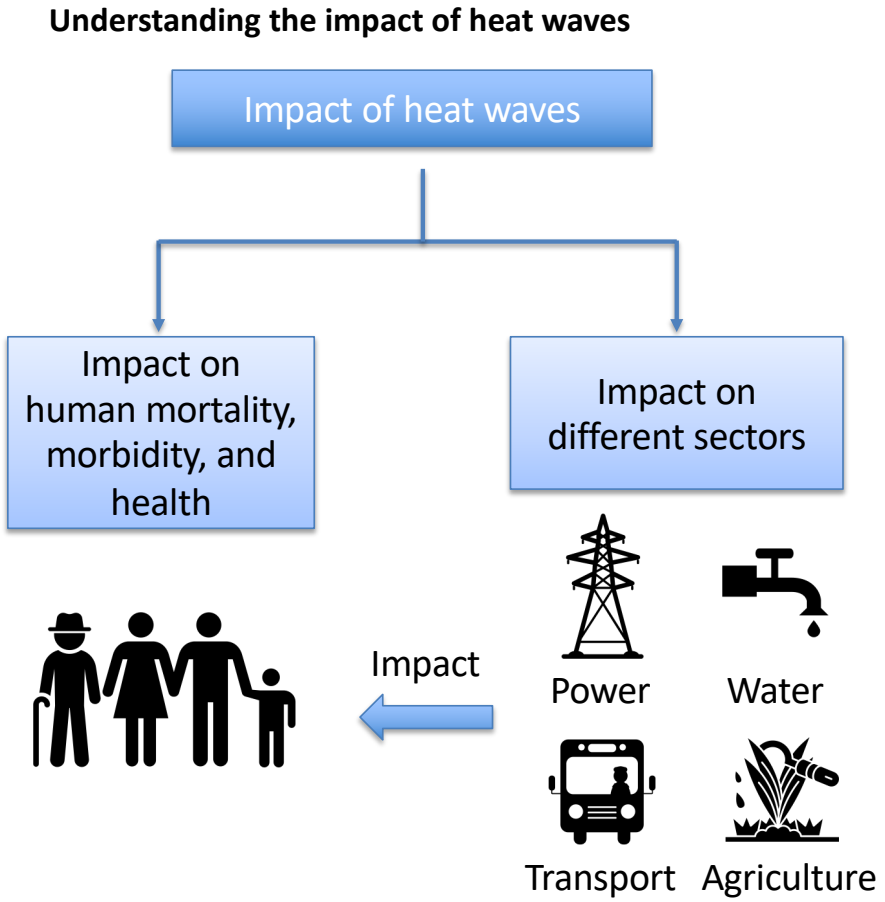
Major gaps identified in the City HAPs in India

1. HAPs without heat impact studies

Most HAPs in India do not undertake any assessment of the impact of heat waves on people and infrastructure, and their cumulative impacts.

It is important to conduct the following assessments when developing a HAP:

- Local heat projection studies to understand the impact of climate change and local factors on the nature of heat waves.
- Understand the cascading impact of heat stress on sectors such as energy and power supply, water supply, public transport, education, agriculture, and animal husbandry, among others.
- Cumulative impact on population



2. HAPs not tailored for local conditions

a) NDMA guidelines require cities to develop local thresholds for an early warning system, as it depends on many factors, including the built environment, slum population, Urban Heat Ssland effect, etc.

Very few cities have developed local thresholds – Ahmedabad, Bhubaneshwar *(much lower threshold than IMD)* and Thane *(based "Feels like" temperature)*.

Delhi HAP

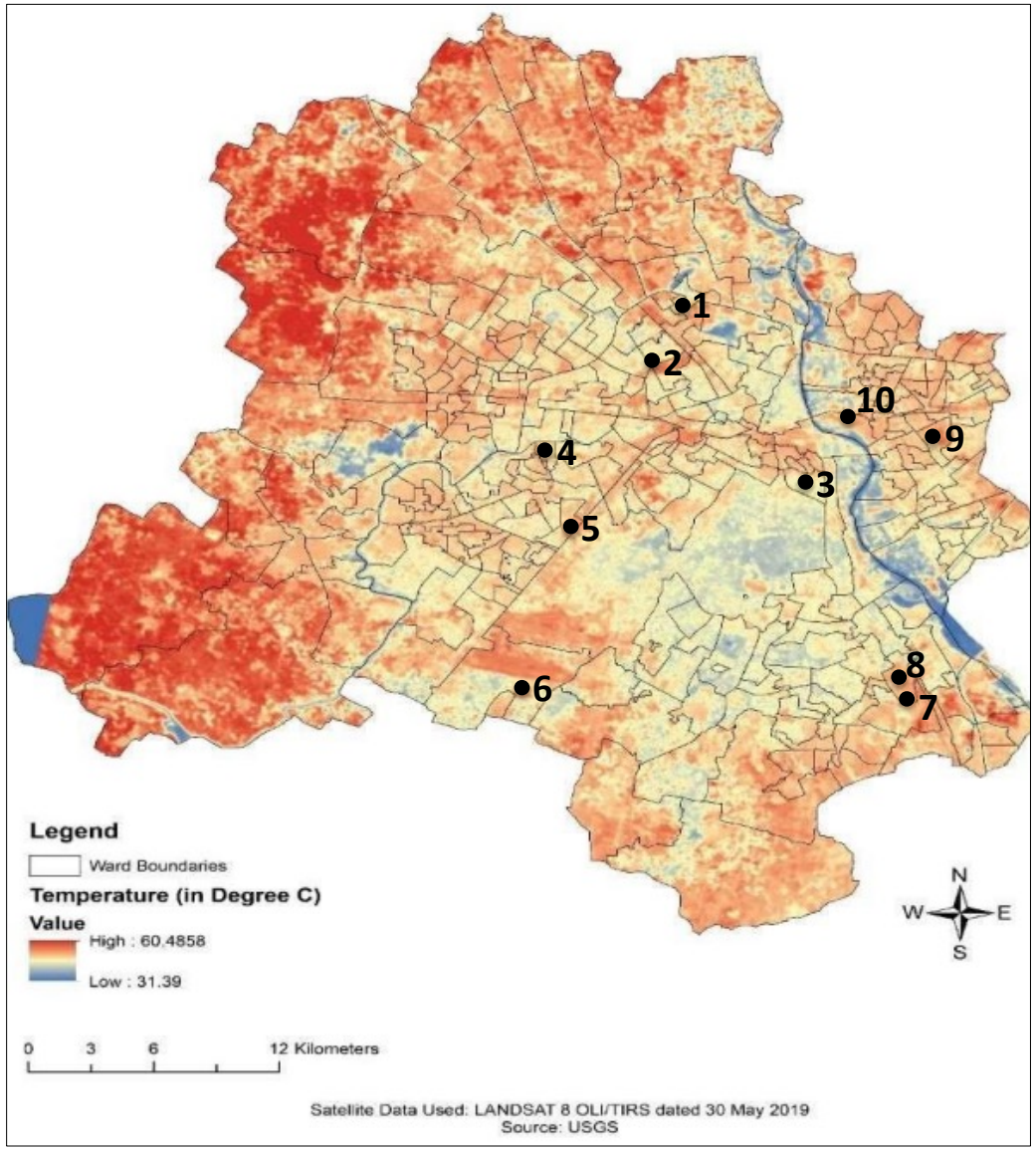
Delhi has not developed local thresholds. It has used maximum temperature threshold of IMD to declare heatwaves.

Green (No Action)	Normal Day	Maximum temperatures are nearnormal
Yellow(Be updated)	Hot day advisory	>= 40 °C
Orange Alert(Be prepared)	Heat alert day	>= 45°C
Red Alert (Take Action)	Extreme heat alert day	>= 45°C

2. HAPs not tailored for local conditions

b) NDMA guidelines require cities to map vulnerable areas (hotspots) and populations and develop specific action plans for them.

- Some cities have mapped hotspots – Bhubaneshwar, Jodhpur, Rajkot and Thane.
- Very few city has mapped vulnerable population – they have largely copy-pasted vulnerable groups (women, children, senior citizen, outdoor workers, traffic police etc.)
- **No city has developed specific action plan for hotspots or vulnerable population.**



Ten hotspots identified by the Delhi HAP:

1. Jahangirpuri
2. Prem bari Bridge
3. Shakoor ki Dandi
4. Slum in Khayala
5. Mayapuri slum along Rewri railway line
6. Slum near samalkha
7. Indira kalyan Vihar
8. Sanjay colony Okhla phase 2
9. New Sanjay Amar colony, Vishwas nagar
10. Buland masjid slums

Interestingly, none of the high temperature wards identified as hotspots.

No action plan developed for identified hotspots.

3. HAPs are weak on upgradation of infrastructure and human resources to deal with heat waves

Cities will require new infrastructure (for example cool shelters, water and shelter for livestock etc.), upgradation of existing infrastructure (hospital, fire fighting etc) and additional human resources to implement HAP.

- No city has done analysis of new and additional infrastructure and human resources.
- Most cities have listed infrastructure like cool shelters and cool wards in hospitals, without any action plans to implement them.
- None have listed department-wise requirements

Delhi’s Hospitals poorly-prepared for heat waves

As per the Delhi HAP, the medical and health departments are tasked with keeping emergency wards prepared for people suffering from heat symptoms.

However, with no funding provisions and no assessment carried out to estimate the number of such wards that would be required, it is not surprising that the hospitals in Delhi are ill-prepared.

Delhi hospitals’ week of horror amid influx of heatwave cases. ‘Saw patients die faster than in Covid’

Before rain brought respite, doctors say surge in number of patients with heatstroke & heat exhaustion put unparalleled pressure on hospitals' resources, with most needing intensive care.

SUMI SUKANYA DUTTA and MRINALINI DHYANI

22 June, 2024 03:18 pm IST

Delhi govt. directs hospitals to ramp up facilities as heat-related deaths rise

Published - June 20, 2024 12:55 am IST - New Delhi

THE HINDU BUREAU

4. HAPs without money

Cities will require additional resources to implement HAP, as different departments have been assigned additional responsibilities to provide support and services during heat waves.

- No city has allocated separate resources or mentioned financial allocation in HAP.

4. HAPs without money: Delhi's HAP

Name of the Agency	Responsibilities	
	Pre Heat Season	**During Heat Season**
Labour Department	1. Organise training for employers, outdoor labourers' and workers. 2. Change the shift of outdoor workers schedule change from peak hours. 3. Make emergency kit (Ice Packs, ORS, etc .) for the construction workers.	1. Encourage employers to shift outdoor workers schedules away from peak afternoon hours (1pm-5pm) during Heat alert. 2. Re scheduling of working hours for employees in different sectors. 3. Provide emergency ice packs and heat illness prevention material to construction worker as pilot project. 4. Ensure provision of shelters/ cooling areas, water and supply of emergency medicines like ORS, etc. at work sites by employers 5. Co-ordinate with health department and ensure regular health, with special care for vulnerable groups women and old ages. 6. Check up of the workers and provide emergency packets and heat illness prevention material for construction workers.

No additional resources were allocated to the Labour Department

5. HAPs without cooling action plan

NDMA guidelines requires cities to Implementing short-, medium-, and long-term heat reduction strategies.

NDMA guidelines are itself weak on hot to reduce heat and provide cooling to all. It provides general guidelines like cool roofs, water fountain, rainwater harvesting, enhance green cover etc. There are no specific guidance on changing building bye-laws or integrating HAP in city planning.

- Thus, cities have copy-pasted recommendations given by NDMA.
- No city has developed a cool action plan to reduce heat and provide cooling to all.
- No city has integrated HAP in city planning.

Conclusion

Most HAPs are not designed for action. They contain general information and broad recommendations. They cannot be implemented.

Why Delhi Struggled during 2024 Heat Wave Season?

1. While other cities have been preparing HAPs since 2013, Delhi notified its first HAP only in 2023 – a decade later.
2. It has notified its latest HAP at the beginning of the heat wave season (April, 2024).
3. Departments were not prepared (lacked capacity) to deal with such high intensity heat wave.
4. It seems, the first big meeting by the Delhi government was held just a week back, at the tail-end of the heat wave season.
5. **Bottom-line, the state government and the municipalities were completely unprepared.**

Recommendations

On Declaring Heat Waves as Natural Disaster

12 disasters have been notified under Disaster Management Act, 2005: cyclone, drought, earthquake, fire, flood, tsunami, hailstorm, landslide, avalanche, cloudburst, pest attack, and frost and cold waves. **Heat Waves not notified.**

States can allocate up to 10% of the State Disaster Response Fund (SDRF) for "local disasters" such as lightning or heatwaves. Several states, including Chhattisgarh, Odisha, Kerala, Rajasthan, Andhra Pradesh, Maharashtra, and Karnataka, have recognized heat waves as a local disaster. **But this is not sufficient.**

To prepare states, districts and cities, heat waves should be notified under DMA, 2005.

On Redefining Heat Waves

1. Heat waves currently defined as Maximum Dry Bulb Temperature, which is mostly day time temperature.
2. High night time temperatures not considered.
3. Relative Humidity not considered.

THE RESULT: The current definition fails to capture the actual impact of heat waves or prepare cities to deal with other facets of heat waves like warm nights and high humidity.

Tmax Vs. Heat Index Vs. Heat Wave Declaration in Delhi

Date	Tmax	Heat Index	Heat wave declared
15/06/24	45.5	48	Yes
16/06/24	44.9	48	Yes
17/06/24	45.5	50	Yes
18/06/24	44	50	Yes
19/06/24	44	51	Yes
20/06/24	39	52	No
21/06/24	39	52	No
22/06/24	39	53	No
23/06/24	40	52	No
24/06/24	39	53	No
25/06/24	39	51	No
26/06/24	40	52	No

5 more die of heat stroke in Delhi; death toll at 58 in national capital

By HT Correspondent

Jun 22, 2024 05:16 AM IST

Play & Win Big

Delhi sees 17 heat-related deaths in 24 hours

Delhi has been battling searing heatwave conditions over the last few days

Updated - June 20, 2024 03:19 pm IST Published - June 20, 2024 02:51 pm IST - New Delhi

Heat waves should be redefined based on "Feels Like" temperature. New threshold should be developed for warm nights.

On Heat Action Plan

1. NDMA to revise HAP guidelines to make it more specific and actionable.
   a) Develop separate guidelines for city, district and states.
   b) Focus on infrastructure upgradation, resource requirements and capacity development.
   c) Strengthen heat reduction strategy and integrate cooling requirements in HAPs
   d) Guidelines to integrated HAPs in city planning.
2. Cities should develop Heat and Cooling Action Plan (HCAP) to save lives from heat, as well as to reduce heat and provide sustainable cooling to all.
3. All ULBs should be encouraged to develop HCAP.
4. Current HAPs are inadequate and cities should re-do their HAPs to reflect the ground realities and realistically estimate impact and resource requirements.
5. All HAPs should have **financial and legal backing**.
6. Capacity building of departments and other stakeholders in crucial.