



INDIAN
INSTITUTE
of PUBLIC
HEALTH
GANDHINAGAR

ESTABLISHED BY GOVT. OF GUJARAT AND PHFI

Ahmedabad Heat Action Plan

A real life case study on Heat and Health

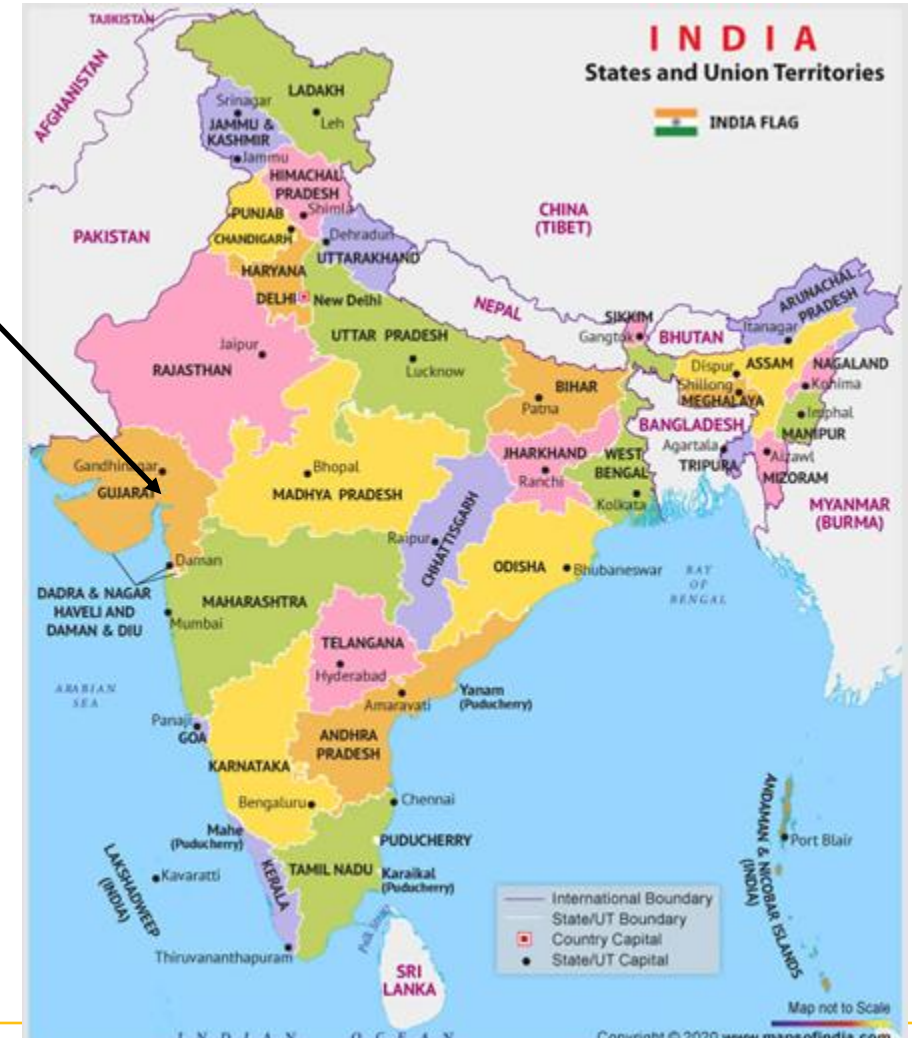


Prof. Dileep Mavalankar

Former Director. And Honorary professor Indian Institute of Public Health Gandhinagar

First University focused on Public Health

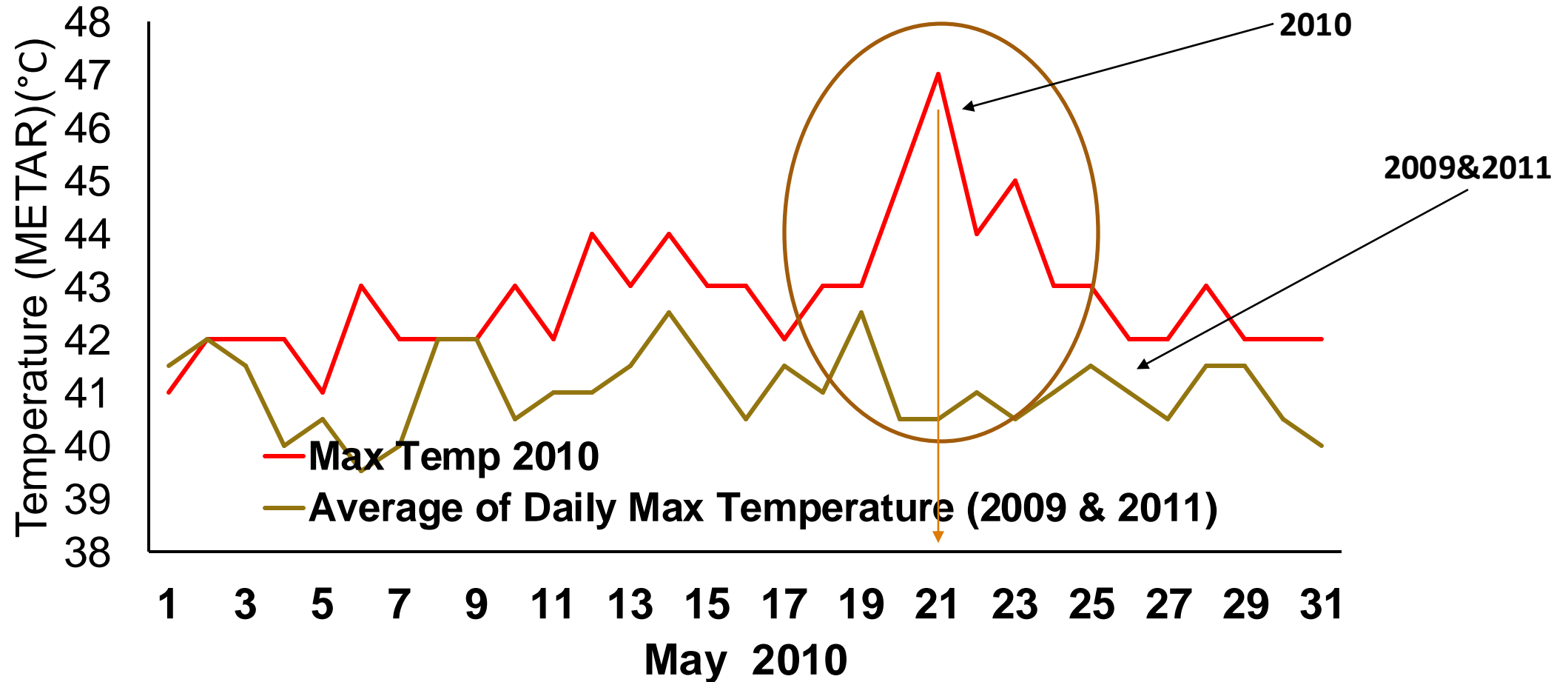
2010 – Deadly Heat wave in Ahmedabad a 600 year old city in West of India, Gujarat, 5 million Population



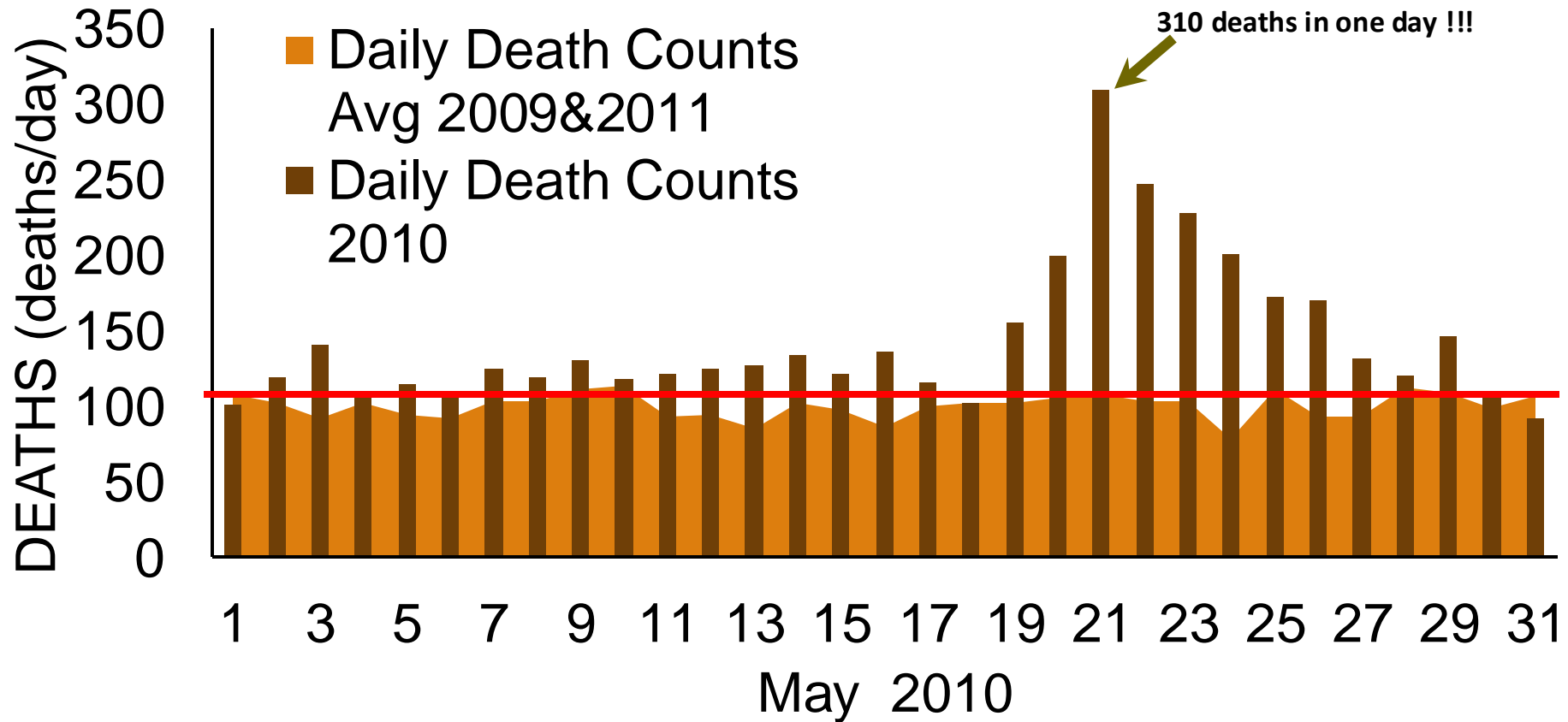
Maximum Temperature 2010 (Red) , average of 2009 & 2011 (Brown) - Ahmedabad



2010 Heat wave in Ahmedabad – Temp. reached 47deg C on 21st May

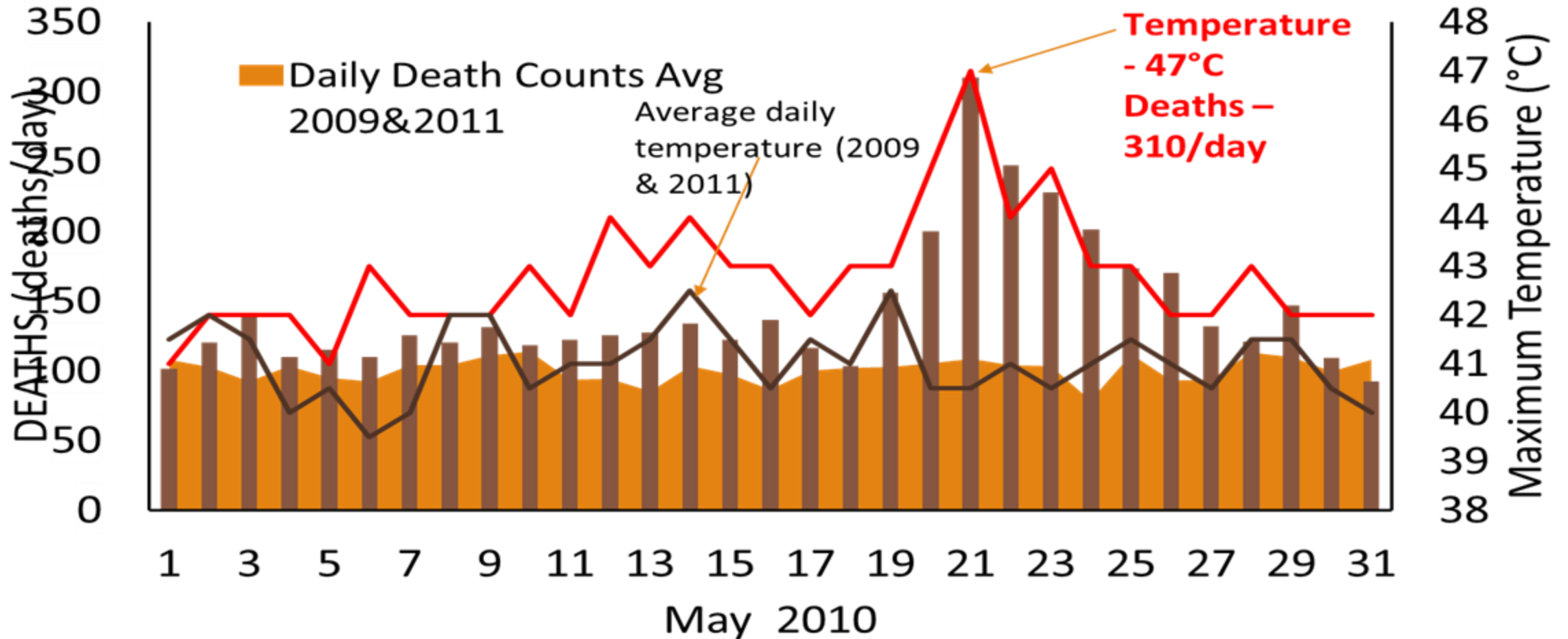


Daily All cause mortality May 2009, 2010 and 2011 – Daily mortality numbers increased from 100 per day to 310 per day on 21st May 2010



2010 Ahmedabad heat wave :

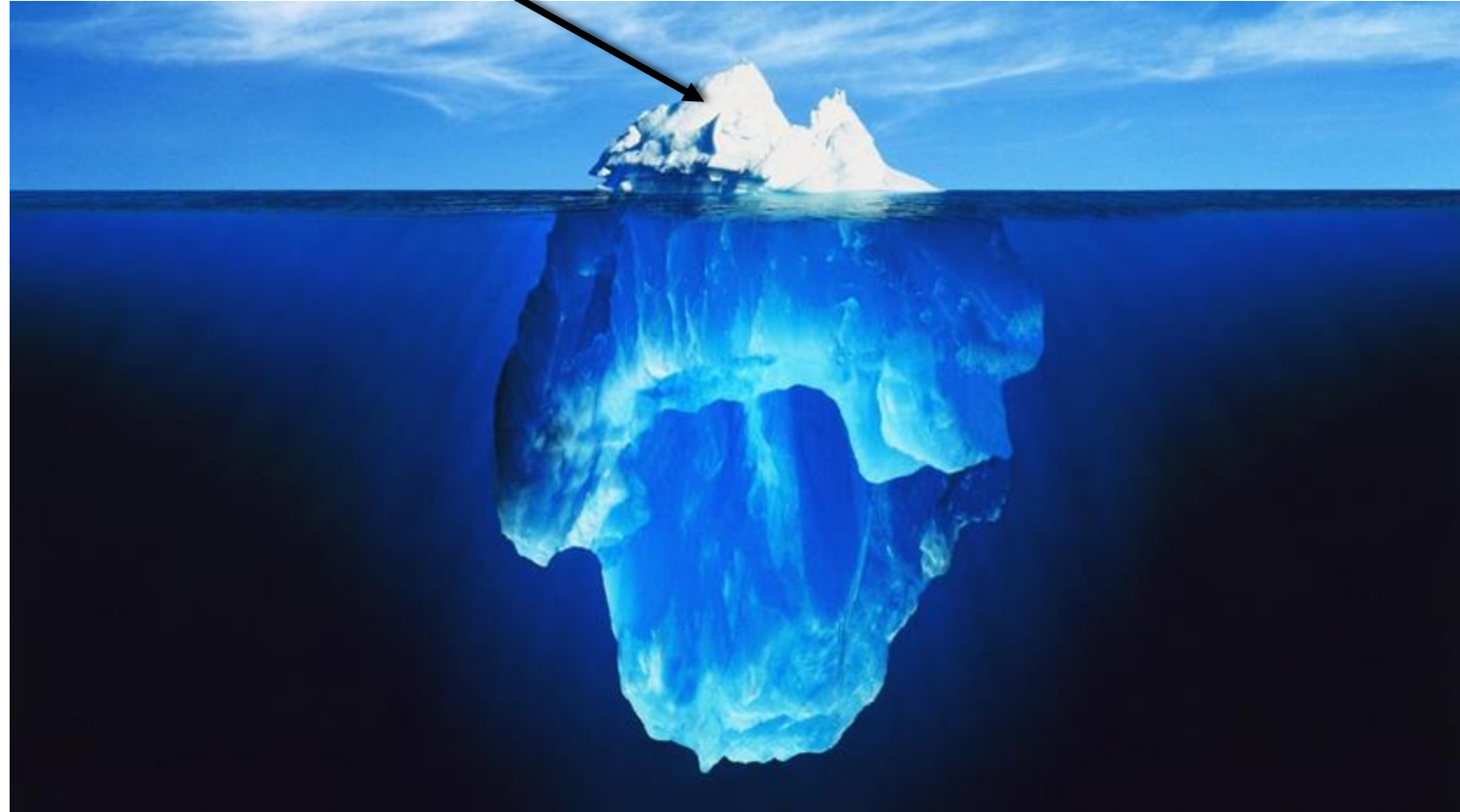
May 20-27th – excess deaths 800 in one week and 1344 excess deaths in May 2010.



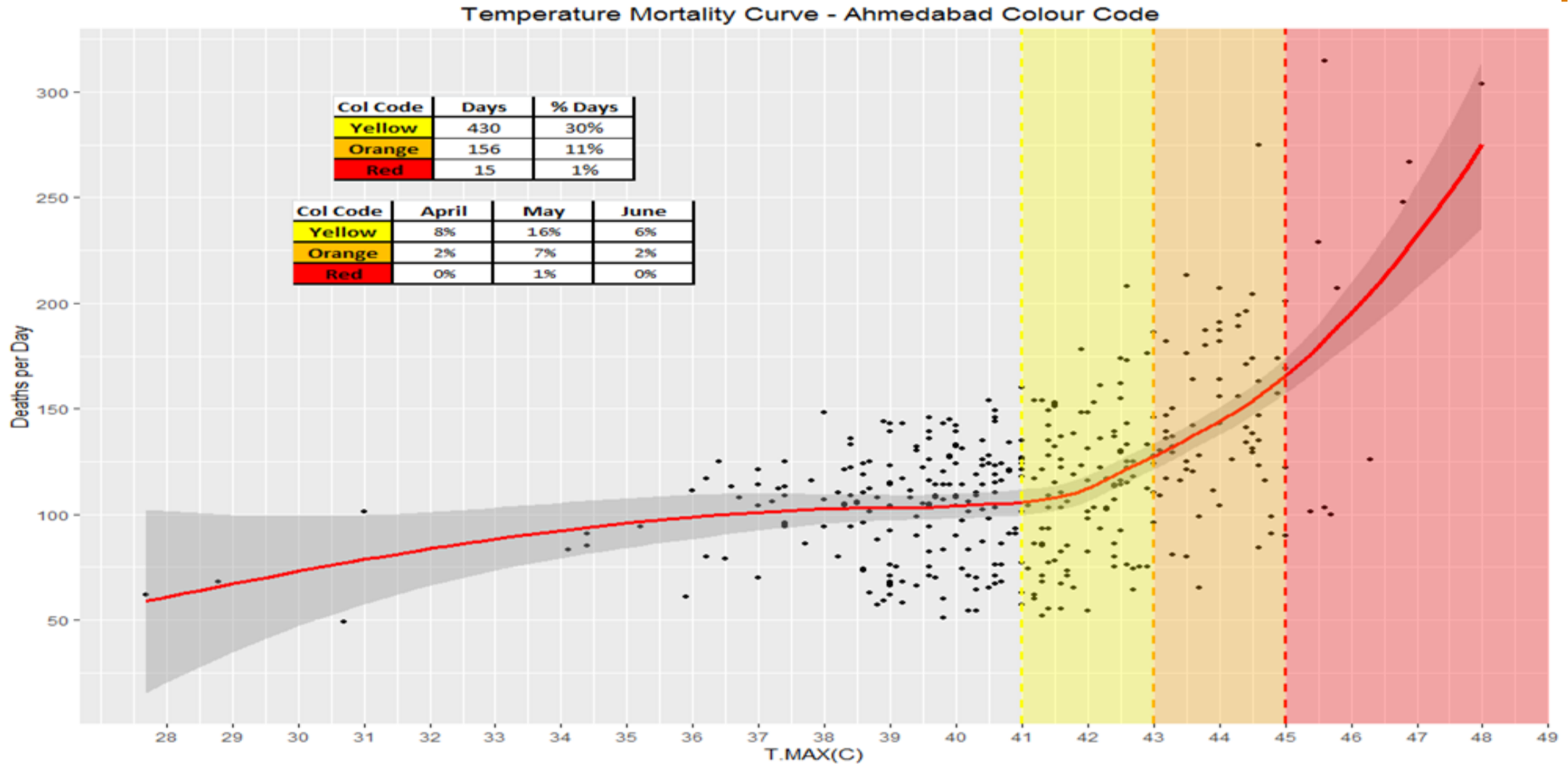
Reported Heat wave deaths are like tip of an icebergs -10% visible (direct) – 90% not visible (indirect)

**Ahmedabad
2010
Heat wave
associated
Excess
mortality 800**

**Reported heat
stroke
Deaths 76**

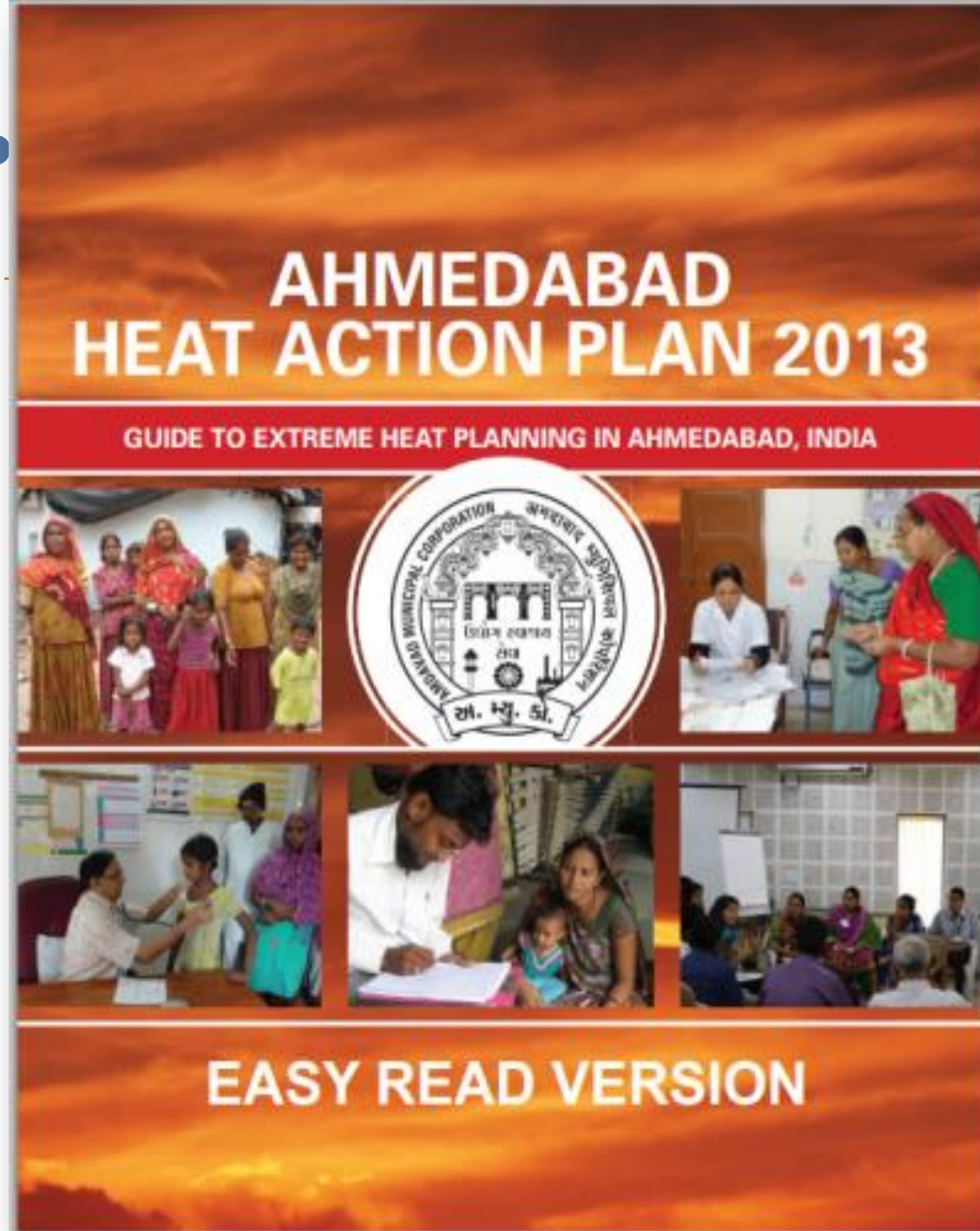


Temperature Mortality scatter plot and fitted Curve – Setting the Thresholds for warning - Ahmedabad 2001-16



Ahmedabad Heat Action Plan (HAP)

- Ahmedabad implemented South Asia's first heat action plan (HAP) in 2013 after a 2010 heatwave learning from various global HAPs & guidance.
- HAP implemented by AMC with help from IIPHG and NRDC, and other partners



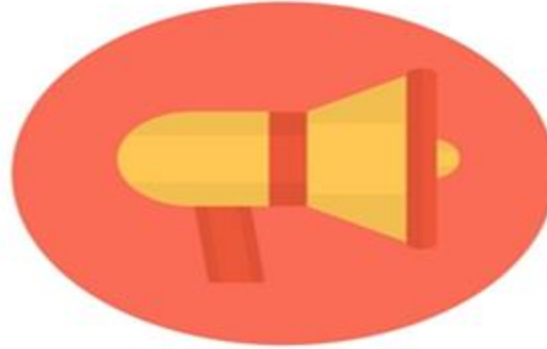
Key components of Heat Action Plan:

HAP COMPONENTS



EARLY WARNING SYSTEM & INTER AGENCY EMERGENCY RESPONSE PLAN

Alert residents of predicted high and extreme temperatures & formally communication channels to alert governmental agencies



PUBLIC AWARENESS & COMMUNITY OUTREACH

Communicate the risks of heat waves and implement practices to prevent heat-related deaths and illnesses



CAPACITY BUILDING OF MEDICAL PROFESSIONALS

Training focus on primary medical officers and other paramedical staff, and community health staff




REDUCING HEAT EXPOSURE AND PROMOTING ADAPTIVE MEASURES

Access to potable drinking water and cooling spaces during extreme heat days & promote adaptive measures.

Intervention – 1 Early Warning System & Inter-Agency Emergency Response Plan

भारत सरकार
पुणे विज्ञान संशोधन
भारत मौसम विज्ञान विभाग
सौराष्ट्र मंडल,
आर एसआर इन्फोमेशन भवन,
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Government of India
Ministry of Earth Sciences
India Meteorological Department
Meteorological Centre,
RS/RW Building, Airport,
Ahmedabad-382 475.
Phone: 079-22885012
Fax: 079-22865449

Issuing Office: Meteorological Centre, Ahmedabad
Time of Origin : 1200 Hrs. IST
Date : 09/05/ 2016
HAP2016050901

Five days City weather forecast (Maximum temperature forecast) for Ahmedabad

Maximum Temperature forecast	Maximum temperature in deg Celsius	Probability of occurrences	High Temperature Warning
Day:1 (Valid from time of origin to 0830 Hrs. IST of 10/05/2016)	43	Most likely	
Day:2(Valid from 0830 Hrs. IST of 10/05/2016 to 0830 Hrs. IST of 11/05/2016)	43	Most likely	
Day:3(Valid from 0830 Hrs. IST of 11/05 /2016 to 0830 Hrs. IST of 12/05/2016)	43	Very likely	
Day:4(Valid from 0830 Hrs. IST of 12/05 /2016 to 0830 Hrs. IST of 13/05/2016)	44	Likely	
Day:5(Valid from 0830 Hrs. IST of 13/05 /2016 to 0830 Hrs. IST of 14/05/2016)	44	Likely	

Legend: Probability of occurrences

Unlikely: less than 25 %

Likely: 25 to 50 %

Very likely: 50 to 75 %

Most likely: 75 to 100 %

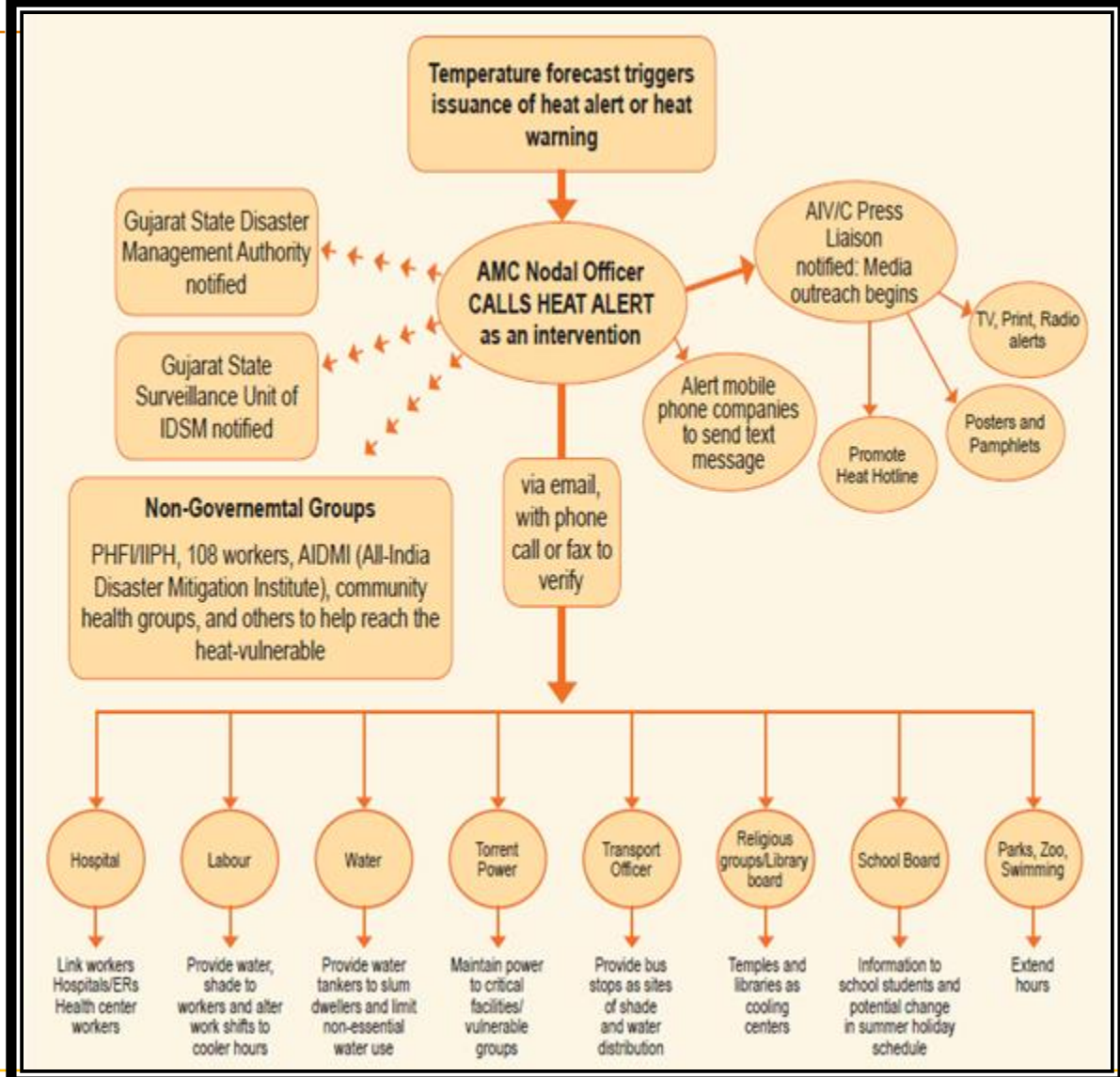
Levels:

Yellow: 41.1- 43 deg Celsius

Orange: 43.1- 44.9 deg Celsius

Red: ≥45.0 deg Celsius

For Director In-charge
Meteorological Centre
Ahmedabad



Intervention – 2

Public Awareness & Community Outreach



HEAT ALERT

Dos & Don'ts DURING HEAT WAVES

- Drink water, chaas, and other liquids (no soft drinks)
- Stay out of the sun
- Find a place to cool down
- Wear light clothing
- Check in with friends & family

SYMPTOMS TO WATCH FOR:

- Heat rash or cramps
- Heavy sweating and weakness
- Headache and nausea
- Lack of sweating despite the heat
- Red, hot, and dry skin
- Muscle weakness or cramps
- Nausea and vomiting

DRINK MORE WATER

People at high risk: children, elders, and pregnant women

In case of an emergency, CALL 108

NRDC
INDIAN INSTITUTE OF PUBLIC HEALTH GANDHINAGAR



Intervention – 3

Building Capacity of health staff and facilities



Case Definitions

Heat Illness - Typical Presentations

Clinical Entity	Age Range	Setting	Cardinal Symptoms	Cardinal Signs	Painful Negatives	Prognosis
Heat rash	All, but frequently children	Hot environment; +/- insulating clothing or swaddling	Itchy rash with small red bumps at pores in setting of heat exposure; bumps can sometimes be filled with clear or white fluid	Diffuse maculopapular rash, occasionally pustular, at hair follicles; pruritic	Not focally distributed like a contact dermatitis; not confluent patchy; not petechial	Full recovery with elimination of exposure and supportive care
Heat cramps	All	Hot environment, typically with exertion, +/- insulating clothing	Painful spasms of large and frequently used muscle groups	Uncomfortable appearance, may have difficulty fully extending affected limbs/joints	No contaminated wounds/tetanus exposure; no seizure activity	Full recovery with elimination of exposure and supportive care
Heat exhaustion	All	Hot environment; +/- exertion; +/- insulating clothing or swaddling	Feeling overheated, lightheaded, exhausted and weak, unsteady, nauseated, sweaty and thirsty, inability to continue activities	Sweaty/diaphoretic; flushed skin; hot skin; normal core temperature; +/- dazed, +/- generalized weakness, slight disorientation	No coincidental signs and symptoms of infection; no focal weakness; no aphasia/dysarthria; no overdose history	Full recovery with elimination of exposure and supportive care; progression if continued exposure
Heat syncope	Typically adults	Hot environment; +/- exertion; +/- insulating clothing or swaddling	Feeling hot and weak; lightheadedness followed by brief loss of consciousness	Brief, generalized loss of consciousness in hot setting, short period of disorientation if any	No seizure activity; no loss of bowel or bladder continence; no focal weakness; no aphasia/dysarthria	Full recovery with elimination of exposure and supportive care; progression if continued exposure
Heat stroke	All	Hot environment; +/- exertion; +/- insulating clothing or swaddling	Severe overheating; profound weakness; disorientation, obtundation, seizures, or other altered mental status	Flushed, dry skin (not always), core temp >40°C; altered mental status with disorientation, possibly delirium, coma, seizures; tachycardia; +/- hypotension	No coincidental signs and symptoms of infection; no focal weakness; no aphasia/dysarthria; no overdose history	25-50% mortality even with aggressive care; significant morbidity if survive

Intervention – 3

Heat stroke wards in Hospitals and ORT corner in HC



Intervention – 4 Reducing Heat Exposure & Promoting Adaptive Measures – cooling centers, free drinking water,



Cool Roofs promotion



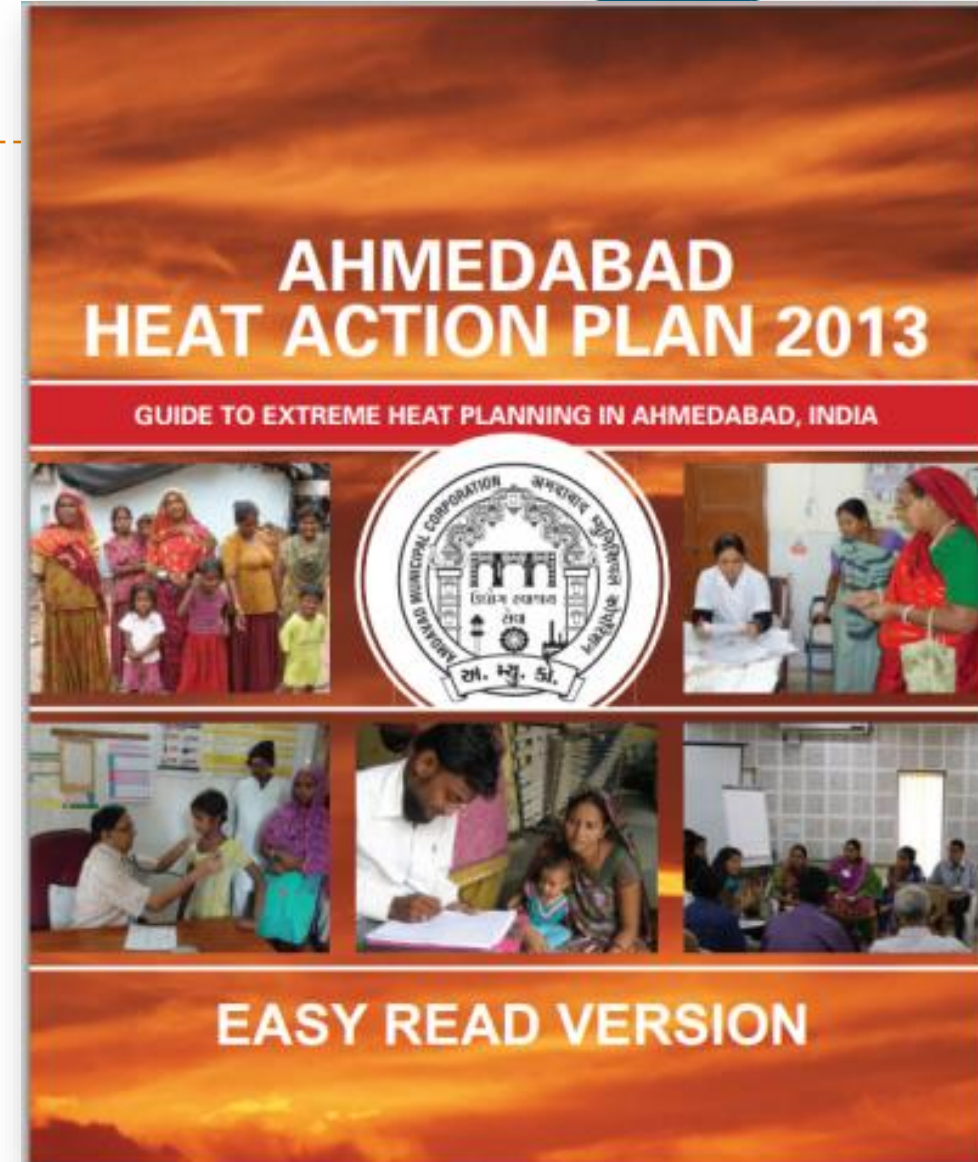
Recently urban forest developed in more than 407 plots in Ahmedabad – Miyawaki forests – Reduces temperature and increases oxygen



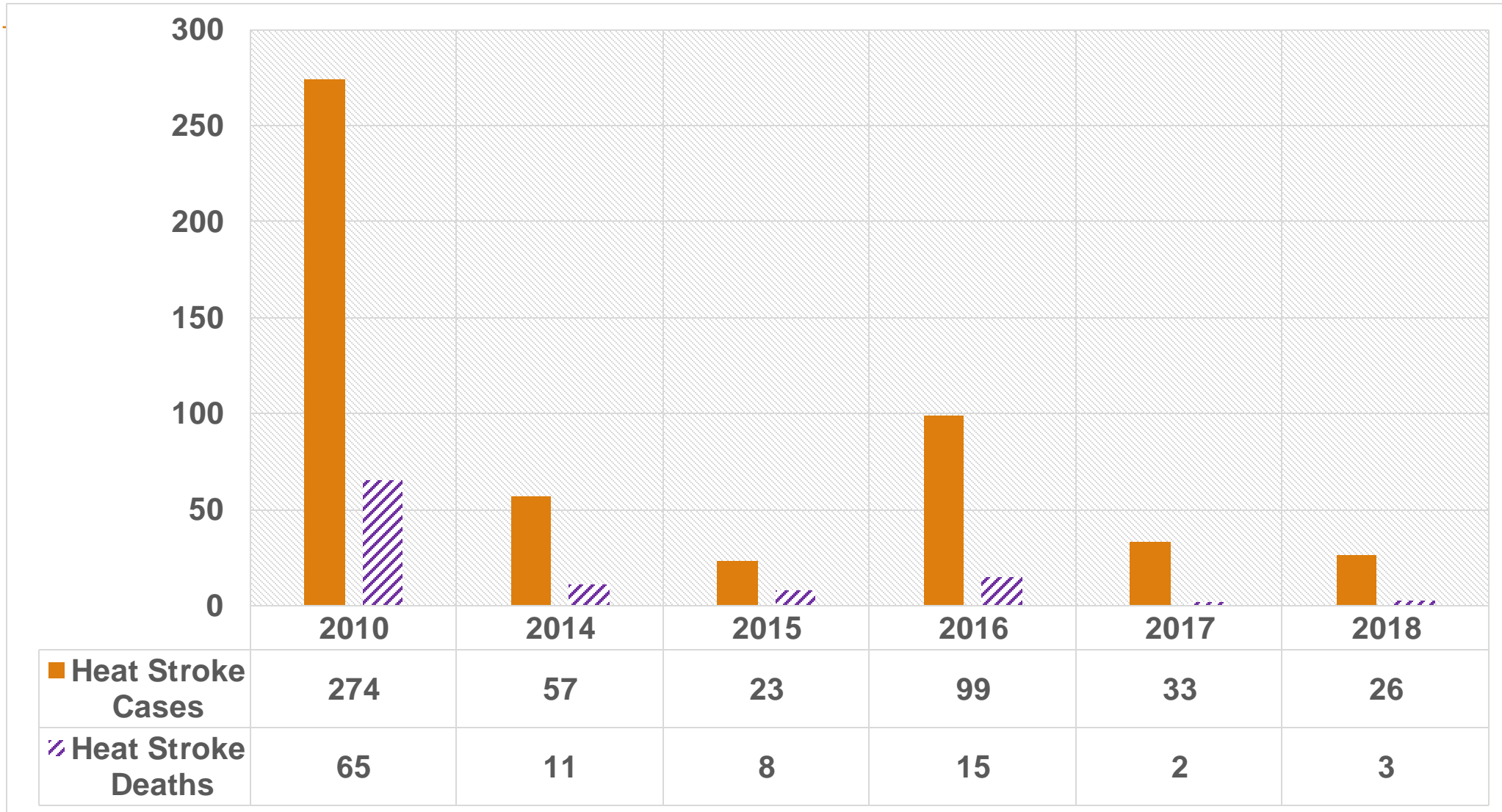
Impact of Ahmedabad Heat Action Plan (HAP)

- Decrease in heat stroke cases and death
- Reduction in all-cause mortality
- Estimated 1,190 (95%CI 162–2,218) average annualized deaths were avoided in the post-HAP period.

(Source: Hess et al., 2018)

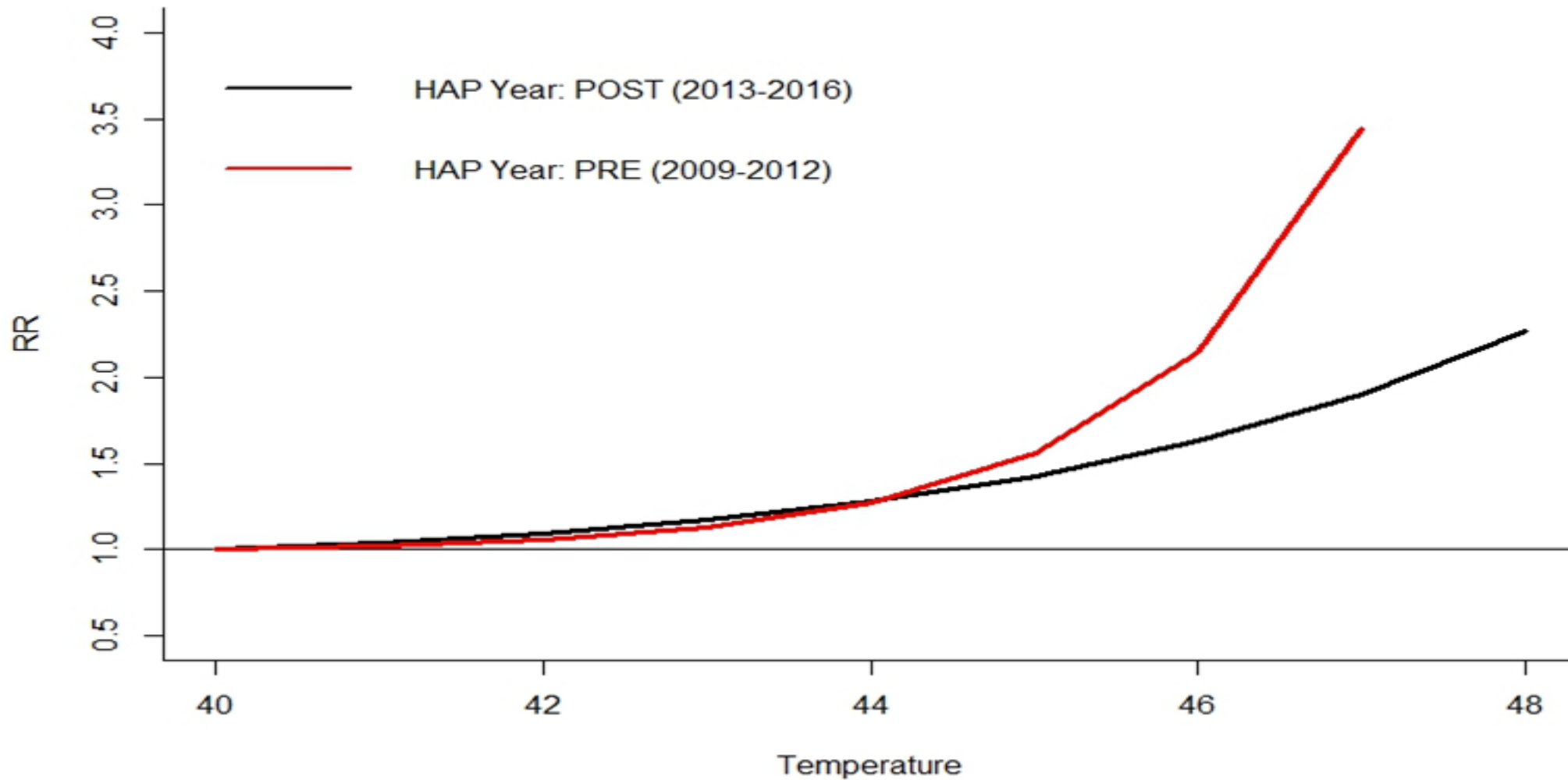


Year wise Diagnosed Heat Stroke cases & Deaths In 5 major hospitals of Ahmedabad

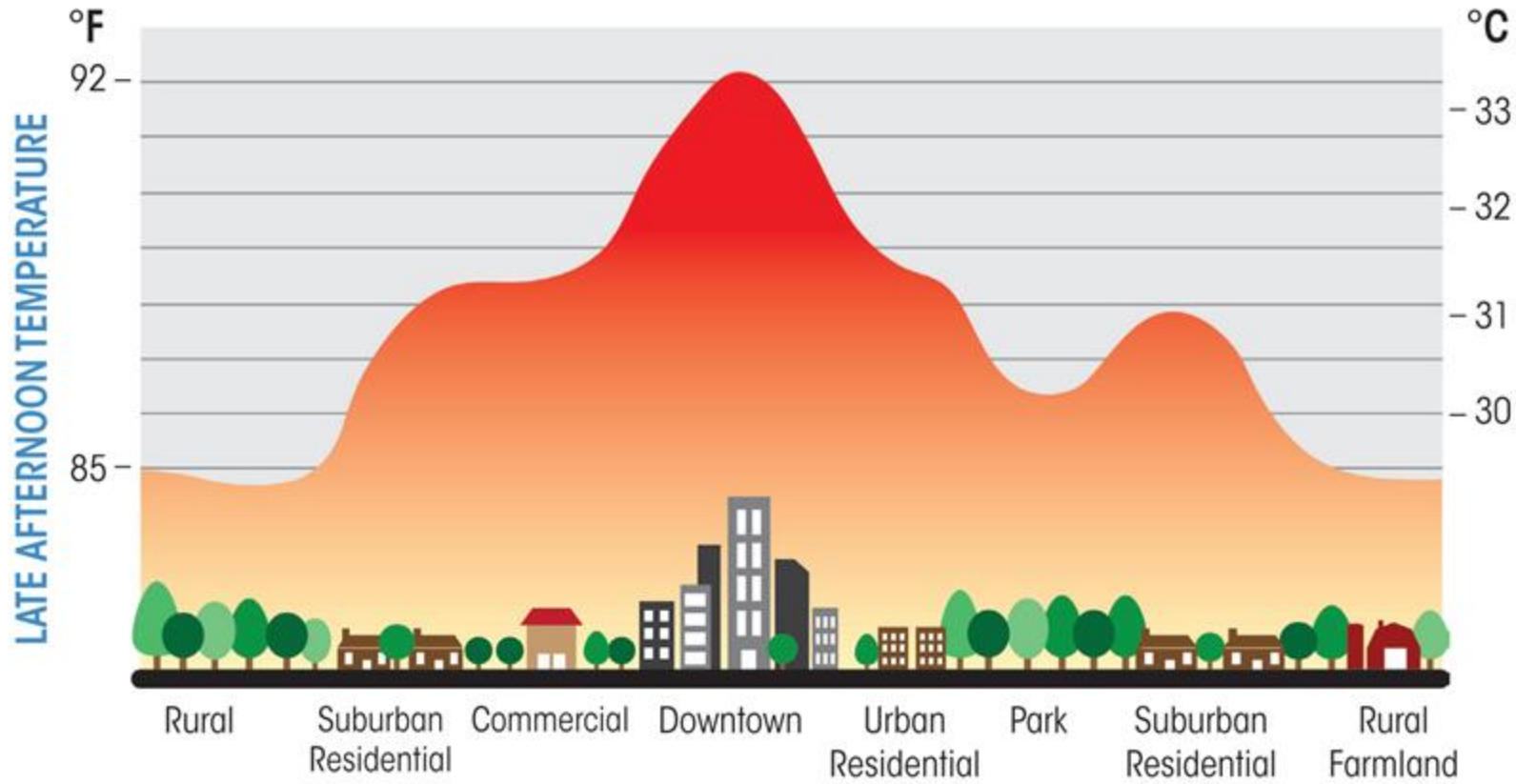


Relative Risk of Death with max temperature – Ahmedabad Pre & Post HAP

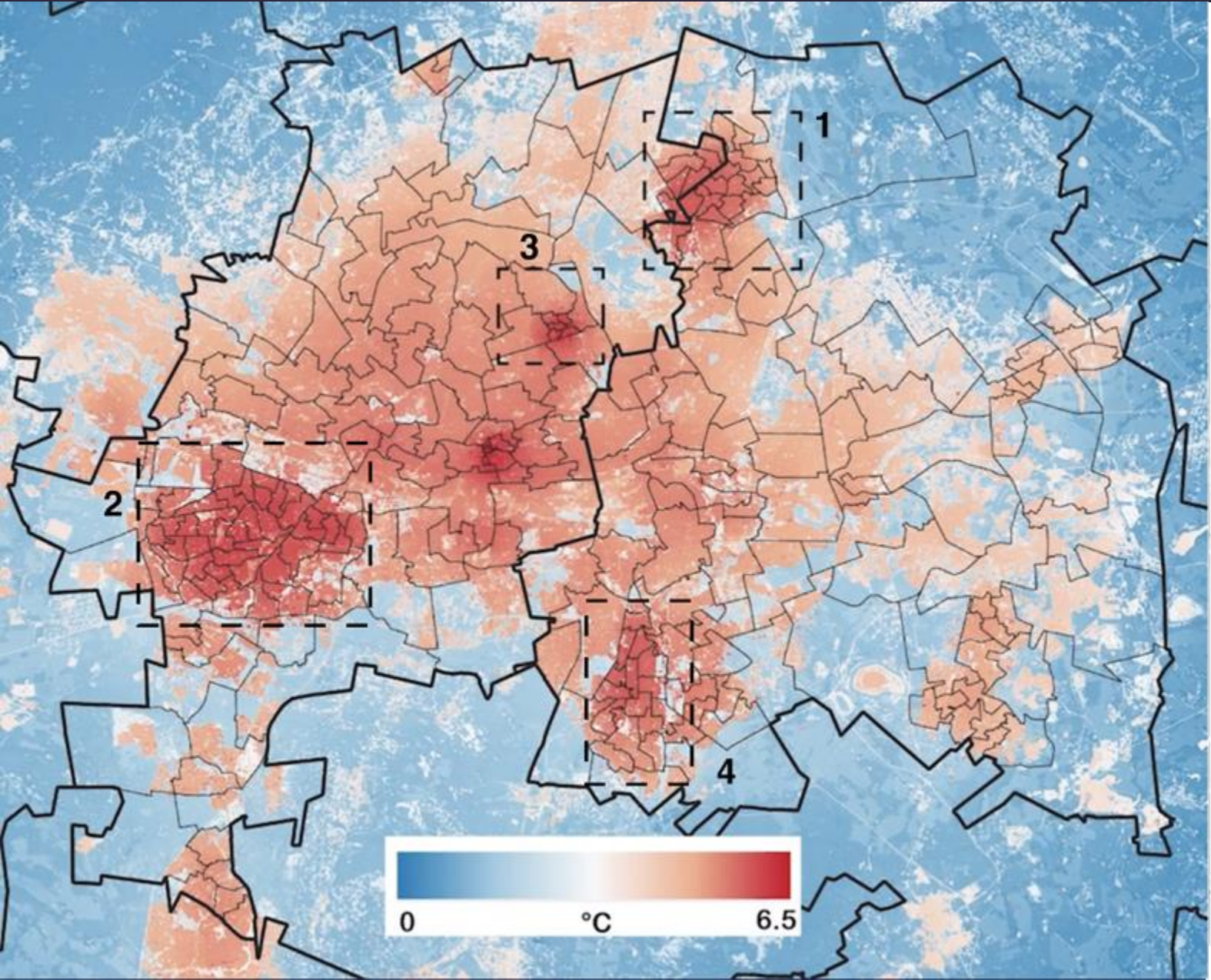
Ahmedabad - PRE & POST HAP Comparison



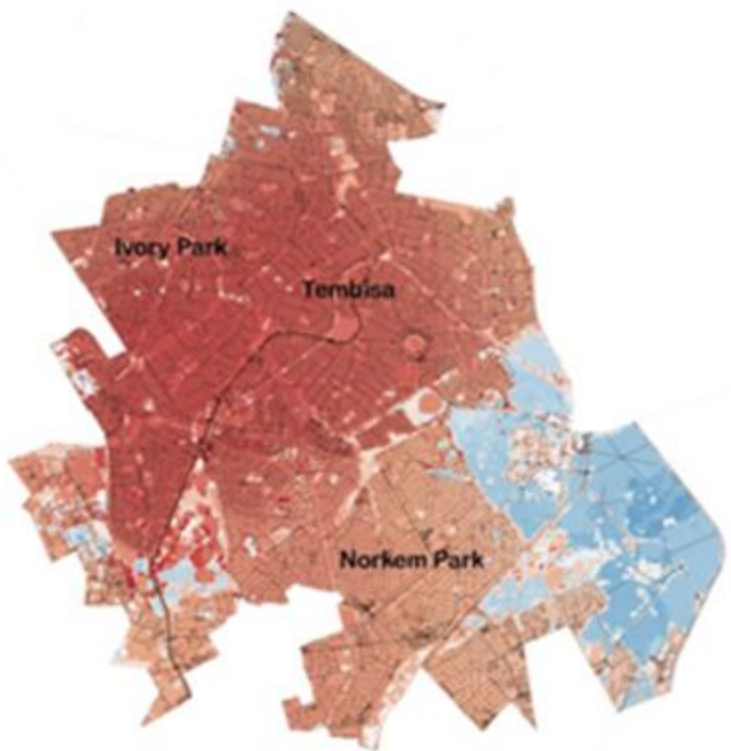
Urban heat island effect and measurement of local temp.



Neighborhoods with densely packed buildings and no trees face 6°C higher temperatures



Source : Nick Jones / World Bank

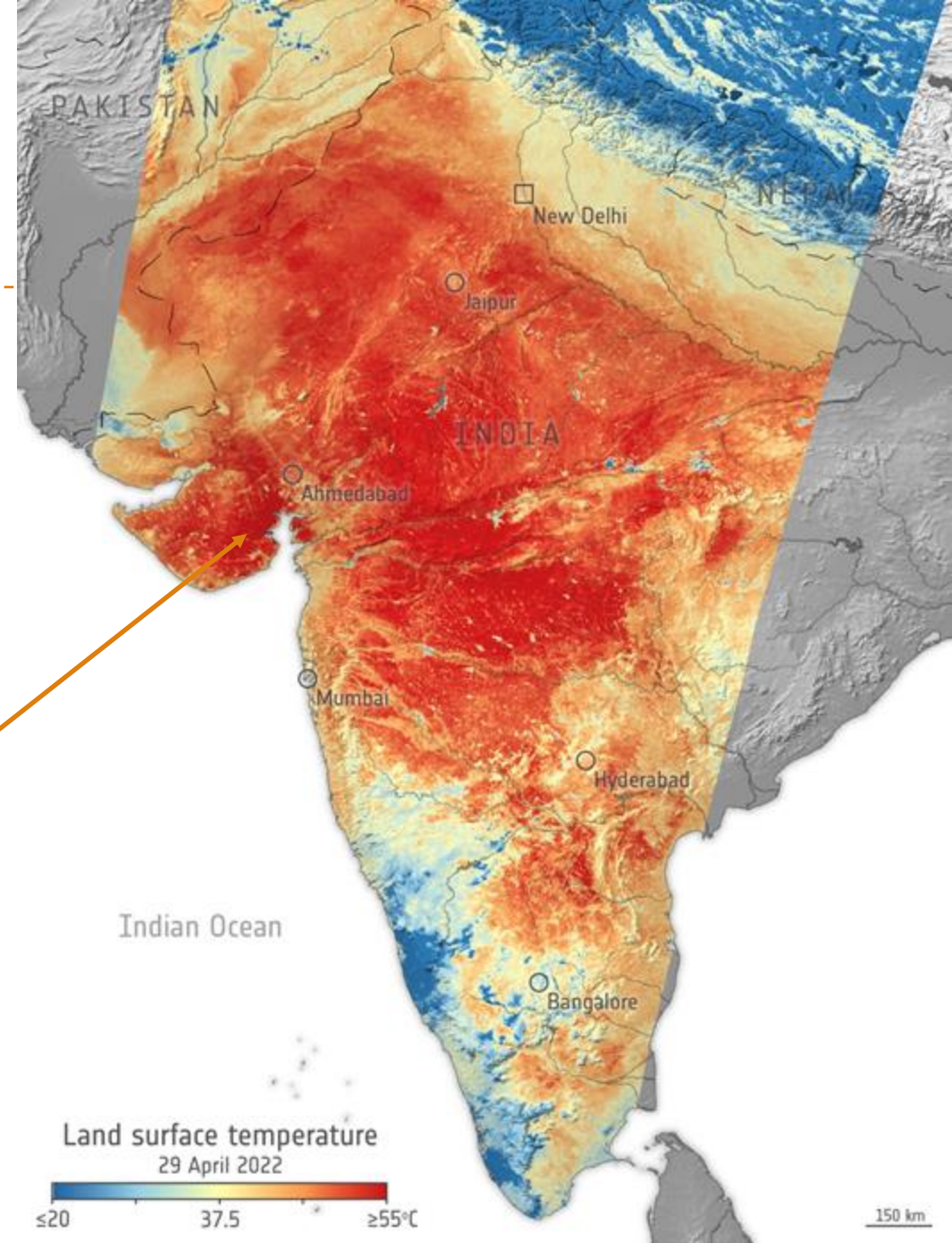


Map shows the topography-corrected urban heat island effect (mean daytime temperature compared with a rural reference point).

Land surface temperature April 25-29, 2022 – measured by Satellite cameras

European space agency

- Land surface temperature via satellite
- “accurate measurement of the land surface temperature of the ground, which exceeded 60°C in several areas.
- The data shows that surface temperature in Jaipur and Ahmedabad reached 47°C, while the **hottest temperatures recorded are southeast and southwest of Ahmedabad (visible in deep red) with maximum land surface temperatures of around 65°C**”

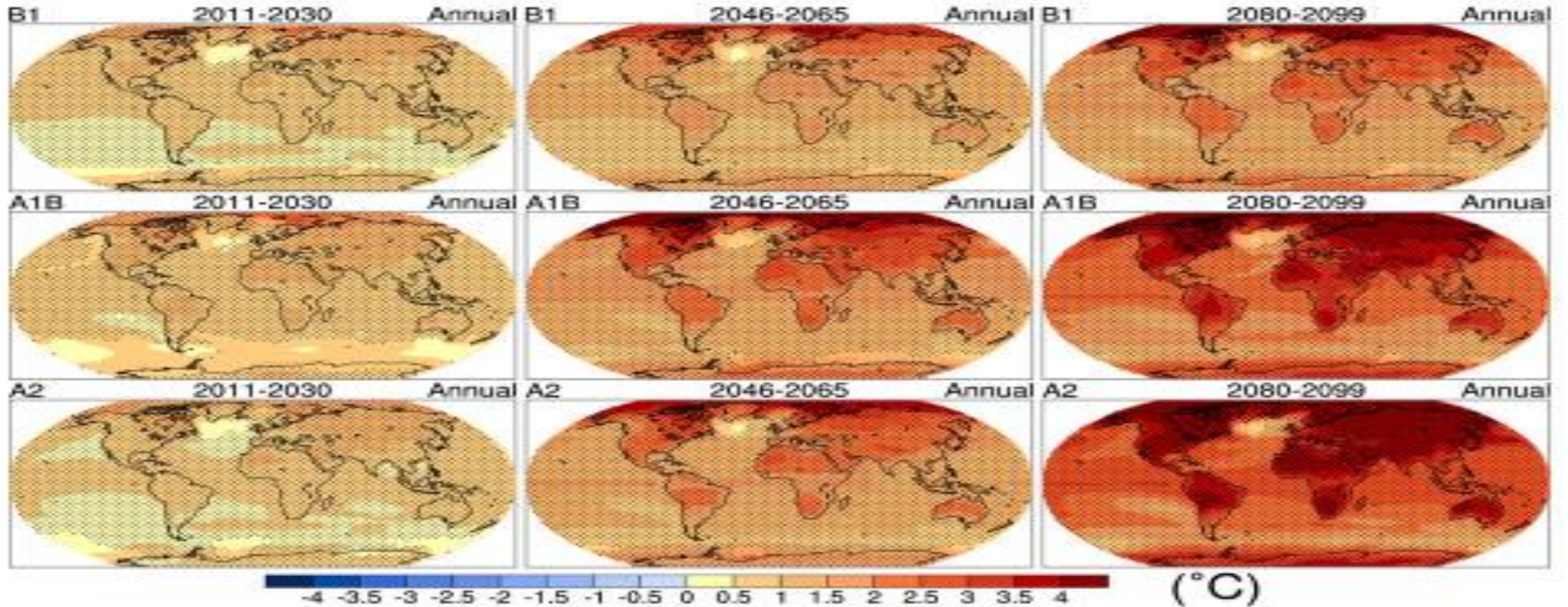




Melting Road in Indian Heat

This is the beginning of climate change – worse still to come – so lets prepare now for next 80 years

IPCC multi-model mean surface air temperature



Lessons

- Climate change is just starting – long way to go and much worse situations will arise.
- See if your city or country has a climate change plan and how it is implemented.
- How it is monitored / measured – is all cause mortality, morbidity or other parameters of health being monitored ??
- Is there a Nodal officer or office for CC and Heat health. What are they doing.
- Is the predictions available ?? How are they communicated to the public
- What role you can play to make the community aware of the dangers and actions.

Thanks.
