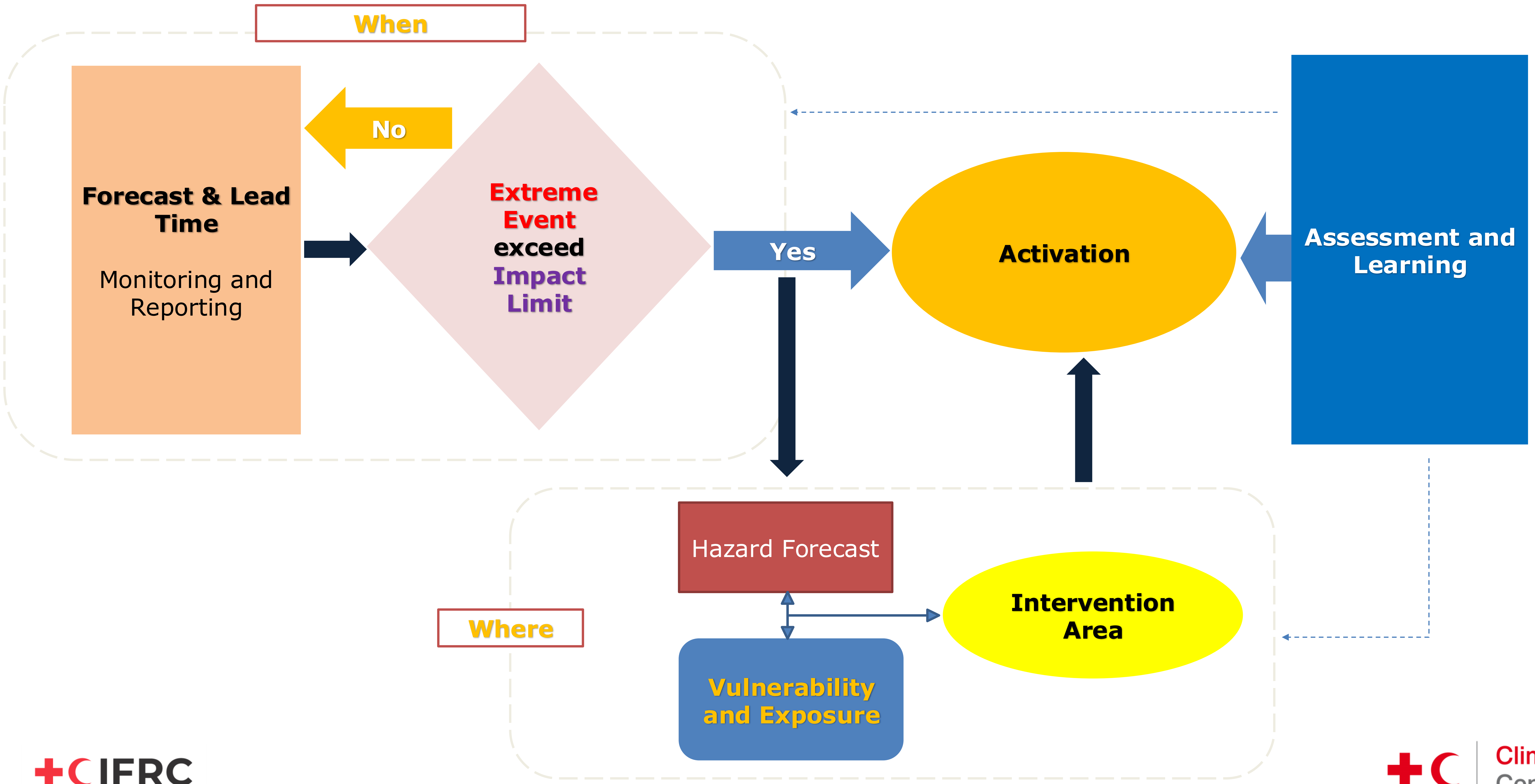
Supported by:

REGIONAL WORKSHOP ON IMPACT-BASED FORECASTING

Training-of-Trainers and National Demonstration Planning for Temperature-Related Hazards

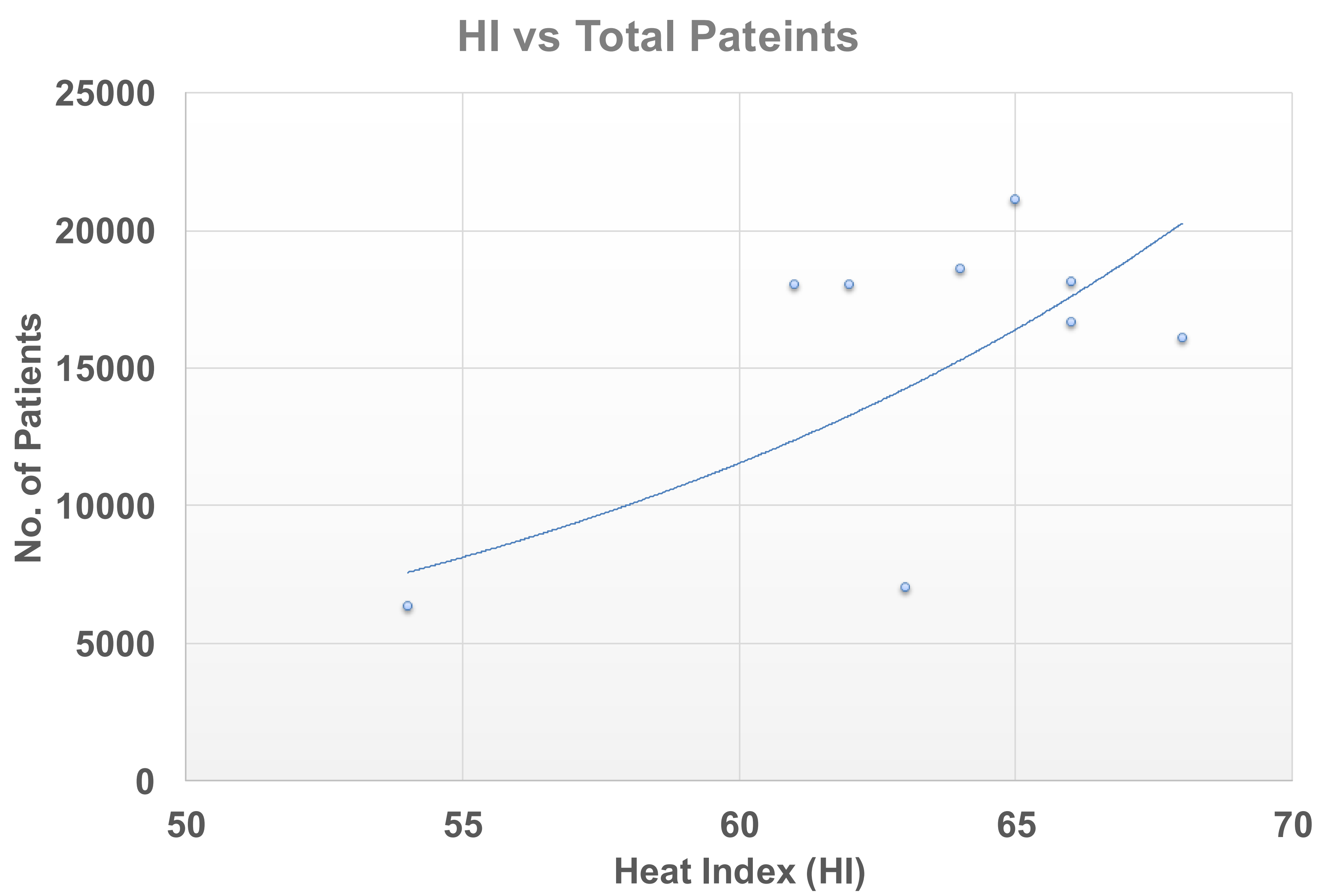
Trigger and Thresholds for Anticipatory Action in Temperature related Hazards

AA Trigger model - Basic FRAMEWORK

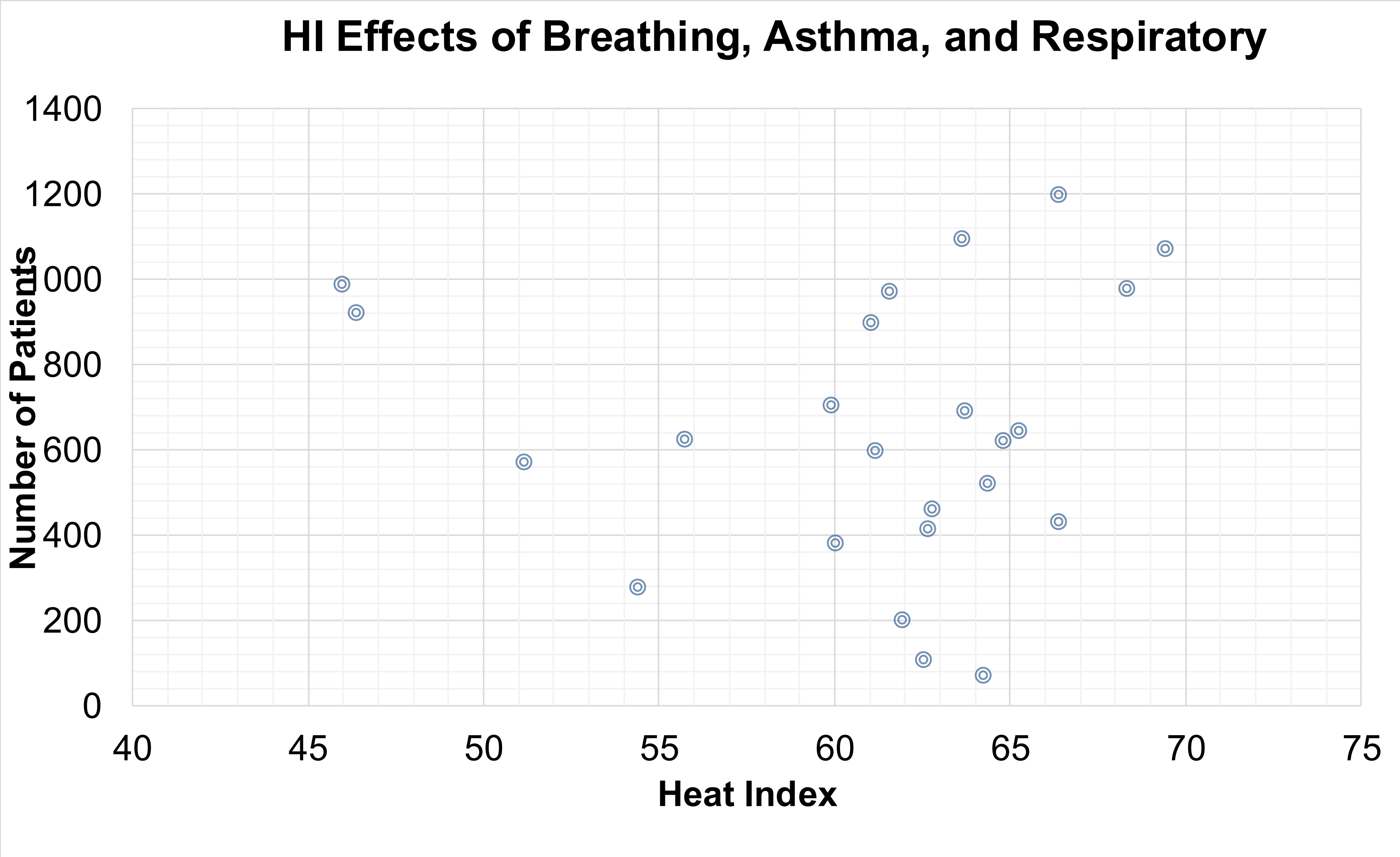


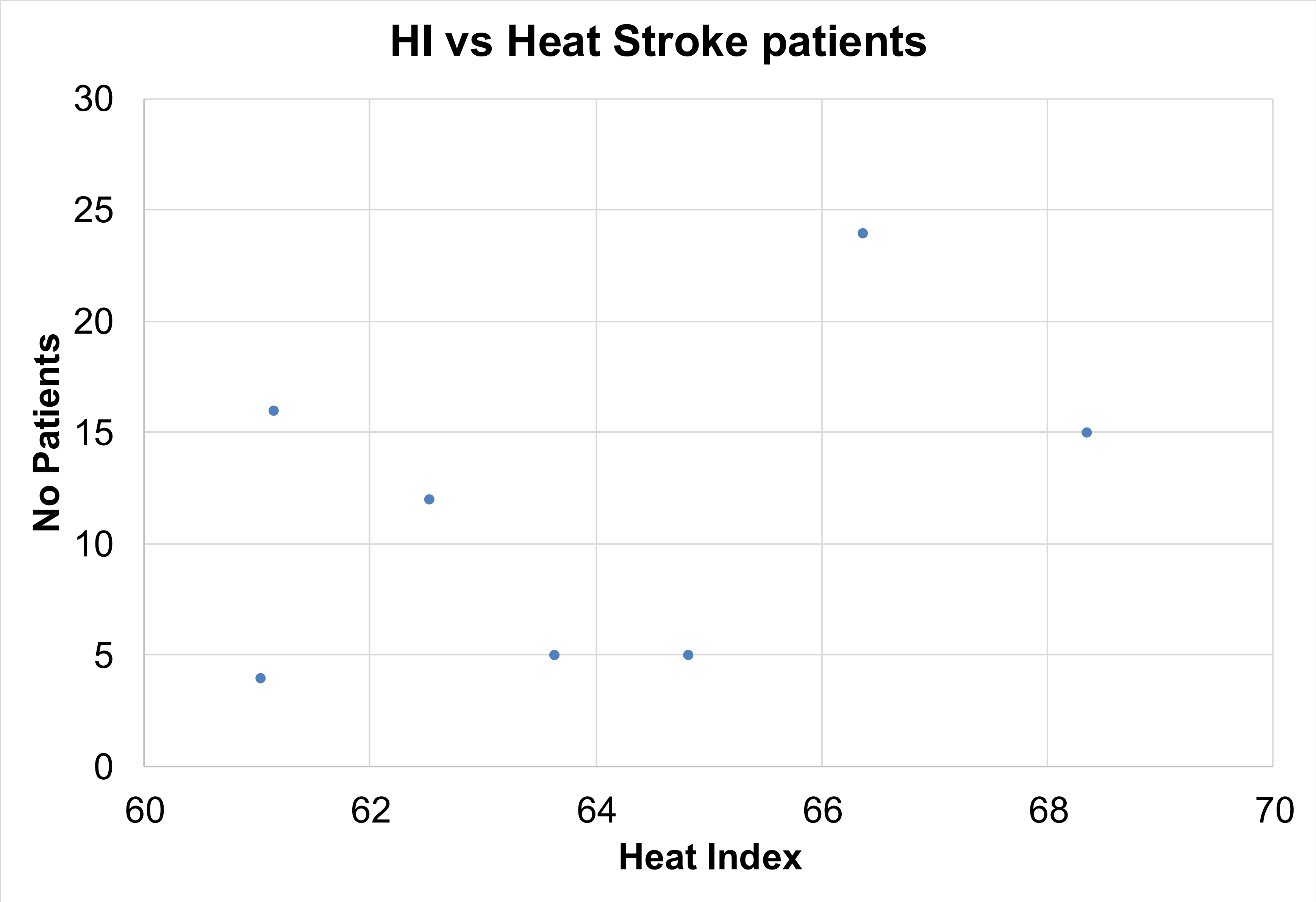
IMPACT LEVELS –Setting the Trigger Thresholds for AA

For trigger development in AA, thresholds must be defined from assessments of the magnitude of hazard that results in specific impacts

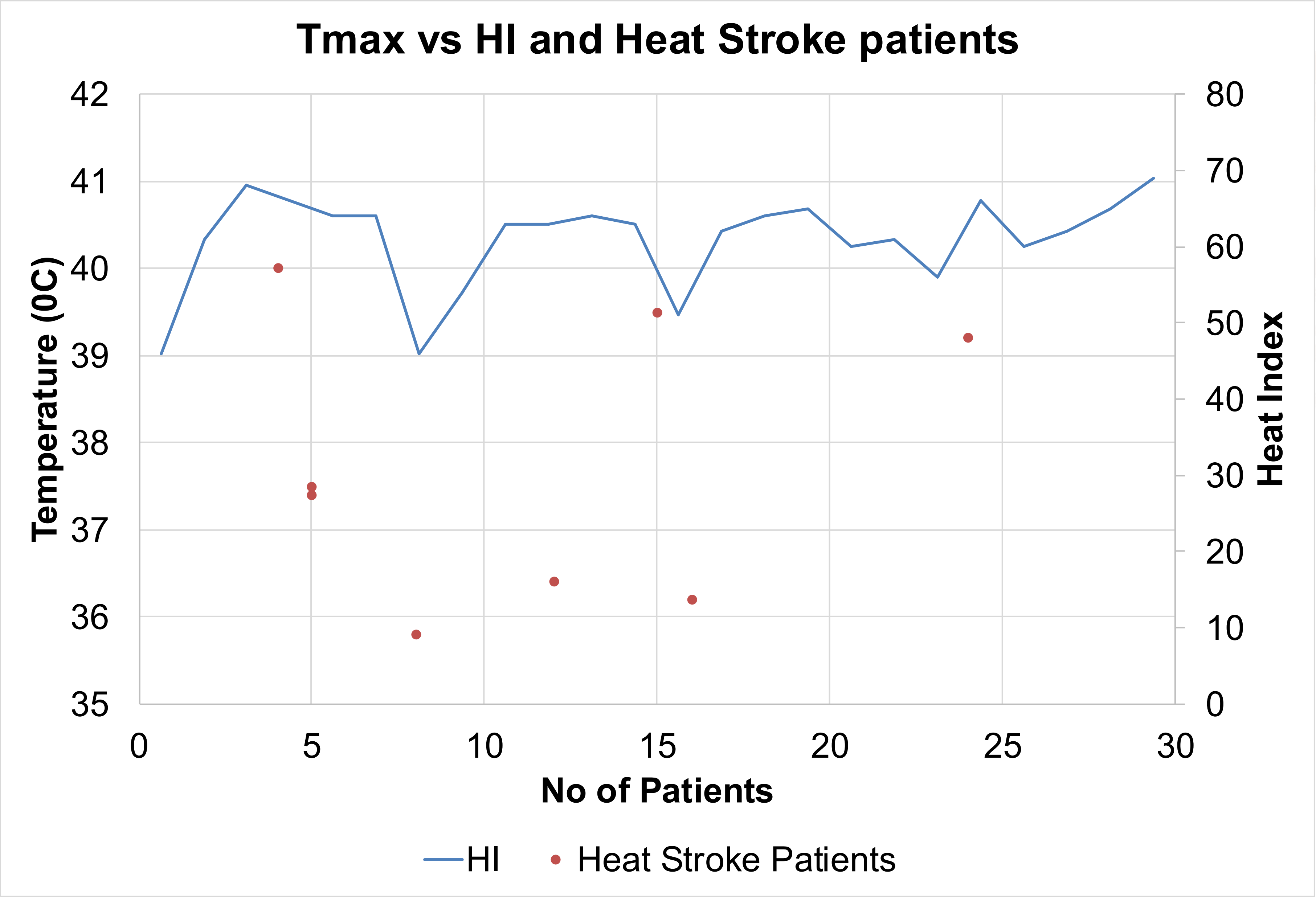


- In Rajshahi, Bangladesh study, heat threshold was calculated using human health impacts by using historical, location-specific health data, rather than relying solely on climatological extremes.
- Hospital admissions or mortality records are analyzed alongside temperature and Heat Index values
- Increasing trends of total patients with the heat index.
- The trajectory of health impact or the number of patients admitted to the hospital can be seen upward **when the Heat Index (HI) is over 55.**
- **The health impacts due to heatwaves get severe when HI touches 60 and above.**





- The HI effects on breathing, asthma, and respiratory disease start when the HI is above 45 and significantly increase when the HI is 60 and more.
- Shows that the number of patients with heat strokes increases exponentially after crossing HI 60
- The number of total patients is increasing depending on the HI rise, with a sharp rise when it exceeds 60.



- The number of patients with heat stroke rises dramatically when the temperature exceeds 39°C and HI is 55

Health surveillance data shows a strong relationship between Heat Index (HI) and multiple heat-sensitive diseases

Health impact analysis shows:
Initial impacts begin when HI crosses ~50
Rapid escalation of health impacts occurs when HI exceeds 55
85% of heat-related cases occur between HI 55 and 70

The study recommended HI 55 as a proxy for the impact threshold for health-related AA in Rajshahi, Bangladesh

Myanmar Example (With limited health-related impact data)

Station	Summer Months (March – April – May) – Heat Index			Suggested Thresholds	Impact Correlation
	99 Percentile	95 Percentile	90 Percentile		
Yangon (Kaba Aye)	72.1	66.3	62.6	HI > 90 Percentile for more than 3 days consecutively	16-23 April 2019 (8 deaths),
Mandalay	73	61.5	58.2	HI > 90 Percentile for more than 3 days consecutively	18 – 28, April 2014 (49 heatstroke, 9 deaths) May 2010 (HI not reaching but temp consistently above 42 – 230 deaths)

Myanmar Heatwave AA

- Use of Heat Index (Percentile based)
- Duration aligned with heatwave event definition by DMH
- Sometimes, heat index (HI) may not be best option, for e.g., in Mandalay (dry zone) – Maximum temperature may be good enough in certain context

- During the period of 2010 – 2022, these trigger thresholds for Yangon would have been reached in **2012, 2013, 2019 and 2020**.
- However, the Mandalay trigger thresholds would have been reached **during 2012 & 2014** but would have missed in **2010** which was the foremost the deadliest heatwave in record with daily temperature reaching to 47°C leading to 230 deaths.

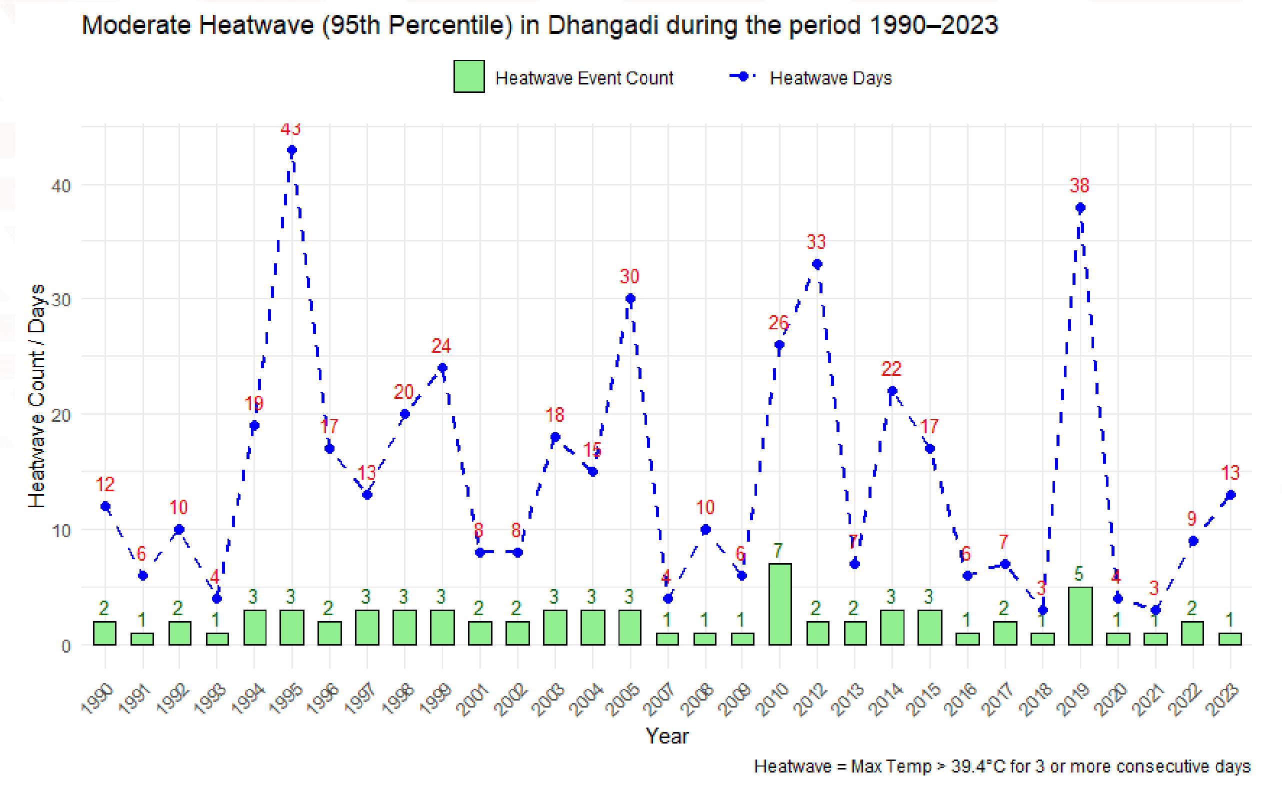
Source: Myanmar Red Cross – Simplified Heatwave EAP

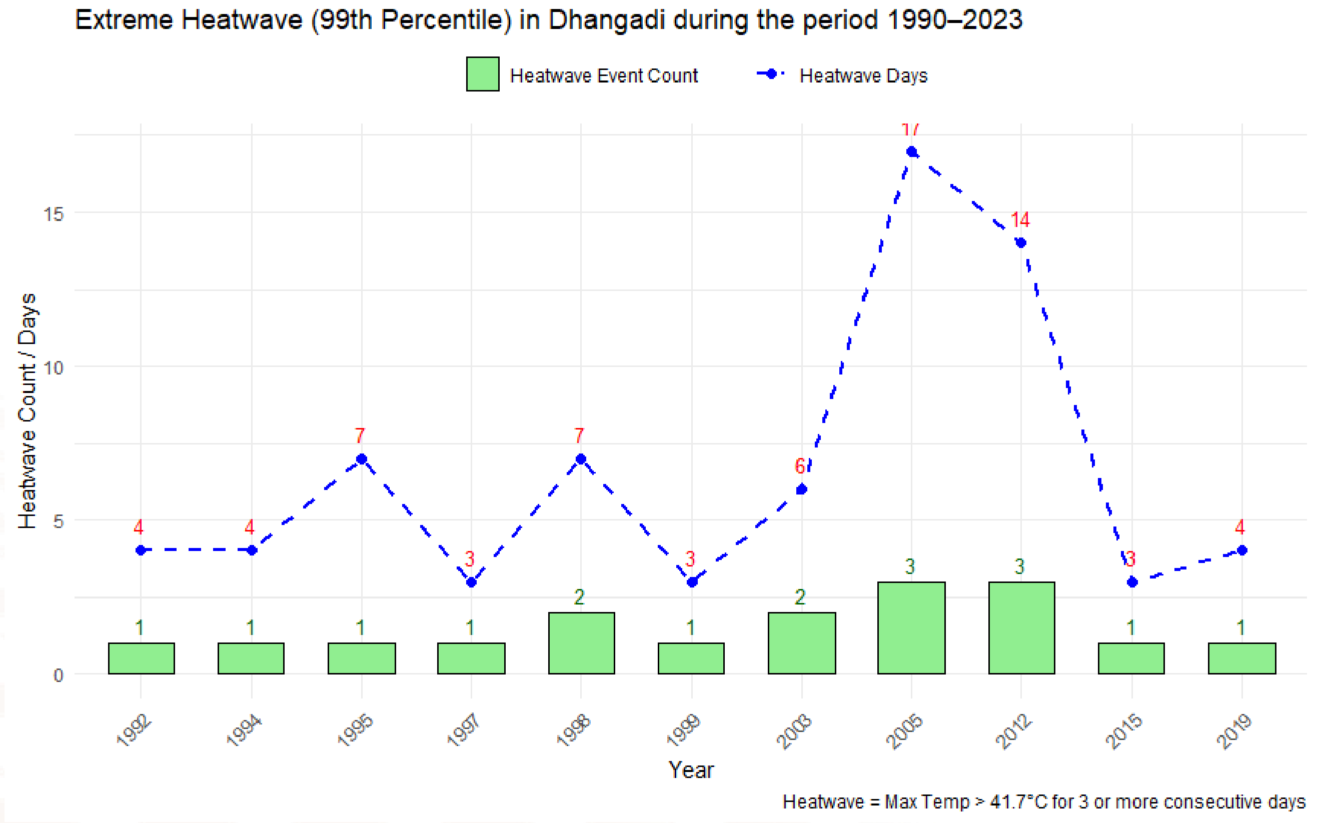
Nepal Example (With no health-related impact data)

Source: Nepal Red Cross – Simplified Heatwave EAP

Cities	Weather Stations	Temperature Thresholds Percentile			Trigger Threshold
		90th	95th	99th	
Nepalgunj	Nepalgunj Airport	38°C	39.8°C	42.6°C	41°C
Dhangadi	Dhangadi Airport	37.7°C	39.4°C	41.7°C	40.5°C
Siddharthanagar	Bhairahawa Airport	37°C	38.6°C	41.6°C	40.5°C
Biratnagar	Biratnagar Airport	35°C	36°C	38.2°C	37.5°C

- DHM Heatwave Definition (meteorological thresholds – percentile based for mild, moderate and extreme – with duration of 3 days)
- Mild heatwave events occur very frequently, with multiple episodes observed in every year or so. Only moderate and extreme heatwave events can be considered.
- Moderate heatwave events are also common in all these four cities with at least one annual episode observed in recent years. On the other hand, extreme heatwave events are relatively rare in terms of occurrences
- Therefore, the proposed trigger thresholds have been catered for the higher-end moderate heatwave events that are less frequent and pose greater risk





Bangladesh Example – National Heatwave EAP

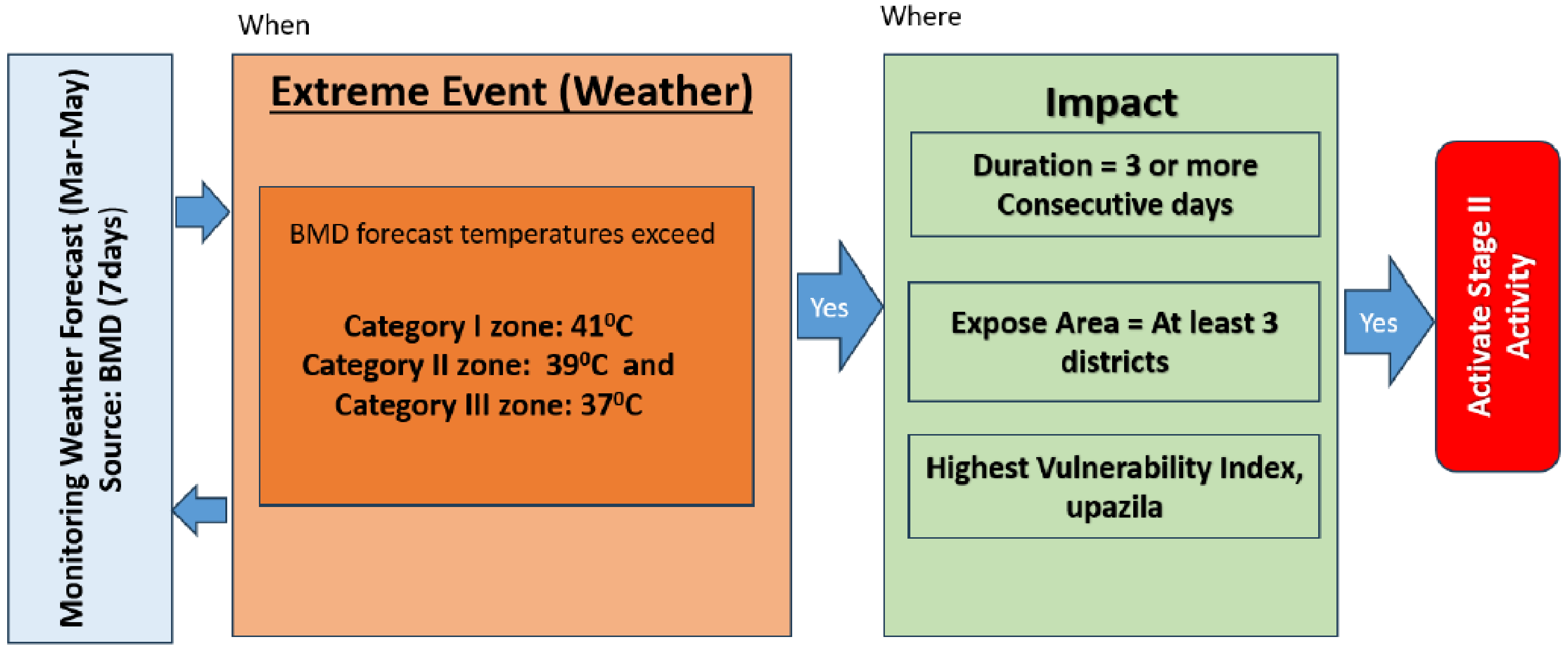


Figure 18: Schematic representation of the Activation Trigger for Health sector

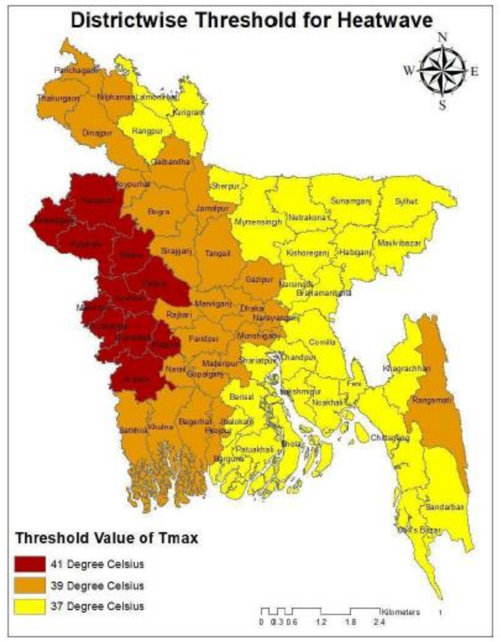


Figure 11: Threshold value of heatwave for Health sector

Source/Reference: Final-Draft National Early Action Protocol of Heatwave_Bangladesh

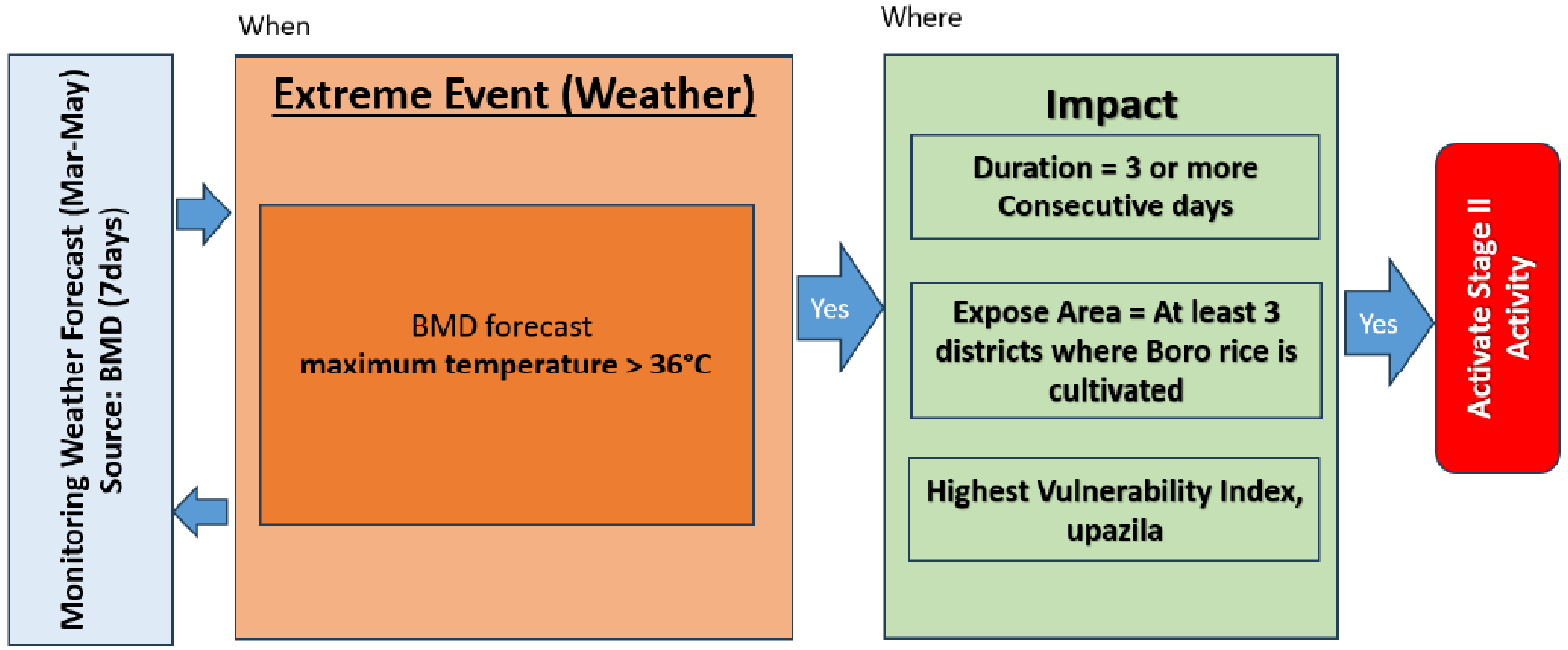


Figure 20: Schematic representation of the Activation Trigger for Agriculture (crop focusing on Boro) Sector

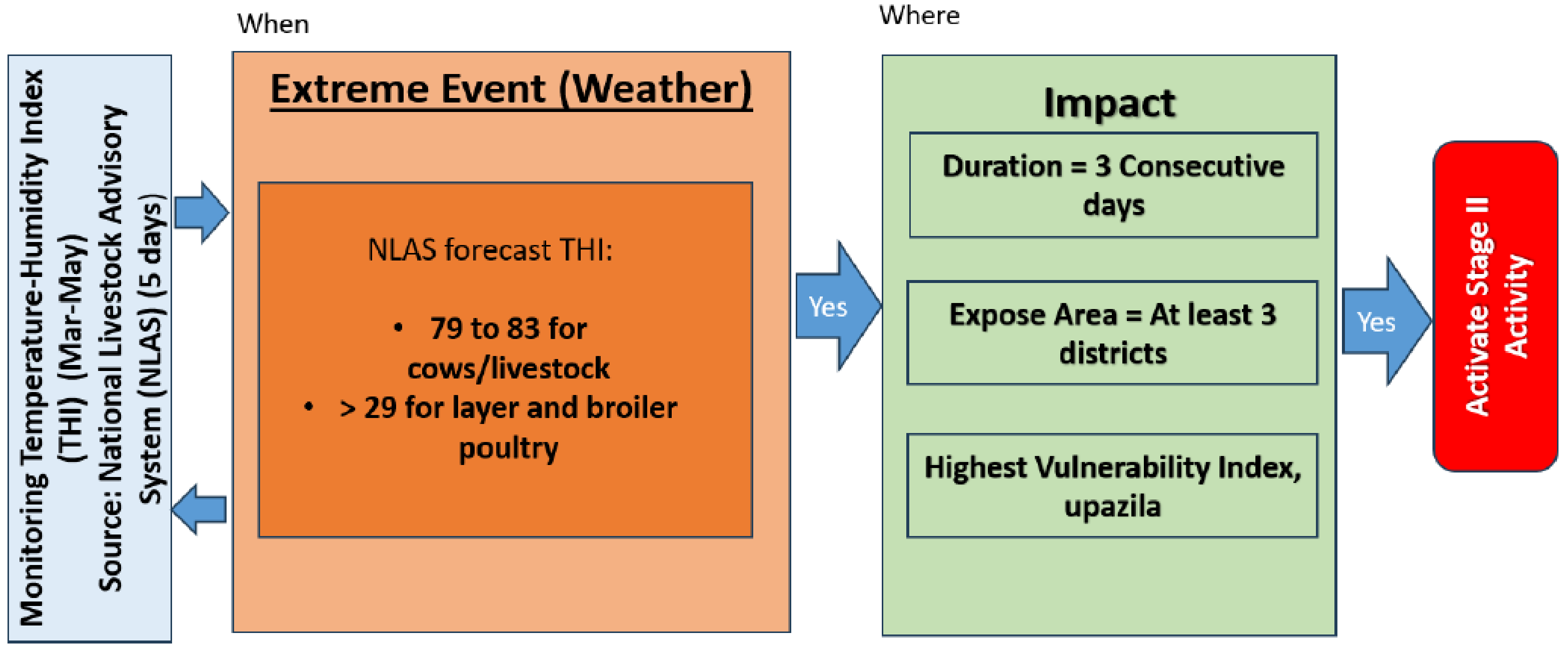


Figure 22: Schematic representation of the Activation Trigger for Agriculture (livestock) Sector

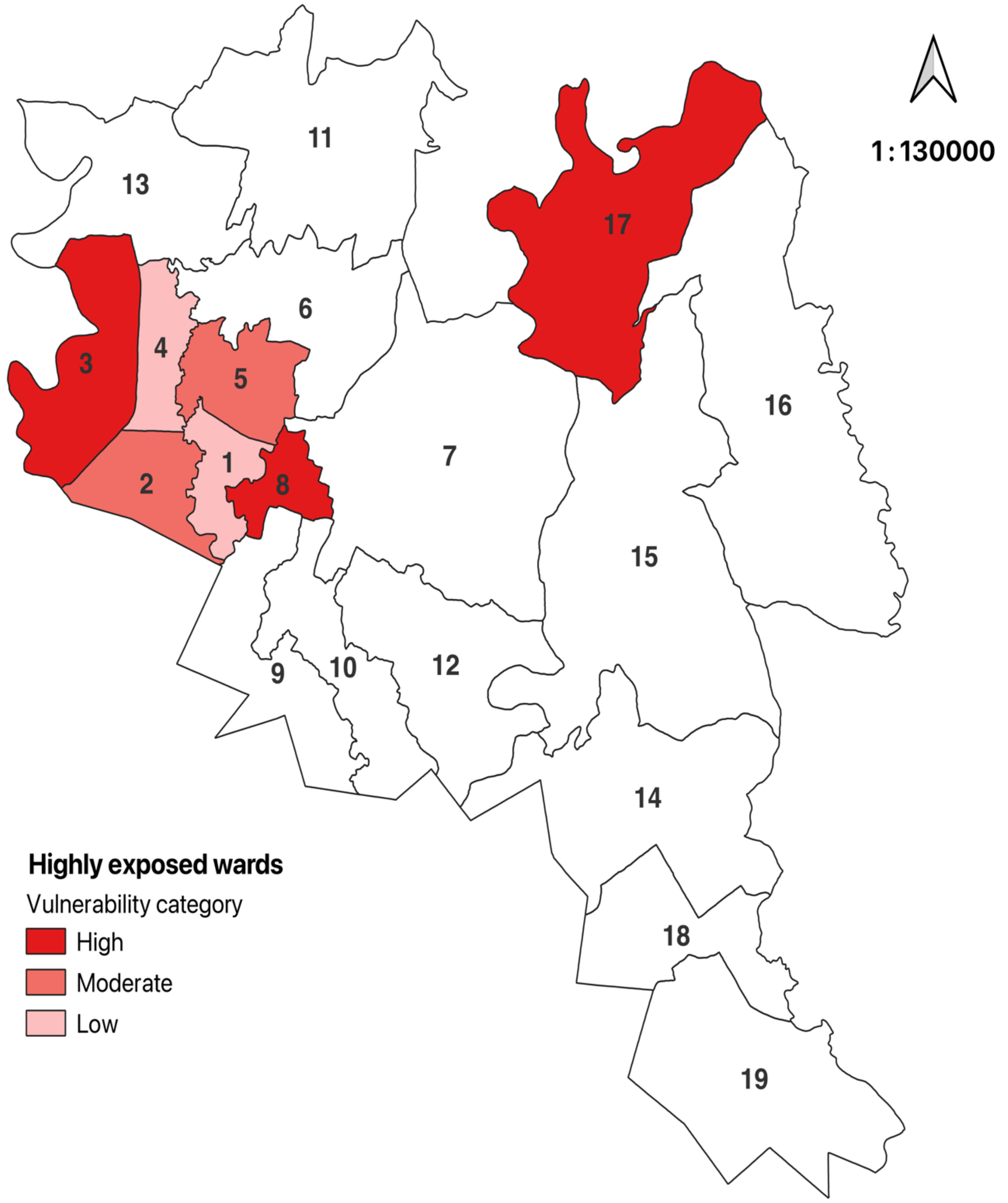
Heat Hotpots & AA Intervention Mapping

- Heat hotspots identify areas where action is needed due to significantly higher exposure to heat risks and vulnerability compared to surrounding regions.

- This increased risk arises from a combination of natural and human-made factors.

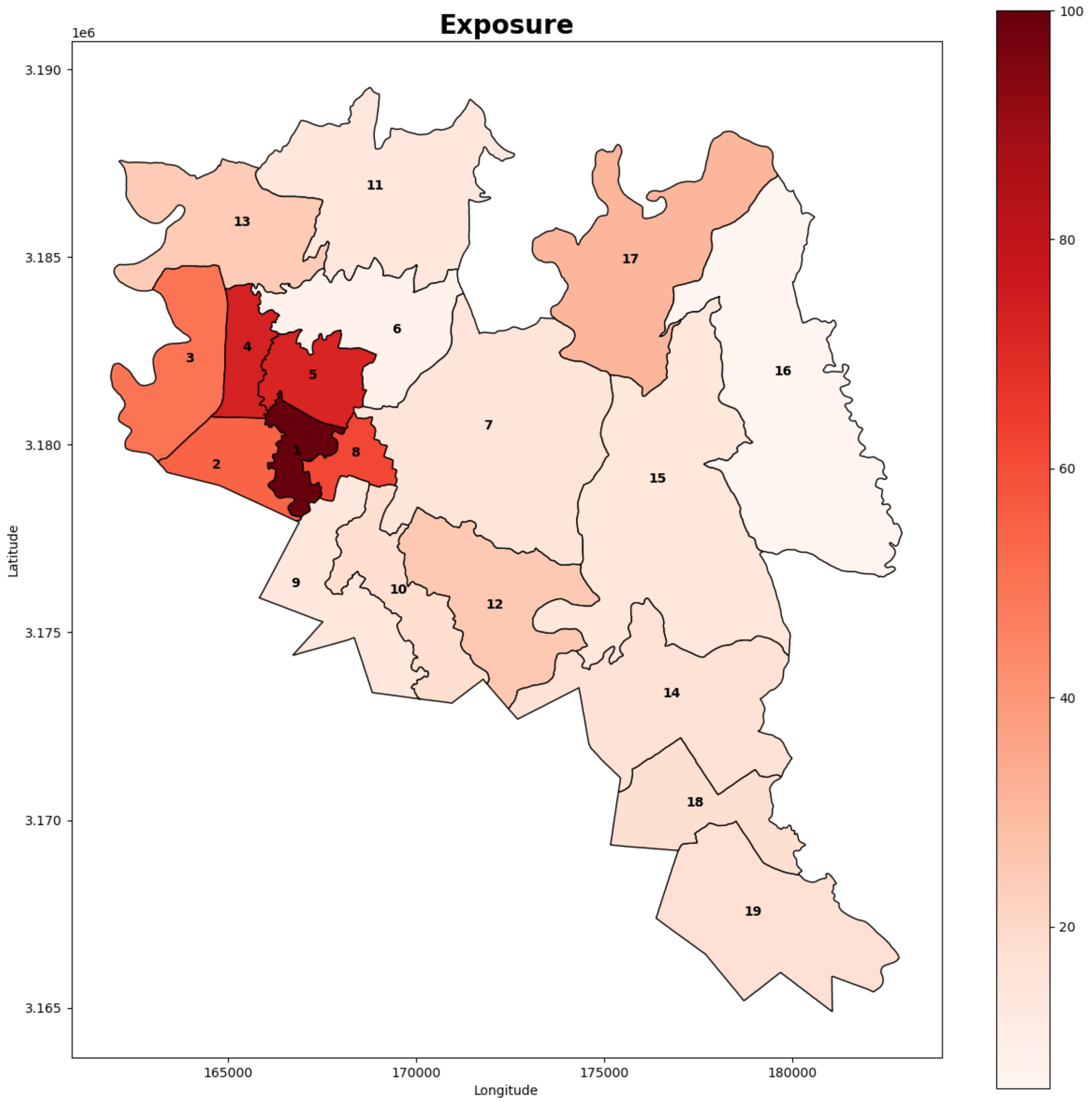
- The determination of these heat hotspots is based on three main components: exposure, vulnerability, and adaptive capacity.

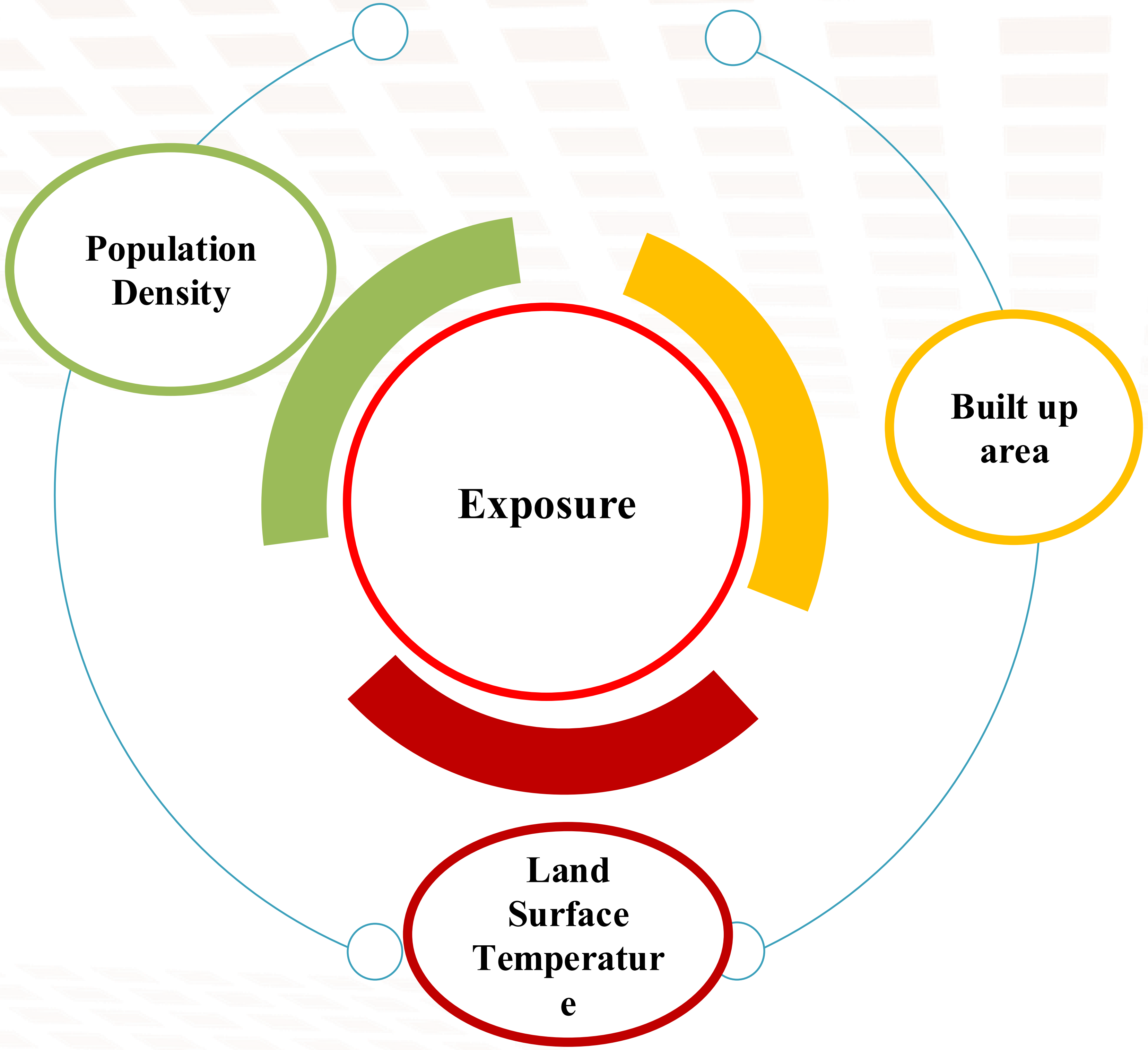
Dhangadi Nepal (Ward-wise) Heat Hotspots



Exposure Analysis

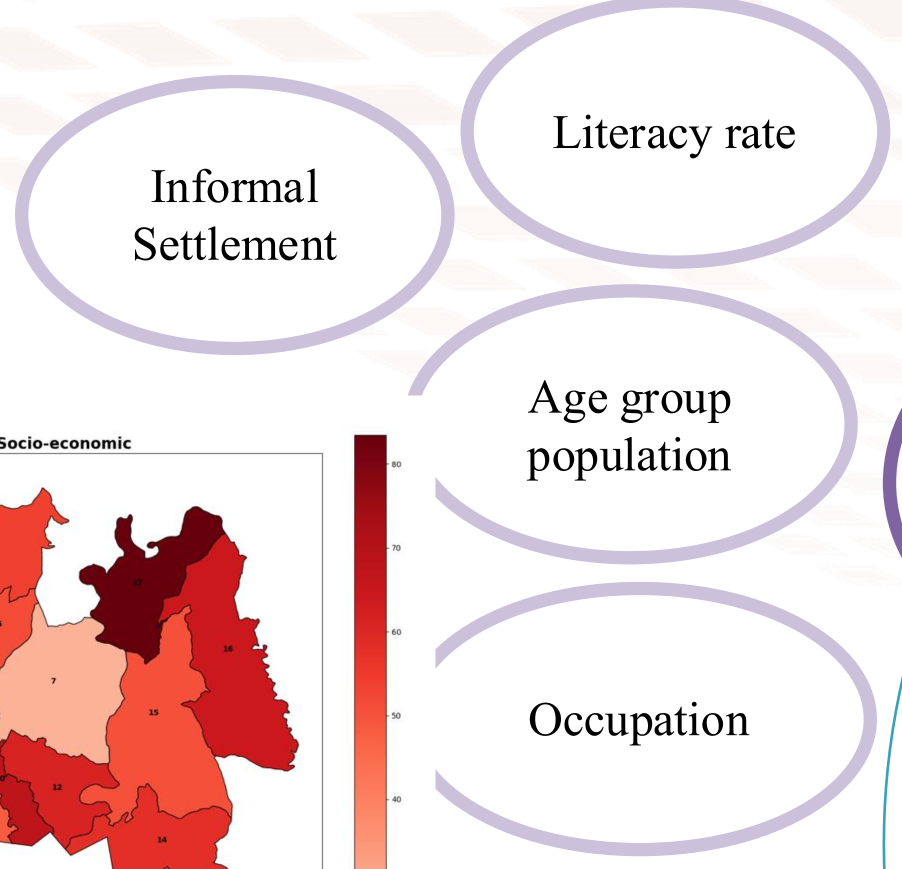
Dhangadi Nepal (Ward-wise) Heat Exposure Map

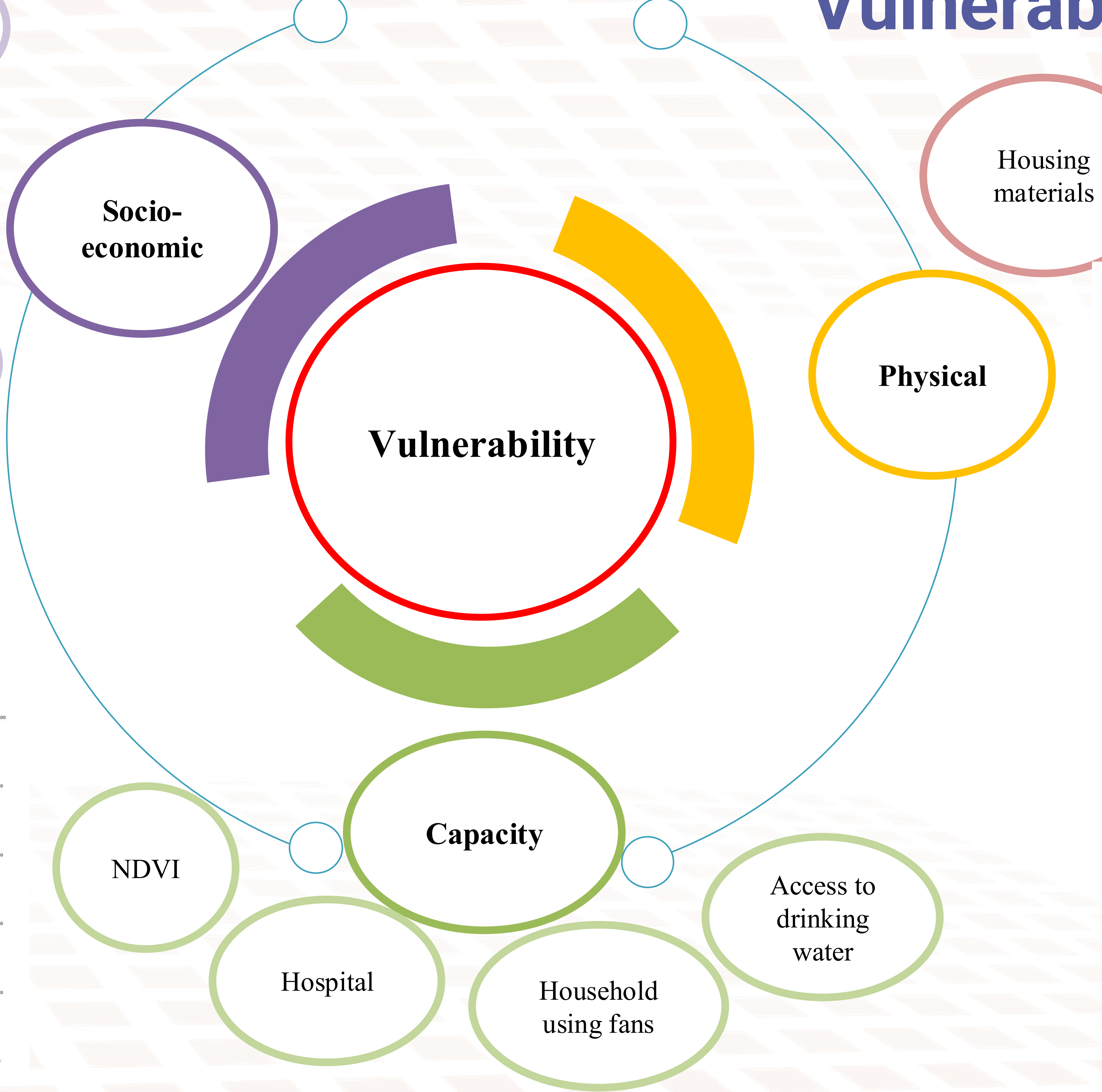


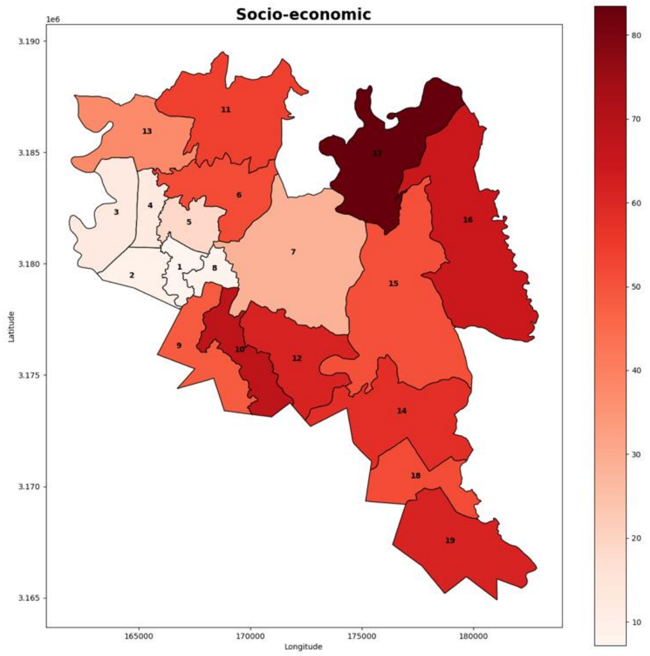


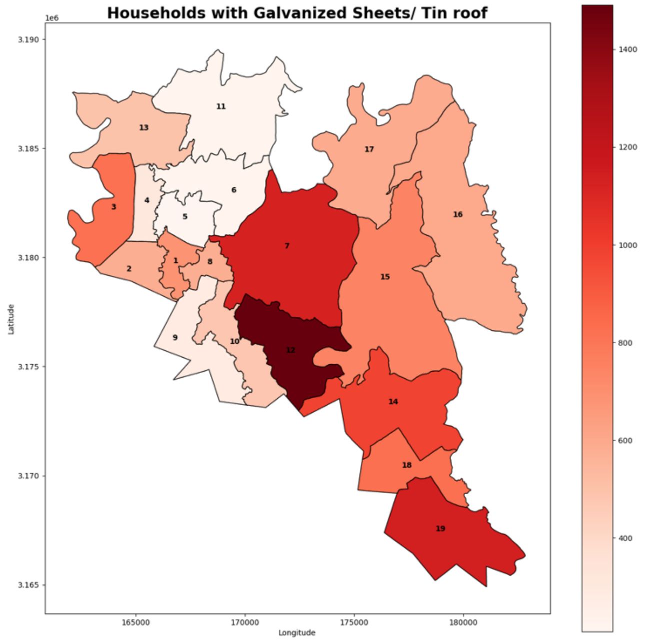
- Exposure to a heatwave refers to the degree to which individuals or communities are subjected to the elevated temperatures.
- This includes factors such as the duration and intensity of heat.

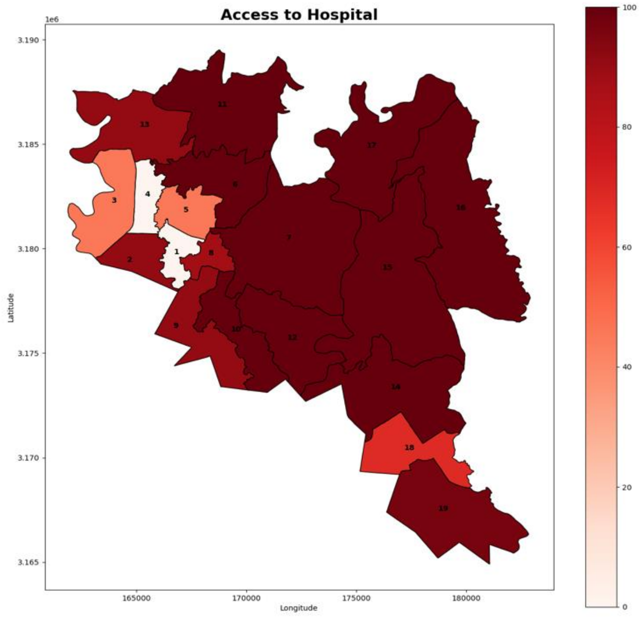
Vulnerability Analysis







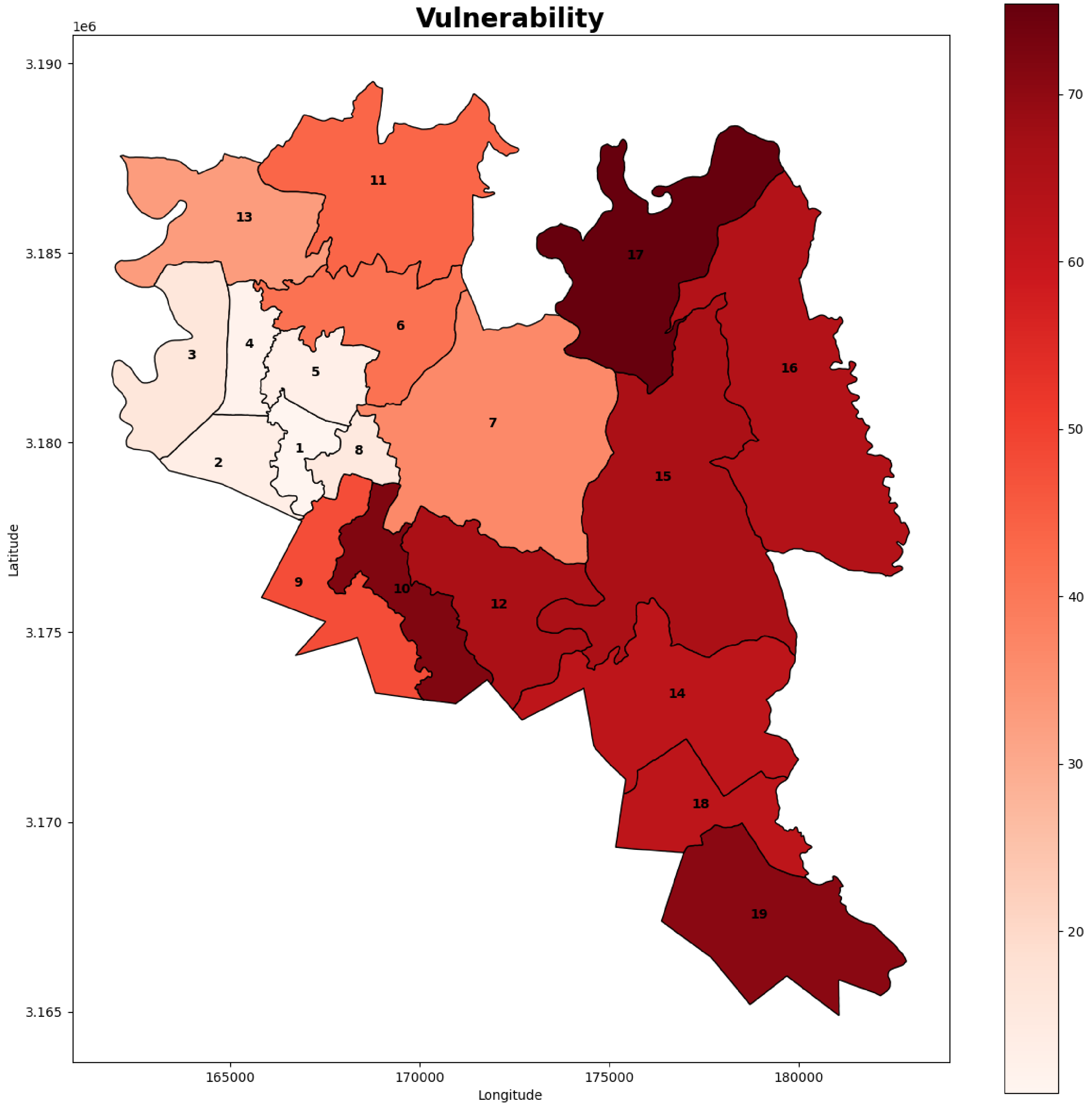




Vulnerability Analysis

Overall Vulnerability = Socio-economic Vulnerability + Physical Vulnerability - Capacity

Dhangadi Nepal (Ward-wise) Vulnerability Map



Intervention Criteria for Anticipatory Action: Targeting At Different Level

📍 WHERE (Location Targeting)

- High-risk townships/wards (based on heat risk/hotspot map)
- High Exposure Sites: Markets, Streets, Transport Hubs, Construction Areas

🏠 WHICH HHs (Household Level Targeting)

• People living in heat hotspots
Outdoor daily wage income (outdoor workers)
• Poor housing conditions
• Children <5 | Elderly 65+
• Disability or chronic illness
• Single-headed HH
• No external support or salaried income
•Migrants, including undocumented people

👥 WHO (Population Targeting)

For First Aid posts, shading & water points
Outdoor workers (street vendors, trishaw drivers, construction, waste collectors, delivery workers)
Pedestrians in high-heat public spaces

For Heat Awareness & First Aid visits
Children (schools, orphanages)
Elderly and persons with disabilities (care homes)
Pregnant & lactating women, newborns (public health centres)
Vulnerable households in poor housing settlements

Thank You!

Any Questions?