NO TIME TO COOL

Delhi's most vulnerable populations bear the brunt of climate change

RAJNEESH SAREEN AND MITASHI SINGH

VIKAS CHOUDHARY / CSE

DELHI'S SUMMERS have become increasingly unbearable. The city that once enjoyed distinct seasons now sees scorching heat that begins as early as February and stretches well into August or September. In 2025, the capital witnessed its warmest February and March on record, with the India Meteorological Department issuing multiple heatwave alerts in subsequent months. The previous year saw temperatures climbing above 45°C for days on end, testing the limits of human endurance.

This is not a temporary anomaly. A comprehensive decadal assessment by Delhi-based think tank Centre for Science and Environment (CSE), analysing data from 2015 to 2024, reveals a disturbing pattern: the capital departed from its normal temperature range in 42 of 50 occasions during the summer months (March to July). Maximum temperatures averaged 3°C higher than normal, transforming winters and springs into unseasonably warm periods. The message is clear—hotter summers are no longer an aberration but Delhi's harsh new reality.

A city under heat stress

The scale of Delhi's heat problem is staggering. According to the ongoing CSE study, nearly 76 per cent of the city has been facing heat stress during summer months over the past decade. Heat-stressed areas are defined as locations where land surface temperatures exceeded 45°C for more than six years within this 10-year period. The implications for public health, livelihoods, productivity, infrastructure and the environment are severe and far-reaching.

The city's southwestern region bears the heaviest burden. Neighbourhoods like Najafgarh, Palam, Dwarka, Indira Gandhi International Airport, Mahipalpur, Uttam Nagar and Dabri consistently record the highest temperatures. Western and northwestern localities including Patel Nagar, Moti Nagar, Rajouri Garden, Vikas Puri, Nangloi, Rohini, Samaypur Badli, Bhalswa, Azadpur and Narela also experience intense heat stress. Most of these areas sit on the city's periphery, where urban planning has often prioritised expansion over liveability.

The historic Old Delhi area faces similar challenges, along with central locations such as Connaught Place, New Delhi Railway Station, Pragati Maidan, Bharat Mandapam and Indraprastha. Southern neighbourhoods like Okhla, Tughlakabad, Khanpur, Sangam Vihar, and Jaitpur, as well as eastern areas including Ghazipur, Gharoli, Patparganj, Anand Vihar, Shahdara and Shiv Vihar all register high heat stress.

Interestingly, major corridors like Grand Trunk Road, Rohtak Road, the Kirti Nagar-Mayapuri road, and much of the Ring Road are also heat traps. Dark bitumen surfaces absorb and retain solar heat, while traffic congestion creates additional anthropogenic heat from vehicle exhaust and the metal bodies of cars and buses that store thermal energy.

Between 2015 to 2024, Delhi departed from its normal temperature range in 42 of 50 occasions during the summer months (March to July). Maximum temperatures averaged 3°C higher than normal

The city's relief zones tell an equally important story. Areas with lower heat stress invariably contain heat sinks in the form of ridges, green belts, district parks, the Yamuna and other substantial green and blue infrastructure. This correlation underscores a fundamental truth: nature provides the most effective defence against extreme heat.

The hottest wards

Analysis of heat stress at the ward level using Census 2011 boundaries presents a more alarming picture. Ten wards experience heat stress across 100 per cent of their area: Bazar Sitaram, Ballimaran, Kucha Pandit and Turkman Gate in Old Delhi; Milap Nagar and Madhu Vihar in West Delhi; and Babar Pur, Karawal Nagar East, Tukhmir Pur and Nehru Vihar in East Delhi. These wards house approximately 550,000 residents and share common characteristics—high population density and virtually no nearby green space or waterbodies.

The situation extends beyond these extreme cases. Seventy-eight additional wards have more than 90 per cent of their area under heat stress and are home to 4.59 million people according to 2011 census figures—a number that has undoubtedly grown significantly. These heat-stressed wards average less than 1.5 per cent green cover, a dangerously low figure that leaves residents with minimal natural protection.

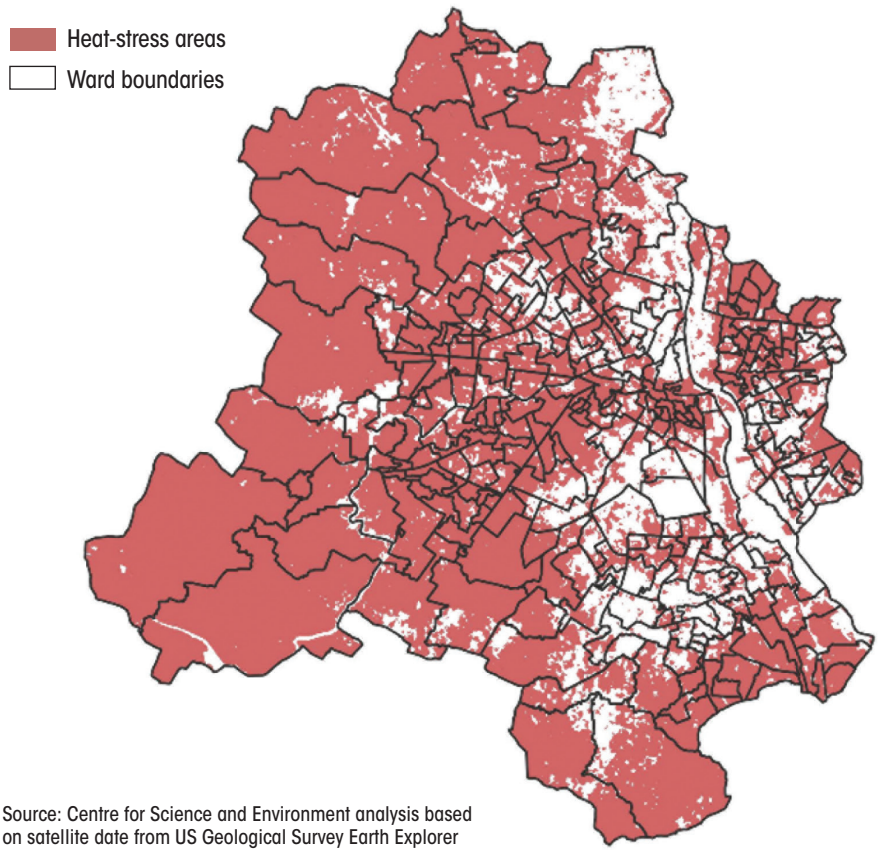
On the other end of the spectrum, only 23 wards enjoy relative relief, with less than 25 per cent of their area experiencing heat stress. These include New Delhi Municipal Council (NDMC) Charge 4 and 5, Geeta Colony, Guru Tegh Bahadur (GTB) Nagar, Malviya Nagar, Shahpur Jat, Chittaranjan Park, Preet Vihar, Mehrauli, Pushp Vihar, Majnu ka Tila, Munirka and Lado Sarai. All these wards benefit from proximity to a district park, ridge or the Yamuna, reinforcing the critical need to expand green and blue spaces throughout the city.

The human face of heat

Extreme heat does not affect everyone equally. Certain demographic groups face greater vulnerability due to physiological disadvantages, co-morbidities, or lack of resources to

CAPITAL IN RED

Areas in Delhi that have persistently crossed heat threshold over 2015-2024



Source: Centre for Science and Environment analysis based on satellite date from US Geological Survey Earth Explorer

adapt. Children, the elderly, and women face heightened risk from high temperatures. Meanwhile, economically disadvantaged populations—the poor, homeless individuals, and outdoor workers including construction labourers, street vendors, artisans, automobile mechanics, ragpickers, sanitation workers and gig economy workers—lack access to basic cooling solutions and face occupational and locational disadvantages.

These vulnerable groups constitute a substantial portion of Delhi's workforce. Analysis by UK-based non-profit Women in Informal Employment: Globalizing and Organizing (WIEGO), based on 2017-18 Periodic Labour Force Survey data, indicates that 80 per cent of Delhi's workforce operates under informal arrangements, making them particularly susceptible to heat-related health risks and economic disruption.

CSE has conducted a detailed ward-level vulnerability assessment examining seven groups: construction workers, street vendors, residents of informal settlements, homeless individuals, children aged 0-9 years, women and the elderly aged 60 and above. The analysis mapped how many individuals from each group reside in heat-stressed areas, providing both group-specific concentrations and cumulative vulnerability profiles for each ward.

The findings are sobering. Nearly one-third of Delhi's wards fall within moderate to very high vulnerability categories. Matiala, Kakraula, Hastsal, Narela, Bawana, Mukundpur and Chandni Chowk fall under very high vulnerability category, while Bhalaswa, Burari, Shiv Vihar, Badarpur, Nangloi, Najafgarh, Chhatarpur, among others see high vulnerbaility, along with many other peripheral wards that are witnessing massive self-construction and even development of unauthorised colonies. The remaining peripheral wards and those within Delhi's walled city show moderate vulnerability.

This cumulative vulnerability index identifies areas requiring urgent intervention due to both inadequate safeguards and high concentrations of vulnerable populations. Any comprehensive strategy for heat resilience must address both aspects through emergency response mechanisms and long-term mitigation measures.

Beyond emergency measures

Despite mounting evidence of Delhi's heat crisis, the city's response—like that of most high-risk Indian cities—focuses primarily on short-term emergency measures. Research by Delhi-based research organisation Sustainable Futures Collaborative shows that urban heat action plans typically emphasise providing drinking water access, adjusting work schedules, and boosting hospital capacity before or during heatwaves. These measures require minimal investment but offer only temporary relief.

Long-term solutions demand dedicated fiscal resources and systemic change. While Delhi's 2025 Heat Wave Action Plan includes a pilot program for cool roofs at the Delhi Secretariat and the Inter-State Bus Terminals (ISBTs) at Kashmere Gate and Anand Vihar, such initiatives need wider deployment in informal settlements alongside improved access to safe water and sanitation. The plan mentions increasing green cover and promoting passive building design, but these goals will remain aspirational until incorporated into Delhi's master plan and building by-laws.

Building true heat resilience

Urban planning and design must form the foundation of long-term heat resilience. Ward-level vulnerability assessments should guide priority interventions, focusing resources on locations with high heat exposure and concentrated vulnerable populations.

Green spaces and waterbodies remain ultimate safeguards. Increasing tree cover, expanding pervious surfaces, shading streets and parking lots, bio-swales, rain gardens and fountains can improve Delhi's microclimates

High-priority wards lacking natural cooling features need immediate retrofitting with passive cooling solutions wherever possible: shading devices in public spaces, light-coloured reflective paint on building facades and roofs, overhangs on south and west-facing walls, window and roof shading using sun blinds or shade nets, cool and green roofs on public buildings, and solar rooftop installations.

Cool roof programmes targeting buildings in vulnerable wards and informal settlements deserve special attention. Insulation using polyurethane foam panels, spray foam, bamboo or fiberglass mats inside metal roofs, combined with high solar reflective index paints, can reduce indoor temperatures by up to 5°C. Basic services—safe water, toilets, and primary healthcare facilities—must be ensured in these wards before peak heat season arrives.

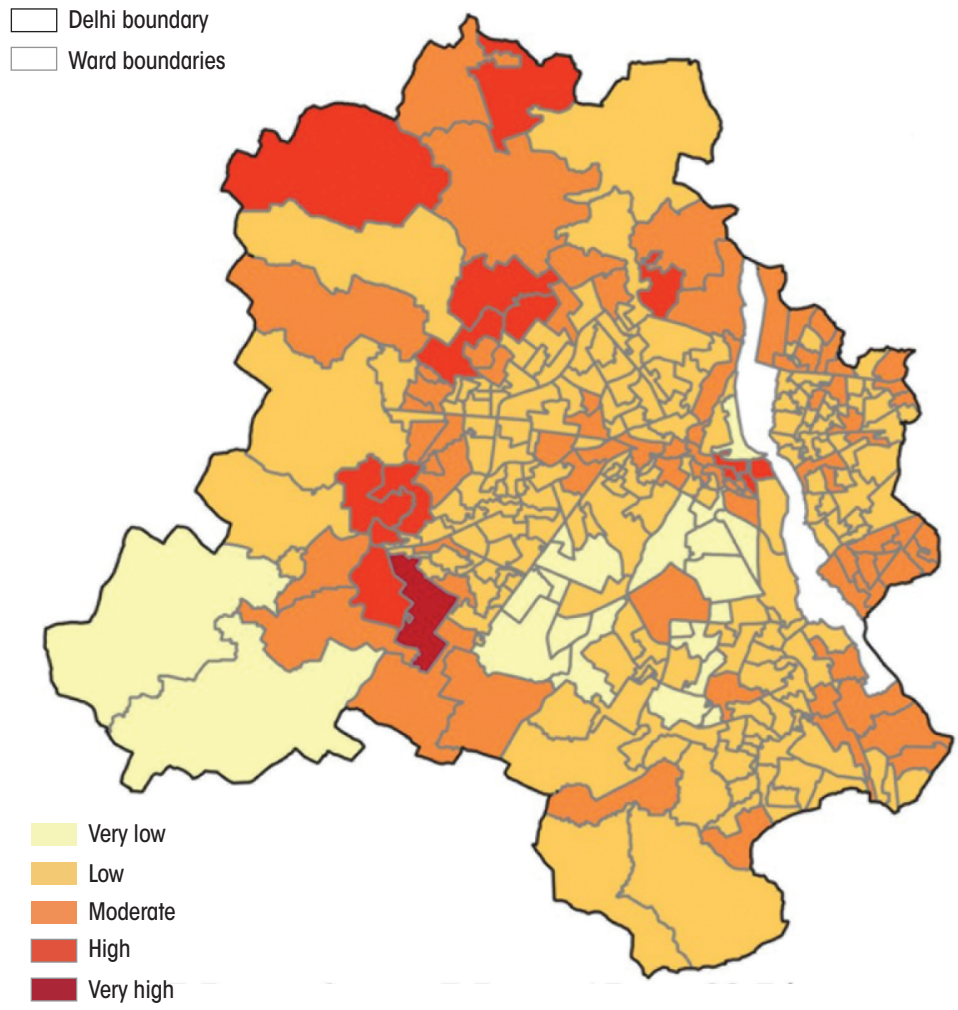
Vulnerable groups require specific interventions: staggered work timing during heat emergencies, potable water and toilets at workplaces and public areas, shaded resting areas and community cooling centres for outdoor workers, temporary passive-cooled shelters for homeless populations, emergency relief kits and modified workplace procedures during extreme temperatures.

The ultimate safeguards remain green spaces and water bodies. Increasing tree cover, expanding pervious surfaces, shading streets and parking lots, and incorporating water features like bio-swales, rain gardens, and fountains—especially in precincts with high footfall—can substantially improve microclimates. Water-sensitive urban design combined with systems like evaporative wind towers can reduce ambient temperatures by 3-8°C.

Public guidance on passive design techniques including shading, insulation, and ventilation can empower residents to cool their homes while reducing dependence on air conditioners that intensify urban heat. Integrating these cooling strategies into master plans and building bylaws will prevent poor planning in future developments and create a climate-responsive built environment.

WARDS AT RISK

Ward-wise cumulative vulnerability in Delhi (in terms of population groups)



Source: Centre for Science and Environment analysis

Funding these solutions requires tapping existing resources such as the Delhi Building and Other Construction Workers Welfare Fund, Town Vending Committee funds for street vendors, technology innovation grants under Pradhan Mantri Awas Yojana 2.0 for affordable housing retrofits, adaptation funds, climate bonds, and parametric insurance instruments are some.

Supporting measures like improved healthcare and public transportation, early-warning systems, public awareness campaigns about heatwave safety, self-diagnosis guidance for heat-related illness, and capacity building for healthcare, emergency services and municipal staff, must continue year-round.

Delhi's heat crisis demands more than seasonal emergency responses. It requires a fundamental reimagining of urban planning that prioritises the most vulnerable, integrates natural cooling systems, and builds genuine resilience against the climate reality we already face. The question is no longer whether Delhi will experience extreme heat, but whether the city will protect all its residents when it does. ■