



The cooling divide: Climate change, social stratification and the unequal experience of urban heat in India

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Abstract

Urban heat is becoming an increasingly important social and environmental problem in India. Rising temperatures, recurrent heatwaves and the urban heat-island effect are increasing the demand for cooling, yet the ability to protect oneself from heat remains socially unequal. Households with greater economic resources are more likely to access air conditioners, coolers, better housing and reliable electricity, while low-income households and outdoor workers often remain more exposed to heat. This study examines this emerging cooling divide from a sociological perspective. It uses a quantitative, descriptive and comparative secondary-data research design based on government surveys, climate and energy reports, and recent empirical research on heat exposure and cooling access in India. The analysis focuses on trends in heat and cooling demand, socioeconomic differences in access to cooling, housing and occupational vulnerability, energy access and the broader social consequences of unequal heat adaptation. The findings indicate that urban heat is not experienced equally: socioeconomic position shapes both exposure and the ability to adapt. Access to cooling is strongly differentiated by urban residence, economic status and region, while occupational and caste-based inequalities further increase exposure among workers whose livelihoods require outdoor activity. The paper argues that access to thermal comfort is emerging as a new dimension of urban social inequality. The cooling divide therefore needs to be understood not simply as a difference in appliance ownership but as a broader inequality in the capacity to obtain protection from a changing climate.

Keywords: Climate change, urban heat, social stratification, cooling divide, environmental inequality, climate vulnerability, India

Introduction

Climate change is increasingly being experienced through everyday environmental conditions rather than only through distant or exceptional events. In India, rising temperatures, heatwaves and prolonged periods of extreme heat have become important concerns for public health, livelihoods and urban life. These changes are particularly significant in cities, where dense construction, limited vegetation, extensive paved surfaces and heat-retaining materials can intensify local temperatures. A major review of urban heat-island research in India, based on more than 300 peer-reviewed studies, found that urban heat islands are widespread across Indian cities and that reported urban heat-island intensity varies considerably across locations. The review also identified rapid urbanisation as an important driver of the phenomenon. (Islam *et al.*, 2024) ^[7].

Urban heat, however, is not experienced in the same way by everyone. A household's ability to protect itself from high temperatures depends partly on its economic and social position. Air conditioners, air coolers, efficient fans, insulated buildings and other forms of thermal protection require financial resources, electricity and suitable housing. Those who lack these resources may remain exposed to excessive heat even when they live in the same city. A recent national analysis using Indian household data found substantial inequality in access to cooling equipment, with air conditioners and coolers much more concentrated among urban and wealthier populations. The study also found considerable differences between states. (Shah *et al.*, 2026) ^[12].

The growth of cooling technology presents a social paradox. On the one hand, cooling can protect individuals from heat and improve health, comfort and productivity. On the other hand, access to effective cooling is itself unequal. At the same time, rising dependence on mechanical cooling increases electricity demand and can add to environmental pressures. The International Energy Agency reported that space cooling accounted for about 15% of India's electricity demand growth between 2021 and 2025 ^[2] and is expected to account for more than one-fifth of total demand growth through 2030. Thus, climate change is simultaneously increasing the need for cooling and making the unequal distribution of cooling resources more socially significant.

The social dimension becomes even clearer when heat exposure is considered alongside occupation and caste. Recent research on heatwaves in India found substantial caste differences in occupational heat exposure. Using labour-force data and high-resolution heat-stress information, Shah *et al.* found that the heat-stress exposure of marginalised caste groups rose more steeply with work hours than that of dominant caste groups. The findings indicate that the social organisation of labour can influence exposure to climate risk. (Shah *et al.*, 2025) ^[13].

Similarly, evidence from Ahmedabad demonstrates that heat vulnerability is shaped by the interaction of gender, occupation, income and education. Research on female outdoor workers found that low income and other social vulnerabilities limited their capacity to avoid working during heatwaves, while access to heat warnings was also influenced by phone ownership and literacy. (Trahan *et al.*,

2023)^[14]. These findings illustrate an important sociological point: environmental risk becomes socially unequal because people's ability to respond to it is conditioned by social structure.

The present paper uses the concept of the cooling divide to describe this unequal capacity to obtain protection from urban heat. The term goes beyond differences in air-conditioner ownership. It encompasses differences in access to cooling technologies, electricity, housing quality, occupational protection and other forms of adaptation. In this sense, the cooling divide represents a broader relationship between climate change and social stratification.

The paper examines how socioeconomic position shapes the experience of urban heat and the ability to adapt to it. It specifically considers the role of income and wealth, housing, occupation and energy access and explores the broader social consequences of unequal heat adaptation. Rather than treating heat as an environmental condition experienced equally by an urban population, the study views heat as a socially differentiated experience.

Review of Literature

1. Climate Change and Urban Heat

Climate change has increased the significance of extreme heat as an environmental and social issue. Heat extremes affect health, labour productivity, energy consumption and everyday well-being. In cities, the urban heat-island effect can further intensify high temperatures. The Indian literature shows that changes in land use, dense built-up areas, low vegetation and heat-retaining surfaces contribute to urban warming. Islam *et al.* (2024)^[7] found that research across Indian cities consistently identifies urbanisation as a major factor associated with the development and intensification of urban heat islands.

The social consequences of heat are not confined to direct health effects. Higher temperatures can reduce the ability to work, disturb sleep, increase household spending on cooling and place pressure on electricity systems. The World Bank has also noted that urban populations in India are increasingly exposed to heat stress and that poor housing, limited greenery and inadequate access to air conditioning can make coping with extreme heat more difficult.

2. Social Stratification and Climate Vulnerability

Climate vulnerability is socially structured. People with fewer economic resources often have fewer options to move, change working hours, improve housing or purchase protective technologies. Social stratification therefore influences not only the distribution of economic resources but also the distribution of environmental risks.

This perspective is particularly relevant in India because class and economic status intersect with caste, gender and occupation. Research on caste and heat exposure demonstrates that climate vulnerability may be reproduced through existing labour arrangements. Marginalised caste groups are more likely to be concentrated in occupations involving greater exposure to heat, making climate risk part of a wider pattern of social inequality. (Shah *et al.*, 2025)^[13].

3. Unequal Access to Cooling Technologies

Cooling technologies have increasingly become an important form of climate adaptation. Fans, air coolers and

air conditioners can reduce heat exposure, but they differ greatly in effectiveness, cost and energy requirements.

Government survey data already indicate considerable differences in household possession of cooling equipment across Indian states. The Multiple Indicator Survey of 2020^[10]–21 reported that, at the all-India level, 4.9% of households reported possessing an air conditioner and 14.1% reported possessing an air cooler. The state-level figures varied substantially. For example, the reported share of households possessing an air conditioner was 31.9% in Delhi, 21.2% in Goa, 14.6% in Punjab and 2.4% in Uttar Pradesh, while cooler possession was particularly high in Haryana, Punjab and Rajasthan. (National Statistical Office [NSO], 2023).

Recent research further demonstrates that this variation is not simply geographical. Shah *et al.* (2026)^[12], using NFHS data, found that access to air conditioners and coolers is concentrated among wealthier and urban populations, establishing a direct relationship between socioeconomic inequality and cooling access.

4. Housing, Occupation and Heat Exposure

Housing is an important part of the capacity to adapt to heat. A dwelling with ventilation, shade, suitable roofing and adequate space may provide greater protection than an overcrowded or poorly ventilated dwelling constructed from heat-retaining materials. Urban settlements with limited greenery can experience particularly difficult thermal conditions.

Occupation also determines exposure. Indoor workers in air-conditioned environments may have opportunities to avoid extreme heat that are unavailable to street vendors, construction workers, transport workers and others whose livelihoods require outdoor activity. The relationship between employment and heat exposure is especially important in India because a substantial part of the workforce is employed in informal or outdoor occupations.

Research in Ahmedabad shows how income, occupation and gender interact to influence heat vulnerability. Female outdoor workers with limited economic resources may continue working during heatwaves despite high exposure because stopping work would threaten household income. (Trahan *et al.*, 2023)^[14].

5. Environmental Inequality and Climate Justice

The concept of environmental inequality highlights the unequal distribution of environmental risks and resources among social groups. Climate change extends this concern because the capacity to adapt is itself unequally distributed.

The cooling divide can therefore be understood as a question of environmental justice. Those who contribute least to climate change may have fewer resources to protect themselves from its effects, while more affluent groups can purchase technologies that provide greater protection. The issue is not simply unequal exposure but unequal adaptive capacity.

The current policy literature increasingly recognises this issue. The 2026^[12] analysis of cooling access in India argues that equitable access to cooling must be balanced with energy and environmental concerns and highlights the importance of efficient fans and coolers, better building design, urban greening and cool roofs. (Shah *et al.*, 2026)^[12].

Research Gap

Existing studies provide substantial evidence on urban heat, cooling access and climate vulnerability in India, but these dimensions are often examined separately. Recent research has demonstrated socioeconomic differences in cooling access and heat exposure, while other studies have examined caste, gender and occupational vulnerability.

However, there is still scope for an integrated sociological analysis connecting social stratification, heat exposure, access to cooling, housing, occupation and energy resources. The present study addresses this gap by bringing these dimensions together under the concept of the cooling divide and examining unequal adaptive capacity as a social phenomenon.

Objectives of the Study

1. To study the relationship between climate change, rising urban heat and social inequality in Indian cities.
2. To study how socioeconomic position influences access to cooling technologies and other forms of heat protection.
3. To examine the role of housing, occupation and energy access in shaping unequal experiences of urban heat.
4. To study the broader social implications of the emerging cooling divide in urban India.

Research Questions

1. How is rising urban heat experienced differently across socioeconomic groups in Indian cities?
2. How does social stratification influence access to cooling technologies and other forms of heat protection?
3. How do housing, occupation and energy access shape vulnerability to urban heat?
4. What are the broader social consequences of the emerging cooling divide in urban India?

Research Methodology

1. Research Design

The study adopts a quantitative, descriptive and comparative secondary-data research design. The purpose is to identify measurable differences in exposure to heat, access to cooling and adaptive capacity across social and economic groups. Since the study does not collect primary data, it

relies on published statistics, government surveys, climate and energy reports and empirical research.

The analysis is primarily descriptive and comparative. It does not attempt to establish causal relationships between socioeconomic status and heat exposure where the available secondary data do not permit such inference.

2. Sources of Secondary Data

The study draws on multiple sources. Household-level information on cooling equipment is taken primarily from the National Statistical Office's Multiple Indicator Survey. Additional evidence on socioeconomic inequality in cooling access is drawn from the recent analysis of NFHS data by Shah *et al.* (2026) ^[12]. Climate and urban heat evidence is drawn from published research on India's urban heat islands and recent national studies of heat exposure.

Energy and cooling trends are examined using data and projections from the International Energy Agency and the Bureau of Energy Efficiency. Information concerning urban climate resilience and housing is supplemented by World Bank analysis of Indian cities. Labour and social vulnerability are examined using research based on labour-force data, occupational exposure and studies of outdoor workers.

The Multiple Indicator Survey covered the period January 2020 to August 2021 ^[5, 10], while later energy and research reports provide more recent evidence.

3. Selection of Data

Data were selected according to three criteria: relevance to the research questions, availability of comparable indicators and reliability of the source. Official national surveys and government or intergovernmental reports were prioritised for statistical indicators, while peer-reviewed research was used to provide evidence concerning heat exposure, social vulnerability and occupational inequalities.

Because different datasets cover different periods and geographical units, direct comparison is made only where variables are sufficiently comparable. Where nationally comparable data are unavailable, findings from published studies are treated as supporting evidence rather than combined mathematically with survey estimates.

4. Variables and Indicators

Dimension	Indicators used
Social stratification	Wealth/economic status, caste, occupation, gender and urban location
Cooling access	Air conditioner, air cooler and other cooling equipment
Housing	Housing condition, building materials, ventilation and neighbourhood characteristics
Heat exposure	Heatwaves, temperature, urban heat-island intensity and heat-stress exposure
Occupational vulnerability	Outdoor work, work hours and occupational exposure
Energy access	Electricity availability, cooling demand and electricity use
Adaptive capacity	Ability to obtain cooling, modify behaviour and avoid heat exposure

The study treats cooling access as one indicator of adaptive capacity, rather than as the sole measure of climate vulnerability.

5. Data Analysis

The available secondary data are analysed using frequencies, percentages, trend comparisons and comparative analysis. Frequencies and percentages are used to describe household access to cooling equipment, particularly air conditioners and air coolers. Comparative

analysis is used to examine differences across selected states, socioeconomic groups, housing conditions and occupational categories. Trend comparisons are made where comparable data are available, particularly for electricity demand and air-conditioner sales. Findings reported in previous empirical studies are also compared to identify broader patterns of heat exposure and adaptive capacity across social groups.

Since the available datasets differ in their years, geographical coverage and definitions, statistical

comparisons are made only where the variables are sufficiently comparable. The study does not independently calculate cross-tabulations, rates or composite measures from incompatible datasets. Instead, existing statistical findings from official surveys and published studies are synthesised to identify the relationship between social stratification, cooling access and unequal heat adaptation.

6. Limitations

The study has several limitations. First, the available datasets differ in year, geographical coverage and definitions, which limits direct comparison. Second, national household surveys provide useful information about cooling ownership but do not fully capture how frequently cooling devices are used or whether households can afford to operate them for long periods. Third, heat exposure varies within cities and across occupations, while national household surveys generally do not provide neighbourhood-level exposure information. Fourth, some aspects of the lived experience of heat—such as discomfort, sleep disruption and perceptions of thermal insecurity—cannot be adequately captured through the available secondary statistics. Finally, the study identifies patterns of inequality but does not claim that socioeconomic status alone causes heat vulnerability.

Findings

1. Trends in Urban Heat and Cooling Demand in India

The evidence indicates that India's urban heat problem is occurring alongside a rapid expansion of demand for cooling. Research reviewed by Islam *et al.* (2024) [7] shows that urban heat islands are widespread across Indian cities, with reported intensities varying considerably between locations and some studies reporting differences of several degrees Celsius between urban and surrounding areas. Recent energy data demonstrate a corresponding rise in cooling-related electricity demand. Peak electricity demand in India increased from 148 GW in 2014 to around 250 GW in 2024 [7]. The IEA reports that cooling contributed substantially to this growth and that less than one-fifth of Indian households had an air conditioner in 2024, demonstrating that rising cooling demand is occurring even though access remains incomplete and unequal. At the household-appliance level, Bureau of Energy Efficiency data show that annual air-conditioner sales increased from approximately 8.38 million units in 2021–22 to 10.91 million in 2023–24. The expansion of cooling therefore appears alongside increasing heat exposure, creating a growing social need for thermal protection.

Table 1: Selected Indicators of India's Heat–Cooling Transition

Indicator	Earlier value	Later/recent value	Implication
National peak electricity demand	148 GW (2014)	250 GW (2024)	Strong growth in peak demand
Air-conditioner sales	8.38 million (2021–22)	10.91 million (2023–24)	Rapid expansion of AC market
Space cooling contribution to electricity-demand growth	—	15% of demand growth, 2021–25	Cooling is a significant demand driver
Expected contribution of cooling to demand growth	—	>20%, 2026–30	Cooling is expected to become more important

Source: International Energy Agency and Bureau of Energy Efficiency.

The trend is therefore not simply one of rising temperatures. It is a simultaneous process of rising heat exposure and increasing demand for technological protection from heat. This creates the social conditions in which unequal access to cooling becomes more consequential.

2. Socioeconomic Differences in Access to Cooling

Government survey data show considerable inequality in household ownership of cooling technologies. The Multiple Indicator Survey reported that 4.9% of households nationally possessed an air conditioner and 14.1% possessed an air cooler. State-level variation was substantial.

Table 2: Household Possession of Air Conditioners and Coolers in Selected States/UTs

State/UT	Households with AC (%)	Households with Air Cooler (%)
Delhi	31.9	39.9
Chandigarh	54.1	50.9
Goa	21.2	0.2
Punjab	14.6	46.9
Haryana	12.9	48.5
Rajasthan	3.6	45.6
Maharashtra	6.8	18.9
Uttar Pradesh	2.4	16.0
Andhra Pradesh	8.1	6.5
All India	4.9	14.1

Source: National Statistical Office, Multiple Indicator Survey in India, 2020 [1]–21.

The figures demonstrate that cooling access is highly uneven across India. Air-conditioner ownership is particularly high in Chandigarh and Delhi, while cooler ownership is especially high in Chandigarh, Haryana, Punjab and Rajasthan. The geographical pattern reflects not

only differences in climatic conditions but also differences in income, urbanisation, housing and household purchasing capacity. Recent research using NFHS data provides stronger evidence that the cooling divide is socioeconomically

structured. Shah *et al.* (2026) ^[12] report that access to air conditioners and coolers is concentrated among wealthier

and urban populations and that substantial inter-state inequalities remain.

Table 3: Social Dimensions of Unequal Cooling Access

Social dimension	Pattern identified in available evidence
Economic status	Higher-resource households have greater access to ACs and coolers
Urban residence	Cooling access is generally higher in urban populations
State/region	Large differences exist across Indian states
Electricity availability	Reliable electricity increases the practical value of cooling appliances
Housing quality	Better housing increases the effectiveness of cooling
Occupational position	Indoor workers may have greater access to controlled thermal environments

The cooling divide therefore involves more than appliance ownership. A household may own a fan or cooler but still have limited ability to maintain comfortable indoor temperatures, especially when electricity costs are high or housing quality is poor.

3. Housing and Unequal Heat Exposure

Housing is one of the most important mechanisms through which social inequality becomes environmental inequality. A dwelling's roof, walls, ventilation, density, orientation and surrounding built environment influence indoor thermal conditions.

The World Bank's recent assessment of Indian cities identifies poor housing, low greenery and high density as factors that increase urban heat vulnerability. The report

notes that many buildings, particularly in vulnerable settlements, are poorly insulated and may lack air conditioning.

The relationship can be represented as follows:

Low household resources → poorer housing conditions → greater indoor heat exposure → greater dependence on mechanical cooling

This is important because mechanical cooling cannot fully compensate for structurally poor housing. An air cooler or fan is likely to be less effective where ventilation is inadequate, while an air conditioner may be unaffordable to purchase or operate.

Table 4: Housing Conditions and Heat Adaptation

Housing/social condition	Likely implication for heat exposure
Better-insulated housing	Greater protection from external heat
Adequate ventilation	Lower dependence on mechanical cooling
Access to shade/greenery	Potential reduction in local heat exposure
High-density built environment	Greater heat accumulation and reduced airflow
Heat-retaining roofs/materials	Higher indoor heat burden
Poor-quality/informal housing	Lower capacity to adapt to extreme heat
Air-conditioned housing	Greater ability to maintain thermal comfort, subject to electricity affordability

These relationships indicate that the cooling divide is also a housing divide. Households with the resources to improve housing and purchase cooling equipment can combine several forms of protection, whereas poorer households often face multiple disadvantages simultaneously.

4. Occupational Differences in Heat Vulnerability

Occupation is another major source of unequal heat exposure. Outdoor workers have limited control over their working environment and may be unable to avoid heat

because their income depends directly on their physical presence at the workplace.

This vulnerability intersects with caste and social status. Shah *et al.* (2025) ^[13] found that marginalised caste groups experienced markedly steeper increases in heat-stress exposure with increasing work hours than dominant caste groups. Their study used nationally and regionally representative labour data involving more than 100,000 individuals and linked these data to detailed heat-stress information.

Table 5: Occupational Exposure and Adaptive Capacity

Occupational group	Typical heat exposure	Ability to modify work conditions	Relative adaptive capacity
Construction workers	High	Limited	Low
Street vendors	High	Limited	Low
Delivery/transport workers	High	Limited to moderate	Low-moderate
Domestic workers	Variable	Limited	Low-moderate
Agricultural/outdoor workers	High	Limited	Low
Office workers in controlled buildings	Lower	Greater	Higher
Formal indoor workers	Generally lower	Greater	Higher

The Ahmedabad study of female outdoor workers reinforces this pattern. Trahan *et al.* (2023) ^[14] found that income, occupation, education, phone ownership and gender all influenced vulnerability and access to heat warnings.

Economic insecurity could force workers to continue working during dangerous heat conditions.

The significance of occupation is therefore not merely that some jobs are physically hotter. Occupational position

determines whether a person can avoid heat, change working hours, access a cooled environment or stop work without losing income.

5. Energy Access and the Cooling Divide

The growing demand for cooling connects climate inequality to energy inequality. Cooling technologies depend on electricity, and the capacity to use them depends on household resources.

India's electricity system is increasingly influenced by cooling demand. The IEA estimates that space cooling accounted for around 15% of electricity-demand growth

between 2021 and 2025 and is expected to contribute more than 20% of demand growth through 2030. The Bureau of Energy Efficiency has similarly projected substantial increases in India's cooling requirements over the coming decades.

This creates a social paradox. Those who can afford air conditioning gain stronger protection from heat, but widespread dependence on energy-intensive cooling contributes to growing electricity demand and potentially higher costs. Lower-income households may therefore face a double disadvantage: lower access to cooling and greater difficulty coping with rising energy costs.

Table 6: Socioeconomic Position and Cooling Capacity

Dimension	Higher-resource households	Lower-resource households
Ability to purchase AC	Higher	Lower
Ability to purchase coolers	Higher	More limited
Electricity affordability	Greater	More constrained
Housing quality	Generally better	Often poorer
Ability to avoid outdoor heat	Greater	Lower
Occupational flexibility	Greater	Lower for many informal workers
Overall adaptive capacity	Higher	Lower

Cooling thus operates as a form of private climate adaptation. Those with greater economic resources can purchase protection individually, whereas disadvantaged groups depend more heavily on public infrastructure such as tree cover, shaded streets, cool roofs, water access, heat warnings and public cooling facilities.

6. Social Consequences of Unequal Heat Adaptation

The consequences of the cooling divide extend beyond thermal discomfort. Unequal heat exposure can affect health, sleep, productivity, household expenditure and the ability to participate in everyday social and economic life.

The World Bank estimates that increasing extreme heat poses substantial risks to Indian cities and notes that timely adaptation can reduce future heat-related losses and deaths. Heat therefore has implications for social welfare as well as physical health.

The burden may also fall disproportionately on those who already have fewer social and economic resources. A worker who loses productivity because of heat may lose income, while a household that cannot afford cooling may experience poorer sleep and greater discomfort. This produces a cumulative disadvantage:

Table 7: Social Consequences of the Cooling Divide

Dimension	Possible consequences of unequal heat adaptation
Health	Greater exposure to heat-related illness
Work	Reduced productivity and greater occupational stress
Income	Potential earnings loss when outdoor work becomes difficult
Household expenditure	Higher relative burden of cooling and electricity costs
Sleep and well-being	Greater risk of heat-related sleep disruption
Urban quality of life	Unequal access to comfortable and safe living environments
Social inequality	Reinforcement of existing class, caste and occupational inequalities

The cooling divide can therefore contribute to the reproduction of existing social inequality. Heat does not necessarily create social stratification, but it can intensify inequalities that already exist.

Discussion

The findings support the argument that urban heat should be understood as a socially differentiated environmental risk. Climate change produces a physical condition—higher temperatures—but the consequences of that condition depend heavily on social position.

The most significant finding is that the ability to adapt to heat is unequally distributed. Households with greater economic resources can purchase air conditioners, coolers, better housing and reliable energy. People with fewer resources may have to rely on fans, inadequate housing or behavioural adaptations that provide weaker protection. The

recent national evidence on cooling access directly supports this interpretation. (Shah *et al.*, 2026) ^[12].

This means that cooling should be regarded as a social resource, not merely a household appliance. Just as access to education, healthcare, housing and transportation reflects social inequality, the ability to obtain thermal comfort increasingly reflects socioeconomic position.

The occupational findings deepen this argument. Heat vulnerability is not simply a matter of where a person lives but also of what work that person performs. Outdoor workers cannot always respond to heat by staying indoors or switching on an air conditioner. The caste-based differences documented by Shah *et al.* (2025) ^[13] demonstrate how established social hierarchies can shape exposure to climate risk through occupational structures.

This suggests that climate inequality in India is partly embedded in the social organisation of labour. Workers who already occupy less secure economic positions may face

higher heat exposure and have fewer options to avoid it. The result is an unequal distribution not only of income but also of environmental safety.

Housing creates another layer of inequality. Better-off households can combine structural and technological protection: improved buildings, better insulation, greater ventilation, access to cooling equipment and more reliable electricity. Low-income households may face the opposite combination of poor housing, dense surroundings and limited cooling resources. Heat therefore becomes one more dimension through which urban housing inequalities are expressed.

The concept of the cooling divide also reveals a tension in climate adaptation. Private cooling technologies can protect individuals, but reliance on them alone cannot provide an equitable adaptation strategy. The rapid growth of cooling demand is already contributing significantly to India's electricity demand, and the IEA expects cooling to become an even larger driver of demand in the coming years.

This creates what may be described as the private adaptation paradox. Those who can afford private cooling can reduce their immediate exposure to heat, but widespread dependence on mechanical cooling can increase energy demand and place pressure on infrastructure. At the same time, people without access to such technologies remain more exposed. The result is an adaptation system in which protection is partly determined by purchasing power.

From an environmental-justice perspective, this raises a fundamental question: Should protection from extreme heat be treated primarily as an individual consumer good or as a collective social right? The evidence presented in this paper favours the second perspective. Individual cooling technologies have an important role, but equitable adaptation also requires better housing, urban greenery, cool roofs, shaded public spaces, heat warning systems, accessible electricity and protection for outdoor workers.

Recent assessments of Indian heat-action plans similarly emphasise the need to identify and address the needs of vulnerable groups. Research examining city-level heat-action plans has found differences in how comprehensively these plans address vulnerable populations and heat-health measures.

The concept of the cooling divide therefore extends the discussion of urban inequality. Conventional analyses of social stratification focus on income, occupation, education, housing and access to services. Under increasingly hot urban conditions, access to thermal safety may become another dimension of stratification.

The implication for Indian cities is significant. Urban climate policy cannot rely solely on expanding air-conditioning ownership. A more socially inclusive approach would combine targeted access to affordable and energy-efficient cooling with structural improvements in buildings and neighbourhoods. The recent Indian literature itself recommends efficient fans and coolers, urban greening, improved ventilation, cool roofs and better building standards as complementary measures.

The cooling divide also suggests a need to rethink how climate vulnerability is measured. A household's vulnerability cannot be inferred solely from temperature exposure. Two households living in the same neighbourhood may experience the same outside temperature but very different levels of indoor heat because of differences in housing, electricity and cooling access.

Similarly, two workers in the same city may face different heat risks because one works indoors while the other works outdoors.

The central sociological insight is therefore that climate exposure and climate protection are socially distributed. Social stratification influences who are exposed, who can adapt and who bears the economic and social costs of adaptation.

Conclusion

Urban heat is emerging as an important dimension of social inequality in India. Climate change and urbanisation are increasing heat exposure, while the capacity to protect against heat remains unevenly distributed across households, occupations and social groups. The evidence examined in this paper demonstrates substantial differences in access to cooling equipment, as well as important inequalities in occupational and socioeconomic exposure to heat.

The concept of the cooling divide helps bring these patterns together. The divide is not simply a difference between households that possess air conditioners and those that do not. It reflects broader inequalities in income, housing, electricity access, occupation and adaptive capacity. A household with better housing, reliable electricity and multiple cooling options has a very different experience of heat from one living in poorly ventilated housing and depending on outdoor work for its income.

The paper also shows that climate adaptation through private cooling can reproduce existing social inequalities. As cooling becomes increasingly necessary, access to thermal comfort may become a new marker of urban social stratification. At the same time, growing dependence on mechanical cooling increases electricity demand, creating an environmental and infrastructural challenge.

The response to extreme heat therefore cannot depend exclusively on the purchasing power of individual households. Equitable climate adaptation requires improvements in housing, urban greenery, shaded public spaces, cool roofs, ventilation, heat-warning systems, workplace protections and affordable energy-efficient cooling. Such measures are particularly important for low-income households, informal workers and other groups whose capacity to adapt is constrained by their social and economic position.

The cooling divide ultimately demonstrates that climate change is not experienced as a universal environmental condition with identical consequences. It is filtered through the structures of society. As Indian cities become hotter, the ability to remain cool may increasingly become a matter of class, occupation, housing and access to resources. Understanding and addressing this emerging form of environmental inequality is therefore an important task for environmental sociology as well as for urban climate policy.

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