Burning the Daylight:

Heat Stress Among Gig Workers in Delhi

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Abstract

As rapid urbanisation and climate change intensifies, gig workers in Delhi remain disproportionately affected by the incrementing and uneven risks which have become concomitant with climate variability. Notwithstanding, they still remain absent from official heat action frameworks. Rooted in Lefebvre's 'Right to the City', this study investigates how climate variability impacts the health, productivity, financial stability, adaptive strategies, and overall lived experience of gig workers of 10 minute delivery apps. Using a mixed-methods approach, it assesses everyday adaptive strategies and highlights systemic gaps in protection. The research aims to inform revisions to the Delhi Heat Action Plan by foregrounding the vulnerability of informal urban labor in the face of escalating heat stress.

Keywords: urban heat, gig workers, delhi heat action plan, social vulnerability

Introduction

As global climate change exacerbates, economically developing regions are experiencing a disproportionate rise in mean annual temperatures (Xu et al. 2020). In accordance with World Bank Reports, India may account for 34 million of the proposed global job losses from extreme temperatures (Delhi Heat Action Plan 2024 - 2025).

While heat affects all urban residents, socially vulnerable groups are more likely to live in high-temperature zones with limited access to mitigating resources (Hoffman et al, 2020). The Delhi Heat Action Plan (2024 - 2025) identifies vulnerable populations as “Economically Weaker Sections (EWS), elderly, children, women and working individuals, including construction workers, factory workers, transport, sweepers, laborers and vendors or street hawkers” (p. 14). However, it possesses no direct reference to gig workers – a growing workforce segment characterized by precarious employment, income instability, and limited access to social protections (Hsu, 2024).

Thus, this study examines the heat-related risks faced by quick commerce sector workers in Delhi, grounded in Lefebvre’s (1968) ‘Right to the City’ which foregrounds equitable access to resources and livable conditions. Specifically, we look at gig workers from Zepto, Instamart and Blinkit on account of their popularity among consumers in Delhi, India. Through a multimethodological approach, this project explores the lived experiences, adaptive strategies of gig workers and its impacts on work, health, productivity, income, and their overall lived experience. This research aims to inform policy improvements in the current Delhi Heat Action Plan while contributing to broader debates on climate justice.

Literature Review

In India, most studies on heat vulnerability focus on socio-demographic groups such as children under 15, pregnant women, neonatal infants, the elderly above 65, construction workers, and residents of informal settlements (Kakkad et al., 2014; Acharya et al., 2018; UN Habitat, 2003). Despite rising attention to environmental justice and occupational exposure, limited empirical research addresses how urban heat affects gig workers, who represent a rapidly expanding and precarious segment of the urban workforce.

International studies like Ge, Lu, and Mao (2024) examined food delivery workers' heat exposure in China, while Biloria, Goodman, Humphrys et al. (2019) studied bike couriers in Sydney during extreme heat events. However, their findings are not directly transferable to India's socio-economic and infrastructural contexts. Emerging Indian scholarship—such as Sangeetha (2025), who highlights the precarity of app-based gig workers amid environmental stressors, and Tschakert (2025), who critiques the generic framing of vulnerability in heat action plans—marks an important beginning, but this research area remains nascent.

Furthermore, heat exposure is deeply intertwined with the built environment and patterns of urban planning (Bulkeley et al., 2016). Exposure varies across social and occupational lines (Harlan et al., 2008). The affluent are shielded by cooling systems and private transport, while outdoor workers who rely on public transit face greater risk. The sprawl of satellite cities and inadequate access to shaded or cooled public spaces further exacerbate vulnerability (Norton et al., 2015).

Research Questions

1) What are the lived experiences of gig workers during heatwaves in Delhi?
2) How does it impact work productivity, health risk and financial stability?
3) How do existing governmental and institutional frameworks address extreme heat risk, as experienced by the gig workers in Delhi?
4) How have gig workers adapted to heat risk on an everyday basis in Delhi?

Methodology

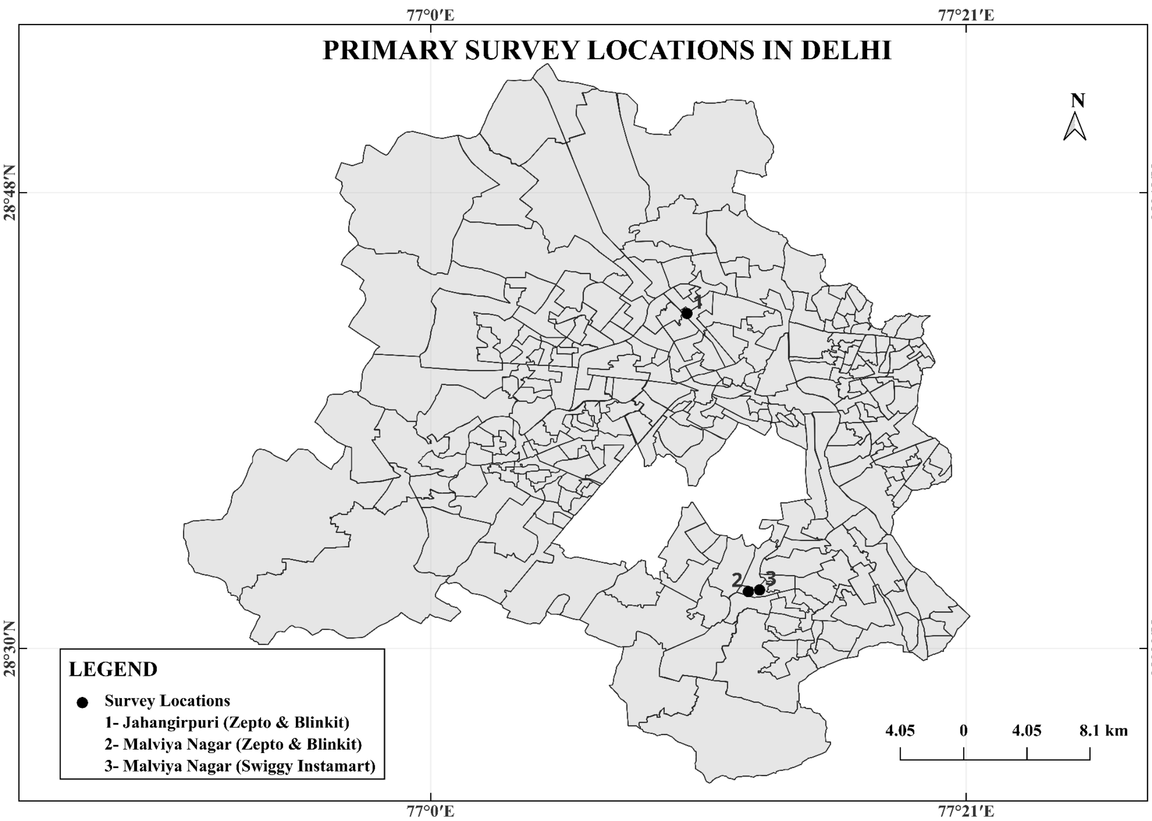
This study adopted an interdisciplinary, multimethodological approach combining qualitative fieldwork, spatial analysis, and socio-economic assessments to understand how urban heat exposure affects gig workers in Delhi.

Study Area

Delhi, the capital city, was selected as the field site due to its geographical location and its heightened susceptibility to heat amplification arising from air pollution and urban heat island effects (Ulpiani, 2021). Fieldwork was conducted across two regions of Delhi—Jahangirpuri and Malviya Nagar—to represent contrasting heat vulnerability profiles. Jahangirpuri was identified as one of the most heat-vulnerable zones in the Delhi Heat Action Plan (2024–2025), while survey sites in Malviya Nagar were selected to capture conditions in relatively less heat-affected areas. Within these zones, three 10-minute delivery warehouses—Zepto, Blinkit, and Swiggy Instamart—were chosen as focal points for data collection, representing the dynamic and heat-exposed environments of gig work.

Figure 1

Survey Locations in Delhi



Methods Employed

The study employed a mix of quantitative and qualitative techniques to ensure comprehensive coverage of the research problem. A pilot survey in mid-June was conducted to test the reliability and clarity of instruments. A structured schedule was administered to 170 respondents, selected using random sampling, to collect socio-economic, occupational, and health-related data.

In-depth qualitative interviews (n=45) and Focused Group Discussions (FGDs) (n=7) were conducted using purposive sampling to understand subjective experiences and coping mechanisms. These interviews were primarily held in Hindi and lasted between 30–45 minutes. Non-participant direct observation was also used to study kinesics and proxemics, providing contextual insight into behavioural and spatial responses to heat. This combination of methods allowed for the cross-validation of findings, where statistical data on heat vulnerability could be substantiated and contextualized through personal testimonies and field observations.

Indicators and Measures

Following indicators and measures were utilised:

Table 1

Indicators data sources and relationship to total vulnerability.

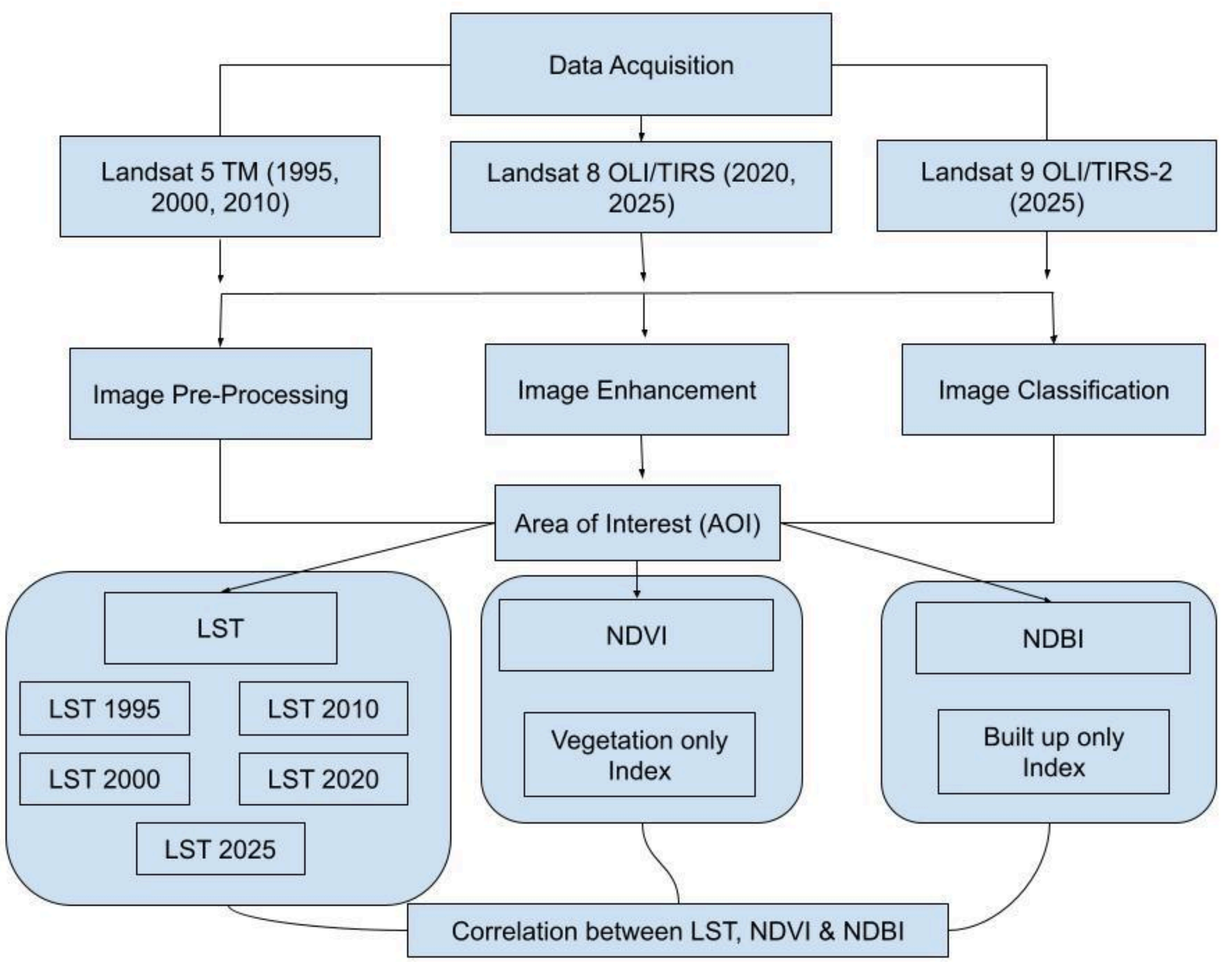
S.No	Measure	Source	Relationship to Total Vulnerability
A.	**Physical Exposure**		
1	I. Land Surface Temperature •LST 2025 & 2020 •LST 2010, 2000 & 1995 II. Normalized Difference Vegetation Index (NDVI) III. Normalized Difference Vegetation Index (NDBI)	Landsat 8 OLI/TIRS Landsat 5 TM Landsat 9 OLI/TIRS-2	Measures ground-level heat stress in the region.
2	Real Time Ground Temperature	Primary data using infrared thermometer	Utilized to Calculate Perceived vs Actual Temperature
B.	**Health, Productivity and Efficiency**		
3	Average Income	Primary Data (Schedule)	Run Regression along with control to see how income vary with temperature

4	Severity Score	Primary Data (Schedule)	Impact of afternoon heat hours on Health Productivity
C.	**Vulnerability and Mitigation**		
5	Vulnerability and Mitigation	Primary Data Semi-Structured Interview and Focused Group Discussions	Identifies adaptation measures and work environment conundrums

Methodological Framework for Calculation of Physical Exposure

Figure 2

Calculation of physical exposure



Methodological Framework for Calculation of Health Productivity and Efficiency

To quantitatively assess how heat exposure affects the productivity of gig workers, an additional variable called Severity Score was constructed based on workers' self-reported experiences of heat-related health issues. It transforms subjective health symptom responses into a structured numerical indicator that captures both the presence and intensity of heat-induced effects.

Calculation of Severity Score: In Table 2 (Annexure) each symptom was assigned a severity Rank (1–5) reflecting its relative medical seriousness, from minor (e.g., sunburn) to critical (e.g., heatstroke). The **Severity Score** is computed as the sum of the Severity Ranks corresponding to all symptoms experienced simultaneously by the individual:

Severity Score =∑(Severity Rank of reported symptoms)

For instance, a worker experiencing Heat Exhaustion (3), Dehydration (2), and Sunburn (1) would have *Severity Score => 3 + 2 + 1=6.* This continuous score serves as a quantitative measure of total health stress, directly linked to potential productivity loss during high-temperature exposure.

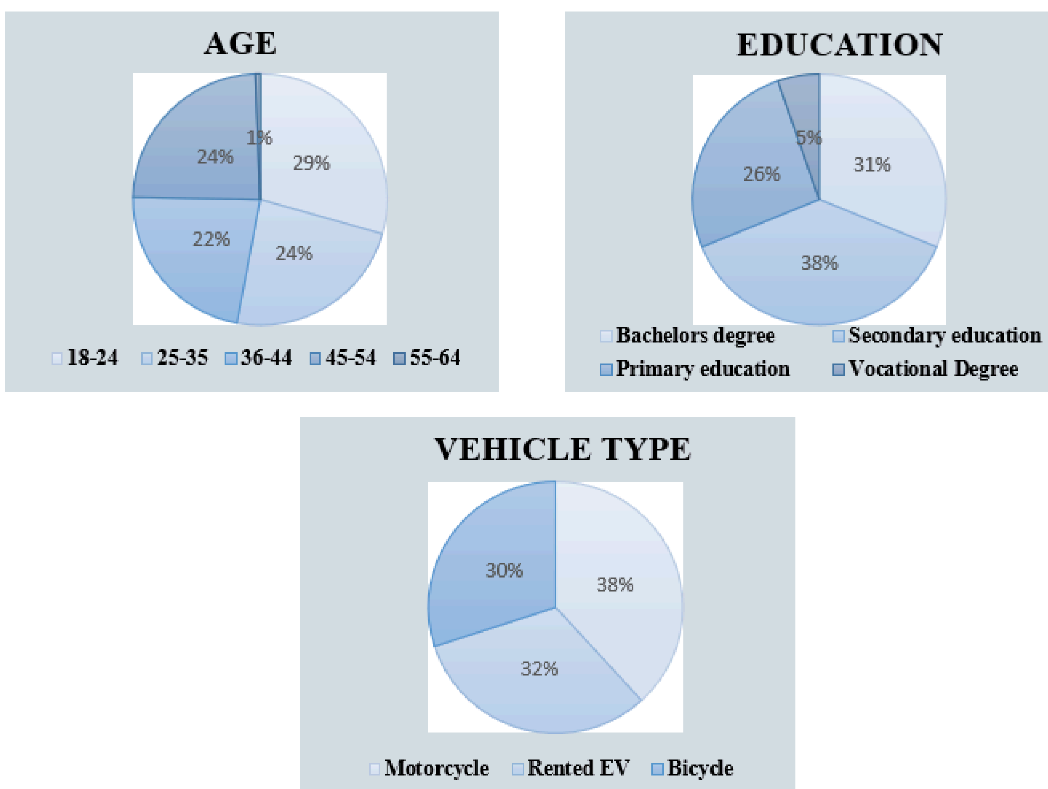
The integration of these three methodological strands allowed for triangulation. Spatial data established the physical and environmental exposure, socio-economic surveys captured structural and financial vulnerabilities, and qualitative narratives reveal the lived experiences and adaptive behaviours of workers.

Descriptive Statistics

Figure 3 shows that the sample is largely young, with most workers between 18–35 years, and only a very small share above 55. Educational attainment is mainly at the secondary and primary levels, with fewer holding a bachelor's degree. Several participants were former employees of IT firms, laid off either during the COVID-19 pandemic. Others were students in the final years of high school or early stages of university. Additionally, some individuals turned to gig work in response to economic hardship following the collapse of their own businesses. For many, gig work was regarded not as a long-term career, but as a temporary measure. In terms of vehicle use, motorcycles are most common, followed by rented EVs and bicycles.

Figure 3

Summary Statistics of Categorical Variable



Results and Discussion

Thermal Landscape of Delhi

Delhi's tropical steppe climate is marked by extreme seasonality with temperatures routinely surpassing 45°C between April and July (Delhi Heat Action Plan 2024-25). Such heat is intensified by air pollution and dense built-up environments which makes outdoor work, especially on two-wheelers, physically hazardous.

Figure 4

LST map of Delhi

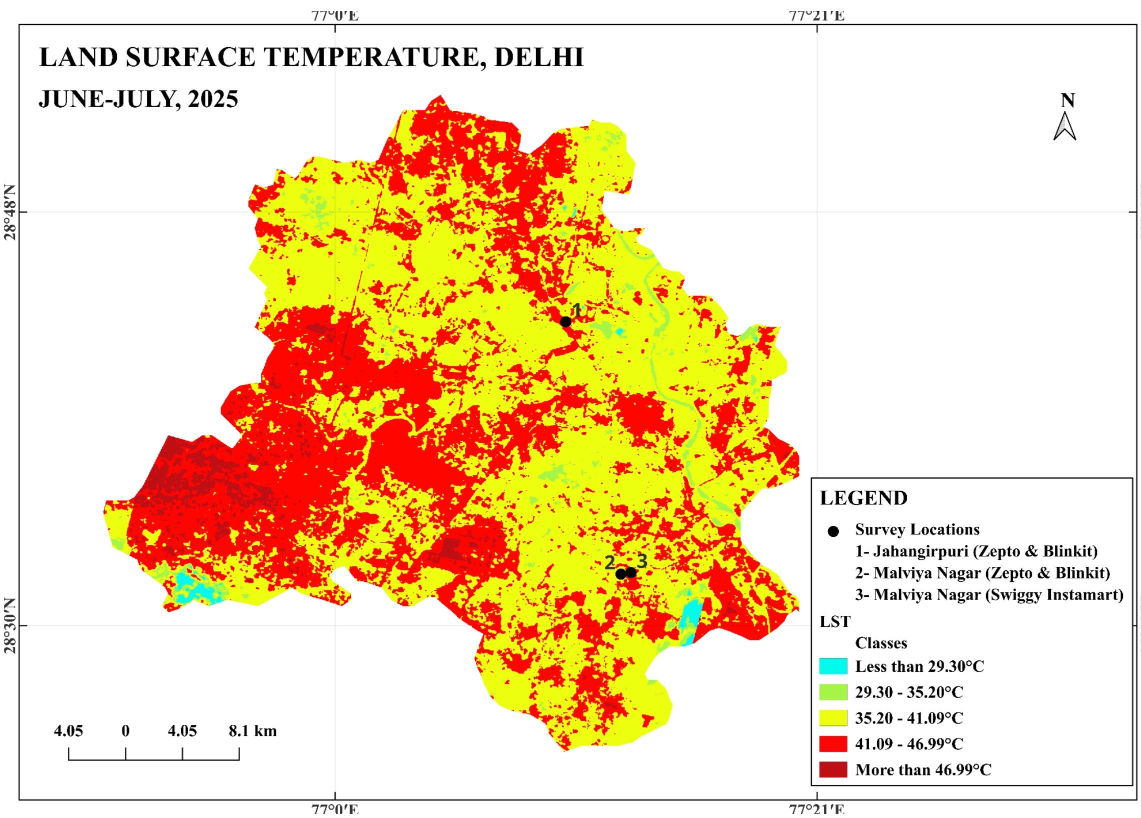
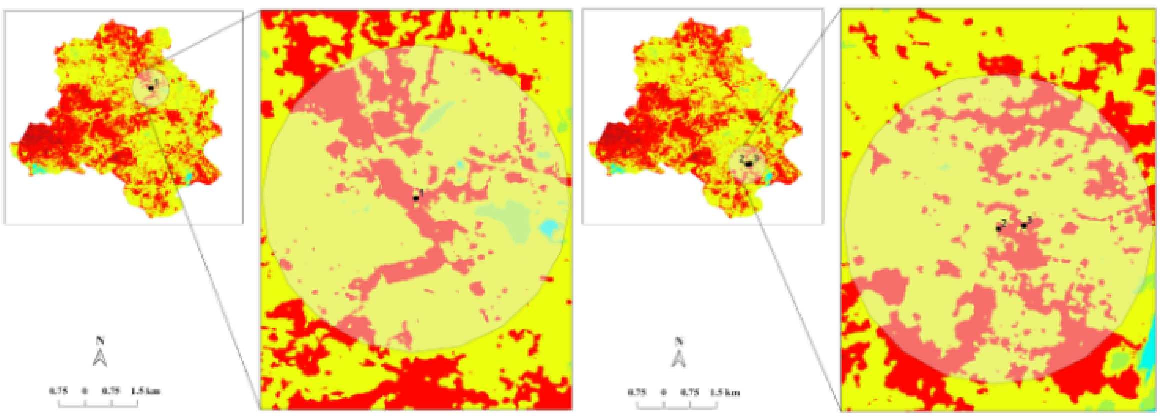


Figure 4 shows the spatial distribution of the surface temperature of Delhi for the month of June-July, 2025. The south-west and north portions of Delhi exhibit high surface temperature due wasteland/bare soil and fallow land. Similarly, central-west and the south-east areas exhibit high surface temperature from commercial, industrial, and residential land use. In contrast, regions near Yamuna River and ridges remain cooler due to vegetation and water bodies.

Figures 5 is the zoomed versions of Figure 4 - Jahangirpuri (SL1: Zepto & Blinkit store), Malviya Nagar (SL2: Zepto & Blinkit store), and Malviya Nagar (SL3: Swiggy Instamart store), respectively.

Figure 5

LST map of Survey location 1, 2 & 3



Around Jahangirpuri (SL1), two major industrial zones - Jahangirpuri Industrial Area and Wazirpur Industrial Area—register consistently high surface temperatures. The presence of these heat intensive zones coupled with compact residential land use and proximity to MCD dumping yard (Bhalswa), intensify heat stress for gig workers delivering in this region specially during peak summer. Although nearby cooling zones such as Bhalswa Lake, Dhirpur Wetland, and Shalimar Bagh provide some respite, the overall area remains a thermal hotspot due to the dominance of built-up and industrial surfaces over green or water bodies.

In contrast, SL2 and SL3 in Malviya Nagar exhibit relatively lower surface temperatures, attributed to the presence of significant green cover surrounding the area. Proximity to Sanjay Van, Deer Park, Hauz Khas Forest, Jahanpanah Forest, and local parks moderates the urban heat. However, pockets of dense residential settlements—such as Hauz Rani Village, Khirki Extension, Savitri Nagar, Begumpur, Chirag Delhi, and Mehrauli—still experience higher local heat exposure. This can make last-mile deliveries physically demanding for gig workers.

Normalised Difference Vegetation Index: For June–July 2025, NDVI values across Delhi range from -0.09 to 0.79 (Figure 6). Vegetation is densest in the central and southern parts of Delhi, particularly along the ridge zones and the Yamuna River corridor, while sparse vegetation is evident in the north and west.

Figure 6

NDVI of Delhi

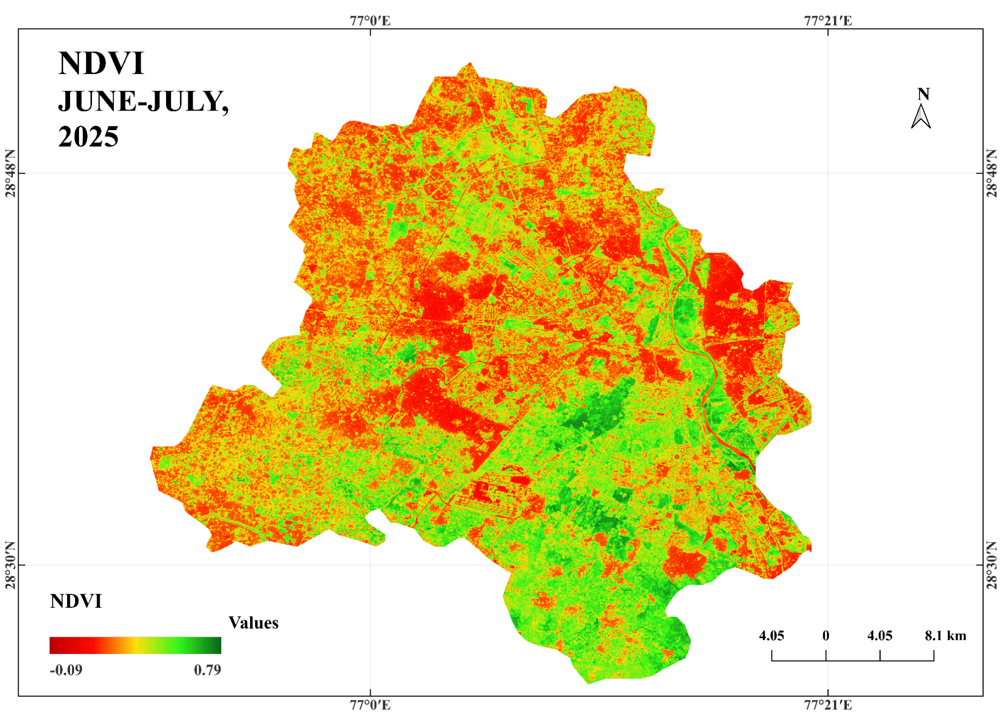
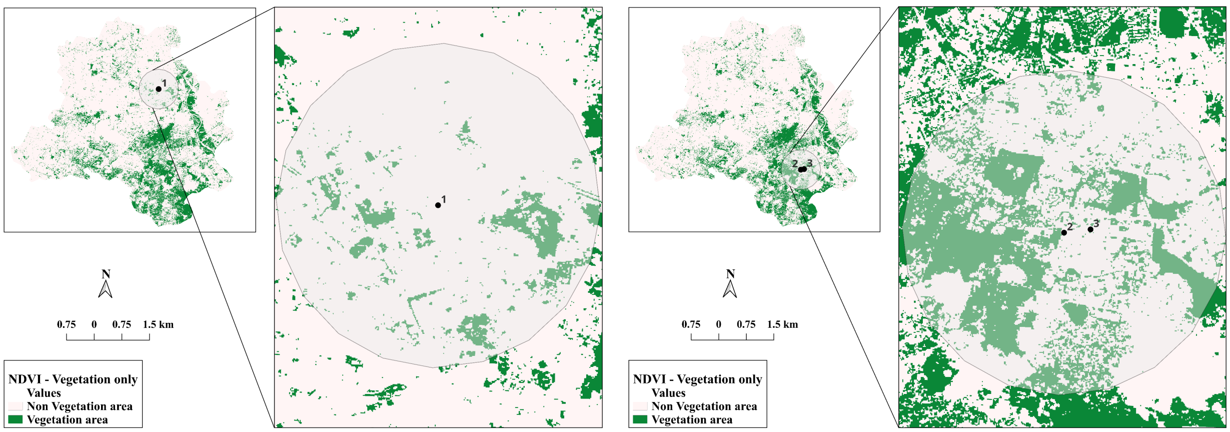


Figure 7 shows that Jahangirpuri (SL1) has significantly lower NDVI values compared to Malviya Nagar (SL2 and SL3). Low NDVI reflects reduced vegetation and limited cooling potential, directly correlating with higher surface temperatures observed in Figure 5.

Figure 7

NDVI- Vegetation only map of Survey SL1, SL2 & SL3



Normalised Difference Built-Up Index: The NDBI values for Delhi (June–July 2025) range between -0.39 and 0.28 (Figure 8), with high built-up concentration evident in north-east, west, and south-west Delhi. Jahangirpuri (SL1) exhibits the highest built-up index among the survey areas due to dense industrial and residential structures. In contrast, Malviya Nagar (SL2 and SL3) demonstrate comparatively lower NDBI values. The higher built-up density in SL1 corresponds with elevated surface temperatures. This affirms the positive correlation between urban density and heat intensity.

Figure 8

NBDI of Delhi

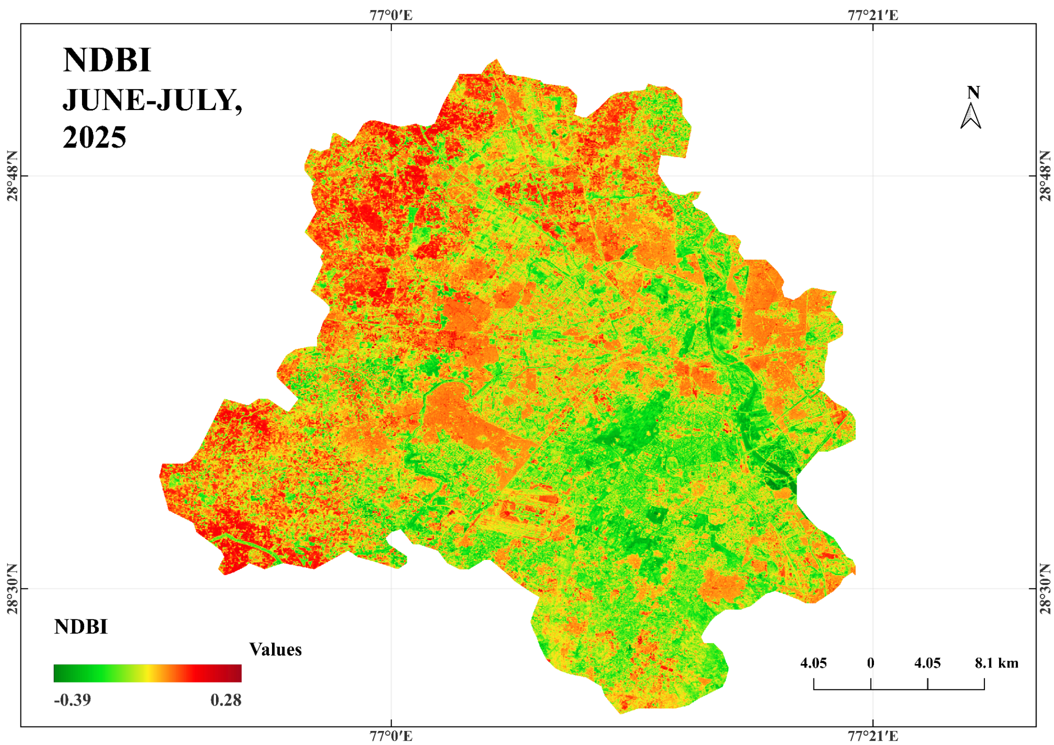
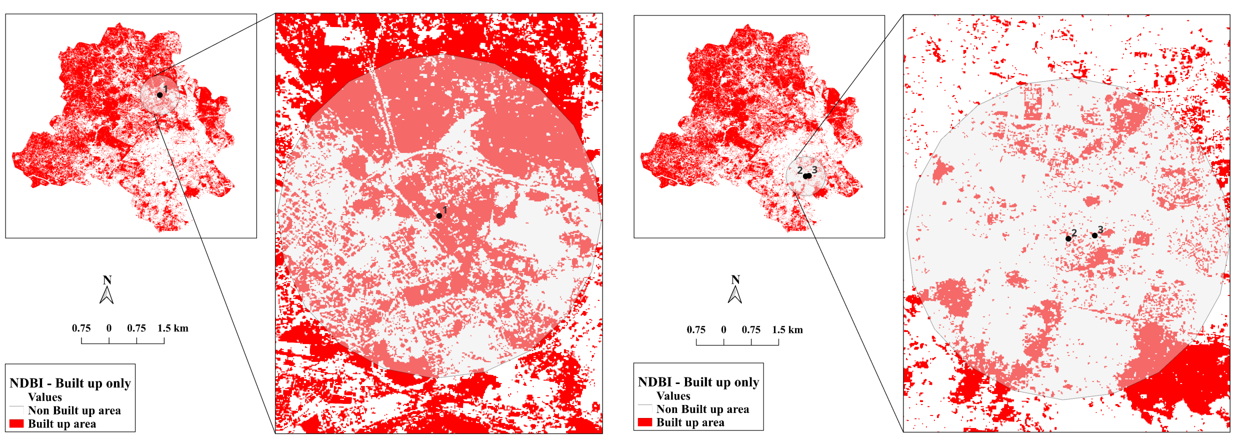


Figure 9

NDBI- Built up only map of survey SL1, SL2 and SL3



Perceived vs. Actual Temperature: Human thermal perception depends on multiple meteorological variables - air temperature, humidity, wind speed and solar radiation (Staiger et al. 2012). Currently, the Delhi Heat Action Plan only takes into consideration actual temperature and does not consider feel like temperature in their analysis for heat and its impact. During our field survey conducted under extreme summer heat, real-time ground temperature was recorded using an infrared thermometer.Relative humidity data were obtained from NASA's POWER Data Access Viewer, and the *feels-like* or perceived temperature was calculated using the Heat Index method developed by NOAA's National Weather Service.

Figure 10

Heat Index Chart

Relative Humidity %	Temperature °C																
	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
40	27	28	29	30	31	32	34	35	37	39	41	43	46	48	51	54	57
45	27	28	29	30	32	33	35	37	39	41	43	46	49	51	54	57	
50	27	28	30	31	33	35	36	38	41	43	46	49	52	55	58		
55	28	29	30	32	34	36	38	40	43	46	48	52	54	58			
60	28	29	31	33	35	37	40	42	45	48	51	55	59				
65	28	30	32	34	36	39	41	44	48	51	55	59					
70	29	31	33	35	38	40	43	47	50	54	58						
75	29	31	34	36	39	42	46	49	53	58							
80	30	32	35	38	41	44	48	52	57								
85	30	33	36	39	43	47	51	55									
90	31	34	37	41	45	49	54										
95	31	35	38	42	47	51	57										
100	32	36	40	44	49	56											

Source: Calculated °F to °C from NOAA's National Weather Service

Figure 11

Heat Alert Thresholds for Delhi City

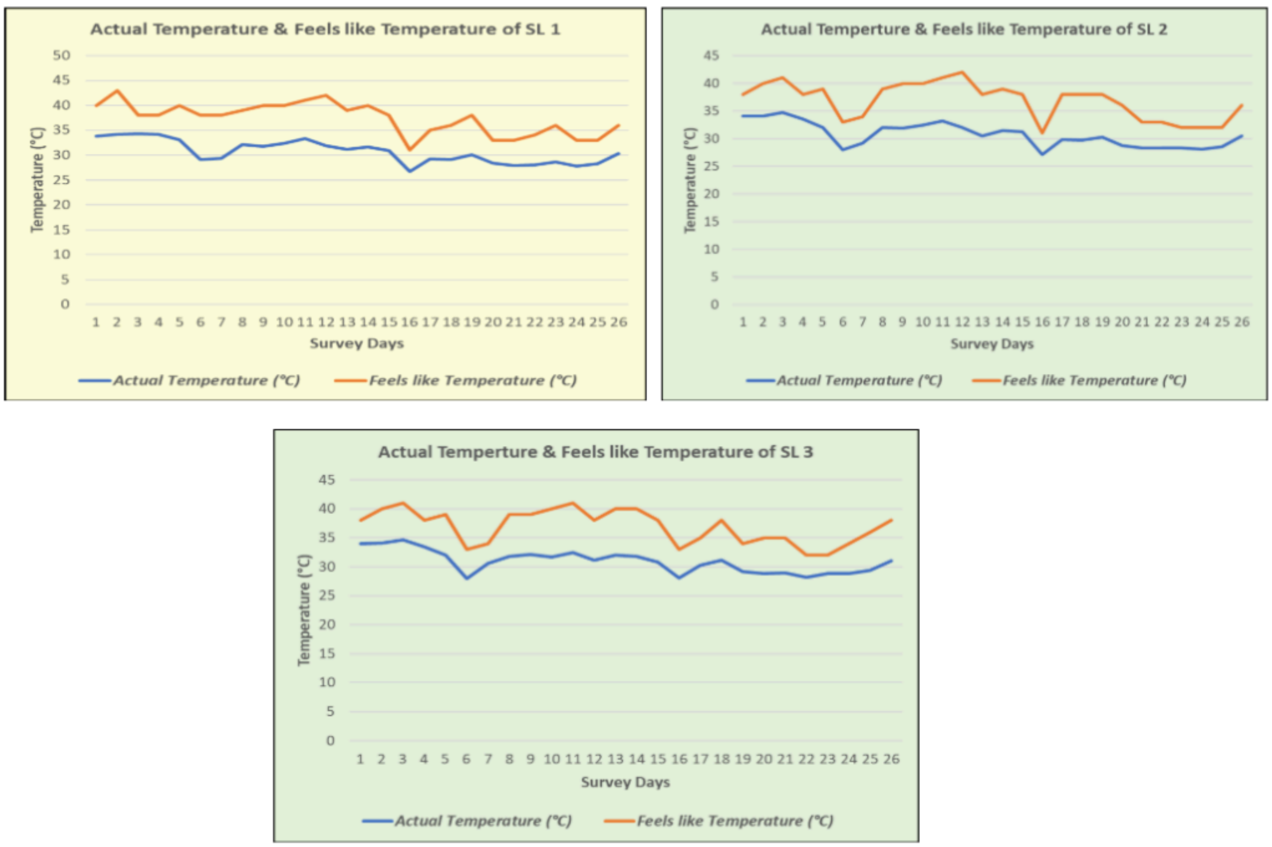
Blue (No Action)	Normal Day	Maximum temperatures are near normal
Yellow (Be Updated)	Hot day advisory	>= 40 °C
Orange Alert (Be Prepared)	Heat alert day	>= 45 °C
Red Alert (Take Action)	Extreme heat alert day	>= 45 °C

Source: NDMA

Tables 4, 5, and 6 (Annexure) detail the actual and feels-like temperature at each survey site. The highest recorded ground temperature was 43 °C at Jahangirpuri (SL1) on 23 June. This location also experienced three heat-alert days, as defined by the NDMA Heat alert thresholds for Delhi.Malviya Nagar (Location 2) peaked at 42 °C on 6 July, also with three heat-alert days, while Location 3 recorded 41 °C on 5 July with two alert days.

Figure 12

Comparative analysis b/w AT & FT at SL1, SL2 and SL3



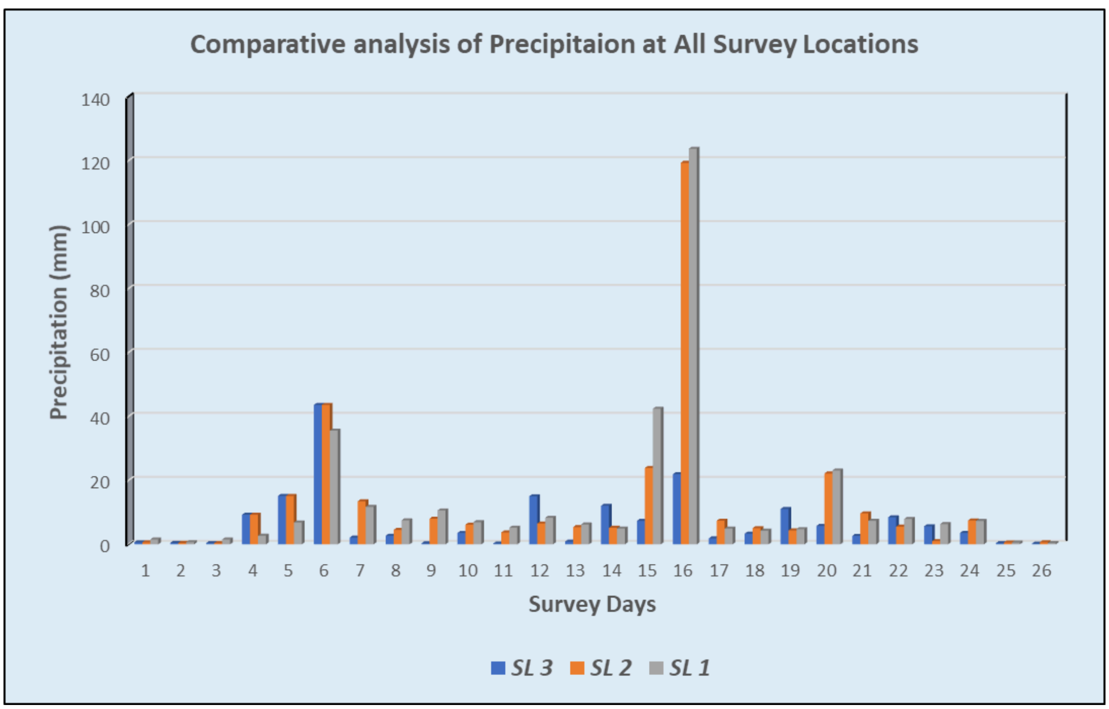
Average actual temperatures across Locations 1, 2, and 3 were 30.68 °C, 30.68 °C, and 30.91 °C respectively, while corresponding feels-like temperatures averaged 37.38 °C, 36.88 °C, and

36.92 °C. Thus, there is an average 7 °C difference in the actual temperature and feels like temperature. This has been graphically represented in Fig 11.

The primary factor contributing to this discrepancy is relative humidity. Limited precipitation events during the survey period elevated relative humidity without substantially reducing surface temperatures. This combination intensified the thermal stress and elevated the feels-like temperature beyond the actual recorded values. Figure 12 illustrates the comparative precipitation patterns across the survey sites.

Figure 13

Comparative analysis of precipitation of all Survey Locations



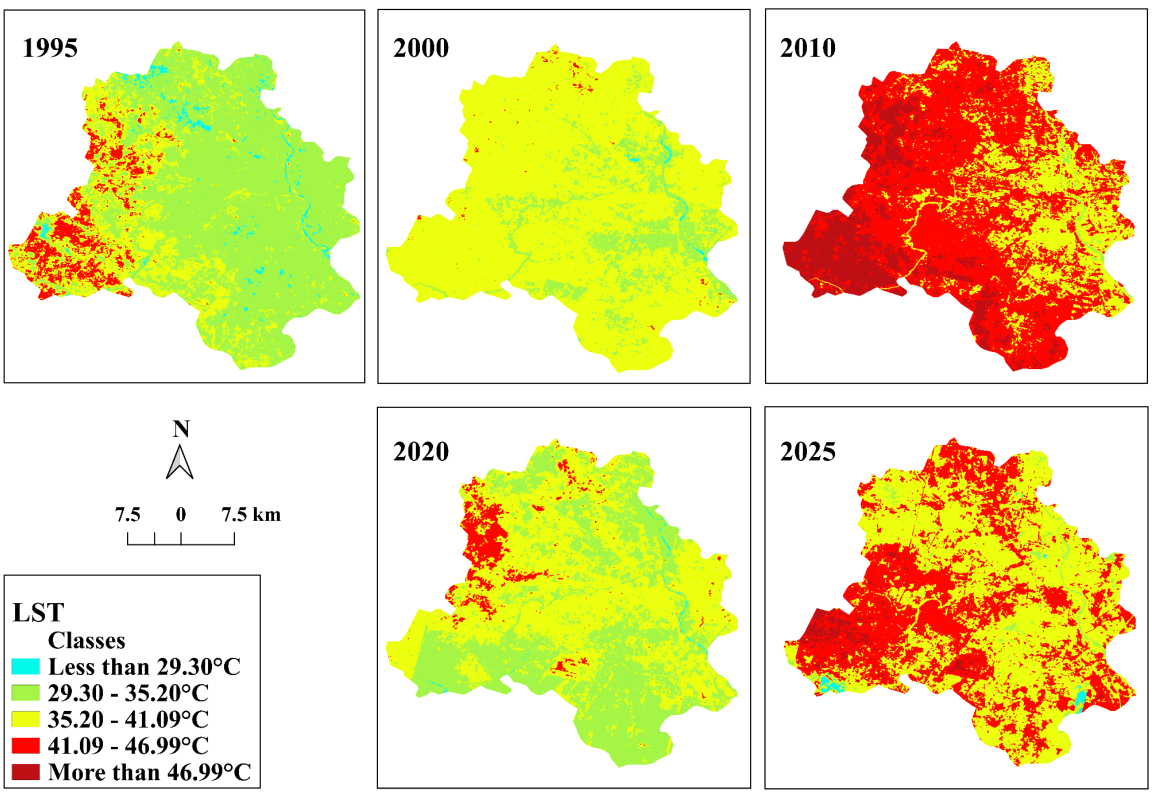
Source: NASA Power - Data Access Viewer

Spatio-Temporal Analysis of Surface Temperature of Delhi

Figure 14 presents the spatiotemporal trend of Delhi's LST over the last 30 years (June-July Months). The highest temperature of Delhi in the month June-July has risen from 42.94 °C in 1995 to 52.89 °C in 2025. This indicates an approximate **10 °C** rise in the city's peak temperature. Over time, the spatial extent of areas exceeding 46.99 °C has also expanded.

Figure 14

Spatio-Temporal Analysis of LST of Delhi for past 30 years



The year 2010 recorded anomalously high LST values. Scholars have attributed this to large scale infrastructure development associated with Commonwealth Games (Sharma, 2009). During this period, Delhi's built up area increased from 11.05% to 16.51% . There was also a strong correlation of LST and NDBI (0.937) and strong negative correlation of LST and NDVI (0.900) in 2010 (Singh et al., 2022).

In 2020, a temporary dip in temperature occurred due to COVID -10 lockdowns that curtailed industrial and vehicular emissions (Palanisamy et al., 2023). Atmospheric pollutants like NO_2 reduced by 60.37% (Vadrevu et al., 2020) and Aerosol Optical Depth (AOD) dropped by 20-60% (Parida et al., 2021). This improved the overall air quality and lowered heat absorption. However, post-lockdown, urban activities rapidly resumed and LST returned to or surpassed previous high (Palanisamy et al., 2023). This upward trend in surface temperature persists.

Heat Exposure and Economic Outcomes

Baseline Specification: We estimate the effect of heat exposure on gig workers' productivity and health outcomes using the following regression specification:

$$Ln\ Average\ Income_{ijt} = \alpha_i + \beta_1 Feels\ like\ Temp_{jt} + \sum \beta_k X_{ijt} + \gamma_j + \delta_t + \epsilon^{5}_{ijt} \qquad \textbf{(I)}$$

$\mathbf{X_{ijt}}$ It is a vector accounts for time-varying observable characteristics[6] that may confound the relationship between temperature and the outcomes of interest.

Across the different time intervals, the relationship between perceived temperature and income appears to vary. When considering average daily income, the coefficient on feels-like temperature is positive but not statistically significant, indicating no clear association at the aggregate level. However, during the afternoon period, a statistically significant negative

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[5] γ_j is a location fixed effect that controls for unobserved, time-invariant factors specific to geographic zones such as traffic, infrastructure(road/routes) and demand. δ_t is a day- fixed effect that controls day specific shocks such as festivals, traffic surges and activities that affect all workers simultaneously. ϵ_{ijt} error term where standard errors are clustered at the time level to account for intra-individual correlation in the error terms

[6] age group, full-time or part-time gig status, vehicle type, rides completed, sick days, hours of sleep, and date indicators

coefficient is observed, suggesting that higher temperatures in this mid-day window are associated with lower earnings.

Table 5

Regression of Log Average Income on Feels-Like Temperature

	(1) **Ln Full Income**	(2) **Ln Afternoon Income**	(3) **Ln Night Income**	(4) **Ln Income (Combined Data)**
Feels like temperature				
Full Day	0.1651072 (0.100494)			
Afternoon		-0.230679** (0.1123449)		
Night			0.0022234*** (0.00006)	
(Combined data)				0.9300** (0.4342123)
Controls	YES	YES	YES	NO
Number of Worker	134	155	126	290
R- Squared	0.2995	0.2089	0.9396	0.0157
Adjusted R- Squared	0.1681	0.0908	0.9288	0.0123

In contrast, during the night, the coefficient is positive and statistically significant indicating a small increase in income with higher nighttime temperatures. When the data are combined i.e. when we put together all three observations collected from a specific individual, the overall coefficient on temperature is negative, which likely reflects the stronger effect of reduced income during the hotter mid-day period relative to the smaller positive association observed at night. Across all specifications, the included control variables—age group, full-time or part-time gig status, vehicle type, rides completed, sick days, hours of sleep, and date indicators—do not exhibit statistically significant effects, suggesting that variation in income within this sample is more closely related to time-of-day temperature conditions than to differences in worker characteristics.

Table 6

Regression of Log Average Income on Feels-Like Temperature

	(1)	(2)	(3)
Feels like temperature			
Full Day	0.0013032		
	(0.0642454)		
Afternoon		0.3326954** (0.1421813)	
Night			-0.0291525
			(0.046275)
Controls	YES	YES	YES
Number of Worker	165	134	165
R- Squared	0.0775	0.1703	0.0799
Adjusted R- Squared	0.0302	0.1172	0.0327

Table 6 presents the regression results examining the association between feels-like temperature and the severity score across different time periods. In the full-day specification (Column 1), the coefficient on feels-like temperature is positive but small and statistically insignificant (β=0.0013, p>0.10) indicating no clear relationship when averaged over the entire day. In the afternoon period (Column 2), the coefficient is positive and statistically significant

(β=0.333, $p<0.05$) suggesting that higher perceived temperature during afternoon hours is associated with a higher severity score, i.e., workers report feeling more strain or discomfort when temperatures are higher in this time window. In contrast, the night-time specification (Column 3) shows a small and statistically insignificant coefficient (β=−0.029, $p>0.10$), suggesting that perceived temperature at night does not meaningfully relate to severity scores.

Controls are included across all models, indicating that the explanatory contribution of temperature and the included covariates is limited, which is expected given the variability in self-reported severity responses. Overall, the results suggest that the relationship between perceived temperature and severity score is time-specific, with effects appearing primarily during afternoon hours rather than across the full day or at night.

$$\textit{Severity Score}_{ijt} = \alpha_i + \beta_1 \textit{Feels like Temp}_{jt} + \sum \beta_k X_{ijt} + \gamma_j + \delta_t + \epsilon_{ijt}$$ [7]

Figure 15 shows that severity scores vary across age groups, with younger workers displaying a wider range of reported strain, including higher severity levels. In contrast, workers in the older age groups show more clustered and moderate severity scores, this suggests greater work adaptation over time. Figure 16 suggests the pattern that severity is not strongly age-dependent, but variability of how it impacts health tends to decrease with age and then rise again among the oldest workers.

[7] γ_j is a location fixed effect that controls for unobserved, time-invariant factors specific to geographic zones such as traffic, infrastructure(road/routes) and demand. δ_t is a day- fixed effect that controls day specific shocks such as festivals, traffic surges and activities that affect all workers simultaneously. ϵ_{ijt} error term where standard errors are clustered at the time level to account for intra-individual correlation in the error terms

Figure 15

Severity Score Across Age Groups

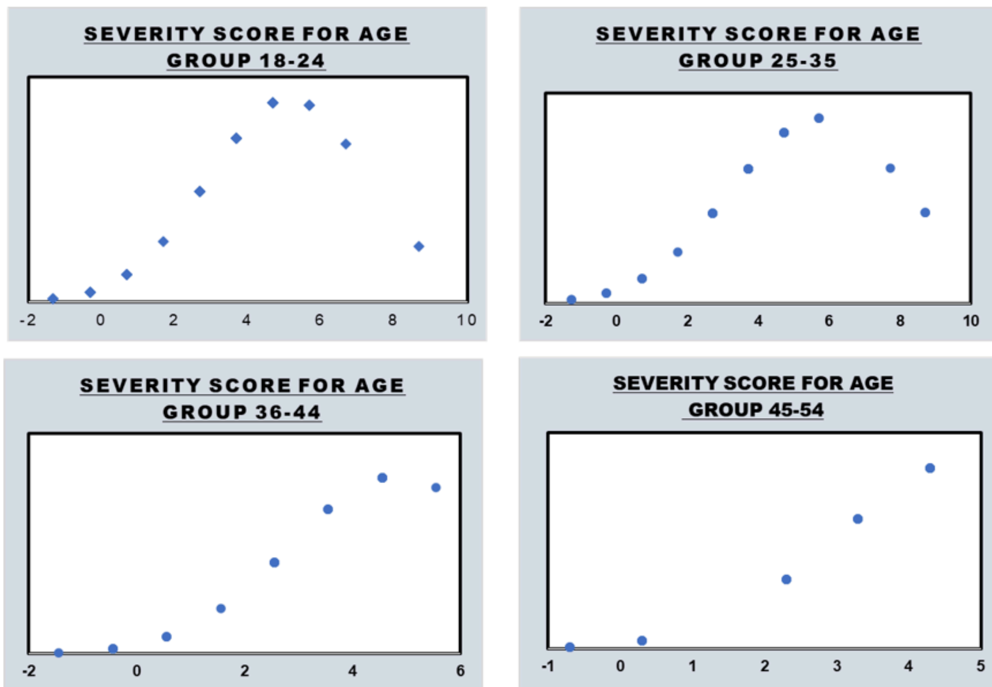
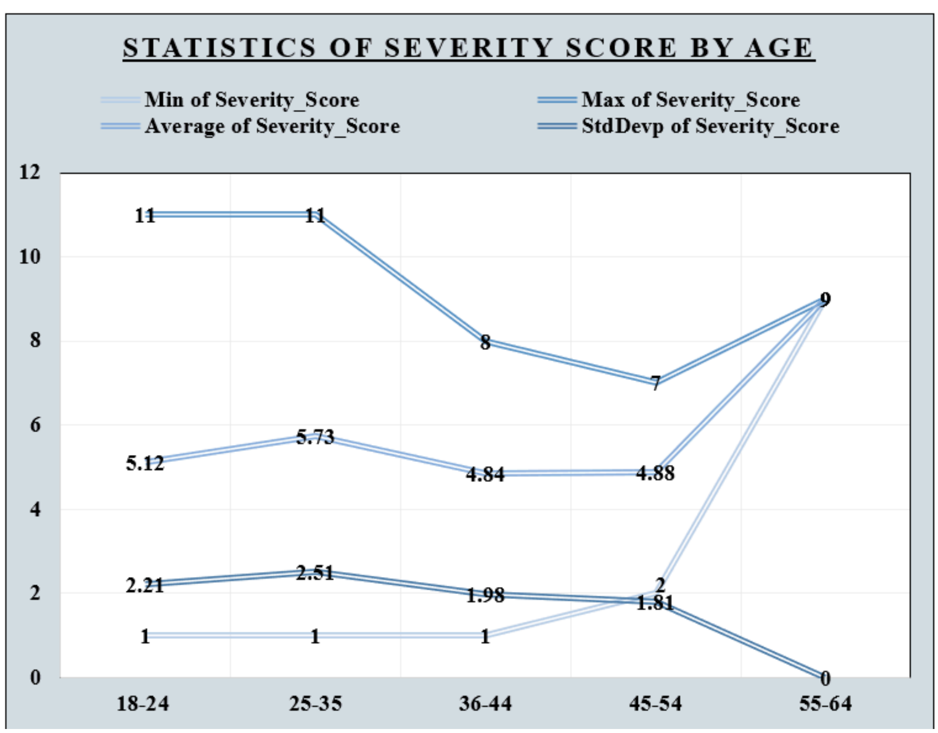


Figure 16

Summary Statistics of Severity Score



Heat Impact and Vulnerability

Understanding the vulnerability of gig workers to extreme heat requires situating their experiences within the broader socio-material and infrastructural context in which their labour is performed. In this section, we will be corroborating the quantitative findings of our report by adding in qualitative sociological analysis.

The Warehouse

Firstly, in order to understand the impact of heat on the gig workers, and their idiosyncratic vulnerability, we need to comprehend the context of the warehouses. The resting conditions for delivery riders during their shifts varied significantly depending on the platform, location, company, and the feasibility of providing such infrastructure.

<u>Source: Authors' Compilation</u>

All the aforementioned enterprises possess multiple warehouses which serve two essential functions: storage of goods and resting places for the delivery partners. The differing physical conditions of the warehouses is a good entry point into how heat exposure is mediated by corporate hierarchies and spatial inequalities.

At the Blinkit center in Jahangirpuri, for instance, riders waited under a tin shed equipped with coolers and access to cold water. During the summer months, they were also provided with Glucon D to keep themselves hydrated.

Riders perceived these amenities as both a product of their labour and a reflection of their own industriousness—"the result of our hard work," as several put it—rather than as entitlements owed by the company. This idea underscores a subtle internalisation of corporate disengagement. Here, minimal welfare provisions are reframed as rewards for individual effort rather than structural responsibility.

In contrast, on the first floor of the same building, the Zepto warehouse in Jahangirpuri lacked comparable provisions. However, Zepto warehouse in Malviya Nagar included a small riders' room equipped with a fan, a non-functional television and a water cooler. More recently, a sweeper had been assigned to this room, at which the riders expressed a sigh of relief.

Image 1: Zepto Riders' room

Yet the materiality of this space—bare, semi-functional, and dependent on informal upkeep—spoke to the improvisational nature of welfare provision in the platform economy. As one rider described the summer peak: “12 baje June ki garmi mein sab yaha laashon ki tarah pade hote hai” (“At noon during June, the delivery drivers lie in the rider rooms like corpses”). This evocative statement conveys the corporeal exhaustion and heat stress that define much of their workday, forcing many to temporarily deactivate their accounts to rest, even at the cost of lost income.

The Swiggy Instamart warehouse in Malviya Nagar presented an even starker picture. The Swiggy Instamart warehouse in Malviya Nagar lacked a designated riders’ place altogether. Delivery personnel were often observed resting outside, sitting on their bikes and seeking shelter under nearby trees amid extreme heat. Although cold water was made available, the absence of indoor shelter during heat peaks positioned these workers at the extreme end of vulnerability.

The comparison of the three survey locations and their variability in material infrastructure illuminates a hierarchy of corporate care and the uneven geographies of labor protection. The warehouse in this scenario acts as a microcosm of inequality where access to shade, fans and water itself is seen as a privilege mediated by platform, location and profit margins.

Delivery Partners and the Precarity of Logged work

These infrastructural disparities must be situated within the wider ambit of labour organisations that define platform economy. Ursula Huws (2016) identifies a post-2008 configuration of labour she terms “logged work”—a regime in which labour is fragmented, standardised, and digitally monitored. Workers remain perpetually connected to platforms in order to access employment This inhabits a paradoxical space where formal regulation coexists with deep insecurity. This mirrors Guy Standing’s conception of the precariat: a social class defined not merely by economic instability but by ontological insecurity (Standing, 2011). For Delhi’s delivery partners, this paradox of regulated precariousness manifests in the interplay between algorithmic control, fluctuating demand and environmental exposure.

The gig workers occupy a peculiar spatial position within the contemporary urban economy. They are omnipresent in the city’s circulatory system—its roads, markets, and residential complexes—yet remain structurally excluded from its social and economic protections. Zampoukos, Butler, and Mitchell (2024) describe this as the logic of the “algorhythmic city,” wherein on-demand service labour generates new forms of spatiotemporal disruption.

Workers must remain perpetually on standby, synchronized with the algorithm’s rhythm, while also delivering services at an accelerated pace. A significant finding in the study cited is about ‘Waiting’ which they call a slow violence. The waiting that these partners have to do is never paid for and steals their time from them.

Figure 17

Proportion of Customer Waiting time in Sample

Figure 17 shows how 69% of the respondents are made to wait 5 minutes or more when delivering goods. Riders frequently faced delays due to customer-related issues, such as being made to wait for protracted periods of time (sometimes, even exceeding 20 minutes) while recipients retrieved change or were not present at the delivery location mentioned on the application.

This vulnerability is further enhanced by looking at work and household characteristics of the respondents (Table 7). 53.53% of the respondents were the primary income provider in their household. 63.53 % of the respondents reported that they had other jobs. This shows the precarity of income which requires them to work for multiple jobs to ensure financial stability.

Table 7

Summary Statistics of Binary Variabl

Binary Variable	Yes	No
Sole breadwinner	53.53%	46.47%
Gig worker full-time	55.88%	44.12%
Do you have another job as well?	63.53%	36.47%
Afternoon shift	42.94%	57.06%
Yesterday was the weekend	48.24%	51.76%

The Paradox of Flexibility

A core element of the Standing's understanding of the *precariat* is the flexible nature of employment relations. Interestingly, flexibility was commonly regarded as a benefit by most respondents, who appreciated the autonomy it offered—such as the ability to deactivate their facial recognition login at will. One particularly telling case involved a Blinkit Large Delivery driver employed on a fixed monthly salary with structured 12-hour shifts. Rather than being envied, this worker was perceived as overly constrained and subordinate to corporate control, in contrast to the autonomy experienced by gig workers.

Flexibility also served as a tool for collective bargaining. Several respondents recounted coordinated efforts to manipulate platform algorithms by simultaneously deactivating their accounts. At Blinkit's Jahangirpuri warehouse, for example, workers were offered Rs. 30 for deliveries to Model Town—an amount considered below acceptable rates. In response, all workers independently switched off their IDs, without any formal leadership or negotiation structure. Once order volumes rose to 100–200 pending deliveries, the platform was compelled to revise the remuneration to Rs. 44. This shows how collective agency emerges within digitally mediated labour regimes.

However, flexibility from the workers perspective showed a complicated relationship. Lata, Burdon, and Reddel (2022) argue that the apparent flexibility of platform work constitutes "mythical autonomy." Workers are compelled through both soft and hard forms of control—ranging from algorithmic nudges to economic coercion—to align their labour with platform-defined rhythms. Similarly, Sun et al. (2021) identify an emergent "de-flexibilisation" within gig work, as rising casualisation paradoxically pushes workers toward fixed schedules to stabilize income under volatile conditions. The ethnographic data support these insights: most riders reported adhering to consistent daily routines, starting early morning and working late evenings, even though the system nominally allowed flexible timing.

Soft Algorithmic Controls

Beneath these surface-level freedoms operate "soft algorithmic controls"—mechanisms of influence on informational asymmetry and incentive manipulation. Respondents described high variability and opacity in incentive calculation: some believed their bonuses were distance-based, others time-based, demand-based, or contingent on day-night shifts. Thus, income is not directly proportionate to the rides completed. This opacity fosters what Sun et al. (2021) term "sticky labour," where workers, despite dissatisfaction, remain tethered to platforms by uncertainty and dependency. The need to meet incentive thresholds compels longer work hours and riskier behaviour—such as working through extreme heat, storms, or during illness—to maintain income stability.

37-year-old Ramesh Upadhyay[8] highlighted, “Kitna paisa milta hai usmein bhi bohot farak ajati hai. Kabhi 55 milta hai yahan (Malviya Nagar) se IIT jane ke liye, kabhi 60” (There exists a lot of variability in the incentives received. For instance, for travelling from Malviya Nagar to the Indian Institute of Technology, Delhi, sometimes we are provided with INR 55, and, at other times with INR 60”.

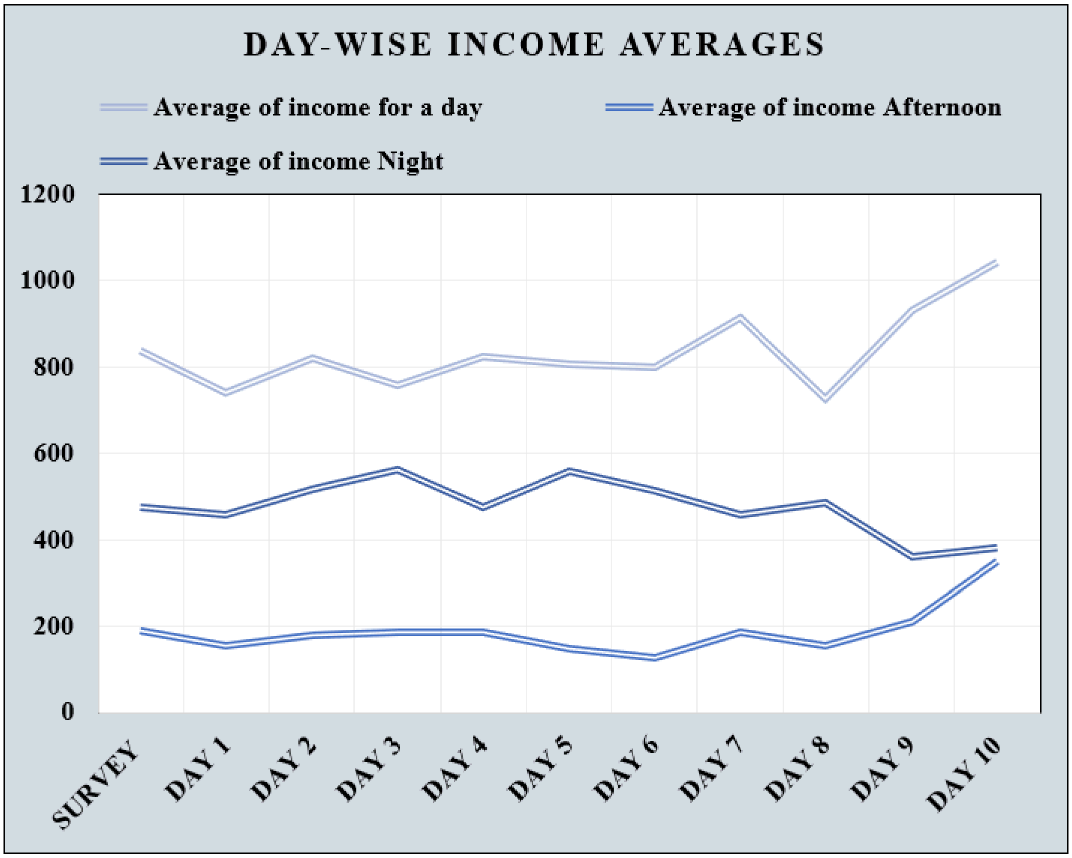
One respondent highlighted: “Company ko humse kuch farak nhi pasta…. Jab ladke zyada hote hai toh kuch nhi milta aur jab kam hote hai aur order pending hote hai toh incentive de dete hai” (*Company does not care about us.. They provide incentive when there is a shortage of delivery partners and pending orders that is when we get incentives*).

The average daily income reported by workers is approximately ₹836, with substantial variation across respondents this could be due to difference in either rides completed or compensation received per ride. Additionally, income varies across time of day. Earnings are lower in the afternoon i.e. INR 154 compared to the evening i.e. INR 405, indicating that a larger share of income is generated during night.

Figure 18

Average Income for different time of Day

8 Name changed for anonymity purposes



On average workers report 10.3 hours of work per day, this is due to incentive constraints on apps to ensure maximum login window by workers. The average body temperature shows little variation. On average, workers completed 27 rides per day, with substantial heterogeneity in daily rides . The average experience level in gig work is 0.46 years, indicating that most respondents are relatively early in their tenure.

Table 8

Summary Statistics of Continuous Variable

Continuous Variables	Obs	Mean	Std. Dev.	Min	Max	Scaled (0–1)
Average Daily Income	170	836.25	251.07	350	1800	0.34
Yesterday Income Afternoon	170	153.92	94.51	0	500	0.31
Yesterday Income Evening	170	404.53	263.6	0	948.26	0.43
Yesterday Work Hours	170	10.29	3.64	4	18	0.45
Average Body Temperature	170	36.8	0.94	34.4	39.1	0.51
Yesterday Rides Completed	170	26.68	14.11	3	59	0.42
Experience Years	170	0.46	0.5	0	1	0.46
Household Size People	170	3.88	1.95	1	13	0.24
Number Earning Members	170	1.72	1.05	1	9	0.09
Work Days Last 7 Days	170	4.37	2.09	1	7	0.56
Total Sick Days	170	1.08	0.88	0	3	0.36
Yesterday Sleep Hours	165	3.32	2.48	0	10	0.33

Instances of penalisation further reinforced this insecurity. Several respondents described being suspended or fined following customer disputes. Missing return bags, delayed deliveries, or false claims of non-delivery resulted in automatic pay deductions. This was often without recourse or explanation. Moreover, delivery partners also reported instances of not being adequately compensated for orders that exceeded the company's designated delivery radius, i.e., when customers provided inaccurate or misleading addresses and later requested the delivery at a farther location.

The disciplinary practices which followed were rarely traceable to human managers as they came as whatsapp messages. As Veena Dubal and Vitor Araújo Filgueiras (2024) argue, platform-mediated management deliberately obscures authority by decentralizing control through algorithms and customer feedback systems. This invisibilization of corporate power renders grievance redressal nearly impossible. This effectively displaces accountability onto the worker. Interestingly, grievances were not directed toward warehouse managers but toward faceless "customer support" representatives or even customers themselves. These managers were often seen as equally powerless. This diffusion of control fragments solidarity and erodes the possibility of organized resistance.

Impact of Heat on Precariat

While algorithmic governance constitutes the structural core of precarity, the intensifying climate crisis amplifies its embodied consequences. Extreme heat exposes the fragility of these labour arrangements and their dependence on bodily endurance. During fieldwork, workers frequently described their relationship with heat in terms that blended humor, resignation, and pride. One respondent quipped, "Gareeb ko garami nahi lagti… Kabhi ameero ke bache khelne bhi jaate hai toh mitti se bimar ho jate hai… humein to bachpan se aadat hai" (*The poor don't get tired. The rich kids get sick even from our soil but we are habituated to it*). This statement encapsulates the moral economy of endurance—where suffering becomes normalized as class identity. The denial of vulnerability is both a coping mechanism and a marker of dignity within the working-class.

The physical toll of deliveries was further exacerbated by infrastructural and spatial exclusions. Workers reported instances wherein they were required to ascend up to seven flights of stairs during high temperatures, as elevators were often restricted to building residents. Territorial exclusion was thus both literal and symbolic which reinforced socio-economic hierarchies. These delays not only forced riders to endure prolonged exposure to extreme weather conditions but also hindered their ability to fulfill subsequent orders which affected their earnings.

Despite the heightened physical risks, institutional safety nets remained ambiguous. Riders frequently mentioned a nominal health insurance policy valued at one lakh rupees, yet none had successfully accessed it. Awareness of eligibility criteria was minimal and perceptions varied by company and warehouse. This ambiguity reflects the gap between symbolic welfare and functional protection. Similarly, first aid kits were reportedly available in warehouses but limited to minor cuts and scratches.

Sahil Khan[9], a 43-year-old delivery partner with Blinkit noted, “One of my colleagues has been with Blinkit for the past ten years. Recently, he met with an accident during work hours, and had to take a leave for the first time ever in his career. Still, the company did not even once bother to check up on him or even help him. So, I am only praising the flexibility associated with this job with a grain of salt. It is truly flexible in all regards as this means that the company does not even really care about its workers”.

These findings highlight how climate, technology, and capital coalesce to deepen labour precarity. The experience of heat is not merely physiological but social which is mediated by

9 Name changed for anonymity purposes

infrastructures of neglect and regimes of data-driven control. Their resilience—manifested in humor, improvisation, and informal solidarity—should not obscure the structural violence of their condition. As platforms optimize delivery times and customer satisfaction, they abstract away the human costs of mobility. The embedded heat exposure, fatigue and illness become variables that become small dots in the algorithmic calculus of productivity.

The Way Forward

Gig workers in Delhi's on-demand economy embody intersectional precarity: algorithmically managed yet physically exposed, formally self-employed yet structurally subordinated and spatially mobile yet socially excluded. Their everyday realities expose how the platform economy's discourse of flexibility and autonomy collapses when confronted with the material conditions of labour and the environmental stresses of the city.

In light of impeding algorithmic governance and environmental injustice, equity must be ensured for gig workers. In Lefebvrian terms, gig workers' constrained ability to reclaim urban space, to rest in public, cool down in shaded areas, or even protest algorithmic control evinces their partial and conditional citizenship. Although their bodies occupy the streets, their rights are mediated via opaque corporate algorithms instead of public accountability. Thus, using Lefebvre's notion of 'Right to the City,' we suggest that gig workers should be furnished with more than a mere physical access to urban space. They should be provided the right to inhabit, participate in, and shape the city's material as well as social life.

As rising urban temperatures intersect with algorithmic control, inadequate cooling infrastructure, and weak social protections, heat stress emerges as both a labour and justice issue.

Thus, firstly, recognising gig workers as a distinct at-risk group within the Delhi Heat Action Plan is imperative. Secondly, it has to be structurally ensured that uniformity exists among the various warehouses of the disparate companies. In this context, all warehouses must possess shaded areas for rest, access to clean, drinking water, and so forth.

Thirdly, health insurance as well as the income of the workers need to be fixed, and not be gamified by leaving it up to chance and purported will, i.e., as instantiated by the existence of 'incentives'. Only actions of such a nature would ensure that we will eventually move towards genuine urban climate justice transcending symbolic inclusion in the realm of urban governance.

Limitations

Despite this research study's objective best utmost endeavour to offer preliminary sociological insights, it remains circumscribed by the following variegated limitations. Firstly, we would like to reflexively address the positionality of the researchers. This research group composed of four people, three of whom identify as women while one identifies as a man. On account of these gender dynamics, the delivery partners, being exclusively male, primarily felt comfortable to speak to the male researcher.

Additionally, the scope of inquiry of our research and the responses elicited from the respondents may have also been affected by the fact that the researchers mainly hail from metropolitan cities, are university-educated, proficient in English language, and belong to the middle and upper-middle SES. To address this conundrum, we would like to put forward that researchers from variegated social backgrounds should aim to conduct a sociological study on the heat impact of gig workers in order to gain a more comprehensive sociological analysis of it.

We would also like to address the possible bias inherent in our selection of the topic itself. We have endeavoured our best to ensure that the project does not reflect a top-down, paternalistic approach, and instead the voices of the delivery partners are highlighted. Moreover, during focus group discussions, participants' responses might have been influenced by the dynamics of the group, in the sense that their opinions might have been affected by the opinions of co-interviewees. This possesses the potentiality of effectively limiting the diversity of perspectives expressed.

In addition to this, selection bias on part of the authors, when it came to interviewing respondents, may have influenced the results of the study. The researchers were also limited for they were unable to access the management echelon of the Zepto, Blinkit, and Zomato for the purposes of data collection as well as the possibility of interviews. Given the paucity of time, owing to strict academic deadlines, these limitations remain, and thus, the alternative perspectives remain underexplored in this study. Future research should endeavour to undertake a longitudinal study on this topic in order to enrich further analyses.

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Annexure

Table 2

Severity Rank

Health Issue	Severity Rank	Justification
Sunburn/Skin Issues	1	Least severe — external, recoverable without systemic impact.
Dehydration	2	Mild to moderate — manageable if caught early.
Water Retention/Heat edema	2	Mild to moderate — indicates strain but not systemic failure.
Heat exhaustion	3	Moderate conditions may cause dizziness, weakness, etc.
Gastrointestinal Problems	3	Moderate — can cause weakness
Chronic Kidney/Urinary Issues	4	Severe because it indicates long-term physiological impact
Heatstroke	5	Most severe — medical emergency, can cause organ failure

Table 3

Severity Score

	Permutation	Severity Score
1	Sunburn/Skin Issues	1
2	Dehydration	2
3	Heat exhaustion	3
4	Heat exhaustion, Sunburn/Skin Issues	4
5	Heat exhaustion, Dehydration	5
6	Heat exhaustion, Dehydration, Sunburn/Skin Issues	6
7	Dehydration, Chronic Kidney/Urinary issues	6
8	Heatstroke, Sunburn/Skin Issues	6
9	Heat exhaustion, Sunburn/Skin Issues, Gastrointestinal problems	7
10	Heat exhaustion, Dehydration, Water retention/Heat Edema	7
11	Heat exhaustion, Dehydration, Sunburn/Skin Issues, Water retention/Heat Edema	8
12	Heat exhaustion, Dehydration, Gastrointestinal problems	8
13	Heatstroke, Dehydration, Sunburn/Skin Issues	8
14	Heat exhaustion, Dehydration, Sunburn/Skin Issues, Gastrointestinal problems	9
15	Heat exhaustion, Heatstroke, Dehydration	10
16	Heat exhaustion, Heatstroke, Dehydration, Sunburn/Skin Issues	11

Table 9

Survey Location 1 Temperature on survey days

Survey Location 1				
Survey Days	Date	Relative Humidity (%)	Actual Temperature (°C)	Feels like Temperature (°C)
1	25-06-2025	54.59	33.78	40
2	26-06-2025	52.84	34.15	43
3	27-06-2025	51.91	34.27	38
4	28-06-2025	51.79	34.2	38
5	29-06-2025	59.88	33.07	40
6	30-06-2025	81.38	29.18	38
7	01-07-2025	77.34	29.41	38
8	02-07-2025	66.35	32.08	39
9	03-07-2025	69.1	31.75	40
10	04-07-2025	67.72	32.34	40
11	05-07-2025	65.14	33.32	41
12	06-07-2025	74.66	31.87	42
13	07-07-2025	74.2	31.17	39

14	08-07-2025	71.65	31.71	40
15	09-07-2025	72.98	30.95	38
16	10-07-2025	92.49	26.72	31
17	11-07-2025	82.5	29.21	35
18	12-07-2025	84.37	29.07	36
19	13-07-2025	80.72	30.12	38
20	14-07-2025	84.39	28.44	33
21	15-07-2025	86.71	27.92	33
22	16-07-2025	88.46	28	34
23	17-07-2025	84.11	28.63	36
24	18-07-2025	84.76	27.78	33
25	19-07-2025	83.29	28.25	33
26	20-07-2025	73.29	30.3	36

(Source: NASA Power - Data Access Viewer)

Table 10

Survey Location 2 Temperature on survey days

Survey Location 2				
Survey Days	Date	Relative Humidity (%)	Actual Temperature (°C)	Feels like Temperature (°C)
1	25-06-2025	51.69	34.03	38
2	26-06-2025	53.01	34.08	40
3	27-06-2025	49.95	34.7	41
4	28-06-2025	54.03	33.5	38
5	29-06-2025	64.5	32.06	39
6	30-06-2025	87.23	27.98	33
7	01-07-2025	77.51	29.21	34

8	02-07-2025	65.92	32	39
9	03-07-2025	67.72	31.94	40
10	04-07-2025	67.07	32.4	40
11	05-07-2025	64.29	33.18	41
12	06-07-2025	72.98	32.04	42
13	07-07-2025	77.23	30.46	38
14	08-07-2025	74.09	31.44	39
15	09-07-2025	72.77	31.2	38
16	10-07-2025	92.25	27.15	31

17	11-07-2025	79.95	29.8	38
18	12-07-2025	81.01	29.69	38
19	13-07-2025	79.71	30.28	38
20	14-07-2025	82.29	28.7	36
21	15-07-2025	84.37	28.36	33
22	16-07-2025	86.19	28.32	33
23	17-07-2025	82.36	28.36	32
24	18-07-2025	81.75	28.07	32
25	19-07-2025	82.24	28.49	32

26	20-07-2025	73.19	30.44	36

(Source: NASA Power - Data Access Viewer)

Table 11

Survey Location 3 Temperature on survey days

Survey Location 3				
Survey Days	Date	Relative Humidity (%)	Actual Temperature (°C)	Feels like Temperature (°C)
1	25-06-2025	51.69	34.03	38
2	26-06-2025	53.01	34.08	40
3	27-06-2025	49.95	34.7	41
4	28-06-2025	54.03	33.5	38
5	29-06-2025	64.5	32.06	39
6	30-06-2025	87.23	27.98	33
7	01-07-2025	65.92	30.61	34
8	02-07-2025	64.87	31.8	39

9	03-07-2025	64.38	32.16	39
10	04-07-2025	68.34	31.73	40
11	05-07-2025	64.19	32.46	41
12	06-07-2025	70.86	31.16	38
13	07-07-2025	67.35	32.05	40
14	08-07-2025	69.82	31.84	40
15	09-07-2025	71.74	30.84	38
16	10-07-2025	84.64	28.07	33
17	11-07-2025	71.62	30.23	35
18	12-07-2025	68.06	31.18	38
19	13-07-2025	76.68	29.16	34
20	14-07-2025	81.26	28.8	35
21	15-07-2025	81.5	29	35
22	16-07-2025	78.12	28.18	32
23	17-07-2025	78.18	28.82	32
24	18-07-2025	76.98	28.83	34

25	19-07-2025	76.54	29.38	36
26	20-07-2025	70.69	31.04	38

(Source: NASA Power - Data Access Viewer)

Table 12

Ranges of LST

Maps	Temperature Range (In °C)
LST 1995	27.40 - 42.94
LST 2000	26.93 - 41.35
LST 2010	31.12 - 52.42
LST 2020	29.29 - 47.00
LST 2025	29.29 - 52.89