

The impact of heat on outdoor laborers: a case study in HaĐong - Hanoi, Vietnam

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Abstract: This study describes the current impacts of extreme heat on outdoor workers in Hanoi city. Based on a survey of 102 observations in Ha Dong District, the results reveal an alarming situation for both health and livelihoods. Specifically, over 66% of workers must labor during the peak heat hours (11:00–17:00), leading to 44.1% taking sick leave due to heat-related symptoms. Economically, heat causes widespread productivity declines, with 70.58% reporting reduced workloads and over 63% experiencing direct income losses. These figures underscore the vulnerability of informal laborers to climate change and urban heat island effects, highlighting the urgent need for infrastructure support like public rest stations and targeted health guidelines to protect this at-risk group.

Keywords: Heatwaves, outdoor workers, informal labor, urban heat island effect.

1. INTRODUCTION

World Weather Attribution (WWA) [1] - An international collaborative organization specializing in climate change research, which has found that climate change increases the likelihood of heatwaves by 30 times, with temperatures rising by at least 2°C compared to scenarios without climate change impacts.

Extreme heat, particularly during heatwaves, severely affects outdoor laborers, impacting their health, work performance, and occupational safety. ILO [2] indicate that productivity losses from heat could account for up to 6% of GDP across Southeast Asian nations by 2030. According to the Ministry of Natural Resources and Environment of Vietnam (MONRE, [3]), the annual average temperature has risen by about 0.9°C over the past 50 years. Hanoi frequently experiences summer heatwaves exceeding 40°C, worsened by rapid urbanization, dense construction, and limited green spaces that intensify the urban heat island effect. This effect can raise urban air temperatures by several degrees Celsius compared to surrounding suburban or rural areas (Chapman et al., [4]). As a result, outdoor laborers—already lacking robust social protections and infrastructure support, such as construction workers, street vendors, delivery drivers, porters, and other informal workers—face heightened risks of heat-related illnesses (like heatstroke, exhaustion, and heatstroke), reduced productivity, and job loss. These workers predominantly belong to the informal sector, characterized by low incomes and minimal labor protections.

As the capital city that draws huge numbers of migrant workers, Hanoi still lacks solid data on how heat affects the health, income, and productivity of outdoor laborers. Policies for informal workers—especially those working outdoors—remain scarce, making health and income challenges for this group even more acute. This study delivers a practical statistical survey of heat's effects on outdoor workers across health, productivity, medical costs, and earnings, providing evidence to shape better protections for these vulnerable folks facing extreme weather in Hanoi.

2. RESEARCH METHODOLOGY

This study employed semi-structured questionnaire surveys with 102 outdoor workers in Ha Dong Ward, Hanoi. Data focused on workers' personal characteristics, frequency of exposure to extreme heat, health issues, productivity, and income impacts. Primary data were analyzed using Stata 17.0 with descriptive statistical techniques to map out the vulnerability profile of outdoor laborers—especially informal ones—under harsh weather conditions.

3. RESEARCH RESULTS

(i) Observation' characteristics

This study was conducted on a sample of 102 observations, with characteristics described in Table 1.

Table 1: Characteristics of the research sample

No.	Characteristics		Percentage (%)
1	Gender	Male	65.68
		Female	34.32
2	Age groups	<30	21.48
		30-50	19.61
		>50	58.91
3	Ethnicity	Kinh	97.1
		Others	2.9
4	Educational Level	Under high school graduation	38.23
		High school graduation	30.39
		Vocational / College degree	5.88
		University degree	22.54
		Postgraduate degree	2.9
5	Occupation	Long-term contract laborers	17.67
		Seasonal / Short-term contract laborers	28.43
		App-based platform laborers (Gig workers)	35.29
		Self-employed individuals	0.9
6	Total Observations (N)		102

Sources: Authors survey

Specifically, 65.68% of the study sample were male, mostly from the Kinh ethnic majority. Education levels varied but skewed low, with over 68% untrained (including 38.23% not finishing high school and 30.39% high school graduates); vocational/college training accounted for 5.88%. Around 22.54% held university degrees and 2.9% postgraduate qualifications—mostly in long-term contract roles—yet even these workers often struggled to find stable jobs or ended up in unprotected freelance gigs without contracts or benefits.

In terms of age, 21.48% of workers were under 30 (mostly in tech delivery or ride-hailing), 19.61% fell between 30-50, and the largest group—58.91%—was over 50. These older workers typically have years of outdoor experience but struggle to land long-term contracts at that stage. They often come from rural areas with low education (no high school diploma, high school grads, or laid-off factory workers).

Occupational Structure. Job roles show most outdoor workers as freelancers without contracts (over 80%), with long-term contract holders at just 17.67%. Combined with the majority over 50—when health naturally declines—this leaves them without protections or care under harsh outdoor conditions, making them the most vulnerable group to today's extreme weather.

Working Frequency during Heat Exposure Intensity. Most respondents (over 66%) worked outdoors during the day's hottest window, 11 a.m. to 5 p.m., with more than 37% doing so every workday of the month and 29.4% frequently. This timeframe sees peak UV index and thermal radiation, posing serious risks to exposed workers.

Workers locked into these hours reflect limited flexibility, driven by survival needs and non-postponable jobs that prioritize income over health. They bear the brunt of climate change and urban heat islands yet fall outside formal protections, underscoring informal labor's fragility.

Findings call for targeted fixes like public rest stations and health advisories for informal sectors.

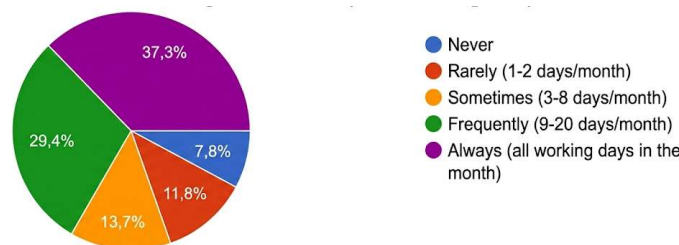


Figure 1: Working frequency of outdoor working labors

(ii) The impact of heat on outdoor laborers

Health Impacts. Survey results show most workers suffer dehydration (38% regularly), followed by headaches, dizziness, and lightheadedness, plus issues like sunburn rash, itching, vomiting, extreme fatigue, and exhaustion. Over two-thirds work relentlessly from 11 a.m. to 5 p.m. every day, leaving no recovery time and raising risks for chronic conditions such as heat exhaustion, skin/eye disorders, and frequent neurological problems.

Sick Leave Due to Heat. Heat takes a toll on workers' health, disrupting their ability to keep working steadily. 44.1% of those surveyed had to take sick days because of it—a high rate showing nearly half faced work interruptions from heat-related illness, turning a health issue into a direct economic barrier that makes livelihoods even more precarious. The 55.9% who didn't take sick leave raises eyebrows too. For these vulnerable workers, "not taking time off" often means they can't afford to—pushing through illness, which can be riskier still, heightening chances of workplace accidents.

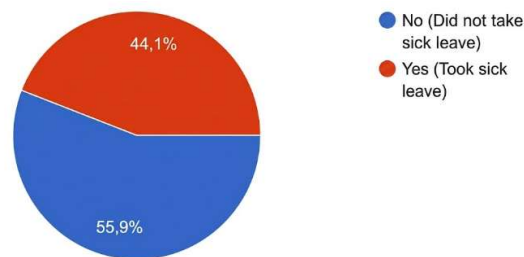


Figure 2. Percentage of Outdoor laborers taking sick leave due to extreme heat

Over 60% of workers had to spend money treating heat-related problems, with 30% shelling out more than 10 million VND per year on medical care tied to extreme heat.

Productivity Decline from Heat. Heat isn't just a personal health issue—it's a direct drag on work efficiency and workplace safety, especially in outdoor sectors like construction, transport, and ride-hailing (Kjellstrom et al., [5]; International Labour Organization, [2]). This study's findings back that up: most Hanoi workers reported clear drops in productivity during harsh heat spells.

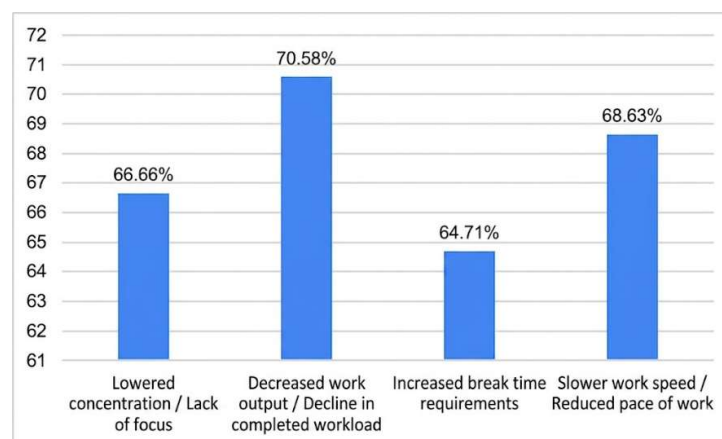


Figure 3. The impact of extreme heat on the work performance of outdoor laborers.

Heat shrinks the amount of work completed—over 70% of workers confirmed lighter workloads, showing it directly stalls economic goals. Distraction creeps in for 66.66%, slowing pace (68.63%) and forcing more breaks (64.71%), all disrupting flow and tanking output. Urban heat stands out as a real barrier to growth from outdoor labor. Slower speeds plus scattered focus doesn't just cut productivity—they amp up safety risks. Urban planners need flexible quotas or adjusted hours during extreme heat to safeguard workers' long-term livelihoods.

Income Losses from Heat. Heat cuts productivity and, in turn, paychecks. Over 63% of workers saw earnings drop at varying levels, with 45.1% facing mild declines under 25%—likely from pushing through reduced output or added costs like water, fuel, or gear. Nearly 20% took steeper hits above 25%, a heavy blow for freelancers scraping by without the safety nets formal workers enjoy.

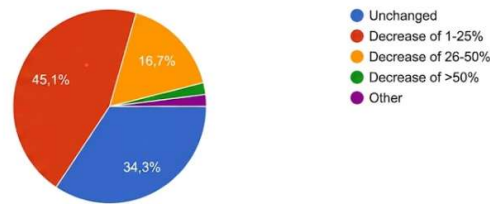


Figure 4. Income reduction during heatwaves compared to the cool season

Survey data uncovers a tough paradox for outdoor workers in Ha Dong, Hanoi. While summer living costs spike (higher power, water, and medical bills), over 63% saw their earnings shrink. Among them, 45.1% dropped under 25%—likely from lower output or adaptation expenses—and nearly 20% faced steeper cuts, fueling a new poverty trap. With over 80% in informal roles, extreme heat clearly widens economic gaps, hitting the unprotected hardest.

4. CONCLUSION

Extreme urban heat in Vietnam directly threatens the health and livelihoods of millions of outdoor workers, with 63% facing income drops and nearly 20% losing over 25% of monthly pay—trapping vulnerable groups in a climate-driven poverty spiral. To safeguard this essential workforce, key steps include:

Expand social insurance for informal labor. With 44% sidelined by heat illness, design low-cost, flexible health and accident coverage for freelancers and day laborers.

Boost urban infrastructure. Add shaded public rest stops with free water in high-density informal work zones; repurpose health stations or community centers as free cooling spots.

Develop worker apps. Create free tools for heat alerts, route adjustments, and nearby shade finders. Add a "heat mode" for ride-hailing apps (Grab, Be, etc.) to hike fares or add weather surcharges, offsetting drivers' lost output and health costs.

Train on self-first aid. Teach workers to spot heatstroke signs and perform quick interventions—vital for solo outdoor tasks.

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