

## Climate Change and Heat Stress: Impacts on Home-Based Workers and Street Vendors in Bangkok, Thailand

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Chaninporn Duangnguen sells fried chicken in Bangkok, Thailand. Photo credit: Chanakarn Laosarakham

Extreme heat is an escalating threat to Bangkok. This brief examines the impact on home-based workers and street vendors. It draws on a survey with over 1,000 workers, focus groups, and key informant interviews.

- 1 **Severe impacts on work:** Nearly 80% of all workers surveyed reduced their hours due to heat, with older workers most affected. Street vendors and home-based workers reported lower sales and lower productivity respectively. Among home-based workers, 75% lost at least one day of work per month due to their own or a family member's heat-related illness.
- 2 **Impacts on physical and mental health:** Some 73% of street vendors and 80% of home-based workers reported heat-related illness, and more than half required medical attention. Impacts on workers' mental health were especially acute. Nearly nine in ten respondents across both occupations reported heightened irritability, anxiety or stress due to heat.
- 3 **Costs of coping:** The majority of vendors (95%) and home-based workers (88%) reported incurring extra costs to stay cool and continue working. Lack of access to shade, ventilation and basic services significantly worsened heat impacts, while also driving up the costs workers incurred to cope. Most of the coping measures reported by workers were behavioural (adjusting working hours, relying on personal cooling methods, taking breaks), ad hoc and self-financed.
- 4 **Risks amplified by lack of workplace infrastructure and poor housing conditions:** Vendors without shelter/shade were more likely to reduce their working hours and reported higher rates of damage to goods. Overcrowded and poorly ventilated homes trap heat, compounding health impacts and reducing productivity for home-based workers. Access to basic infrastructure protects workers' health and prevents economic loss.
- 5 **Policy frameworks remain disconnected from workers' lived realities:** National and local climate strategies prioritize technical measures while overlooking urban informal livelihoods. As a result, adaptation measures rarely reach grassroots workers, leaving critical gaps in resilience planning. Bridging the expertise of local and national governments, membership-based organizations, academia, civil society and the private sector can lead to climate-responsive urban plans that effectively address workers' needs.

## Introduction

Thailand is considered highly vulnerable to climate change, and heat stress is an escalating urban challenge, particularly in Bangkok (ONEP 2023; Eckstein et al. 2021). As the country's economic centre and largest urban area, the city faces compounding risks from rapid urbanization and a strong urban heat island (UHI) effect (Marks & Connell 2024). In a study analyzing the impact of the UHI, 80% of respondents reported that heat disrupts their sleep, work routines, and commutes, and worsens physical and mental health (Arifwidodo et al. 2019). A World Bank study provided insights into overall economic impacts, concluding that a 1°C increase in annual average temperature caused losses of 0.8% of Bangkok's gross domestic product (Rubinyi et al. 2025: 14). While these studies provide important general insights, it is critical to understand the pathways of climate change impacts on workers in general and different groups of workers in particular to adequately inform policy responses.

Informal employment accounts for 42% of all jobs in Bangkok (66% in Thailand), with workers providing essential goods and services that directly support the formal workforce and economy (WIEGO/HNT 2017; Paweenawat & Vechbanyongratana, forthcoming). Poverty is closely intertwined with informality: 9.9% of households headed by workers in informal employment live in poverty, compared to just 1.5% among those headed by formal workers (ILO/UNICEF, 2022). Since the late 1990s, HomeNet Thailand (HNT) has been organizing home-based workers and advocating for their rights. In 2016, HNT helped to establish the Federation of Informal Workers of Thailand, bringing together other groups of workers in

informal employment – the Association of Motorcycle Taxi Drivers, the Network of Domestic Workers, the Muubaan Nakila Service Cooperative (representing market vendors) and the Confederation of Street Vendors in Bangkok. For all of these workers, climate change has become an increasingly pressing priority. In early 2025, HNT partnered with WIEGO to expand its work on climate change. The first phase of the collaboration has focused on the impact of heat on home-based workers, street vendors and market traders in Bangkok.

This brief draws on focus group interviews, a survey and key informant interviews. Two rounds of 14 focus groups<sup>1</sup> were conducted in March and July 2025 respectively, involving 183 workers in total. The first round explored workers' perceptions and knowledge of climate-related issues, with a focus on strengthening climate awareness. The second round focused on heat impacts on work, infrastructure, health, unpaid care and adaptation strategies. During May 2025, a mobile phone-based survey was completed with over 1,000 workers – 530 home-based workers in 8 districts and 496 street vendors and market traders in 15 districts. The survey was conducted after Bangkok's hottest period, when temperatures peaked at 38°C. To supplement policy analysis and existing literature, seven key informant interviews were conducted with local and national government officials, civil society organizations, and worker leaders.

This Policy Brief starts by assessing the broad policy environment and the extent to which national and local climate plans in Thailand address the vulnerabilities of workers in informal employment. It explores impacts on work and health, workers' access to infrastructure, and costs incurred to cope with and adapt

<sup>1</sup> The focus group design drew inspiration from Moser and Stein's (2011) participatory climate change adaptation appraisal methodology, which aims to help participants identify how climate risks affect their lives and livelihoods, while encouraging them to articulate solutions. In the second round, one group comprised worker leaders only.

to extreme heat. The analysis considers how workplace location, gender and age mediate the degree of impacts experienced by workers. Finally, the brief concludes with policy recommendations for aligning climate solutions with the realities of informal work.

## The Policy Environment and Informal Work

Since the 1990s, Bangkok's urban development has been shaped by a strong push towards "global city status", driven by private-sector-led real-estate projects — office complexes, shopping malls and luxury condominiums. This process accelerated after the 1997 economic crisis, which further amplified the power of private developers, who drove the rapid horizontal and vertical expansion of the city. Government infrastructure investment reinforced these trends.<sup>2</sup> The resulting spatial restructuring has intensified competition over land, eroding affordable housing and workspace options for the urban poor and pushing low-income residents out of central areas (Endo 2022; Polakit & Boontharm 2008).

These urban dynamics have had direct consequences for workers in informal employment. Slum evictions in the 1980s and 1990s exacerbated the displacement of communities to Bangkok's periphery, leaving many home-based workers with limited access to transport or basic services (Chen & Sinha 2016). This has caused a weakening of community networks and support infrastructure for home-based workers.

For street vendors, the pursuit of "orderliness" has translated into growing

restrictions. Since 2014, the number of permitted vending areas has fallen sharply, from 773 in 2011 to 59 in 2025 (The Nation 2025).<sup>3</sup> Current efforts to concentrate vendors in designated areas, modeled on Singapore's hawker centres, have led to negative livelihood impacts. This has resulted in reduced incomes due to high rents, low foot traffic, and intensified competition from large businesses (Valdivia, Ogando & Tulaphan 2024). For both sectors, urban policy and planning trends have increasingly undermined the foundations that once sustained their livelihoods.

Despite these policy trends, private-sector investments have played a visible but uneven role in heat mitigation. Malls and building owners have financed shaded walkways linked to the Bangkok Mass Transit System (BTS Skytrain), motivated by the commercial benefits of increased foot traffic. Some private developments have also deployed advanced cooling technologies, and a handful of public-private partnerships support greening initiatives (Rubinyi et al. 2025). Nevertheless, these efforts remain concentrated in affluent commercial zones, without necessarily reaching vulnerable workers. In the absence of deliberate measures to extend adaptation beyond commercial centres, Bangkok's response to extreme heat risks reinforcing the same spatial and socioeconomic divides that have long-disadvantaged workers in informal employment.

In terms of national and local climate policies aimed at reducing climate risks, Thailand has notably introduced the Climate Change Master Plan (2015–2050), the National Adaptation Plan (2018–2050), and Bangkok's Climate Change Master

<sup>2</sup> Thailand's Climate Change Master Plan (2015–2050), for instance, aims at supporting an economic strategy that "adds value from innovation and environmental standards, developing industries that support skilled workers, along with trade and the services [...]. This has resulted in increased construction of office buildings, shopping centres, hotels and the like" (Government of Thailand, 2015: 11–12).

<sup>3</sup> Along the 59 "lenient zones" there are 741 unregulated trading spots accommodating nearly 17,000 vendors.

Plan (2021–2030).<sup>4</sup> Core elements of each plan are summarized in Table 1. These plans identify climate threats to water, agriculture, tourism, health and settlements, but vulnerability criteria remain general – “low-income groups” or “communities in high-risk areas” – with no reference to workers’ livelihoods or the informal economy. Although the plans acknowledge climate threats to livelihoods, they address them only indirectly and in reference to agriculture or human settlements.<sup>5</sup> In addition, Suriyasarn and Talerngsri (2023) note gaps between policy goals and implementation, especially in relation to poverty and inequality reduction in the context of climate change.

Key informant interviews confirmed these gaps. Vulnerable groups, from the perspective of the Ministry of Social Development and Human Security, are those with limited adaptive capacity, including “the elderly, people with disabilities, the homeless, and low-income individuals” (Interview, 21 May 2025). Similarly, an official from the Department of Climate Change and the Environment acknowledged that labour concerns are embedded only implicitly in the working principles of the National Adaptation Plan (Interview, 2 May 2025).

Across the plans there is a strong bias towards agriculture. Officials repeatedly

**Table 1. Overview of Climate Risk-Reduction Plans**

	<b>Climate Change Master Plan (2015–2050)</b>	<b>National Adaptation Plan (2018–2050)</b>	<b>Bangkok Climate Change Master Plan (2021–2030)<sup>6</sup></b>
Lead agency	Ministry of Natural Resources and Environment	Department of Climate Change and Environment	Bangkok Metropolitan Administration
Priority sectors	Water, flood/drought management, agriculture, tourism, public health	Water, agriculture, tourism, public health, natural resources management, human settlements/security	Water, agriculture, tourism, public health, natural resources management, human settlements/security
Criteria for vulnerability	No clear criteria; mentions low-income citizens, disaster-risk communities, agricultural and business groups reliant on natural resources	No clear criteria; broad at-risk groups include elderly, low-income, rural communities	No clear criteria
Livelihood lens	Limited; prioritizes livelihoods closely linked to natural ecosystems – e.g. farming, fishing, or forestry; particular mention of small and medium enterprises in tourism, and small-scale farmers	Mentions fair access to funding/ insurance for low-income groups	Mentions farmers (need to reduce chemicals in agriculture)
Reference to informal livelihoods	None	None	None
Adaptation focus	Technical and sectoral; community self-adaptation encouraged	Technical and sectoral; equity mentioned but no targeted measures for the informal economy	More heavily focused on mitigation; mostly technical adaptation

<sup>4</sup> An additional key document is Thailand’s Nationally Determined Contributions, which focuses on emission-reduction targets.

<sup>5</sup> An exception is the Climate Change Master Plan’s inclusion of small and medium enterprises in tourism among the groups that require adaptation capacity. Consistent with this framing, proposed adaptation measures are primarily business- and market-oriented, focusing on certification schemes, infrastructure standards, and investment promotion for tourism enterprises. Overall, the emphasis is on strengthening the competitiveness and sustainability of businesses, rather than on workers’ adaptive capacities (Ministry of Natural Resources and Environment 2015: 55, 104).

<sup>6</sup> In 2024, the Bangkok Metropolitan Administration launched an Urban Heat Management Framework with year-round interventions ranging from awareness campaigns to emergency response measures, emphasizing continuous monitoring, healthcare preparedness and physical cooling strategies (tree planting, cool pavements, urban ventilation corridors) (Rubinyi et al. 2025). As these measures are at varying stages of implementation, they are not evaluated in this brief.

highlighted agricultural workers as the most climate-vulnerable group as their “activities are inherently linked to natural factors, which are becoming increasingly volatile” (Ministry of Labour, Interview, 19 May 2025). An official from the Department of Climate Change and the Environment noted that “if they are impacted [...] food security also becomes an issue” (Interview, 2 May 2025). An official from the Ministry of Public Health confirmed the rural bias, noting “in rural areas, hospitals collaborate with local authorities to care for informal workers, but we don’t see similar examples in urban areas” (Interview, 13 May 2025). A Thailand Environment Institute expert reflected that “urban communities are just as vulnerable as rural ones”, noting the need for data on urban workers’ challenges and approaches to adaptation (Interview, 15 May 2025).

Ober and Sakdapolrak (2020) suggest that adaptation interventions are influenced by the concept of a “self-sufficiency economy”, placing responsibility on local actors to “adapt themselves” without financing mechanisms or institutional support. A Bangkok Municipal Authority key informant confirmed this, saying “adaptation to climate change seems to be something people are learning on their own” (Interview, 15 May 2025).

Overall, the lack of comprehensive data on urban livelihoods means that climate strategies remain technocratic and sectoral – focused on broad sectors such as water, agriculture, tourism, health, and settlements – with little consideration of the diverse realities of workers in informal employment. The interviewee within the Ministry of Labour acknowledged a lack of data on subgroups of the informal economy – “[Data is] crucial because informal workers are very diverse and widely dispersed” and there is a need for “data on the adaptation costs for workers,

which might include coping costs, medical care, or the cost of learning new skills” (Interview, 19 May 2025).

Another gap highlighted in key informant interviews relates to the limitations in workers’ participation in policy formulation due to the lack of “channels or platforms to submit opinions and policy proposals” (Ministry of Labour, Interview, 19 May 2025). While feedback is requested at various stages in the elaboration of sectoral line plans, “workers in informal employment are not specifically invited” as some consultations require technical expertise or prioritize agency input over worker perspectives (Department of Climate Change and the Environment, Interview, 2 May 2025). Overall, labour issues are only indirectly addressed and not seen as an interlinked dimension of climate debates.

In sum, several factors make the urban informal workforce largely invisible in climate planning. These include gaps in data collection, lack of explicit criteria on informality, and limited channels for participation in policy processes. Without deliberately integrating livelihood concerns into cross-ministerial coordination and actions, climate strategies risk reinforcing existing inequalities.

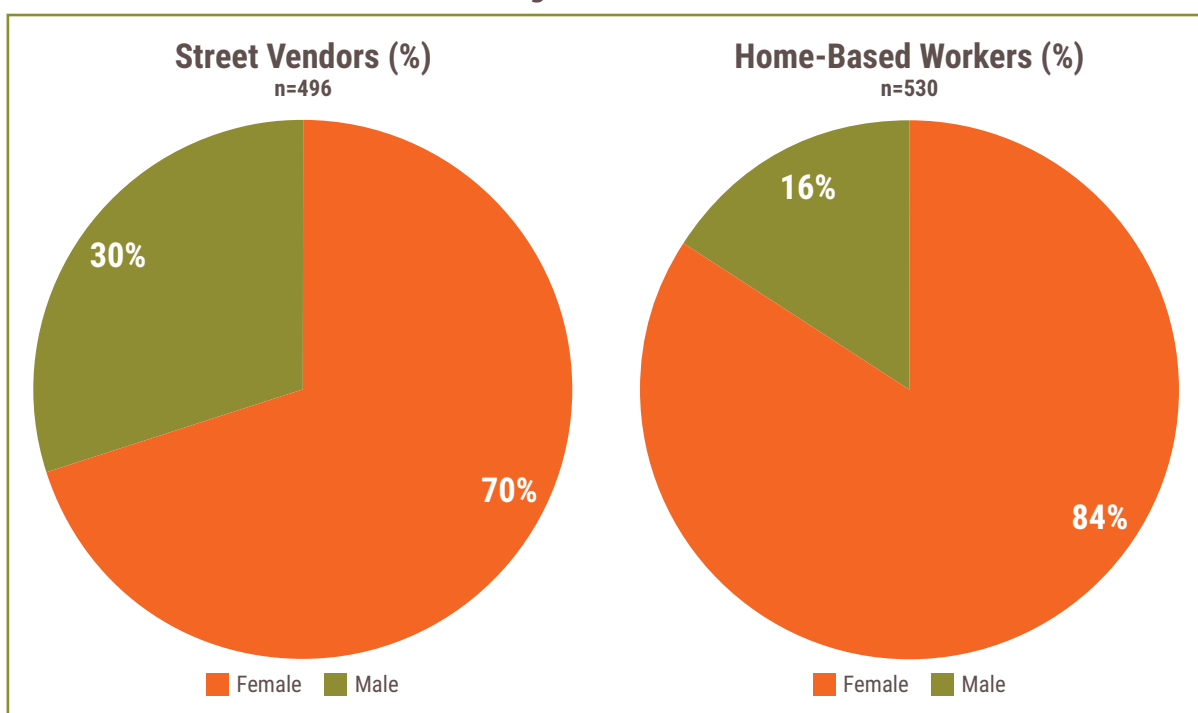
## A Profile of Home-Based Work and Street Vending in Bangkok

Home-based work represents 11% of total employment in Bangkok – just over half a million workers.<sup>7</sup> It is also a highly feminized sector. The vast majority earn well below the minimum wage. Most are self-employed or unpaid contributing family workers, and therefore fall outside the scope of the Homeworker Protection Act, which mandates that employers provide fair wages, contracts, and ensure workers' occupational health and safety (Poonsab, Vanek & Carré 2019). Given that home is also their workplace, housing infrastructure is a core productive asset for home-based workers. Yet many live in overcrowded, poorly serviced, or flood-prone areas, often far from customers, contractors or markets.

There are approximately 160,000 street vendors in Bangkok (2% of city employment) and 196,000 market traders (3%) (Paweenawat & Vechbanyongratana, forthcoming). Unlike many other countries in Southeast Asia, the sector employs more women than men. Street vendors play a crucial role in Bangkok's food system. Street food is also central to Thailand's tourism sector, which contributes significantly to GDP (9% in 2023), and is identified as a priority in Bangkok's climate plan (Tourism.co.th 2023; Hang 2025; Phukamchanoad 2025).

During May 2025, HNT staff surveyed 496 street vendors and 530 home-based workers.<sup>8</sup> Figure 1 reflects the gender composition of the sample. Respondents were predominantly women, making up 84% of home-based workers and 70% of street vendors. This indicates a higher representation of women in the survey sample compared to national figures (Poonsab, Vanek & Carré 2019).

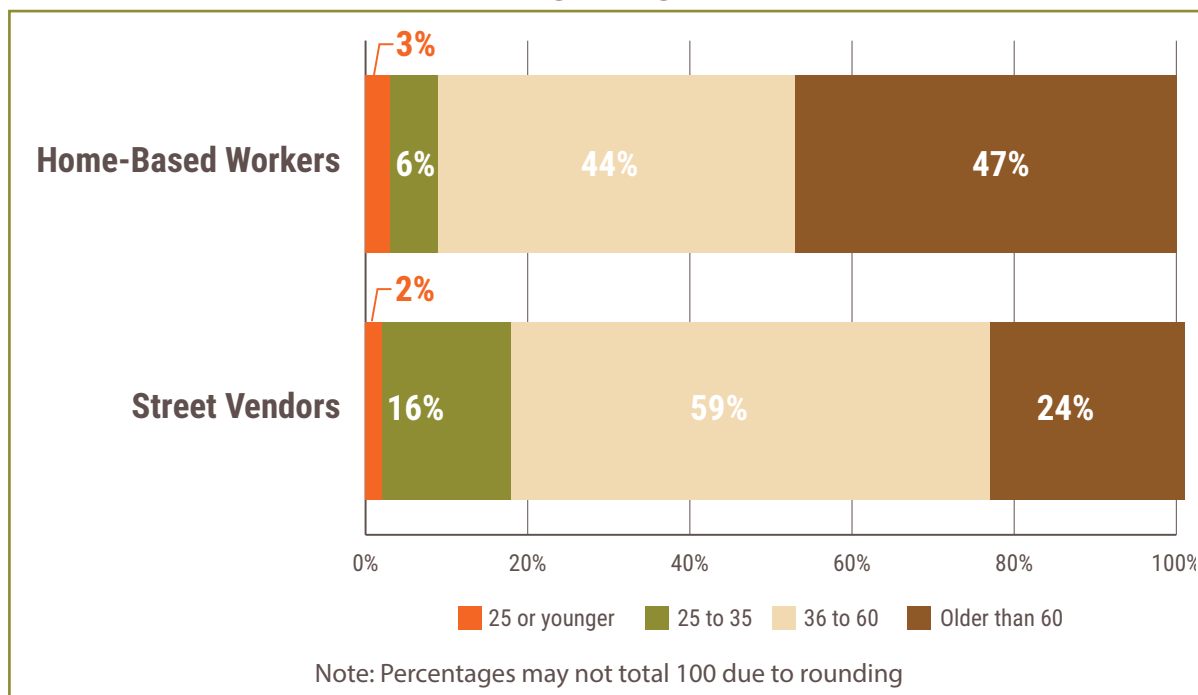
Figure 1. Gender



<sup>7</sup> Note that data on informal employment in Thailand and Bangkok, as well as statistics on street vending, reflect 2024 estimates. Figures for home-based work are based on the most recent available data from 2019.

<sup>8</sup> The sampling approach was purposive since all participants are members of organizations of workers in informal employment. The findings are therefore not representative but indicative.

Figure 2. Age



Surveyed vendors were broadly categorized as food vendors (53%) and non-food vendors (47%), while surveyed home-based workers mainly produced garments (30%), food (26%), and a range of other products such as baskets, herbal sprays, flowers and soap (44%). As shown in Figure 2, most street vendors surveyed were aged 36–60, whereas approximately half of the home-based workers were over 60.<sup>9</sup> While the street vendor sample reflects the overall age composition for the sector in Thailand, the home-based workers surveyed were relatively older. The majority of street vendors (56%) and home-based workers (52%) reported having one or two household dependants.

<sup>9</sup> The WHO (2023) estimates that, by the next decade, 28% of Thailand's population will be older than 60. Moreso, studies show that older workers will continue working into advanced ages and in informal jobs (Moroz et al. 2021).

**Figure 3. Typical monthly earnings by sector and gender (in Thai Baht, THB)**

Bangkok's minimum wage is THB12,000 in 2025 (Acclime Thailand 2025). Most home-based workers surveyed earn far less: 44% make under THB5,000 per month (approximately USD160)<sup>10</sup> (Figure 3). Street vendors' earnings vary but generally approach the minimum wage.<sup>11</sup> In the sample, women vendors earn less than men (48% of women earn under THB15,000 vs. 37% of men) and are more likely to sell perishable goods such as food (56% vs. 47%).

<sup>10</sup> Previous research has shown that those in peripheral areas face additional disadvantages due to limited market access and reliance on lower-value production chains. Irregular work orders, delayed payments, manufacturer relocation, competition from imports, technological change, limited access to raw materials, and seasonal markets further undermine income stability (HomeNet South Asia 2019).

<sup>11</sup> Vendors fall into three categories – licensed, unlicensed but tolerated, unlicensed without permission – with implications for income levels (Angsuthonsombat 2019). While many earn subsistence-level incomes, a “new generation” of vendors uses street vending for economic mobility rather than survival (Nirathron and Yasmeen 2019).

## Perceptions of Extreme Climate Events

Understanding how urban populations perceive and respond to extreme weather is critical to designing effective and inclusive adaptation strategies.

Street vendors participating in the focus groups<sup>12</sup> consistently described heat as increasingly intense, unpredictable and unavoidable. Many noted that whereas flooding affects only certain neighborhoods, heat “touches the whole city”. They spoke of a shift towards “dry heat with no wind” and recalled the summer of 2024, when temperatures reached 43°C, as a time when conditions felt intolerable. Several linked these changes to human activities such as deforestation, pollution, use of plastics, and dense construction that “blocks everything”, worsening urban heat.

Home-based workers described extreme heat as worsening and increasingly disruptive to their work and living environments. Many live in housing projects on the outskirts of Bangkok, such as Kaewpradap, Chalong Krung and Lamphaong, where homes are small, closely packed and often single-storey. These are all conditions that trap heat and limit ventilation. Workers reported that summers now bring more frequent and intense heatwaves, and the seasons feel “out of sync”, with sudden swings between heat, rain and cooler weather. While some noted that heat in central Bangkok feels even harsher due to traffic and pollution, those in peripheral areas face overlapping vulnerabilities: poor drainage, limited public transport, and the absence of basic services such as reliable electricity or water.

## Impacts of Heat

Heat affects street vendors and market traders through a mix of direct health effects and indirect economic consequences. While street vendors and home-based workers experience common vulnerabilities, there are also differentiated pathways of impact shaped by their place of work.

### Work impacts

According to the survey results, most workers had to cut back on their working hours (78% of vendors and 81% of home-based workers) because it was too hot to work. While reductions to working hours were similar for men and women within each occupation, the impact was most severe for older workers: more than 85% of workers aged 60 or over reduced their hours, compared to 71% of home-based workers and just 13% of vendors aged 25 or younger.

In addition, 80% of vendors reported fewer customers due to heat, while 80% of home-based workers took longer to finish tasks. In focus groups, street vendors said hot weather discouraged customers from coming to markets, leaning more towards online ordering and leaving vendors at a loss. Vendors mentioned adjustments to working hours to sustain their livelihoods. “We usually sell at 2 p.m. – if it’s extremely hot, we’d have to wait until a building casts shade. Maybe start selling around 4 p.m. and finish later at night, when it’s cooler” (male, food vendor).

Some home-based workers also described shifting their working hours. Those who made this shift expressed concern about how these changes affected their capacity to finish work orders on time. Older home-based workers mentioned that working into

<sup>12</sup> Of the focus group participants, 86% were women. Participant ages ranged from 25 to 75, with an average age of 58. Workers reported working an average of 5.4 days per week.

the night had implications for their health, particularly their eyesight, and well-being.

Heat also damaged work materials, with 78% of vendors and 63% of home-based workers reporting spoiled goods, damaged equipment, or degraded raw materials. Street vendors reported higher rates of damage compared to market traders (85% vs. 63%), likely due to work infrastructure gaps. Among home-based workers, those involved in food production and processing reported higher rates of damage compared to those producing garments (71% vs. 58%).

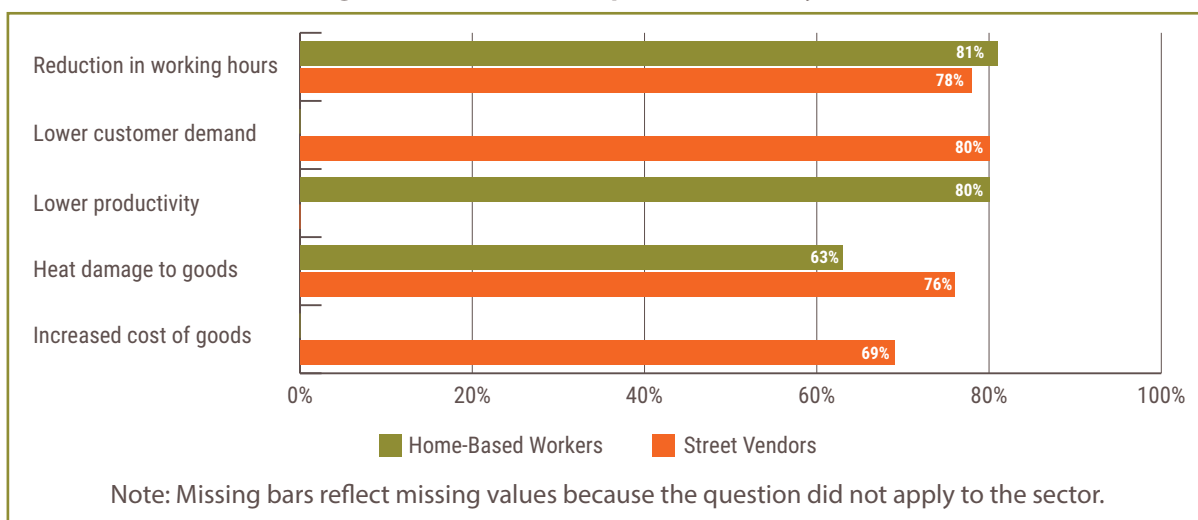
Home-based workers described machines overheating or breaking down. In focus group discussions, they mentioned motors burning out, belts snapping, or sewing needles breaking, with high replacement costs. A woman working for a major clothing brand stated: “The sewing machines can’t run continuously anymore because of the heat. Luckily, I have a backup machine, but expenses have gone up while income has dropped. We don’t get higher wages because the employers say raw materials already cost more.” Another home-based worker working for the same clothing brand reflected on some of the

risks involved in using appliances during heatwaves: “One time while I was working, the fan got too hot, made a loud noise, and then exploded. The blade flew off. Luckily, I was sitting on a high chair and it didn’t hit my face.”

Home-based workers also described the deteriorating physical environment itself. As one worker put it: “The heat from the work and the weather combine, creating a smell like overheated car brakes.” These accounts illustrate how extreme heat creates a series of interlinked problems for home-based workers, ranging from equipment failures and rising raw material costs to serious safety hazards. All of these factors undermine their ability to work safely and sustainably.

Street vendors and home-based workers relied on ad-hoc coping measures such as fans, wet towels, cooling sprays, and drinking water. Some vendors described using umbrellas for shade and opening curtains between stalls for temporary relief. Ultimately, workers expressed their limited capacity to address heat-related challenges and an interest in learning how to better adapt.

**Figure 4. Heat-related impacts on work, by sector**



## Health impacts

The findings on heat-related impacts on health, summarized in Figure 5, suggest that they are severe.

Most respondents – 80% of home-based workers and 73% of vendors – reported heat-related illness such as disorientation, excessive sweating, fever, vomiting and/or rapid pulse in themselves or their households. There were minor differences across men and women vendors (75% of men compared to 71% of women).

During focus group discussions, street vendors with chronic conditions such as diabetes or high blood pressure mentioned concerns that the heat could worsen their symptoms. Home-based workers frequently highlighted increased high blood pressure, fatigue, worsening vision, and allergic reactions to fabric dust and chemicals when temperatures rise. Another common symptom was an increase in headaches. One worker from Kaew Pradap Community stated: “When it’s hot, the headaches are extreme, like the blood vessels in my head might burst. Once, while riding my motorbike to get a blood test, I suddenly blacked out and couldn’t see properly” (female, garment sewing). Another reported: “During March, Ramadan month, I was still working [...]. I was sweating profusely

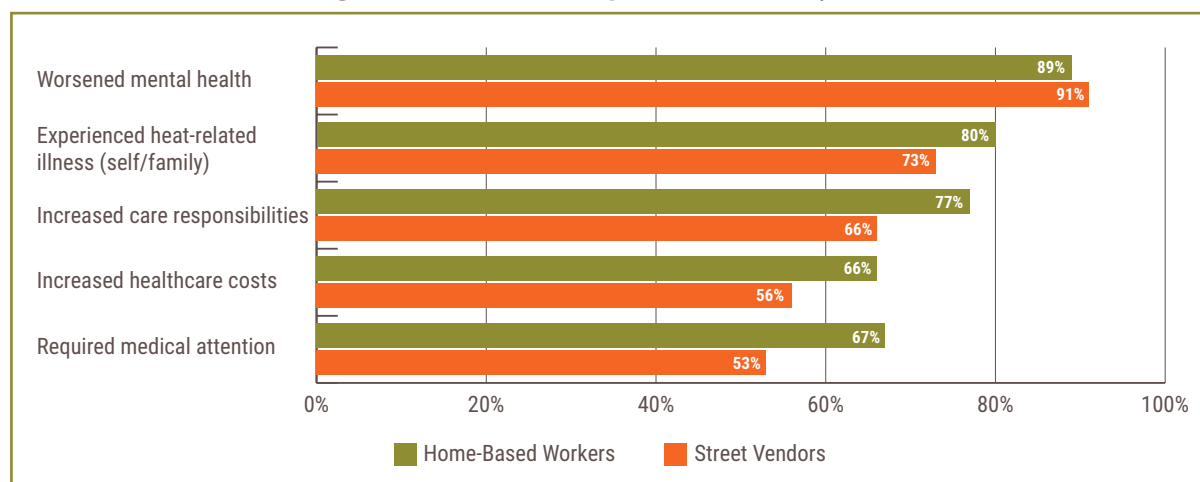
and fainted from the heat” (female, home-based garment producer).

When asked about severity of illness, 67% of home-based workers and 53% of vendors reported they required medical attention for heat-related illness. Among home-based workers, 75% lost at least one day of work per month due to self-reported illness or illness in the household. Findings also point to age as an important determinant for heat-related health impacts. For example, 79% of vendors aged 60 or above reported heat-related illness compared to 38% of those aged 25 or younger.

Two-thirds of the home-based workers and more than half of the street vendors reported increased healthcare expenses due to heat-related illness. Despite Thailand’s comprehensive public health coverage, workers also noted barriers to timely treatment for heat-related illness. A street vendor that experienced dizziness and heart palpitations explained: “I had to go to a hospital outside of my health coverage because the one I’m entitled to is too far. So I had to pay out of pocket” (female, food vendor).

Mental health impacts were even more striking. Nearly nine in ten respondents across both occupations reported heightened irritability, anxiety or cognitive

**Figure 5. Heat-related impacts on health, by sector**



issues due to heat. This was linked to long hours in the sun and declining sales. A female street vendor from Bangpakok Market noted: “I used to be a healthy person, but this year I’ve been feeling confused more often because of the heat. I’m 62 and have never had issues before. But this year, I’ve felt disoriented.” Decreasing working hours to manage heat stress was also linked to higher stress levels: “All this creates stress too, because the workload stays the same while income falls”, mentioned a home-based worker.

More than three-quarters of home-based workers and two-thirds of street vendors reported that heat had increased their direct care responsibilities (e.g. taking care of elders, children and the sick). In focus groups, female vendors noted how the caregiving burden leaves them with minimal leisure time. Older home-based workers noted greater attention to family care needs during extreme heat. A worker from the Thung Song Hong Housing Community Credit Union Cooperative described the impacts of care on her paid work: “My husband has partial paralysis. During the hot season, his condition worsens. He’s a stroke patient, so I have to give him water, massage him, and care for him much more. Meanwhile, I still have to do my own work, which decreases because I must take care of him” (female, home-based garment producer).

## Access to Infrastructure

Workers’ ability to withstand extreme heat depends on hard infrastructure – the physical systems and structures that provide safety at work and basic services, and soft infrastructure – the social systems and networks that strengthen resilience.

### Hard infrastructure: vending spaces and home as a productive asset

Street vendors depend on access to public space and the quality of shelter and basic services available in vending areas. Only 33% of surveyed vendors reported having access to drinking water at work, and while 80% reported having access to shelter, there were notable differences across market traders and street vendors (93% vs. 71%), and across trading sites.<sup>13</sup>

Survey data show that limited access to shade, ventilation and basic services significantly worsens heat impacts, while also determining the costs workers must bear in order to cope. Vendors without shelter/shade were more likely to reduce their working hours (+9 percentage points) and reported higher rates of damage to goods (+16 percentage points) compared to those who reported having shelter. Costs were also greater: 76% of vendors who reported lower access to shade faced increased expenses to keep cool compared to 58% of market traders.

While most (90%) reported having access to toilets, focus groups revealed important gaps. At Bobae Market, some vendors paid to use nearby commercial facilities, while others returned home. In some instances, workers reported waiting up to six hours to use facilities. As one vendor explained: “In hot weather, you just sweat it out. But in winter, you have to be careful.”

<sup>13</sup> Reports of having shelter may be biased by the overrepresentation of survey respondents from three markets (Bobae, Moo Ban Nak Kila and Si Yan markets) which accounted for 68% of the sample.

For home-based workers, the home itself is the workplace, making housing quality a central determinant of resilience. Overcrowded or poorly ventilated dwellings trap heat, directly reducing productivity and compounding health risks. In the sample, 86% reported living in a house with more than one window, but 14% had either none or only one. Ventilation was particularly poor in Chatuchak, Laksi and Lat Krabang. A home-based worker in Lamsali described the situation in her home: “I live near the road. The hot air just comes straight into the house. The houses are all so close together, when one absorbs the heat, it makes everything hotter.”

Those who produce food were particularly vulnerable as high indoor temperatures accelerated spoilage (71% reported damaged inputs compared to 58% of those who produce garments). In focus group discussions, workers mentioned storing fabrics and elastics in refrigerators to prevent damage. Where housing is substandard, workers face a double burden of environmental risks that undermine work and well-being.

In focus groups, workers highlighted structural problems in their communities, including inadequate drainage, frequent flooding and limited provision of basic services. “We post online [about flooding], but no agencies notice. Even if they do, they don’t come to help because our community has no central access – it’s hard to reach” (female, home-based garment producer).

### **Soft infrastructure: social protection and early warning systems**

Social protection is a cornerstone of climate adaptation, providing income security, healthcare, and the resources workers need to cope with shocks and

build longer-term resilience (ILO, 2024). In Thailand, Article 40 of the Social Security Fund allows workers in informal employment to access selected benefits – sickness, disability and survivors’ benefits – through voluntary contributions. Coverage however remains low. In 2019, only 15% of workers in informal employment were enrolled, with cost, lack of awareness and inadequate benefits constituting key barriers to uptake (World Bank/ADB 2021; Komin et al. 2024).

Only 23% of surveyed vendors were enrolled in Article 40 of the Social Security Fund, with coverage decreasing sharply with age, likely due to the enrolment age limit (63% of those aged 25 or under were enrolled compared to 16% of those aged 60 or over). Enrolment rates were comparatively higher – at 46% – home-based workers. Yet being enrolled does not necessarily mean that workers can contribute regularly. Focus groups revealed that financial constraints, administrative difficulties and limited benefits discouraged regular contributions.

Like social protection, early warning systems form a crucial layer of soft infrastructure by helping workers anticipate and respond to climate risks before they escalate into crises. Bangkok’s current heat early warning systems already reach many residents through smartphone apps and online messaging, but less than half of the workers in our survey (43% of vendors and 44% of home-based workers) reported receiving timely warnings. Focus group discussions suggest that many of these warnings came from general weather applications rather than the city’s official system. In focus group discussions, the media (TV, radio, social media) was the most important source of heat-related information for street vendors and home-based workers, followed by family and neighbours, and then government notifications.

Expanding communication across multiple channels, such as radio, loudspeakers and community networks, would improve coverage and complement social protection by reducing immediate exposure to risk (Rubinyi et al. 2025). Together, income security and timely information give workers in informal employment the means and the knowledge to adapt, strengthening resilience at household and community levels.

### Costs of Adaptation

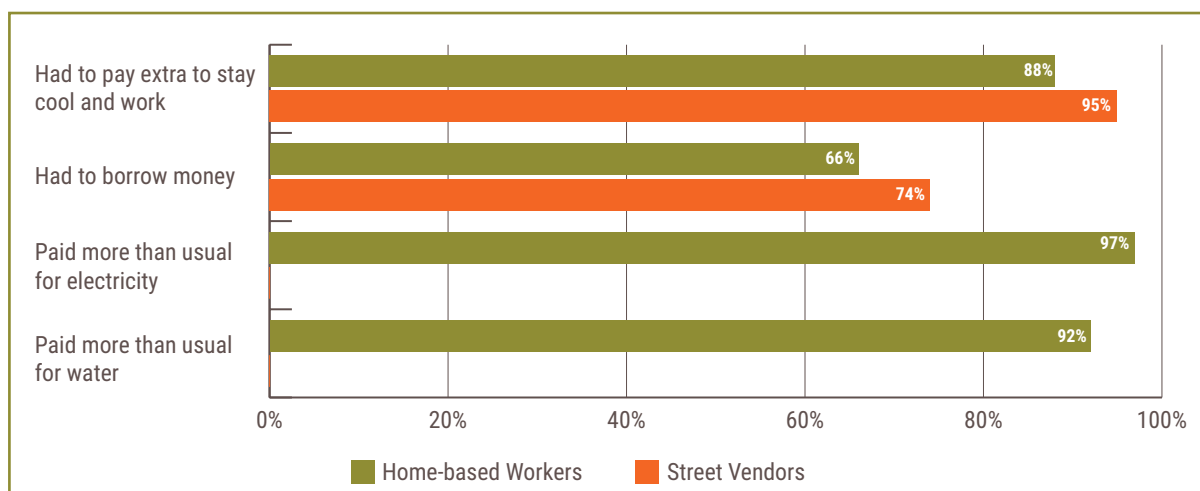
Figure 6 reflects home-based workers' and street vendors' coping strategies.

Nearly all surveyed vendors (95%) reported extra expenses to keep cool and continue working, such as purchasing fans, umbrellas, drinks or ice. Overall, three-quarters of the sample had to borrow money because of reduced income or higher costs, with street vendors more affected than market traders (78% vs. 68%) and no differences across gender. In focus groups, many food vendors said they had to buy smaller quantities to

prevent spoilage, but with transport costs remaining the same, their overall expenses increased. A fish vendor from Bang Khun Thian reported: "Things spoil constantly. The shredded fish I sell used to last longer in storage. Now, even when refrigerated, it spoils more quickly due to the heat. I can't buy in bulk anymore, so I have to buy smaller amounts more frequently – which increases my costs."

Among home-based workers, 88% incurred extra costs to keep cool and continue working, and 66% borrowed money because of increased expenses, including the purchase of air conditioning. Almost all reported higher utility bills, with 97% paying more for electricity and 92% paying more for water. The data suggest that adaptation is often a matter of costly coping rather than long-term resilience. Limited institutional support means that measures are most often behavioural, self-financed and sub-optimal. Workers adjust their working hours, purchase cooling devices, or pay more for utilities, but these strategies provide only temporary relief and increase financial strain.

Figure 6. Costs of adaptation, by sector



## Strength of Collectives to Build Resilience

WIEGO has documented how workers' member-based organizations have stepped in during crises where labour markets and the state have failed. MBOs have provided immediate relief, advocated for state support, and secured occupational health and safety (Vaux and Lund 2003; Horn 2011; Chen et al. 2022). Collective action is equally a critical pathway to adapting to climate risks. This pattern makes organizations like HNT indispensable partners in inclusive adaptation strategies. Building resilience requires organized groups and trusted intermediaries that connect public authorities and workers. As a key stakeholder from the Department of Disease Control noted: "This is precisely where organizations like HomeNet are crucial. Their existing relationships with various groups and communities allow them to reach workers in informal employment and disseminate information effectively."

## Conclusion and Policy Recommendations

Overall, workers in informal employment face heightened vulnerability to extreme heat through three key channels: physical vulnerability due to inadequate work infrastructure (or lack thereof) at the place of work; social vulnerability, shaped by factors such as gender, age and income; and legal vulnerability, stemming from limited recognition as economic actors, weak labour and social protection, and restrictive urban regulations. Informal livelihoods are central to urban resilience, with workers' capacities and constraints to adapt to heat risks directly shaping Bangkok's capacity to adapt. Supporting informal livelihoods and drawing on the knowledge and networks of worker organizations needs to be a cornerstone of inclusive climate resilience.

## Strengthen early warning systems to target workers

Given the critical importance of timely information, local authorities should ensure accurate and location-specific heat alerts with clear guidance on preventive measures and risk levels. Recognizing that workers have diverse communication needs, it is important to rely on multiple formats ranging from short videos to community forums. This multi-format approach would address the fact that not all workers have equal access to digital technology or high levels of literacy. Accordingly, local authorities should consider mobile platforms and community-based channels to ensure effective outreach. To maximize impact, local and national governments need to support and empower membership-based organizations to conduct outreach and awareness. This could lead to an increase in the reach and uptake of alerts and recommendations.

## Invest in climate-resilient workplace infrastructure

To address the immediate physical impacts on workers in public spaces, local government should improve public water, sanitation, and hygiene facilities in strategic locations. These should be accessible to workers and the general public to prevent heat-related illness.

Beyond these provisions, it is fundamental to ensure access to covered structures, water points and rest areas for outdoor workers. Building on these foundational measures, local governments and the private sector could work towards providing shaded and ventilated selling spaces in markets and along vending routes. In addition, they could support access to storage solutions to reduce raw material spoilage and facilitate collective

access to renewable energy solutions such as shared solar-powered fans or cooling stations in vending spaces.

Local governments should ensure reliable water supply, drainage and sanitation in informal settlements, alongside community health services and childcare centres. Embedding these provisions into housing-, urban- and climate-resilience policies would ease unpaid care work, protect health, and enable home-based workers to sustain their livelihoods.

Decent workplace infrastructure and access to public services would increase workers' protection and prevent economic losses. However, to ensure these interventions are effective, it is essential to collaborate with worker representatives to assess climate risks and co-design cost-effective infrastructure solutions.

### **Promote climate-responsive urban planning**

The Bangkok Metropolitan Administration (BMA) should ensure equitable access to green spaces, particularly for those living in underserved neighbourhoods, those without private transport, and low-income groups. In parallel, the BMA can build on existing social infrastructure such as schools and public health units to develop strategies for protecting workers during extreme heat. To achieve these goals effectively, bridging the expertise of local government, membership-based organizations, academia, civil society and the private sector can lead to the development and implementation of climate-responsive urban plans that effectively respond to workers' needs.

### **Improve healthcare access and responsiveness to heat**

The National Health Security Office (NHSO) should address health problems caused by extreme heat. Regulations under the Universal Health Coverage scheme should be amended to allow Gold Card holders to access urgent and emergency care at any facility, regardless of registration status.<sup>14</sup> This reform should include streamlining procedures for transferring healthcare registrations to geographically accessible facilities while establishing climate-related protocols that prioritize immediate care over administrative processes. The BMA should organize health activities in communities to help residents cope with the heat. Sunscreen should be classified and provided as protective medicine rather than a cosmetic product. The NHSO should also expand services for older and chronically ill people to reduce the disproportionate care burden that falls on women workers.

### **Strengthen occupational safety for workers in informal employment**

The government should extend occupational safety policies to include workers in self-employment, providing clear guidance on heat-exposure limits, protective measures, and access to preventive health services. Current occupational safety regulations in Thailand, including the Thai Occupational Standard, set temperature thresholds for halting or adjusting work and require protective measures for employees. However, these protections do not extend to self-employed workers, leaving a significant portion of the workforce exposed to heat-related health risks. Attention should be

<sup>14</sup> Since 2002, the Universal Coverage Scheme, known as "Gold Card" scheme in Thailand, is one of the three schemes in the country. It is the most extensive, providing free healthcare services irrespective of income level or employment status. It is predominantly non-contributory and administered by the National Health Security Office. The UHC faces challenges from rising costs, disparities across insurance schemes, and pressures from an ageing population and changing disease patterns (Sumriddetchkajorn et al. 2019; WHO 2019).

given to gender, and age-friendly and climate-sensitive workplace infrastructure that meets the occupational health and safety needs of workers.

### **Strengthen interministerial communication and coordination**

Relevant ministries should develop clear inter-agency protocols to ensure coordinated responses with technical capacity during extreme heat events. Lead agencies should provide relevant expertise on different aspects of worker protection, including health, labour, urban planning and emergency response. Attention to the well-being of workers should be fully integrated into protocols and as part of communication outreach and coordination processes.

### **Ensure supportive economic and social policies**

To address the financial barriers workers face, the national government should adjust electricity subsidy thresholds to reflect rising heat-related energy needs, as current subsidies risk excluding vulnerable groups. In addition, authorities should ensure capacity building such as training programmes and informational workshops. The Social Security Office should provide better access to information on the Social Security Section 40 scheme and provide income-replacement benefits in cases of heat-related illness. To provide broader protection, the government should expand disaster-relief funds and social protection programmes to cover workers in informal employment affected by climate-related events, and simplify the procedures to access these benefits. More broadly, strengthening enrolment in the social security system, as confirmed by the interview with the Ministry of Social Development and Human Security, is a key pathway to resilience, as it provides more

comprehensive and continuous protection compared to shock-event-based aid.

### **Commit to institutionalized participatory forums**

Local and national governments should promote institutionalized dialogue spaces and channels, with representation for workers in informal employment. Multi-stakeholder platforms and forums can enable the meaningful participation of a range of actors, including academia and the private sector. Attention should be paid to ensure gender and diversity representation.

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## About WIEGO



Women in Informal Employment: Globalizing and Organizing (WIEGO) is a global network focused on empowering the working poor, especially women, in the informal economy to secure their livelihoods. We believe all workers should have equal economic opportunities, rights, protection and voice. WIEGO promotes change by improving statistics and expanding knowledge on the informal economy, building networks and capacity among informal worker organizations and, jointly with the networks and organizations, influencing local, national and international policies. Visit [www.wiego.org](http://www.wiego.org)