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Caring Cities in a Warming World:

Building Climate-Resilient Infrastructure for Workers in Informal Employment

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WIEGO Women in Informal Employment: Globalizing and Organizing

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Key Lessons

- As workers who largely work in public spaces or out of their own homes, informal livelihoods are directly impacted by the presence or lack of infrastructure. Poor workplace and urban infrastructure exacerbate their vulnerability to climate shocks. These vulnerabilities reveal a deeper crisis of care in how cities are planned and governed.
- Following a neoliberal, market-based logic, policymakers often view climate risk in an individualized way. By approaching infrastructure through a care lens, policymakers can work instead towards collective and structural solutions for risk reduction.
- A care-focused approach to infrastructure makes visible the relational work that supports climate resilience and sustains everyday urban life. This includes recognizing informal, invisible, and feminized work, along with the social reproduction that enables all productive activity.
- Membership-based organizations of workers are key allies in shaping climate adaptation interventions, given their localized knowledge of workplace deficits, as well as the care logic that underpins the functioning of their organizations.
- When policymakers draw on this grounded knowledge and logic in the design of solutions, it can strengthen the trust and communication needed to effectively implement climate-resilient, care-focused urban infrastructure and policies.

1. Introduction

While climate change is a global phenomenon, its impacts are especially pronounced in cities, where 64% of the population faces high exposure to disasters (UN-Habitat, 2024). Negative impacts on health, livelihoods and key urban infrastructure such as transportation, water, sanitation and energy systems (IPCC, 2023, p. 12) are shaped by intersecting factors like gender, race, class and age.

Informal employment comprises nearly 2 billion workers and represents 6 in 10 workers globally (ILO, 2023). In low-income countries, it represents 89 per cent of total employment, while in lower-middle income countries it represents 50 per cent (ILO, 2023). Many of these workers operate from their homes, on the streets, or in makeshift storefronts, leaving them directly exposed to destructive weather events (Wagner, 2025). Despite the essential services they provide in waste collection, food distribution, and transport (Oates & Sudmant, 2024), workers in informal employment also face structural barriers related to poor housing and working conditions, limited savings and access to social protection, and lower compensation from public and private institutions during crises.

WIEGO research (Alfers et. al., 2022; Valdivia, Ogando & Tulaphan, 2024; Horn, 2009) has revealed that interlinked crises in recent years –the Covid-19 pandemic, rising living costs, and climate disasters– have compounded one another, creating cascading shocks for informal workers, including livelihood disruptions, food insecurity, and physical and mental health strains. In this context, workers in informal employment, especially women, often cannot generate income when most needed and resort to negative coping mechanisms like taking on debt, trapping them in cycles of vulnerability.

At the local level, these compounded crises underscore the long-standing need for two fundamental shifts in urban planning: rethinking how cities provide infrastructure and centering the voices of those most affected in this rethinking process. This brief adopts a broader definition of urban infrastructure that goes beyond material configurations to include everyday practices and relations that sustain workers, households and communities (Alam & Houston, 2023).

Specifically, the brief presents two complementary approaches to care infrastructure in the context of climate change adaptation. The Acamares waste pickers' sorting centre cooperative in Mário Campos, Brazil, shows how hard infrastructure –physical workplace upgrades– can support informal livelihoods

through worker-led design. The experience of HomeNet Thailand and the Federation of Informal Workers (FIT) demonstrates how soft infrastructure –in this case, social networks and information systems– can extend the reach of public health interventions.

Drawing lessons from these two experiences, this brief concludes with policy recommendations for local governments to strengthen infrastructure-related climate adaptation measures from the perspective of workers in the informal economy. Together, these cases show that climate-resilient infrastructure should encompass both material structures and social networks and systems, and should center worker participation as a pathway for embedding care into urban planning.

2. Care-Focused Urban Infrastructure: A Holistic and Multi-Sectoral Approach to Risk Reduction

A care-focused approach to urban infrastructure is one that recognizes the invisible labour sustaining urban systems, understands vulnerability as structural rather than individual, and values relationality over efficiency. This approach underscores how inequalities are operationalized through infrastructure while at the same time recognizing the agency of those who shape complex urban spaces. Importantly, thinking in terms of care requires a focus beyond the self or individual self-reliance. By considering the needs and concerns of others alongside notions of relationality and interdependence, a care-focused approach reminds us of the potential for more inclusive and collectively oriented urban practices and policies (Alam & Houston, 2020, Puig de la Bellacasa, 2017). Such an approach is necessarily holistic, requiring multi-sectoral collaboration that brings together urban planning, public health, social services, and economic development for the common good and well-being (Celis et al., 2025, p. 8).

Since the Global Recession, austerity has weakened public services and sidelined climate policy, while guidance on coping with heat—often experienced privately—tends to focus on individual behavior (EPSU, 2017; Lim, 2023). Even when addressed through an infrastructural lens, responses are frequently shaped by neoliberal and technocratic logics (Lim, 2023). Such individualized framings obscure the structural and socio-economic dimensions of vulnerability, leading to adaptation measures that may deepen inequalities. Moreso, they can serve to further exacerbate the historical pattern of undervaluing care work and its

essential link to productive economic activity (Fraser, 2021;[1] Binet et al., 2023; Alam & Houston, 2023). By approaching infrastructure through a care lens, policymakers can work instead towards collective and structural solutions for risk reduction.

From the perspective of informal employment, a care-focused urban infrastructure approach to the climate crisis should extend to both hard and soft infrastructures (Oates & Sudmant, 2024; UN Habitat, 2024; Lim, 2024; Dodman et al., 2019). Hard infrastructure includes physical systems that can support workers' routines, productivity, and health and safety. When considering climate impacts, these could be shaded rest areas, cooling centres, water and sanitation facilities, weather-resistant storage, and heat-reflective materials. Soft infrastructure encompasses social systems and knowledge networks, which in climate contexts could include early warning systems, health and safety training, and support networks, cooperatives, and community-based solutions. Together, these hard and soft dimensions make visible how care can be embedded in both the material and social infrastructures of a city.

3. The Acamares Waste Pickers' Cooperative: "Collective Intelligence" as a Catalyst for Climate Resilient Workplace Infrastructure

In recent decades, Brazil has pioneered inclusive solid waste management by organizing waste picker cooperatives, integrating them into municipal recycling, and legally recognizing them through the 2010 National Solid Waste Policy (Bouvier & Dias, 2021). Waste pickers ("catadores") in Brazil work under three main arrangements: as autonomous pickers operating individually, as members of cooperatives or associations, or under contracts in junk yards, industry, or municipal services. While the 2010 Policy is national in scope, it is at the municipal and state levels where this recognition is implemented. Local governments in Brazil have long been central in facilitating waste pickers' cooperatives, supporting them with land, equipment and contracts for waste collection.

The strong history of collective organizing has been linked to improved working conditions and stronger partnerships between government and non-government actors (Dias et al., 2023). Moreso, cooperatives offer a model that embeds varying

[1] For Fraser (2021), capitalism is both the driver of the climate crisis, as it has been the root cause of social injustices involving class exploitation, racism, imperialism and gender and sexual domination.

dimensions of mutual care. With the well-being of workers, their families and communities placed front and center, cooperatives offer sustainable alternatives to traditional economic models (Parra & Farias, 2024).

The Acamares cooperative was founded in 2018 with support from the Brazilian Waste Pickers Movement (MNCR) and other civil society organizations. Focusing on the principles of the social solidarity economy, the cooperative prioritizes the inclusion of women, black women and single mothers. Currently, the Acamares cooperative has 25 waste pickers, 15 of whom are women. Close to half of the cooperative members are younger workers. The cooperative operates two sorting centres: one in the city of Sarzedo and the other in Mário Campos in the state of Minas Gerais, Brazil. The cooperatives' main pillars of work include selective waste collection, agroecology, and sewing.

Throughout Acamare's history, it has closely collaborated with and relied on support from several key actors: technical staff in areas ranging from communications to agroecology, solid waste management experts from civil society and academia, local and national governments and the private sector. This vignette reflects particularly on the newly constructed sorting centre in Mário Campos, which was financed through several public and private projects.

In Mário Campos, the transformation of the Acamares cooperative's infrastructure was made possible through a complex funding arrangement centered on environmental compensation. The largest share of funding came from Vale, the Brazilian mining company responsible for the 2019 Brumadinho tailings dam rupture, which caused 272 deaths and devastated the community and surrounding ecosystem. Additional resources for the renovations came from parliamentary amendments, with some oversight and support from local companies and government entities. Once the sorting centre was completed, a contract was signed between the local government and Acamares for municipal selective waste collection services.

Despite the different funding sources, Acamares had considerable, if not complete, autonomy over how best to use the resources to meet their demands and interests for a climate-resilient and sustainable sorting centre.

Ideas for upgrades to the sorting centre emerged during the cooperative members' participation in WIEGO's exploratory mapping of climate impacts on waste pickers in Brazil in 2022. WIEGO survey (2022) findings revealed 91% of interviewed waste pickers had experienced at least one extreme weather event in

the past year, particularly extreme heat and flooding. During participatory focus groups, waste pickers highlighted issues involving the need for improved indoor environmental quality through better ventilation, lighting, and thermal comfort systems, along with workplace amenities such as water fountains, exhaust fans, and refrigerators.

As the leader of the cooperative recalled, the exploratory mapping helped place climate issues on the waste pickers' agenda. "*Climate change was far from our thinking. We suffered from its impacts, but we didn't have the awareness [of the linkages]. During the research activities, we brought up the problems workers were facing. We decided to think about the Mário Campos sorting centre and asked ourselves what we could do with the financial resources.*"

The waste pickers of Acamares were aware of climate change related impacts and environmental degradation, especially as it affects their lives and livelihoods. However, more technical support was needed to understand complex scientific lexicon, and prepare for adaptation and mitigation. Building on insights from the climate research, Acamares received support from technical experts, primarily from civil society and academia, to translate their vision into concrete improvements. This meant relying on collective intelligence and networks: "*I think the success of Acamares is not working alone. We didn't do anything alone, we did it by listening, by looking for partnerships*," reflected the Acamares leader.

The infrastructure upgrades included improved lighting and ventilation systems, rainwater harvesting capabilities, solar panel installations, and enhanced pavement accessibility. The cooperative also prioritized structural changes over individual equipment restoration, reflecting strategic thinking about longer-term decent workplace conditions and sustainability.

These infrastructure improvements transformed the everyday work experience by increasing workers' productivity and well-being. "*Productivity improves because you are enjoying work. You aren't in that extreme heat. The centre is cool and this increases productivity. In terms of the space, it is much better with surrounding trees and even animals,*" stated the Acamares leader. The process of embedding care practices involves the aforementioned tangible changes, as well as relevant intangible aspects, such as access to clean air, pleasant views and green spaces.

Recognizing that their work extends beyond the sorting centre walls, the cooperative addressed broader environmental challenges affecting their

community and agroecology practices. Resources were also used to treat eleven cesspools, providing benefits to the surrounding neighborhood while supporting their own agricultural work. As the Acamares leader explained: "*We can't practice agroecology seeing that the soil is getting infected, so we took care of it. We treated the cesspools*."

While a service provision contract is now in place, ensuring ongoing rather than ad-hoc support for adaptation remains crucial. This also has implications for the roles of different local government ministries. WIEGO survey (2022) findings reveal that when waste pickers recalled receiving support for extreme weather events, it came primarily from the private sector (34%), followed by city government (31%) and NGOs (23%). Waste pickers particularly noted the role of civil defence teams and the municipal basic sanitation agency.

Acamares reveals how spaces in which workers work and occupy are much more than workspaces. *"I see the warehouse as our home. We spend most of our time here. Most of us are vulnerable workers from the periphery. Housing is extremely important to us. Waste pickers often lack adequate housing at home and also lack proper conditions in our sorting centre, which is also home.* The case of the Acamares cooperative shows that when workers control the design process through data-driven participatory research and collective intelligence, hard infrastructure can become a vehicle for climate adaptation that strengthens both individual livelihoods and community resilience.

3.1. The Role of Local Governments in Providing Decent Work Conditions

Local governments can scale worker-led climate adaptation by institutionalizing assessments with worker organizations, developing technical advisory networks that embed worker knowledge into infrastructure design, and enabling multi-source funding frameworks. For scalability to other contexts in Brazil, a much more concerted effort needs to be made, involving different local government ministries, such as Municipal Basic Sanitation Agency and Municipal Environment Agency, the Public Prosectors' Office, civil society actors and the MNCR.

These structural support mechanisms should be complemented by sector-specific actions: recognizing waste pickers as service providers within city-wide recycling systems; staff training in cooperative principles, participatory forums, and updated data systems; and leveraging national and municipal

financial institutions to create dedicated climate adaptation funding lines for cooperative-led infrastructure improvements (Kumar & Ghimire, 2019; Dias, 2024). These pathways ensure that climate adaptation strategies reflect care principles.

While Acamares demonstrates the power of worker-led hard infrastructure, climate resilience also requires robust information systems and social networks, which is the focus of the second vignette.

4. HomeNet Thailand: "Chain Agents" and Collective Networks for Climate Health

Informal employment is central to Thailand's economy, representing more than half of all jobs nationally and 42% in Bangkok. Within this landscape, street vendors and home-based workers are two important occupational groups in the city and account for 5 and 11% of the city's workforce, respectively (Warunsiri et al., forthcoming; Poonsab et al., 2019). Street vendors are critical to the urban food systems, while home-based workers are integral to modern, industrial chains of production. Women comprise the majority of workers in both sectors.

Extreme heat is an escalating threat to Bangkok and climate vulnerabilities of both groups are closely tied to their place of work. Vendors spend long hours outdoors, exposed to rising temperatures with little shade or protection, especially when outside semi-formal market structures. Home-based workers depend on their homes as productive assets, yet many live in cramped, poorly ventilated housing in underserviced areas. In both cases, inadequate infrastructure intensifies climate shocks, especially heat.

In May 2025, HomeNet Thailand (HNT) and WIEGO surveyed 1,026 workers to assess the impacts of extreme heat on their working conditions during April, typically Bangkok's hottest month. Survey findings showed that nearly 80% of workers had to reduce their working hours and 73% of street vendors and 80% of home-based workers reported heat-related illness in themselves or their households. In many instances, symptoms were severe, as 61% of all workers required medical attention, with older workers facing the greatest health risks. Impacts on workers' mental health were also especially acute: 90% of the sample reported deteriorated mental health, such as increased anxiety and irritability.

Survey data further illustrate how access to shade, ventilation, and basic services mediate resilience. Vendors without shelter were 9 percentage points more likely to reduce working hours and 16 percentage points more likely to report damage

to goods than those with some protection. They also bore higher costs: 76% of vendors without shelter reported increased expenses to keep cool, compared to 58% of those in market structures. For home-based workers, the home itself is the workplace, making housing quality a central determinant of resilience. While 86% reported more than one window, 14% lived in dwellings with none or only one, trapping heat and compounding risks.

4.1. HomeNet Thailand's Approach

Founded in 1999, HNT has long fought for informal workers' rights, from contributing to universal health coverage to advocating for the Homeworker Protection Act[2] and sectoral regulations. Through the Federation of Informal Workers of Thailand (FIT), it now represents more than 10,000 workers across several occupations, including street vendors, home-based workers, motorcycle taxi drivers and domestic workers.

Occupational health and safety has been a central concern, especially given that existing laws apply primarily to formal workplaces. For instance, while Thai Occupational Standards require employers to halt or adjust work when certain temperature thresholds are crossed, and to provide protective equipment, warnings, and health check-ups, no guidance exists for self-employed workers. In 2016, the Ministry of Public Health recorded 2,473 heat illness cases in outdoor jobs, with most of these cases involving informal workers who are not covered by occupational safety laws (Phanprasit et al., 2021).

Recognizing growing climate risks, HNT has expanded its focus to climate resilience. Building on lessons from COVID-19 health campaigns, it worked with WIEGO and public health specialists from Workplace Health Without Borders to develop practical heat-health guidelines for workers in informal employment. These guidelines explain how to recognize heat-related symptoms, prevent illness, and respond in emergencies. An important aspect of the process was HNT's role in adapting guidelines to workers' realities. For example, while international guidance suggested cooling down in public spaces, malls or libraries, HNT recognized that many workers face stigma in public spaces. As a result, the guidelines offered feasible alternatives like buddy systems among workers, paired with visuals that reflect workers' environments and lived experiences.

[2] The Homeworker Protection Act mandates fair wages, provision of contracts, and ensuring occupational health and safety on the part of the employer.

HNT has leveraged its strong grassroots networks to disseminate these materials, including by distributing them to leaders in all four regions where they work (Chiang Rai, Songkhla, Khon Kaen, and Nakhon Pathom). Information circulates via Line groups, social media, and trusted sector leaders, ensuring a wide reach across different worker age groups as well. This model mirrors public health approaches like Thailand's Village Health Volunteers, where peer leaders act as trusted intermediaries. Officials in the Department of Disease Control acknowledge that organizations like HNT are essential partners: "*To effectively do this kind of work, informal workers can't be approached individually; they need to be part of a group with designated representatives to act as 'chain agents'.*" This linkage allows HNT to reach workers who would otherwise remain invisible to public health systems.

According to HNT leadership, the guidelines reflect the care logic that underpins their work. "*Workers have told us they wish we had brought this information to them sooner — which shows how much they value it. For us, it's a reminder that caring for our members goes beyond laws or benefits; it's about their lives. Even if we achieve policy victories, like universal healthcare or social protection, it means little if workers are still dying from extreme heat. This guideline reflects what HNT has always tried to do for over 30 years: to truly protect and support our members in every aspect of their well-being.*"

4.2. The Role of Local Governments in Building Heat Resilience

The Bangkok Metropolitan Administration (BMA) plays a central role in shaping the urban environments that determine workers' exposure to extreme heat. In 2024, the BMA launched an Urban Heat Management Framework with year-round interventions, including awareness campaigns, emergency response measures, healthcare preparedness, and physical cooling strategies such as tree planting, cool pavements, and urban ventilation corridors (Rubinyi et al., 2025). These measures highlight how local governments can protect urban workers whose livelihoods depend on public spaces and home-based workplaces.

However, important gaps remain in Bangkok's Early Warning System, which reaches residents through apps and online alerts (Rubinyi et al., 2025). In HNT and WIEGO's survey, less than half of workers (43%) reported receiving timely warnings. Moreso, focus group discussions suggest that many of these warnings came from general weather applications rather than the city's official system.

Since workers have varied communication preferences and capacities, authorities should disseminate information through diverse channels, from brief video content to in-person community gatherings. This approach accounts for disparities in digital access and literacy levels among workers.

This is where there is potential for complementarity between worker-led networks and local government action. While the BMA brings scale, resources, and technical expertise, organizations like HNT can ensure interventions are grounded in lived realities. Building on these respective strengths, the BMA should empower workers through training, enabling them to serve as climate sensitization agents in their communities. Equally important are sensitization campaigns for local health and community volunteers regarding the risks workers face.

5. Complementary Pathways to Climate-Resilient Care Infrastructure

Taken together, the Acamares and HomeNet Thailand vignettes illustrate how worker-led initiatives can drive climate resilience through both hard and soft infrastructures. The Acamares cooperative demonstrates how workers' collective intelligence can translate into material improvements in workplace design that directly enhance safety, productivity, and community well-being. HomeNet Thailand shows the power of social networks and trusted intermediaries to adapt and circulate life-saving information, bridging critical gaps in occupational health and early warning systems. In both cases, worker organizations played essential bridging and knowledge translation roles that strengthened the credibility, accessibility, and practical use of climate-related information while preventing the exclusion of those without access to formal channels.

Table 1 illustrates how a differentiated care logic manifests through hard and soft infrastructure interventions.

Table 1. Dimensions of Care in Practice

Hard Infrastructure: Acamares Sorting Centre	Soft Infrastructure: HomeNet Thailand's Heat Guidelines
• Care for workspace through ventilation and lighting systems • Care for broader community through environmental remediation and agroecological practices	• Care for workers during climate emergencies through access to information and trusted networks

• Care for future sustainability through rainwater harvesting and solar installations • Care with particular attention to black women and single mothers	• Care with particular attention to women and older workers
• Worker control of design process and resource allocation	• Co-led knowledge translation ensures accessible and actionable information
• Infrastructure improvements address workplace safety, climate adaptation, community environmental health, and economic productivity simultaneously	• Multiple formats and channels relay information to diverse audiences

Despite their different entry points —material infrastructure in Brazil and informational infrastructure in Thailand— both cases highlight three shared lessons. First, local governments play a fundamental role in supporting both hard and soft infrastructures to build climate resilience. Through funding and oversight, they can ensure that physical improvements to urban and workplace infrastructure are reinforced by social support mechanisms and vice versa. A transformative approach requires actively strengthening these linkages rather than treating infrastructure investments as separate or sequential. Ultimately, a care-focused approach can enhance both material conditions and social relations, fostering greater socio-economic inclusion and well-being, particularly for those historically excluded from access to services and protection. Second, worker organizations are indispensable actors in designing climate-resilient systems, as they mobilize knowledge, trust, and participation. Third, equity and inclusion are central to resilience: whether through Acamares' prioritization of women and marginalized workers or HNT's adaptation of guidelines to the realities of street vendors and home-based workers and older workers in particular, care-focused responses must attend to workers' diverse needs.

These vignettes underscore that climate adaptation in cities cannot rely solely on top-down planning or individual coping. WIEGO has documented how workers' member-based organisations have stepped in during crises where labour markets and the state have failed, providing immediate relief, advocating for

state support, and securing occupational health and safety protections (Vaux & Lund 2003; Horn, 2011; Chen et al., 2022). Building on this collective action, resilient and caring cities emerge when governments and civil society recognize the interdependence of hard (physical) and soft (social) infrastructures and when workers in informal employment become co-designers of change.

6. Local Government Leadership in Climate-Care Solutions

Local governments are uniquely positioned to translate these lessons into practice. As the level of government closest to workers' daily realities, local authorities can shift dominant economic narratives that see workers in informal employment as unproductive, and instead recognize their essential contributions to urban systems, particularly during crises. This requires expanding the scope of what care looks like across homes, streets and community networks and for whom cities provide care.

Local governments can also move beyond technocratic planning approaches. As conveners of multistakeholder dialogue, they can bring together worker organizations, civil society, private sector actors, and different government departments to ensure more effective and integrated policy design. Most critically, local governments can counter urban development trends that have systematically ignored how infrastructure shapes workers' care responsibilities and economic opportunities. By embedding care and equity into infrastructure planning, cities can rebuild the connections between livelihoods and community resilience that sustainable urban systems require.

The following policy recommendations provide pathways for more transformative policy practices.

7. Policy Recommendations for Local Governments

Establish Enabling Frameworks

- **Adopt Supportive Legal Frameworks:** Recognize informal workers in urban and climate policies to enable access to protection, services, and investment.

- **Institutionalize Social Dialogue:** Create permanent platforms for worker organizations to participate in government and private sector decision-making so that policies reflect lived realities and gain legitimacy.

Strengthen Knowledge and Planning

- **Integrate Informal Work into Climate Plans:** Co-design adaptation strategies with worker organizations to improve feasibility and ensure strong uptake.
- **Conduct Climate Risk Assessments:** Map vulnerabilities in public workspaces, home-based clusters, and waste collection zones using standardized indicators to guide resource allocation, strategic investment and emergency planning. Consider and address both group and territorial inequalities and risks.
- **Expand Early Warning Systems:** Partner with worker groups to extend the reach and effectiveness of alerts and preparedness campaigns, especially in hard-to-reach communities.
- **Support Peer-to-Peer Learning:** Partner with civil society to support and fund peer-to-peer programmes for workers on selfcare and collective care.

Deliver Targeted Interventions

- **Invest in Climate-Resilient Infrastructure:** Provide shade, water, sanitation, cooling stations, and rest areas in dense work and residential zones. Leverage existing infrastructure like schools and health centres.
- **Issue Tailored Health Guidelines:** Adapt climate-health advice to workers' real conditions in collaboration with their organizations.
- **Secure Waste Collection Contracts:** Formalize service agreements for selective waste collectors to provide stable income and improve urban services.

Secure Long-term Funding

- **Create Climate-Work Resilience Funds:** Establish municipal financing mechanisms with multi-level governance and worker participation.

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