HERA

COUNTING THE COST OF HEAT: THE CASE FOR URGENT SOLUTIONS FOR CITIES

Deep-dive report series: Bangkok, Thailand

Bangkok is a hot, humid city, whose dense core can be 10°C warmer than its surroundings

Bangkok is relentlessly hot and humid due to its tropical location and built-up urban environment. Average daily maximum temperatures are above 33°C (91°F) year-round, and the hot season sees round-the-clock heat, with nighttime temperatures usually around 31°C (87°F).[1] Humidity is high, peaking at nearly 80% during the May-October monsoon season, leading to stifling conditions in which the air feels heavy, making even breathing difficult. The heat is greatly intensified by the urban heat island effect[2]: Bangkok has only 16 square feet of green space per person, one-sixth of the WHO-recommended minimum, and one of the highest population densities in the world, meaning urban areas can be 10°C (18°F) hotter than surrounding rural areas during the day and 6°C (11°F) hotter at night. [3,4,5] The incidence of extreme heat is rising rapidly, with the frequency of heatwave days expected to increase three-fold by 2050.

Bangkok illustrates how extreme heat increasingly affects women through indoor and home-based work, rising energy costs, and crowded urban heat islands – dynamics that are becoming more common in rapidly growing cities worldwide.

Kanokporn's experience: indoor work offers little protection from extreme heat

Kanokporn Hoosawatdee is a food vendor who prepares and sells home-cooked meals from her home – working indoors but surrounded by three stoves that trap and radiate heat. The combination of high temperatures, humidity, and poor ventilation makes her work not just uncomfortable but hazardous, mirroring the experiences of many women who cook, clean, and trade in small, enclosed spaces across the city. As Bangkok grows hotter, women working in informal and home-based occupations face growing risks to their health, incomes, and wellbeing.

[1] Met Office
[2] A phenomenon in which cities are significantly warmer than rural surrounding areas, due to buildings, roads, and other infrastructure absorbing and retaining heat.
[3] Our World in Data
[4] Climate Resilience for All
[5] Atlantic Council

Kanokporn has little respite from Bangkok's sweltering heat. She wakes at 1 a.m. to begin cooking, yet even at that hour the air is already "searing". Surrounded by stoves, she works in stifling humidity until her clothes are drenched in sweat "as if soaked in water," she says. She showers repeatedly just to stay comfortable and changes clothes four times a day. The heat gives her headaches that complicate treatment for her high blood pressure, and she suffers from a sweat allergy that causes painful itching and requires medication.

Kanokporn's experience is far from unique. Across Bangkok, extreme heat is already taking a toll on people's health. Each year, extreme heat contributes to the death of at least 540 Bangkok residents (likely an undercount) – a figure projected to rise fivefold by 2050 due to climate change, population growth, and ageing. During heatwaves, up to one-third of Bangkokians experience heat stress, while over 20,000 people face severe complications from chronic coronary, respiratory, and renal diseases. Bangkok's more than one million older residents and nearly 900,000 children are especially at risk, underscoring the urgent need to protect the city's most vulnerable as temperatures continue to rise. These health impacts are exacerbated by rapidly rising night-time temperatures.[6] Kanokporn describes how the air is still and hot – even in the middle of the night. She cannot sleep – and she thinks this is why her blood pressure is not responding to medication and lifestyle changes.[7]

In addition to impacting health, extreme heat increases the cost of living. Running fans and air conditioning units increases energy bills – Kanokporn has two fans and a small air conditioning unit, which, while insufficient to quell the heat, do increase her expenses. Her electricity costs are usually about ฿800 ($25) per month and can reach up to about ฿1,500 ($47) in the summer. But her costs surged during a particularly hot spring. "Last April, I paid ฿3800 ($120) for electricity because I turned on the air-conditioner day and night to fight the heat." Bangkok residents already face average electricity bills of

[6] Climate Resilience for All (2025)
[7] He et al. (2022)

฿1,133 ($35) per month, over three times higher than the average household in the more temperate northeast of Thailand.[8] A 1°C rise in average temperatures in Bangkok is associated with an estimated ฿17 billion ($535 million) increase in electricity costs per year.[9] Higher air conditioning use not only means higher costs – it also increases greenhouse gas emissions since Bangkok's electricity is largely supplied by fossil fuels[10], and further exacerbates urban heat islands, as heat that is extracted from buildings is released in the city.

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For Kanokporn, the heat also reduces her income. On hot days, she has "fewer customers because they don't want to walk outside in the heat." As the frequency of hot days rises, she sees a persistent reduction in her sales. "I used to sell between 17kg (37lbs) and 20kg (44lbs) of sticky rice a day, now I sell between 13kg (29lbs) and 14kg (31lbs)." This is forcing her to reconsider her business – and she notes she might have to change her profession entirely if her sales slip further. Extreme, relentless heat also makes people work less effectively. Those who work outdoors are more easily exhausted, while even people who work in air-conditioned offices can be impacted by heat through reduced sleep at night, unless they have access to cooling at home.[11] Labor productivity losses in Bangkok are the equivalent of nearly 4% of GDP per year on average (equivalent to the city's annual budget), rising to 8% in hot years.

Losses from reduced income, reduced productivity, and higher energy costs disproportionately affect women – and the family members in their care. While women earn less than men in Bangkok, they spend a higher share of their incomes on their families or households. Losses from extreme heat are reducing Bangkokian women's family investments (including spending on education, medical care, and nutrition) by up to $500 per year.

[8] Atlantic Council
[9] World Bank (2025)
[10] International Energy Agency (2023)
[11] Chen et al. (2023)

Bangkok can build on the Hot Season Intervention Framework by expanding preventative health measures

Bangkok has well-established early warning systems and regulations that help its inhabitants prepare for and respond to extreme heat. The Bangkok Metropolitan Administration (BMA) sets heat-index thresholds, which trigger specific response actions like deploying cooling shelters.12 Action plans and warning systems are accompanied by workplace standards - Thailand's occupational heat standard limits the amount of manual labor that is permitted under different temperature thresholds. This could protect up to 80% of workers in workplaces that comply with the standard.13 However, Kanokporn's experience suggests these efforts are insufficient to protect the entire population, especially those who are self-employed or living in lower-quality housing.[14]

Bangkok authorities have already set ambitious greening targets: the BMA plans to plant one million trees (alongside private-led initiatives such as Metro Forest[15]). However, reaching these targets will require sustained commitment and innovation. With only 16 square feet of green space per person today, expanding and maintaining vegetation is essential to reducing impacts of extreme heat in the city. Converting underutilized land, promoting rooftop gardens, and investing in blue-green infrastructure could all help deliver meaningful cooling and resilience benefits. Our analysis indicates that increasing green space by only 10% would produce more than $468 million in annual benefits (at only $25 million in annual costs). Sites for green space can be targeted to people and areas that are most vulnerable to impacts from extreme heat. For example, the Oasis schoolyard program in Paris, which transforms schoolyards into green spaces accessible to local communities, specifically targeted areas with higher vulnerability, such as lower income neighborhoods.[16]

To alleviate heat-related suffering, Bangkok could focus investment on cool roofs — for which there is strong evidence of high returns. Expanding the use of cool roofs could reduce indoor and urban

[12] World Bank
[13] Atlantic Council
[14] Atlantic Council
[15] World Bank
[16] Climate ADAPT

temperatures, thereby cutting energy costs and improving comfort for Bangkok's residents. Cool roofs can lower indoor temperatures by 2-5°C degrees, offering immediate relief and reducing expenditure on energy, especially for low-income households in poorly insulated buildings.[17] This analysis suggests that every dollar spent on cool roofs generates nearly $26 in health and economic benefits. However, uptake has been limited due to perceived cost barriers, inconsistent quality standards, and lack of regulatory incentives. Strengthening and enforcing building regulations can help overcome these obstacles by mandating reflective materials or surface coatings in new construction and major renovations, while offering incentives or subsidies for retrofits. Housing authorities can play a role - for example, in Singapore, the Housing and Development Board is implementing cool roof coatings across its estates, following a pilot which showed indoor temperature decreases of up to 2°C and reductions in electricity consumption.[18] Cool roof programs can also specifically target lower-income housing. For example, Ahmedabad has piloted cool roofs for slum households, with resulting indoor temperatures 2-5°C cooler.[19] Together, these steps would not only advance Bangkok's Master Plan on Climate Change but also prevent maladaptation that locks in higher energy demand and intensifies urban heat.

Kanokporn*'s* narrative demonstrates that extreme heat is not only an outdoor problem. For women engaged in indoor and home-based work, poorly ventilated spaces, relentless night-time heat, and rising energy costs combine to create serious health and economic risks. Kanokporn's experience shows how these pressures accumulate, eroding sleep, straining health, inflating living costs, and undermining livelihoods. Yet these outcomes are not inevitable. By reducing indoor heat exposure and lowering the cost of safe cooling, Bangkok can protect women working at home and indoors while strengthening the city's resilience to a hotter future.

[17] Vellingrini et al. (2020), Cedeno-Laurent et al. (2023)
[18] HDB (2025)
[19] Vellingiri et al. (2020)

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We build resilience to extreme heat

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