

RESEARCH REPORT



Unsheltered Homelessness and Extreme Urban Heat in Salt Lake County, Utah

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Executive Summary

Extreme heat poses growing health risks in U.S. cities, particularly for people experiencing unsheltered homelessness (PEUH) who lack consistent access to indoor cooling. This report shares insights from three connected studies that explored how policy and tree equity shape PEUH experiences and adaptation to extreme heat in the Salt Lake Valley.

- **Study 1 documented exposure to hazardous conditions among PEUH and asked whether tree shade reduced risk.** Eight PEUH participants used GPS-enabled smartphones and backpack-mounted weather monitors to track locations and temperatures over six summer days. Participants routinely experienced hazardous conditions, including prolonged exposure to moderate (≥ 32.8 °C) and high-risk (≥ 39.4 °C) heat-index thresholds, with high temperatures at night as well. Tree canopy was significantly associated with lower heat index in as little as 10-15 minutes under shade.
- **Study 2 explored how PEUH in Salt Lake Valley experience extreme heat in public spaces.** The team conducted onsite interviews with 24 PEUH in the Salt Lake Valley who described how the built and unbuilt environment, public amenities, and municipal and business policies shaped their ability to cope with extreme heat and affected their health. They reported heat exhaustion, dehydration, sleep disruption, and emotional strain, with limited access to shade, water, and restrooms.
- **Study 3 considered how Salt Lake City businesses respond to people who are perceived to be experiencing homelessness.** The study team conducted interviews with 30 managers and staff from Salt Lake City store-front businesses identified in Study 1 as high-use locations for PEUH. Business responses to PEUH were largely informal, individualized, and shaped by staff discretion rather than corporate policy. Most allowed PEUH to enter without time limits, although some imposed restrictions based on traffic, behavior, or purchases.

KEY RECOMMENDATIONS

1. Establish Code Red policies for extreme heat.
2. Treat water, bathrooms, shade, and cooling resources as integrated heat infrastructure.
3. Expand cooling center locations and hours of availability.
4. Expand and protect tree canopy where PEUH actually spend time.
5. Establish protected shaded rest areas during extreme heat.
6. Include PEUH directly in climate-health planning.
7. Engage businesses as partners, not substitutes for public infrastructure.
8. Support community and peer-led adaptation.

Together, these studies present an urgent need for inclusive climate adaptation and thermal equity. Priority actions include establishing heat-related policy, expanding public tree canopy, improving access to water and indoor cooling, and including PEUH in climate-health planning. We conclude by noting that housing remains the most effective protection from extreme heat coupled with immediate interventions to reduce harm.

Study 1: PEUH Exposure to Heat and Effects of Tree Shade

This study was published in the *Journal of Urban Health*: <https://link.springer.com/article/10.1007/s11524-026-01134-7>.

Study Goals

- Document the level of heat stress that PEUH experience during a typical summer week in Salt Lake City, Utah.
- Assess how tree shade affects heat stress for PEUH.

Methods

- Ten research participants were recruited for this study through personal communication and direct outreach in parks and urban homeless encampments in Salt Lake City, Utah. Eight of these participants had usable data at the end of data collection. Participants had diverse histories with unsheltered homelessness. The sample was evenly split between men and women and was predominantly white (75%).
- Over 6 days in late July/early August 2024, we asked participants to carry Kestrel sensors, which recorded ambient environmental conditions such as temperature and relative humidity every 5 minutes. Participants also carried GPS devices that recorded their location every 5 minutes. At the end of the week, participants turned in their devices so that environmental and location data could be extracted.
- Participants were provided cash incentives at three points during the data collection period and were provided smartphones with three-month data plans at the final touchpoint.

Heat Metrics

- To understand the heat stress that participants were exposed to, we used heat index data from kestrel sensors. Heat index combines air temperature and relative humidity and is commonly used as a measure of heat stress. For instance, the Occupational Safety and Health Administration (OSHA) uses heat index as a primary metric for identifying risky working conditions.
- For each participant, we calculated the level of heat stress they were exposed to during daytime and nighttime hours.
- We also used governmental (OSHA) risk thresholds to determine how often and for how long people were exposed to moderate ($\geq 32.8^{\circ}\text{C}$ / 91.0°F), high ($\geq 39.43^{\circ}\text{C}$ / 103°F), and very high to extreme ($\geq 46.1^{\circ}\text{C}$ / 115°F) risk conditions, as well as hot night ($\geq 20^{\circ}\text{C}$ / 68.0°F) and very hot night ($\geq 25^{\circ}\text{C}$ / 77.0°F) thresholds from prior research on overnight temperatures and health outcomes.

Location Data

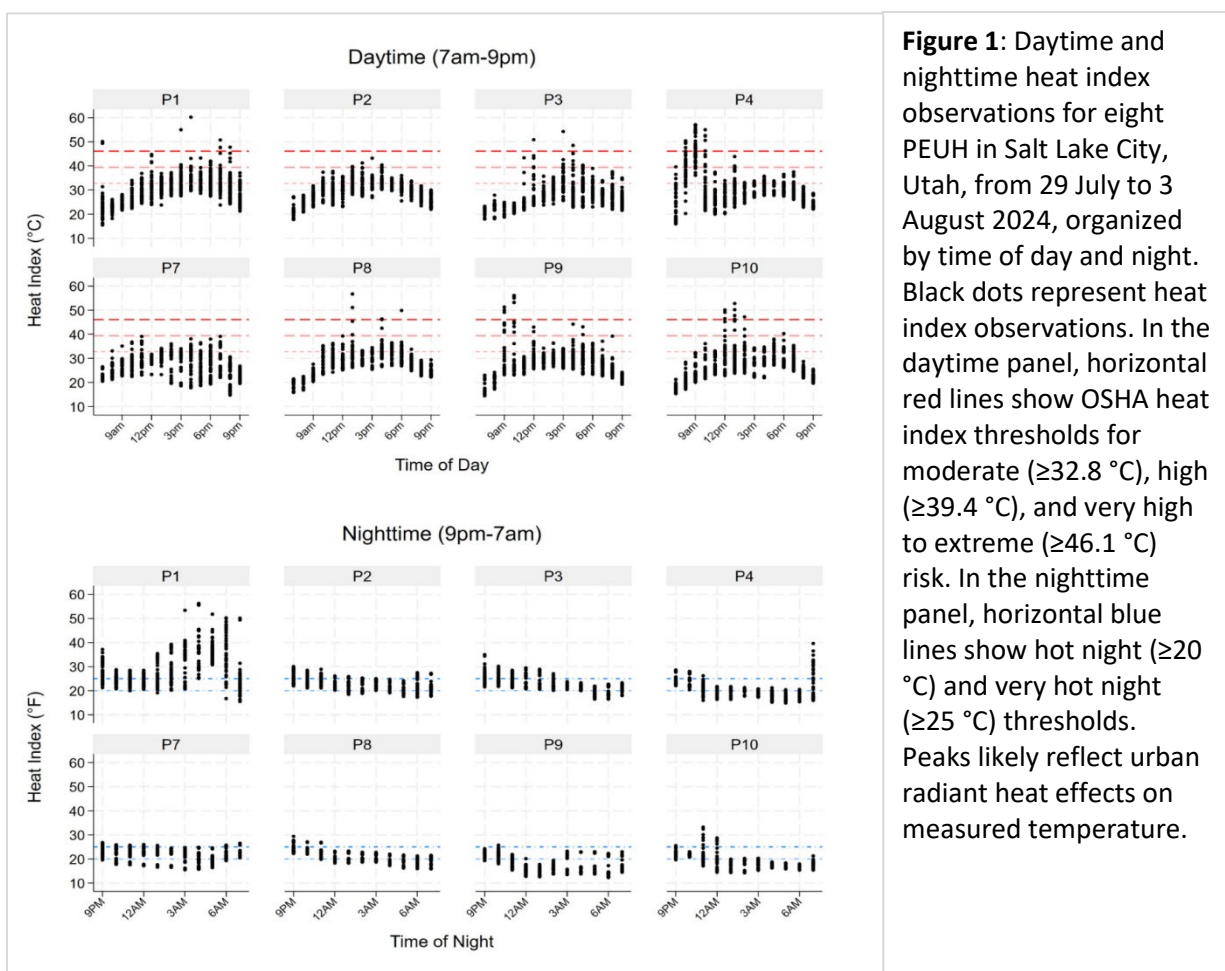
- Location data were used to identify when participants were within 10 feet of tree canopies, buildings, roads, and parks.

- Since location data were recorded every 5 minutes, we were able to estimate the number of minutes an individual had spent under tree shade. For example, if they were under tree shade for two consecutive time points, we took this to mean that they had been under tree shade for at least 5 minutes.
- Using this data, we were able to test whether time spend under tree cover reduced the heat index of PEUH.

Findings

Heat Experiences

- Across daytime and nighttime hours, average heat index was 26 °C (78.8 °F). Average heat index during the hottest hour was 43 °C (109.4 °F).
- Participants were exposed to moderate risk nearly 20% of their daytime hours. High and very high/extreme risk conditions were less common (<4% of the time), but they did occur. On average, participants spent 18 minutes in very high to extreme risk conditions at least once during the study period.
- People did cool down at night (average heat index was 22 °C (71.6 °F) at night, versus 28 °C (82.3 °F) during day), but likely not enough to get relief from the heat of the day. People spent 69% of nighttime hours above the hot night threshold in which sleep tends to be disrupted, and 16% of nighttime hours were spent in very hot night conditions.



Effects of Tree Cover

- Participants were under tree cover for upwards of 40% of the time
- During afternoon hours, when heat index was highest, time under trees was linked to 0.89 °C to 1.75 °C (1.6 °F to 3.2 °F) reduction in heat index compared to not being under trees.
- Being in/near building was also linked with 1.09 °C (2.0 °F) reduction in heat index.

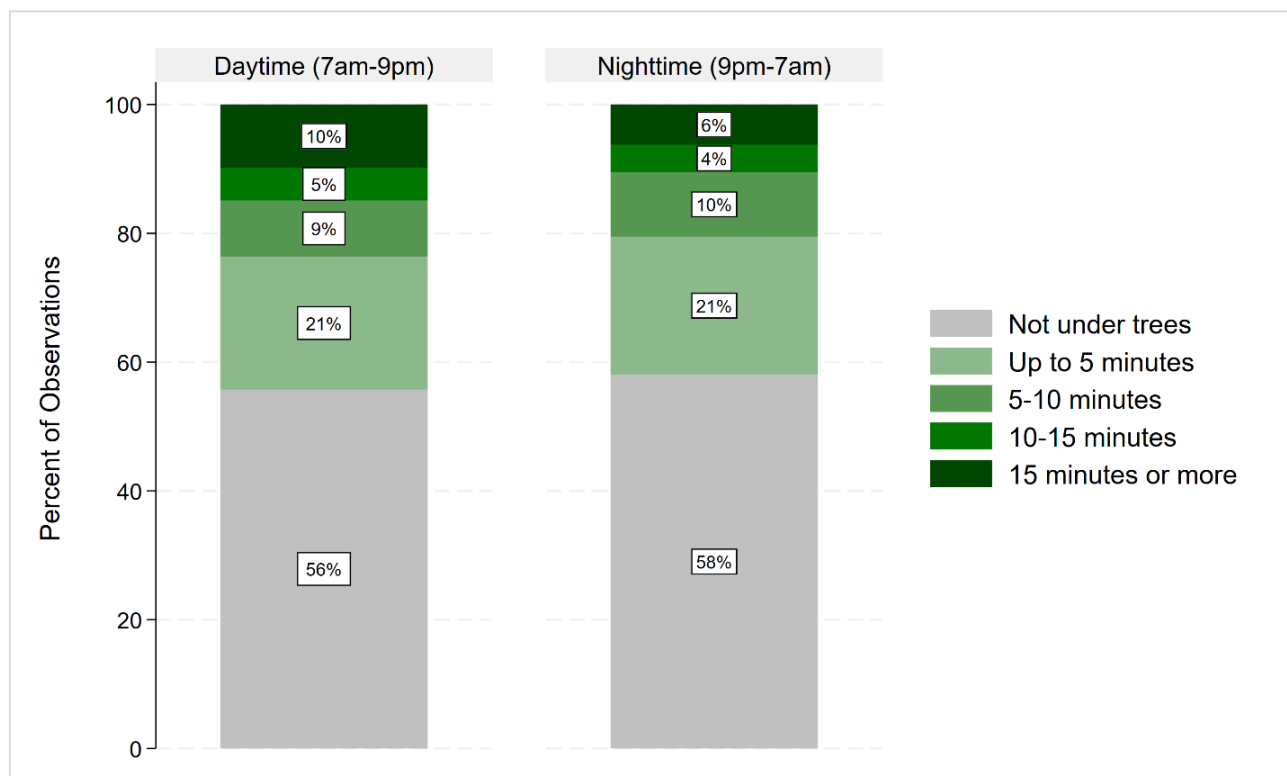


Figure 2: Percent of time eight PEUH spent under tree cover in Salt Lake City, Utah, from 29 July to 3 August 2024. 100% stacked bar graph shows the percent of observations in which participants were (1) not under trees, (2) under trees for 5 minutes or less, (3) under trees for 5-10 minutes, (4) under trees for 10-15 minutes, or (5) under trees for over 15 minutes during daytime hours (7am to 9pm, N = 2,727), and nighttime hours (9pm to 7am, N = 1,409).

Implications

- PEUH are exposed to high heat index – day and night
- Trees matter: Sustained access to tree shade can significantly reduce heat stress for PEUH.
- Nighttime relief is limited: Even cooler nights may not offer enough recovery from daytime heat.
- Planning & Policy:
 - Ensure tree canopy in areas accessible to PEUH.
 - Expand equitable access to indoor cooling spaces
 - Include PEUH in climate resilience planning and urban greening initiatives

Study 2: PEUH Perspectives on Heat

This study is being prepared for submission to an academic journal.

Study Goals

- Understand how PEUH in the Salt Lake Valley experience extreme heat in public spaces
- Explore what role shade trees plays in survival

Methods

Researchers conducted 24 semi-structured interviews with PEUH in Salt Lake City during July and August 2025. Interviews were conducted in public urban areas, including Liberty Park, Pioneer Park, Sugar House Park, Washington Square, and the Jordan River corridor.

Most interviews lasted approximately 45-60 minutes and followed a consistent interview guide. A typical interview focused on participants' experiences with extreme heat during daytime and nighttime hours, how they accessed shade and drinking water, and their experiences with park bathrooms, police, and safety conditions in public spaces. Participants were encouraged to guide the conversation based on their own experiences and specific stories they had.

Interview transcripts were reviewed and thematically coded. Statements and narratives were grouped into recurring themes to support comparison. This analytic approach enabled the identification of shared challenges, coping strategies, and site-specific differences related to heat exposure and daily survival.

Findings

Thematic analysis of the interviews identified three interconnected themes: Health, WaSh and Shade, and Security and Displacement (Table 1). Together, these themes describe how extreme heat, access to basic infrastructure, and enforcement practices shape daily survival in parks and public spaces.

1) Health

Subthemes: Heat Exhaustion and Physical Health Risks; Emotional and Mental Strain

Participants frequently described direct physical impacts of heat exposure, including difficulty breathing, dehydration, fatigue, and heat exhaustion. Many reported actively seeking shade as a primary coping strategy during the hottest parts of the day. One participant explained, "It even gets to the point where it's hard for me to breathe... I just look for shade."

In addition to physical impacts, sustained heat exposure and daily instability were linked to emotional and psychological stress. Participants described exhaustion, difficulty concentrating, and emotional distress associated with constant movement, lack of rest, and limited access to cooling resources. As one participant noted, "It'll break you down emotionally and mentally." Despite these challenges, some participants described resilience through persistence and mutual support.

2) Water, Sanitation, and Hygiene (WaSH) and Shade

Subthemes: Water Access and Bathrooms; Shade and Trees as Survival

Reliable access to drinking water and bathrooms was a persistent challenge. Broken fountains, removed portable toilets, and locked restrooms increased the risk of dehydration and prolonged heat exposure. Participants described having to leave parks to search for water or being unable to cool down when facilities were unavailable. One participant stated, “There are no drinking fountains in this park anymore,” while another added, “They took out the portable toilets we relied on.”

Shade was described as essential for survival during extreme heat. Parks with tree canopy provided some relief, while areas without shade were often avoided or required frequent movement. As one participant summarized, “More water, more shade... stay out of the sun.” However, access to shade was uneven, and in some cases, participants reported being displaced from shaded areas.

3) Security and Displacement

Subthemes: Police Harassment; Community and Mutual Aid

Participants described enforcement practices that contributed to displacement, disrupted rest, and increased heat exposure. Some reported being required to move frequently or pack up early in the morning to avoid citations, including being told to leave shaded areas. One participant explained, “Cops chase us off with 30-second countdowns.”

At the same time, participants emphasized the importance of informal community networks in mitigating risk. Mutual aid practices, such as sharing food, water, and information about enforcement activity, were described as critical survival strategies. As one participant noted, “We share food and warn each other about sweeps.” These networks provided a sense of safety and support in the absence of consistent formal protection.

Table 1. Interview Themes

Theme	Subtheme	Participants (n=24)	Representative Quote
Health	Heat Exhaustion & Physical Health Risks	21	“It even gets to the point where it’s hard for me to breathe... I just look for shade.”
	Emotional & Mental Strain	18	“It’ll break you down emotionally and mentally.”
WaSH and Shade	Water Access	18	“There are no drinking fountains in this park anymore.”
	Bathrooms	15	“They took out the portable toilets we relied on.”
	Shade & Trees as Survival	20	“More water, more shade... stay out of the sun.”
Security & Displacement	Police Harassment & Displacement	19	“Cops chase us off with 30-second countdowns.”
	Community & Mutual Aid	16	“We share food and warn each other about sweeps.”

Implications

Based on the interviews and supported by existing research, findings from this study point to several actionable strategies that could reduce heat-related risks for people experiencing unsheltered homelessness in Salt Lake City. These implications align with the three core themes identified in the analysis.

1) Health

Extreme heat contributed to both physical and mental health strain among participants, including dehydration, heat exhaustion, disrupted sleep, and emotional fatigue. These risks were intensified by prolonged outdoor exposure and limited opportunities for rest and recovery.

Recommendations:

- Integrate unsheltered populations into city heat-response planning, including early warning systems and targeted outreach during extreme heat events.
- Expand access to low-barrier cooling options, including shaded rest zones and indoor cooling spaces that do not require proof of residency or service enrollment.
- Coordinate public health and social service responses to address compounded physical and mental health risks during heat waves.

2) WaSH and Shade

Reliable access to drinking water, bathrooms, and shade emerged as essential for daily survival, yet was uneven, limited, or inaccessible in many park settings. Participants described having to move frequently to locate basic amenities, increasing heat exposure and physical strain. These patterns are consistent with research on inequitable access to environmental protections and disproportionate heat risk.

Recommendations:

- Ensure drinking fountains and bottle fillers are functional, well-maintained, and clearly marked when out of service.
- Extend park bathroom hours during summer months, supported by regular cleaning and basic cooling measures such as fans or ventilation.
- Protect mature trees and expand tree canopy in high-use park areas.
- Install shaded seating and rest areas near water sources, bathrooms, and along major pedestrian corridors.
- Design shade structures that promote airflow and avoid trapping heat.

3) Security & Displacement

Enforcement practices, including move-along orders and sweeps, were reported to disrupt rest, displace people from shaded areas, and increase daytime heat exposure. These experiences contributed to cumulative physical and psychological stress, consistent with evidence on the health impacts of displacement. At the same time, community and mutual aid networks played a critical protective role.

Recommendations:

- Limit or pause non-emergency enforcement actions during extreme heat events.
- Establish designated, shaded rest zones where people can remain without fear of citation or displacement.
- Provide secure storage options to prevent loss of belongings during enforcement activities.
- Train park staff and security personnel in trauma-informed practices and heat-related risk awareness.
- Support peer-led and community-based networks, including women-led efforts, that improve safety and mutual support.

Study 3: Business Perspectives on PEUH and Heat

This study is currently under review with the journal, *Cities*. For more information or inquiries on Study 3 and business responses to PEUH and heat, reach out to Dr. Matthew Fry at m.fry@utah.edu.

In the absence of accessible public cool spaces, private businesses serve as default cool space refuges for PEUH and other vulnerable populations. We focus on Salt Lake City to understand business responses to people who are perceived to be experiencing homelessness.

Study Goal

- To understand businesses' policies around access to their property and plans to address extreme heat and homelessness.

Methods

The GPS routes of 8 individuals from Study 1 identified heavily frequented PEUH areas in the city. We selected five frequented areas to conduct interviews with businesses.

Researchers visited all businesses in each area (n=56) and engaged the first business personnel we encountered.

- Corporate chain and franchise businesses (n=31) weren't always open to chat (58% said no to interviews) and said that we would have to call corporate headquarters for permission.
- Among independent businesses (n=25), 52% said yes to interviews.
- In total, 30 business employees, managers, and owners agreed to interviews, most of which lasted ~15 minutes.

Each interview asked about formal and informal policies regarding who can access the business, off-limit spaces, time limits, existence of written guidelines/policies, enforcement, policy or practice changes through time, and future expectations.

Businesses were also asked about plans and responses to heat events, thoughts on outdoor/indoor spaces as heat refuges, and public health, safety, and access during extreme events.

Findings

Customer access, business policies, and PEUH

Notably, 50% of the business policies on access to space, length of time, and dealing with PEUH are informal, case-by-case, and based on personal preferences of the owners, managers, or employees. Although we expected to find that many businesses had written policies about engaging PEUH, only 30% of respondent businesses have corporate policies. The remaining 20% of respondents were not sure about the basis of the policies. Although some chain and franchise business respondents claimed that they have corporate policies for dealing with homeless people, specific policies on the corporate web pages were unavailable. Conversely, local businesses appeared better able and more willing to adapt practices and address case-by-case situations.

Most interview respondents (n=23, 77%) said their business does not have policies restricting who can enter the business, but most businesses (73%) have spaces that are off-limits to customers, including backrooms, storerooms, employee rooms, and kitchen areas.

- Most respondents (n=22, 73%) also said their business does not have set time limits for customers, with one respondent stating, “The longer the better. It's good for business” (R20).
- Some businesses do ask customers to leave after a set amount of time. For example, a convenience store clerk (R2) said he calls the police if someone (in this case PEUH) is in the store longer than 5 minutes.
- Another convenience store manager (R14) allows customers to stay about 10-15 minutes but handles each situation case-by-case.
- A fast-food restaurant (R24) allows customers to stay as long as they need but limits non-customers to between 15-30 minutes.
- Customer time limits may depend on the amount of customer traffic. For example, a professional services store manager (R28) has no time limits in the winter but does in the summer “because it is more busy and there's less room.”
- Other businesses have time limits that depend on customer behavior, such as allowing restaurant customers “to take their time so long as they are being respectful” (R6) and asking people who are being disrespectful to leave (R15).

Although most interview respondents (n=23, 77%) said their businesses do not have guidelines for communicating and dealing with people experiencing homelessness, there are informal, non-written ways that they interact with PEUH. For example, a café manager said that:

“If someone who's experiencing homelessness comes in, we treat them just like any other customer. If they want to order something, we're happy to do that. They just want to hang out? That's also fine. Traditionally, the only time when it becomes an issue is if someone may or may not be experiencing a mental health episode and making sure that we can be a safe space for the other customers in the store as well. So, depending on what category that is just making sure that

we can try and get them help. It will truly just depend on the situation. The majority of the time, they'll be treated just the same as any other customer.” (R9)

- According to a retail store manager, although few homeless folks come into the store, the guidelines instruct staff “to make everybody that comes through the door welcomed and [to feel] that they belong. And so whether or not they're going to buy clothes or not isn't the number one priority. It's about them feeling like they are welcome here.” (R21)
- A retail store owner (R23) said that he “treats them like they are human while keeping in mind that this is a business,” and noted that he has experienced many unhoused folks who were under the influence of drugs in his store and does his best to keep the peace during difficult situations.
- A corporate chain employee (R14) noted that “managers handle those kinds of situations.”
- Sixty percent of respondents mentioned personal guidelines for engaging and communicating with homeless people. Most responded with statements like “treat everyone the same,” “treat them kindly,” “treat them with respect,” and “treat them with empathy.” Only one said that her rule was to keep her distance and not engage.

A majority of respondents (n=23, 77%) said that PEUH use the outdoor spaces of their businesses, including parking lots (n=6), lawns under trees (n=6), dumpsters (n=4), outdoor seating areas (n=2), and storefronts (n=1). Mostly, PEUH use these spaces at night, and two respondents mentioned that PEUH use outdoor outlets to charge phones.

Heat, PEUH, and business access

Only 37% of respondents said that policies and guidelines for PEUH changed when it is unusually hot (or cold, icy, windy, dusty, smokey, polluted) outside. These changes included providing water during summer months (n=6), allowing people to sit in the lobby when conditions are particularly hot or cold outside (n=3), not providing outdoor seating in winter (n=1), not providing patio access when it's very hot (n=1), and providing jackets for outdoor seating in winter (n=1).

- R21, an owner of a retail store, explained that “We did have one person who was unhoused come in and we gave them water and had them sit inside until they were ready to leave.”
- A restaurant manager (R11) also gives people water and a place to cool off.
- A café manager (R22) said that people who are experiencing homelessness are welcome to get water, hang out in the lobby, and use their bathroom.
- R18 said he would not be inclined to improve access to his store because he “wouldn't want to attract more homeless folks.”
- R30 similarly noted that “Customers are not always happy with the number of homeless folks near their business. We do not want to add to that” with measures to make their outdoor seating areas more attractive.

Trees did not factor into most (63%) respondents' ideas about the outdoor spaces around their businesses, and several saw no importance to having trees and did not connect tree presence to PEUH. Of the 37% who said trees are important, four liked trees because they provide shade and

places to sit, noting that trees are popular. Two also mentioned tree shade but use umbrellas for shade because there aren't shade trees on the business property.

Implications

There are three primary implications from Study 3:

- Informal codes of conduct guide most business employee, manager, and owner decisions regarding PEUH and extreme heat.
 - PEUH using business outdoor spaces was someone else's, like landlord or property manager, responsibility to deal with.
 - Most 'policies' towards PEUH were personal, unwritten, or informal.
 - Independent business respondents were more likely to consider PEUH as community members and said when confronted with PEUH in their store, they claimed a personal code to "treat everyone the same," "treat them kindly," "treat them with respect," and "treat them with empathy."
- Few business owners, managers, and employees have plans – or knowledge of how – to deal with climate change and extreme weather events and generally lack adaptation strategies to confront these challenges.
 - It was uncommon for respondents to have considered climate extremes and few respondents knew of businesses plans or strategies to better deal with extreme events.
 - Cooling centers also remain important because they provide relief to a large number of people at once; stores and cafés can only services small numbers at any one time.
- There is a clear need for greater outreach and engagement to provide storefront businesses better strategies to deal with PEUH and extreme events.
 - Few business owners, managers, and employees have plans to deal with climate change and extreme weather events and did not report possible adaptation strategies to deal with these changes.
 - Need to rethink what businesses do and how they can better support broader community goals.

Discussion

Together, these three studies demonstrate that extreme heat risk for people experiencing unsheltered homelessness (PEUH) is produced not only by high temperatures but also by unequal access to the resources and spaces that enable people to adapt.

Study 1 provides direct evidence of substantial heat exposure and the role trees play in reducing daytime and nighttime temperatures.

Participants experienced an average heat index of 79 °F across daytime and nighttime hours, with an average of 109 °F during the hottest hour. Nearly 20% of daytime hours were spent under moderate-risk conditions, and participants spent 69% of nighttime hours above the hot-night threshold associated with disrupted sleep. At the same time, tree canopy provided measurable protection. During afternoon hours, time under trees was associated with a 1.6-3.2 °F reduction in heat index, comparable to the cooling associated with proximity to buildings.

CONCLUSION 1

Tree shade is a meaningful and measurable form of heat adaptation for people who lack reliable access to indoor cooling and other forms of thermal refuge.

Study 2 helps explain how PEUH experience and respond to these conditions.

Participants described heat exhaustion, dehydration, fatigue, breathing difficulties, disrupted sleep, and emotional strain. Importantly, these risks were shaped not simply by exposure to high temperatures, but by access to basic infrastructure and places where people could recover from heat. Twenty of 24 participants identified shade and trees as important to survival, 18 discussed water access, and 15 discussed bathrooms. Participants described broken drinking fountains, removed portable toilets, locked facilities, and displacement from shaded areas. Thus, having a resource somewhere in the city does not necessarily constitute meaningful access.

People need shade, water, bathrooms, and places to rest that are available when and where heat exposure occurs. Enforcement practices further complicated adaptation: 19 of 24 participants discussed police harassment or displacement, while 16 identified community and mutual-aid networks as important sources of protection.

CONCLUSION 2

Social networks can help compensate for gaps in formal infrastructure, but they are likely unable to replace reliable public services.

Study 3 demonstrates what happens when public cooling resources are insufficient or inaccessible.

Businesses frequently become de facto heat refuges, but access is inconsistent and often depends on individual discretion. Although 77% of business respondents reported no restrictions on who could enter and 73% reported no set customer time limits, half of policies governing access and interactions with PEUH were informal and case-by-case. Only 30% reported corporate guidance, and just 37% changed practices during extreme weather. Some businesses provided water or allowed people to

cool indoors, while others expressed concern that doing so might attract more PEUH. Outdoor business spaces—including parking lots, shaded lawns, dumpsters, and seating areas—were also commonly used by PEUH, particularly at night.

Together, the studies point to thermal equity as both an infrastructure and governance

issue. PEUH are exposed to heat in ways that are intensified by limited access to shade, water, sanitation, indoor cooling, and secure places to rest. Moreover, interventions can work against one another: displacement from a shaded location can force someone into hotter conditions; restricted bathroom or water access can increase health risks; and informal business policies can make cooling opportunities unpredictable. Effective heat adaptation therefore requires more than simply providing cooling resources. It requires ensuring that those resources are accessible, reliable, geographically connected, and available without displacement or exclusion. For PEUH, thermal protection depends on the combined availability of physical infrastructure, supportive policies, and safe places to remain.

CONCLUSION 3

Private businesses often provide important supplemental refuge, but their capacity is limited and their practices are too variable to substitute for coordinated public cooling infrastructure.

Recommendations

Building upon the empirical work from these three studies, there are multiple actionable recommendations for Salt Lake City and potentially other urban areas facing concerns of extreme urban heat and unsheltered homelessness.

1. **Establish Code Red policies for extreme heat.** While there is limited Code Blue legislation across Utah, there is no similar statewide emergency mandate or system for capacity expansions or to protect outdoor residents or workers during summer heat.
2. **Treat water, bathrooms, shade, and cooling as integrated heat infrastructure.** Maintain functional drinking fountains and bottle fillers, extend summer bathroom access, and provide shaded seating near these amenities. Cooling spaces should be low-barrier and available without proof of residency or service enrollment.
3. **Expand cooling center locations and hours of availability.** Designated cooling centers may be distant from typical PEUH locations, and they often close toward the end of the day, but heat relief is also needed during nighttime.
4. **Expand and protect tree canopy where PEUH actually spend time.** Prioritize mature trees and new canopy in high-use parks, pedestrian corridors, and other locations identified through spatial data. Study 1 demonstrates that sustained tree shade can reduce heat exposure by several degrees.
5. **Establish protected shaded rest areas during extreme heat.** Designate places where PEUH can remain without fear of citation or displacement, particularly during dangerous heat conditions. Non-emergency move-along orders and sweeps should be limited or paused during extreme heat events.

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6. **Include PEUH directly in climate-health planning.** Heat warnings, outreach, transportation, cooling resources, and public-health responses should explicitly account for people who cannot retreat to air-conditioned homes.
 7. **Engage businesses as partners, not substitutes for public infrastructure.** Cities can provide businesses with guidance on responding to extreme heat and PEUH, while recognizing that businesses have limited capacity. Public cooling centers remain essential because they can serve larger populations and provide more reliable access.
 8. **Support community and peer-led adaptation.** Mutual-aid networks already help PEUH share water, food, information, and warnings about enforcement. These existing networks should be incorporated into outreach and emergency heat-response strategies.

Ultimately, housing remains the most effective long-term protection from extreme heat, but housing alone does not address immediate risk. Expanding equitable access to trees, water, sanitation, cooling, and secure public space can reduce preventable heat exposure while creating a more inclusive urban climate-adaptation system.



Appendix: Recent Relevant Literature

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