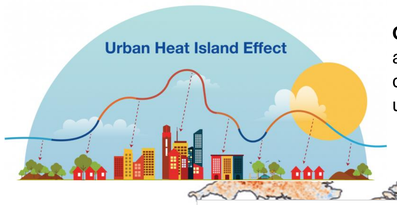
Interventions for **Strengthening Resilience to Extreme Heat** in Worcester, MA

WPI | THE GLOBAL LAB

Julia Silvestrone | Environmental & Sustainability Studies | Advised by Dr. Stephen McCauley | April 3, 2025

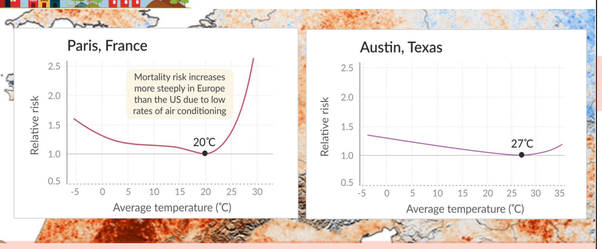
The City of Worcester
Department of Sustainability & Resilience

Extreme Heat in Temperate Cities



Cities retain more heat than non-urban areas due to the types of materials used, decreased vegetation, greater energy usage, and pollution [6].

Northern regions are finding their social, environmental, & built infrastructure **unequipped** to accommodate extreme heat [3].



Heat Vulnerability

How **susceptible** an individual or community is to **heat-related illness** or **death**

Heat vulnerable communities include:

- Elderly
- Young children
- Low-income
- Health conditions
- Socially isolated

Heat Vulnerability in Worcester, MA

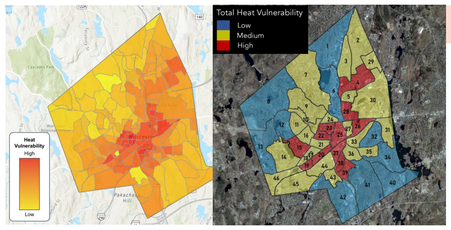
Aging housing stock

of Worcester's residence buildings are **triple-deckers,** built between **1880-1930** [5].

Socio-economic challenges

20% below federal poverty line [7]

23% immigrants [1]



Worcester heat vulnerability indices created by WPI & Urban Climate Consulting [4,8].

Research gaps

Modeling vulnerability through aggregate Census data

- Assumes the factors that shape heat vulnerability are the same in every city
- Overlooks residents' values & experiences

Goal: Identify **interventions for alleviating heat vulnerability** in Worcester, MA that would best meet the needs of residents.

Research Instruments

Survey	Interviews
328 Worcester residents	8 residents, 3 landlords, & 5 local experts

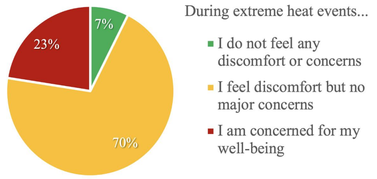
How do Worcester residents **perceive extreme heat** in the city?

Which areas of residents' **lives** are **disrupted** by extreme heat?

Which **populations** in Worcester **feel vulnerable to extreme heat**?

What **cooling measures** do residents **rely on** and what **barriers** impede cooling?

Worcester residents' perceptions of extreme heat



Need for further heat mitigation interventions

"There needs to be as much emphasis on keeping cool as there is on keeping warm in winter."

"We need to do something immediately or people will suffer."

"Certain people… are in serious danger without drastic changes in local policy."

How extreme heat impacts Worcester residents

Survey respondents reported **avoiding outdoor activities** (66%) & **avoiding exercise** (52%) during extreme heat (n=319).

Residents reported feeling heat stress while **in their homes** (79%) and while **walking outdoors** (49%, n=259).

Heat vulnerable populations in Worcester

Individuals of **low-income** status

37%

of survey respondents with incomes **<$25,000/year** reported feeling **concerned for their well-being** during extreme heat (n=44)

vs. 18% of those making over $25,000 (n=217).

More likely to:

- live in a **heat island**
- occupy a **poor condition rental unit**
- **work outdoors**
- be exposed to heat while **waiting for bus**

Less likely to have **air conditioning**

Elderly individuals

27%

of survey respondents **older than 65** reported feeling **concerned for their well-being** during extreme heat (n=26)

vs. 19% of those 65 and younger (n=226).

More likely to have **chronic medical conditions** that impact one's ability to regulate heat.

Being **socially connected** appears to reduce feelings of concern for seniors.

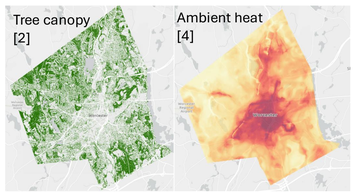
Cooling measures & barriers to cooling

Worcester residents rely on **blue spaces** as a **low-cost cooling adaptation.**

During extreme heat:

Wellness checks are **not common practice** during extreme heat in Worcester.

Only **19%** check in on family, friends, or neighbors (n=319).



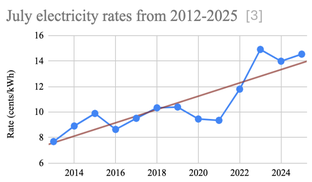
Residents perceive that **inequities in tree canopy** contribute to **heat islands.**

Residents identified barriers to accessing Worcester's **cooling centers.**

- **Limited hours** (close at 4-5 PM)
- **Under-advertised**

Residents noticed that there is a **lack of free drinking water** in the city.

Rising electricity rates prevent residents from achieving a thermally comfortable home.



Worcester's **rental apartments need upgrading,** but landlords face **financial barriers.**

Recommendations

Incorporate **heatwave alerts** into the city's emergency alert system.

Ensure consistent access to **cooling centers.**

Install **water fountains** in the hottest high-trafficked areas of the city.

Continue to invest in keeping **blue spaces open for swimming.**

Shade the most-used **bus stops** in the hottest areas of the city.

Encourage **social connectivity** among **seniors.**

Continue to plan **greening initiatives** in heat islands with vulnerable populations.

Offer summer **utility rebates** for low-income residents.

Incentivize landlords to **upgrade** their **rental properties.**

Continue to update **building standards** to promote **efficiency.**

Research addition sectors that could inform heat resilience.

Acknowledgements

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