Addressing Social Inequities for Temperature Extremes across Austin

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Background

The extreme weather events of Austin have had **disproportionate effects** on its citizens. The 2023 heat wave (1) led to the creation of a **heat mapping handbook** to **expose disadvantaged communities** to heat mitigation and the urban heat island (UHI) effect. This handbook is important because it makes heat mitigation **accessible and engaging**. The other weather event examined was 2021's Winter Storm Uri (2), specifically the blackouts that **disproportionately affected communities of color**[1]. The blackouts during Winter Storm Uri caused detrimental harm. This research seeks to better understand these inequities during the temperature extremes. The broader objective is to provide the foundation to help address Austin's Climate Equity Plans.This highlights why **qualitative problems require empirical solutions.**

Research Questions

1. What are alternative **mediums** for disseminating information on the urban heat island effect?
2. How does **critical infrastructure accessibility** differ based on **demographic makeup**?

Methods and Materials

1. First, a **community resource** about UHI and how to map heat was created. The resource material was reviewed and made more usable by **engaging community feedback**. A website was created to help with the **accessibility of the information**.
2. The winter storm analysis required a more **quantitative assessment** of the **shortest distance** between **census block groups and critical infrastructures** (police stations, fire stations, hospitals). The data was at the census block level with majority demographic categories being White, Latino, and Asian. This data was provided by the RESET Lab at UT. This was done using **Openstreetmap** (OSMnx's python package[2]) for **shortest path length** and **Matplotlib's subplot** functions.

Results

Fig 1. The QR code above will lead to the Heat Mapping Handbook that not only educates on UHI, but also the pre-mapping, mapping, and post-mapping steps of visualizing heat.

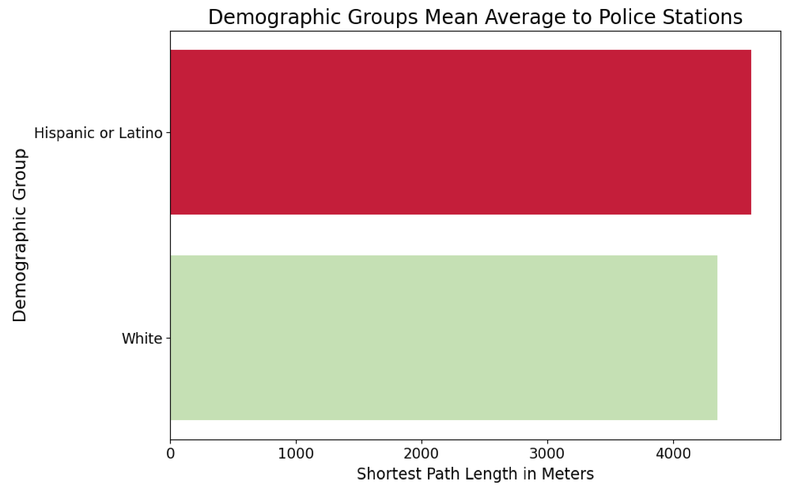

Fig 2. This chart shows that Latino communities are slightly farther away from police stations than predominantly white or non-Latino communities.

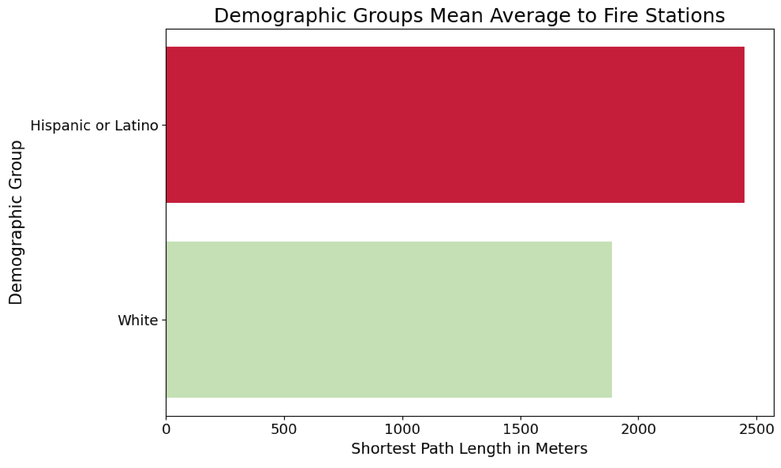

Fig 3. This chart shows that Latino communities are farther away from fire stations than predominantly white or non-Latino communities.

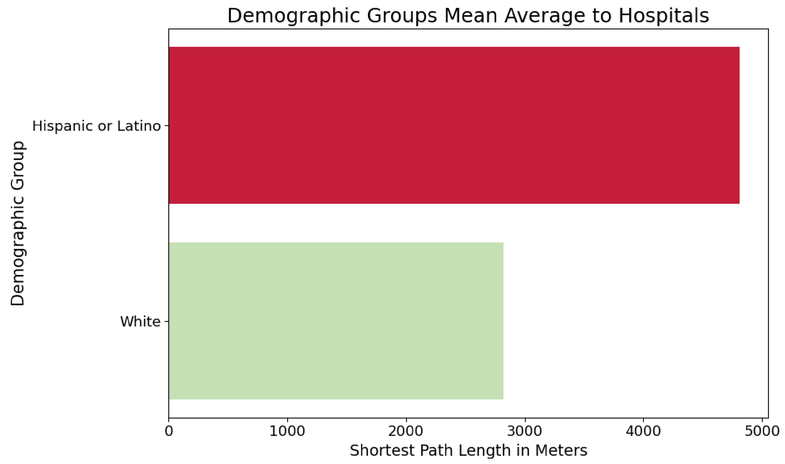

Fig 4. This chart shows that Latino communities are notably farther away from hospitals compared to predominantly white/ non-Latino communities.

Discussion and Future Directions

1. Future work will involve **continued community feedback** on the successes as well as gaps in the handbook's use for heat mapping.
2. Figures 1, 2 , and 3 all indicate that communities of color must travel **greater distances to access critical infrastructure**. It is likely that access to critical infrastructure might have been a factor for power blackouts.

When it comes to future directions it will be valuable to :

- **Corroborate** the methodology
- **Incorporate** water facilities and loss of water
- **Disseminate** with social scientists and stakeholders to discuss combating the inequities in blackouts

Acknowledgments and References

Acknowledgments:

Thank you to Allysa Dallmann,Ting-yu Dai, Harsh Kamath, Naveen Sudharsan, and the RESET Lab for your contributions, as well as the **National Science Foundation** (NSF REU INsTRUCT Grant, grant # 2051110; PIs: Jay Banner and Dev Niyogi) for funding my project.

References:

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2. Boeing, Geoff. "OSMnx Examples Gallery." *GitHub*, 29 July 2023, github.com/gboeing/osmnx-examples. Accessed 30 July 2023.