Community Resilience and Equity in the Face of Disasters

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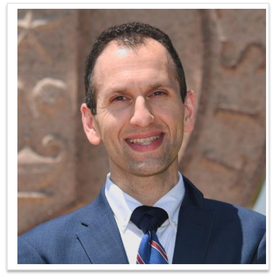

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Analysis of data at various levels revealed **disproportionate** disaster impacts across various **demographics** and **socioeconomic** statuses.

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Introduction

- Previous research has indicated a disproportionate impact on vulnerable and marginalized communities.
- The goal of this research was to investigate the same in the aftermath of winter storm URI across the state of Texas.

A failure to integrate equity into resilience considerations results in unequal recovery and disproportionate impacts on vulnerable populations, which has long been a concern in the United States[1,2]. This research investigated aspects of equity related to community resilience in the aftermath of Winter Storm Uri in Texas.

Methods

- County level data - regression analysis.
- Census tract data and satellite imagery - computer vision.
- Household data through community survey of the state of Texas - LASSO regression to produce a sparse solution.

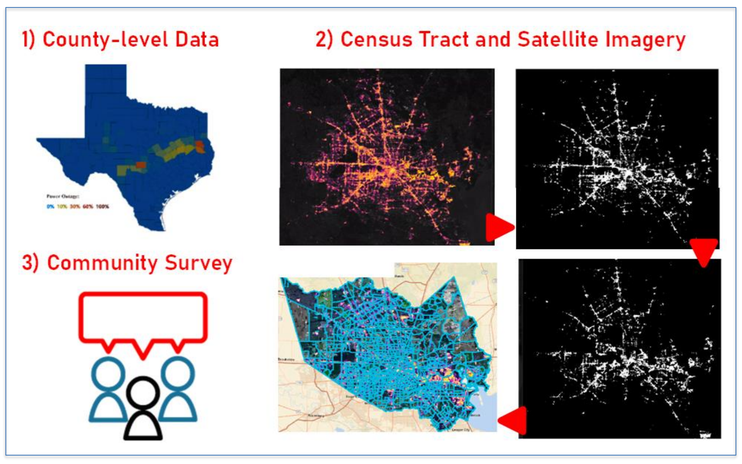


Figure 1. Research Methods

Various methods were used to assess the proportionality of the impact at different levels. The results, as depicted below, revealed a disproportionate impact across various demographics and socioeconomic statuses.

Results

- Counties with higher percentage of whites and higher median household incomes experience fewer lingering outages.
- Probability of belonging to outage affected group increases as the percentage of census tract *linguistically isolated* and *public transportation users* increases.
- Probability of belonging to outage affected group decreases as the percentage of census tract *high school graduates* and *single unit properties* increases.

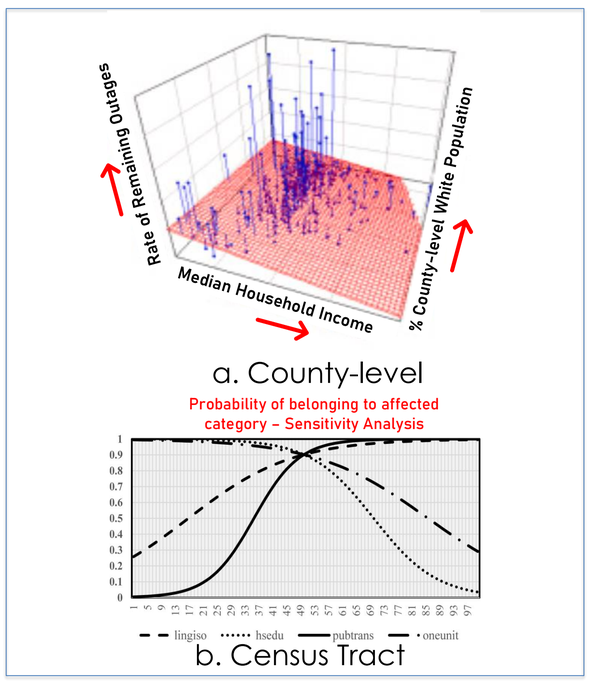
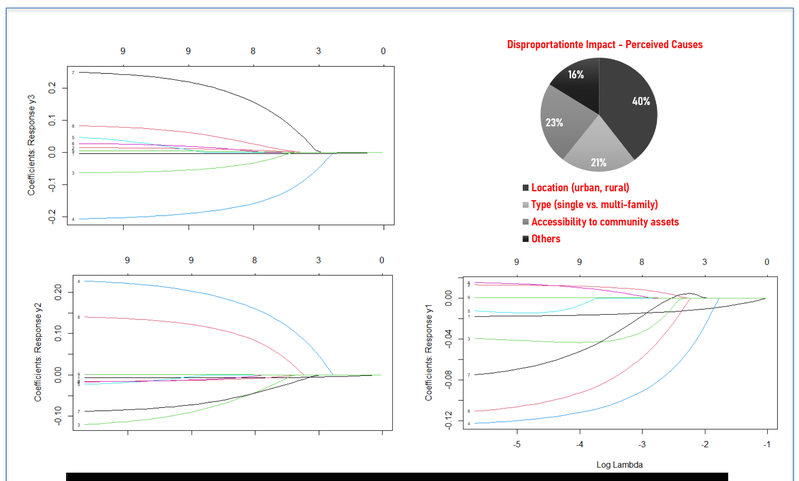


Figure 2. Results

Results - Continued

- Survey of adults within the state of Texas who were affected by the winter storm resulted in 57% believing in a *disproportionate outage*.
- Elastic-net regression highlighted the impacts of *age*, *gender*, *race*, *housing type* and *income* on the level of reported endured problems with various aspects of the outage.



Problem with	FA1	FA2	FA3
Finding plumber/service	0.735	0.214	-0.026
Finding shelter	0.721	0.092	0.205
Injury/Illness in family	0.712	-0.021	0.22
Water damage to residence	0.678	0.228	0.104
Obtaining food/water/groceries	0.485	0.339	0.133
Other	0.393	0.046	-0.002
Loss of cell service	0.382	0.102	0.637
Loss of running water	0.22	0.842	0.094
Loss of drinkable water	0.19	0.846	0.134
Loss of internet	0.096	0.038	0.856
Loss of power	-0.072	0.47	0.607

Response	X1=age	X2=income	X3=employment	X4=gender	X5=married	X6=education	X7=race	X8=house	X9=tenure
FA1	–	+	–	–	–	+	+	–	+
FA2	–	–	–	+	–	–	–	+	+
FA3	–	+	–	–	+	+	+	+	+

Figure 3. Results - continued

Conclusions

- This study can help with facilitating inclusive mitigation and recovery plans by incorporating available technologies that can help with bridging the grid coverage gaps using Distributed Energy Resources (DERs), microgrid technologies, and advanced Fault Location, Isolation, and Service Restoration (FLISR).

References

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