

HEAT SEVERITY INFLUENCE ON MEDIAN HOUSEHOLD INCOME ACROSS FORT WORTH, TX

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Introduction

As global temperatures continue to rise, the urban heat island (UHI) effect becomes more severe, especially in low-income communities due to disparity to past discriminatory housing policies. Urban heat islands occur when cities increase structures and impervious cover such as roads, buildings, and other infrastructures and minimizes natural land cover. These urban heat islands experience higher average temperatures, increase in pollution, and greater negative health impacts as compared to more rural communities. This study utilizes the ArcGIS Pro software to create a series of maps using census data to analyze the correlation between heat severity and median household income across Tarrant County, TX.

Research Question

Does heat severity influence median household income across Fort Worth, Texas, at the US Census block group level?

Data and Methods

Using data from the 2020 Census Block Group, we found the median household income for Tarrant County (Figure 1b) as well as heat severity data (Figure 1a) from Heat.gov for the United States. The data was uploaded into the ArcGIS Pro software where the median household income layer was clipped to the urban areas of Tarrant County using census data. We next clipped the heat severity layer to the urban areas of Tarrant County. We joined the heat severity layer to the median household income layer and used the attribute table to calculate the percentage of the areas with heat severity related to the median household income. To visualize the relationship of these two variables in Tarrant County we used a bivariate classification that shows the low to high median household income and the low to high percent area of heat severity. We then split the median household income into four groups of <\$35,000, \$35,000 to \$85,000, \$150,000, and >\$150,000. Using these groups, we were able to find the mean and standard deviation for the total heat severity of each income group.

Results

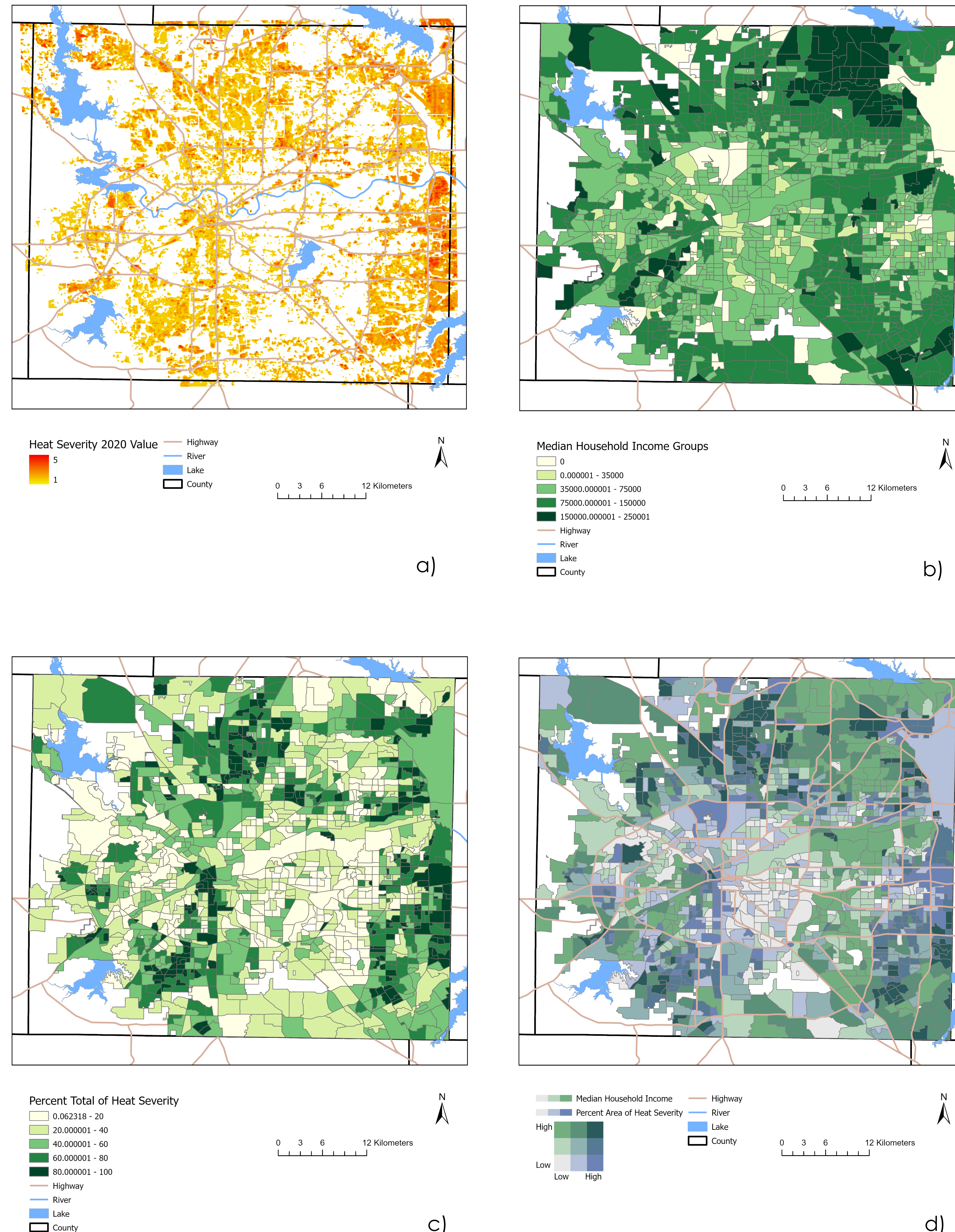


Figure 1. a) Heat Severity in 2020 across Fort Worth b) Median Household Income Groups in Fort Worth c) Percent Total of Heat Severity in Fort Worth d) Combined Stats Map of Percent Area of Heat Severity and Median Household Income in Fort Worth

Table 1. Statistical tests for heat severity index by area (%) based on median household income in Tarrant County (n=1236)

Median Household Income	Heat severity index by area (%)	
	Mean	SD
<\$35,000 (N=157)	55.70	29.73
\$35,0001 to \$85,000 (N=638)	47.51	28.19
\$85,000 to \$150,000 (N=354)	46.95	29.25
>\$150,000 (N=87)	36.47	23.66
Total (N=1236)	47.61	28.68

Discussion and Conclusions

- The results of this research illustrate the relationship between median household income and heat severity in urban portions of Tarrant County. (Figures 1c and d)
- Households with low median income live in areas with a greater proportion of high heat severity. This suggests that these areas are more prone to the urban heat island effect due to impervious cover and infrastructure. (Figures 1c and d)
- Additionally, this result may also show the consequences of prior discriminatory housing practices. Areas with households that have high median income live in areas with a lower proportion of high heat severity. (Figures 1c and d)
- We ran an ANOVA in SPSS software that showed a statistically significant result between median household income less than \$35,000 and income more than \$150,000. This result shows a 20% more exposure to high heat severity in median household income less than \$35,000 as opposed to households with a median income of more than \$150,000. (Table 1)
- These statistics confirm that areas with low median household income have a greater proportion of high heat severity than households with a high median income. (Table 1)

References

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