Examining Socio-Economic Factors, Occupant Behaviors, and Energy Consumption: Air Conditioning Usage Patterns in New York and Texas

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INTRODUCTION

This study focuses on understanding the factors influencing energy consumption patterns in terms of AC usage by individuals from New York and Texas. It examines the relationship between energy burden, socio-economic factors, and occupants' behaviors to identify differences in energy consumption considering weather features, power system characteristics, pricing types, and socio-demographics. Additionally, the study explores how participation in Demand Response programs impacts energy disparities and identifies program types that are appealing across various demographics. The overarching goal is to provide insights for addressing energy inequality and promoting equitable energy practices, with a focus on supporting vulnerable populations in managing their energy needs effectively.

METHODOLOGY

- Conducted a voluntary online survey with 1575 respondents with 790 being from New York and 785 from Texas
- Survey excluded individuals under 18 years old and ensured fair representation across demographics
- Gathered AC usage behaviors from respondents through a series of questions about AC temperature settings and likelihood to use AC during emergency events
- Utilized SPSS for data analysis to perform linear regression analysis to study survey results and examine relationships between variables of interest

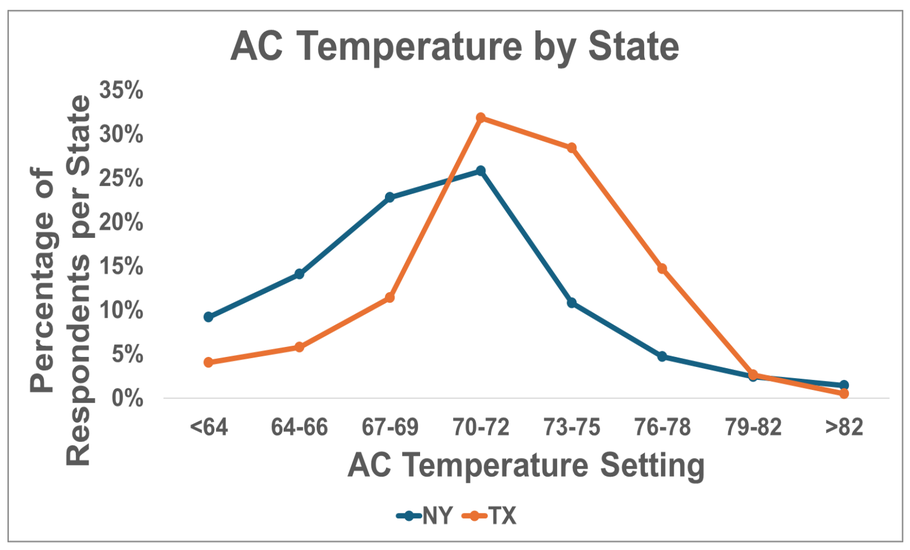
RESEARCH QUESTIONS

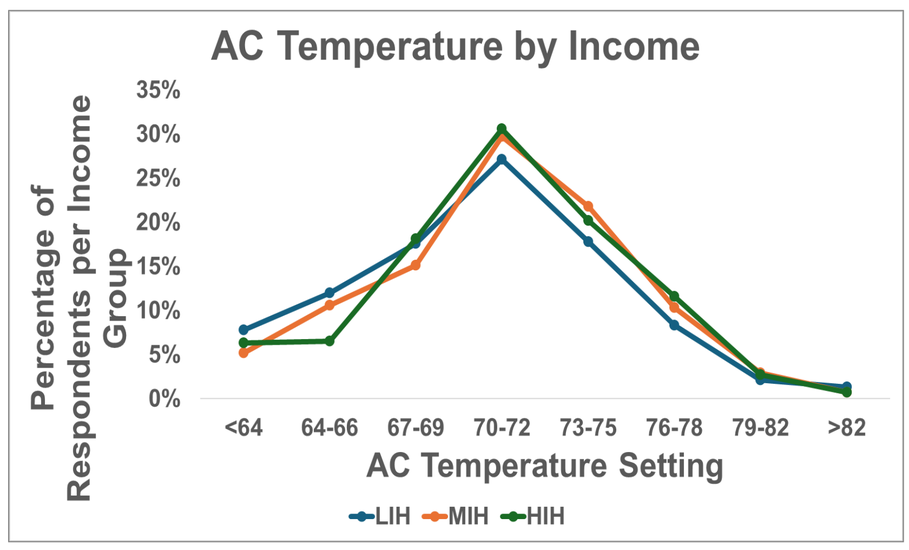
1. What are the differences in occupants' behaviors regarding AC usage patterns between New York and Texas, considering the differing weather features and power pricing systems?
2. Is there a significant relationship between AC setting temperatures and income levels?

AC TEMPERATURE SETTINGS

Variable	β	Std. Error	t	Sig.
Comfort Needs	-.096	.038	-3.636	<.001
Cost Concern	.152	.050	5.743	<.001

- Linear regression results demonstrated as comfort needs increase, the AC temperature setting of respondents decreases
- Additionally, as cost concern increased, the AC temperature setting also increased showing a significant ($p < .001$) relationship

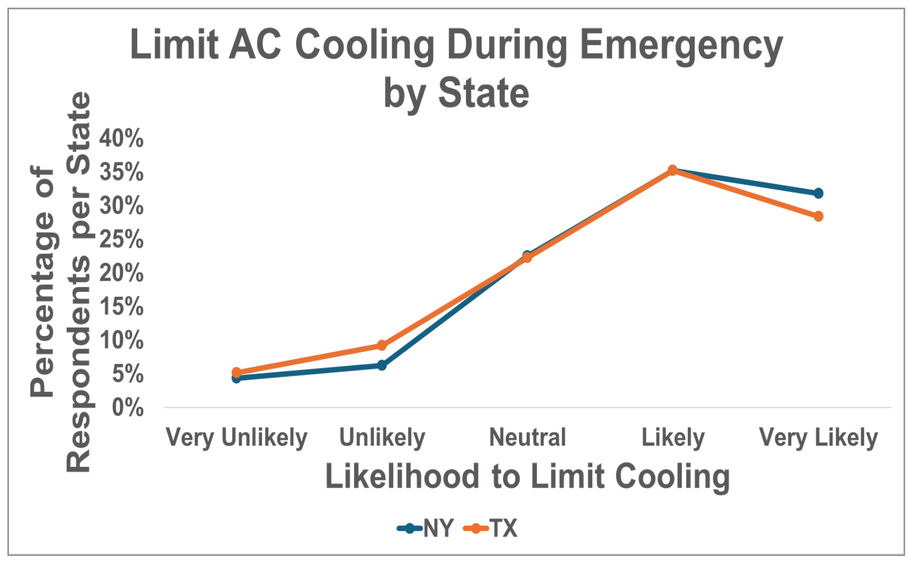


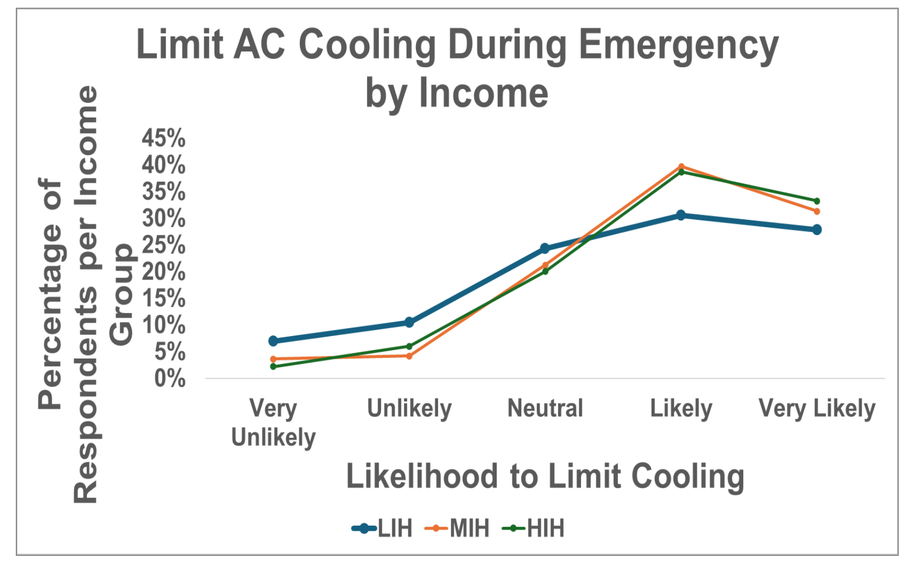


AC USAGE DURING EMERGENCY

Variable	β	Std. Error	t	Sig.
Comfort Needs	-.122	.026	-5.015	<.001
Cost Concern	.361	.033	14.797	<.001

- As cost concern ($p < .001$) increase, the likelihood to limit AC usage during emergencies also increases significantly
- Conversely, comfort needs significantly ($p < .001$) impacts the likelihood to limit AC usage in such events negatively





CONCLUSION

- Cost concerns and comfort needs significantly impact general AC usage as well as during emergency situations
- Cost concerns had the greatest impact on both the AC temperature settings and the likelihood to limit AC usage in emergencies

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