



## Introduction

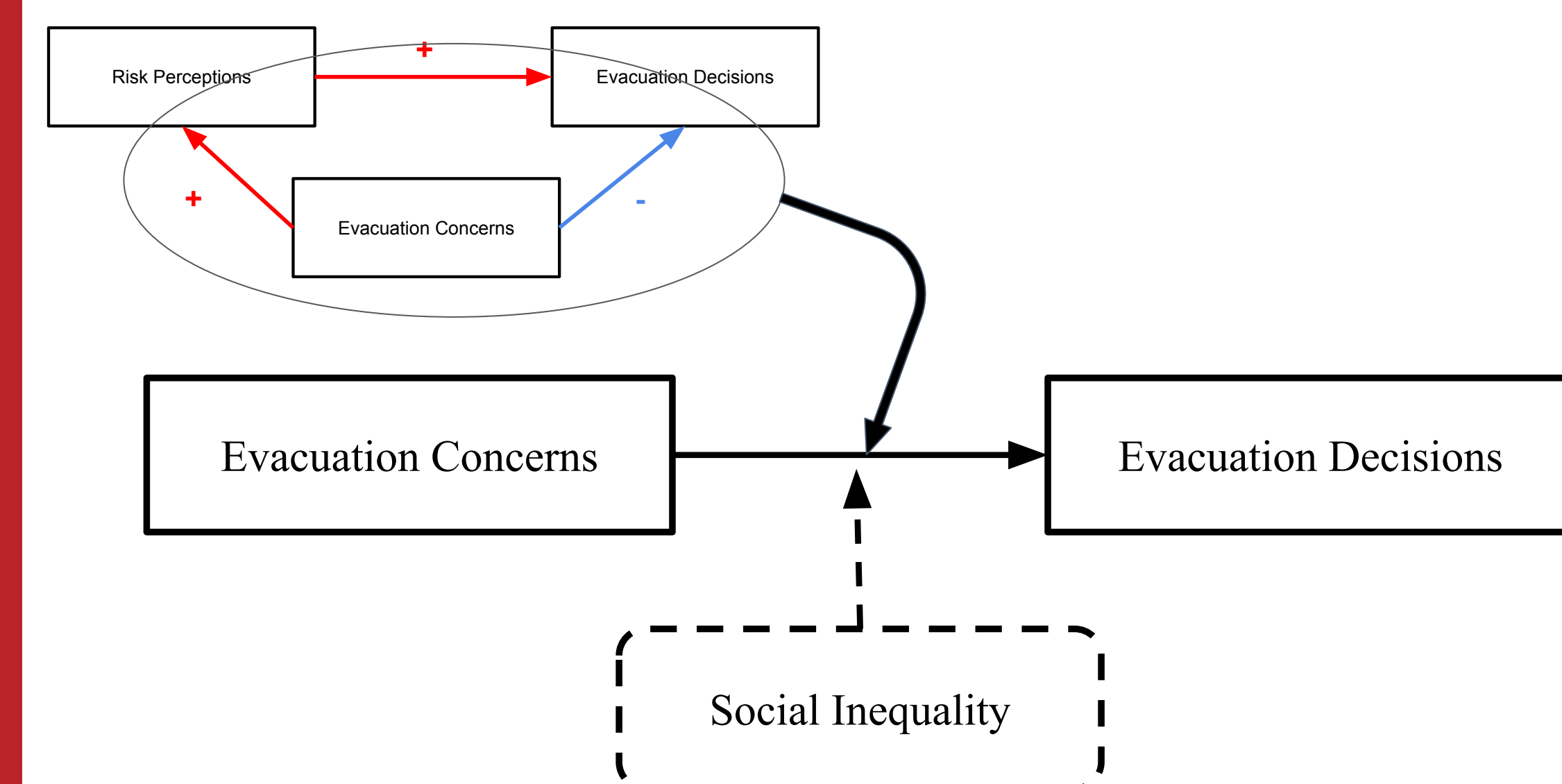
Previous evacuation studies have concluded that social and demographic characteristics, although they may not directly influence behavioral decisions, can still shape the decision-making process. For example, households with higher levels of socioeconomic resilience are often associated with stronger structural resilience as well as greater financial and material resources, which may, in turn, have varying effects on evacuation decisions. Consequently, further research is needed to understand how these social characteristics influence households' perceptions of risk, beliefs about protective actions, and the trade-offs they make between these considerations.

This study will specifically examine the effects of social structure on the relationships between evacuation concerns (e.g., worries about home damage, looting, traffic congestion, and evacuation costs) and hurricane evacuation decisions. In particular, the study aims to identify indicators that may explain, shape, or transmit how households perceive and process evacuation-related concerns in their ultimate decisions.

## Main Model

The effect route of evacuation concerns on evacuation decisions (Huang et al 2012; Huang et al. 2016)

- Positive route: Higher evacuation concerns → greater awareness of risk perceptions → more likely to evacuate
  - Negative route: Higher evacuation concerns → less likely to evacuate
- Is there any social structure indicator that could help identify the effect route?



## Data & Method

- Hurricane Rita & Katrina Evacuation Survey (Texas A&M HRRC) - Katrina: 270 households (LA) / Rita: 1,007 households (TX)
- Logistic regression with interaction terms
- Model: Evacuation Decisions = Evacuation Concerns + (Evacuation Concerns × Social Inequality)
- Moderators tested: household size, children, age, education, income, gender, minority status, homeownership, and registered vehicles
- Thresholds were identified using a data-driven classification approach that searched for cut-off points maximizing differences in evacuation decisions across household categories. Among the variables tested, household size and presence of children showed significant moderation effects.

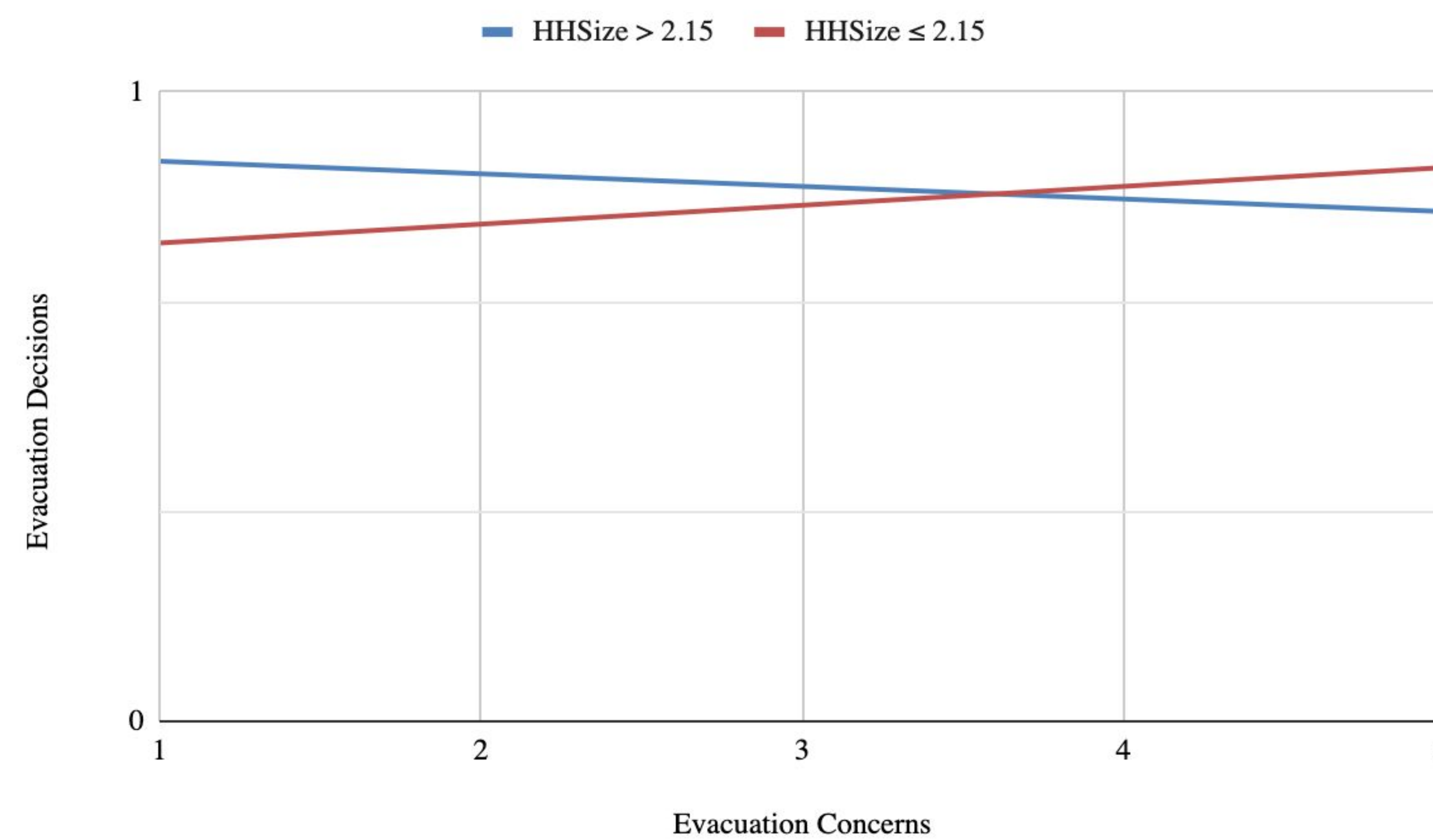
Type	Variable	Measurement / Threshold
Outcome	Evacuation Decision	Evacuate vs. Stay (0/1)
Predictor	Evacuation Concerns	Concerns about looting, traffic, cost, home damage (1-5)
Moderator	Household Size	Small ( $\leq 2.15$ ) vs. Large ( $> 2.15$ )
Moderator	Presence of Children	No children vs. One or more children

## Results

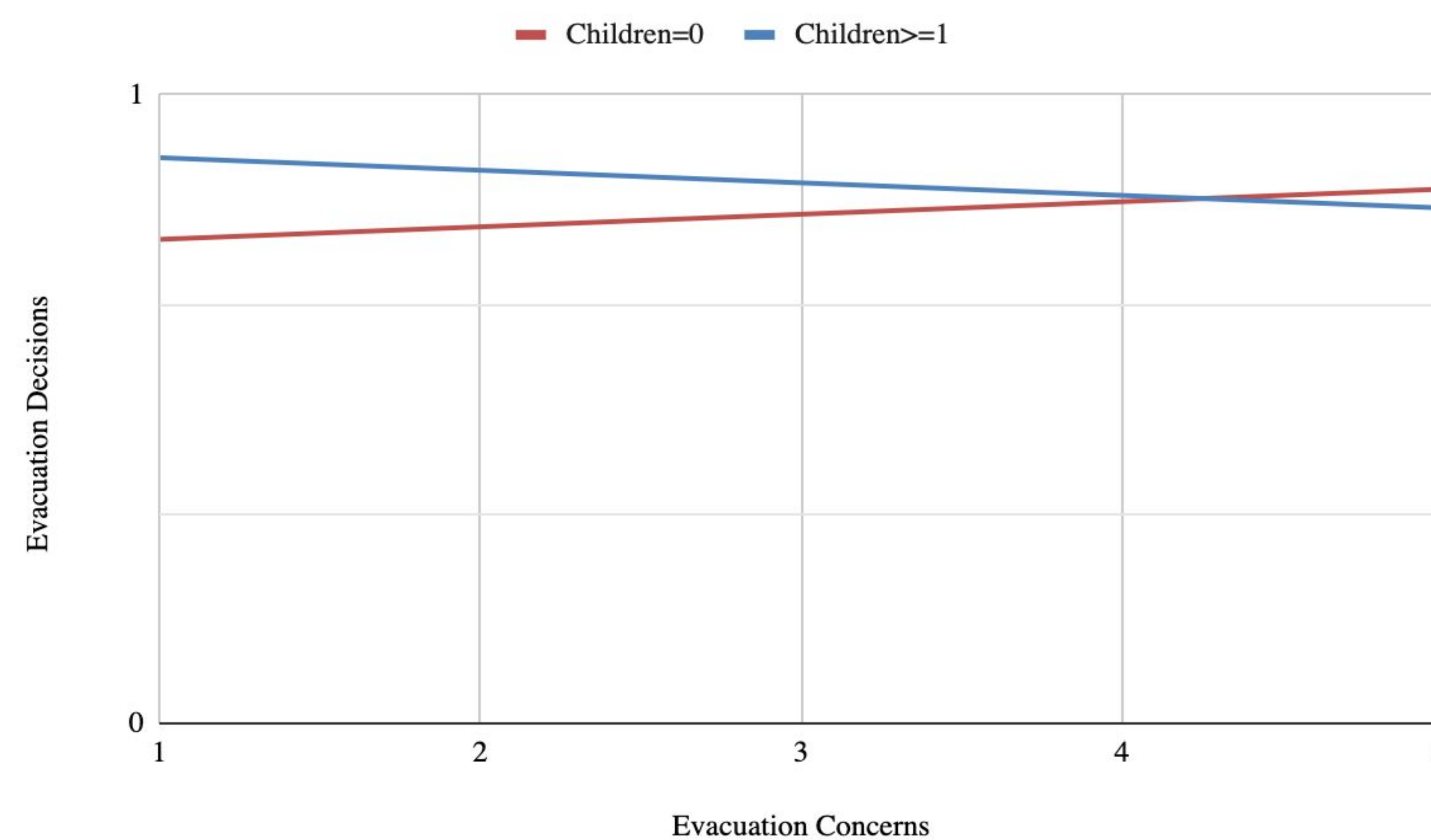
**Table 1. Moderating Effects of Household Structure on the Relationship Between Evacuation Concerns and Evacuation Decisions**

Moderator	Group	Relationship	Effect Direction
Household Size	Large households ( $>2.15$ )	Negative relationship	Concerns ↑ Evacuation ↓
	Small households ( $\leq 2.15$ )	Positive relationship	Concerns ↑ Evacuation ↑
Presence of Children	Households with children	Negative relationship	Concerns ↑ Evacuation ↓
	Households without children	Positive relationship	Concerns ↑ Evacuation ↑

- The effect of evacuation concerns reverses by household size and presence of children.
- Among the factors tested, only household size and presence of children show consistent moderation effects.
- The relationship between evacuation concerns and evacuation decisions varies across household contexts.



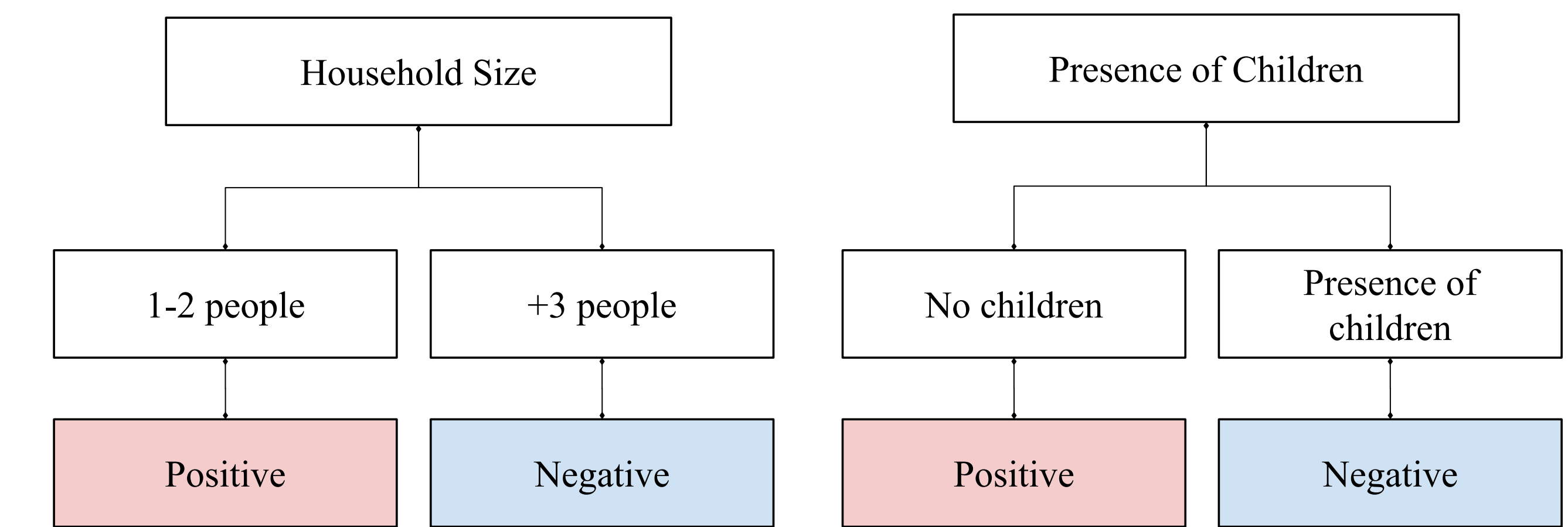
**Figure 1. Interaction effect of household size on the relationship between the evacuation concerns and evacuation decisions**



**Figure 2. Interaction effect of children on the relationship between the evacuation concerns and evacuation decisions**

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## Discussion



### Large Households

The results reveal a threshold effect of household size, whereby concerns regarding evacuation logistics begin to influence evacuation decisions once the household reaches a certain size. One possible explanation is that household size is positively associated with the scale of evacuation-related costs, leading households to weigh these costs against perceived risks when they exceed a manageable level. Another possible explanation is that household composition influences the household decision-making process. Specifically, larger households are more likely to involve diverse mobility conditions and evacuation needs among members, which may introduce additional considerations and complexity into the decision-making process.

### Small Households

As indicated, the positive relationship between evacuation concerns and evacuation decisions is mediated by the relationship between risk perceptions and evacuation decisions. This finding suggests that the positive effect of evacuation concerns is less a direct component of the initial decision-making process and more an implementation-related concern arising during the post-decision stage. In other words, smaller households were more likely to evaluate perceived risks first when deciding whether to evacuate and then consider resource-related concerns when determining how the evacuation could be carried out.

### Households with Children

The consistent findings regarding the moderating effects of household size and the presence of children provide a strong empirical explanation for the observed patterns. Because children are generally more physically vulnerable during disasters, both evacuation risks and the resources required to mitigate those risks increase substantially. Consequently, households with children may require additional planning, childcare arrangements, and financial resources during evacuation, making the evacuation process more challenging as concerns intensify. As a result, the overall scale of evacuation-related costs increases significantly and is more likely to become an important component of the household's complex decision-making process.

### Households without Children

For households without children, evacuation concerns should only function during the implementation phase.

## Key Takeaways

- The findings regarding the moderating effects of household size and the presence of children on the relationship between evacuation concerns and evacuation decisions are significant. On the one hand, they confirm that concerns related to evacuation implementation are substantial and consequential. Accordingly, future evacuation policies could help alleviate these concerns by providing transportation assistance, reducing evacuation-related costs, and expanding shelter capacity for families. On the other hand, the results suggest that the impacts of these concerns vary across different household groups. Therefore, further research is needed to identify and develop more tailored evacuation support policies for diverse household contexts.
- Specifically, future evacuation research and preparedness planning should incorporate household structure, family context, and specific household needs into evacuation decision-making models in order to better explain variations in the decision-making process across different types of households.