

Survey of Social Support Networks and Evacuation Intentions among Households in Houston, Texas

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Abstract

This study reports findings from a survey investigating Houston households' social support networks: family and friends who can provide them with temporary accommodations during a hurricane or other disaster-related evacuation. Findings can inform the development of information systems for evacuation management by describing households' social support network characteristics and evacuation destination and accommodation intentions, as well as the factors these households consider when choosing an evacuation destination. Highlights include differences in the size and range of household social support networks, and the relative tendency of households without social support to lack evacuation plans and prefer hotels/motels and public shelters compared to households with social support. These findings can inform the design of information systems that simulate and predict large-scale evacuation behavior for different geographic and evacuation contexts.

Keywords: Evacuation, Social capital, Survey, Decision-making, Hurricane, Resilience.

1. Introduction

Households fleeing from hazards such as hurricanes and wildfires must travel to destinations outside evacuation zones where they can obtain temporary accommodations until they can safely return home. Although studies survey households' intended and actual evacuation destinations and accommodations, finding that the majority of households travel to the homes of family and friends (Bierling et al., 2020; Kang et al., 2007; Lindell et al., 2011; Mitchell et al., 2017; Morrow & Gladwin, 2005, 2006; Wu et al., 2012), prior studies do not examine where households can go to stay with family and friends during an evacuation or what type of assistance, including accommodations, they can access at these destinations. For information systems research that attempts to model and simulate evacuation behavior to support community evacuation planning, understanding where and what assistance households

might access from family and friends is necessary to accurately predict evacuation behaviors and plan for scenarios in which households lack access to accommodations from family and friends.

In the literature on large-scale evacuations, a gap therefore exists in our understanding of *social support networks*: family and friends who can provide a household with assistance, especially accommodations, during an evacuation (Grace & Na, 2024a; Na & Grace, 2022). More broadly, *social support* refers to instrumental, informational, and emotional assistance networks of family and friends provide to evacuees (Quarantelli, 1985). Despite the acknowledged importance of social support (Asfaw et al., 2019), and, relatedly, social capital (Aldrich & Meyer, 2015; Meyer, 2018), the literature lacks empirical research on the structure and characteristics of household social support networks, and the extent to which these networks influence evacuation decision-making and behavior. Understanding these relationships stands to shed light on the options available to households when making evacuation destination and accommodation decisions.

Addressing this gap in the literature is important for two reasons. First, empirical research on households' social support networks and intended and actual evacuation decisions can help explain large-scale evacuation behavior observed during disasters caused by hurricanes, wildfires, and other hazards. Understanding the size and range of households' social support networks, for example, can explain travel distances regularly observed during hurricane evacuations (Morrow & Gladwin, 2005; Smith & McCarty, 2009; Wong et al., 2018; Wu et al., 2012), as well as patterns of short-term sheltering that see most households staying with family and friends, fewer staying at hotels/motels, and far fewer staying in public shelters (Lindell et al., 2011; Mesa-Arango et al., 2013; Mitchell et al., 2017; Wong et al., 2018; Wu et al., 2012; Zeigler et al., 1981). However, few studies have attempted to gather empirical data describing household social support networks and intended and/or actual evacuation behaviors (Na & Grace, 2022).

Second, studies of evacuees' social support networks can inform and empirically validate models of

household evacuation destination and accommodation decision-making needed to simulate large-scale evacuation behavior (Lindell et al., 2019; Murray-Tuite & Wolshon, 2013). These models are needed to design information systems that accurately model and simulate evacuation behavior to improve emergency management planning and resource allocation ahead of future disasters (Coates et al., 2024).

In this study, we report findings from an intended response survey administered to households (n=256) in Greater Houston, Texas, who reported where they intend to go and stay during an evacuation, destinations where they can stay at the home of friends or relatives, i.e., social support network, and factors they consider when selecting an evacuation destination, such as distance, familiarity, and cost. After reporting the survey findings, we discuss their implications for our understanding of large-scale evacuation behavior and the design of information systems for evacuation management. In the next section, however, we begin by reviewing prior surveys of evacuation destinations and accommodations to identify the gap related to social support networks addressed by this study.

2. Background

This study examines *social support networks*: relatives and friends who can provide households with informational, material (e.g., accommodations, money, etc.), and emotional assistance during an evacuation, i.e., social support (Asfaw et al., 2019; Grace & Na, 2024b). The related concepts of social support and social support networks distinguish the type and source of assistance that households expect and/or receive during an evacuation, respectively. The concepts thus align with individual-level measures of social capital (Meyer, 2018), which can describe evacuees' "access to and use of resources embedded in social networks" (Lin, 2001, p. 5). However, we examine social support networks and social support rather than social capital to distinguish between the number and geographic locations of households' family and friends (i.e., social support networks) and the types of assistance these social network ties can provide to households (i.e., social support), respectively.

Significantly, although research on large-scale evacuations have long recognized the importance of social support during evacuations (Collins et al., 2017; Quarantelli, 1985), few studies empirically examine the availability and accessibility of assistance evacuees expect and/or receive from their social networks. In the sections that follow, we review the literature on households' intended and actual evacuation destinations and accommodations to highlight the relationship between social support, social support networks, and

evacuation decision-making. Overall, we argue that the gap in our understanding of social support networks and evacuation decision-making limits our understanding of evacuation behavior as well as research that attempts to model and simulate large-scale evacuation behavior to support emergency management planning ahead of future disasters.

2.1. Surveys of evacuation destinations

Survey research reports the destinations where evacuees traveled and intend to travel in response to hurricanes along the U.S. Gulf and Atlantic Coasts. These studies show that most households evacuate to in-state and out-of-state destinations, but some evacuate to destinations within their home county or parish. Table 1 shows that survey respondents reported a range of actual in-county (1-49%), in-state (30-81%), and out-of-state (0-56%) evacuation destinations. Additionally, Mitchell et al. (2017) survey the intended evacuation destinations of Louisiana residents, observing that most survey respondents would travel outside the state for a future hurricane. Importantly, observations of in-county, in-state, and out-of-state evacuation destinations vary according to the distance between county and state borders and evacuation zones. For example, Dash and Morrow (2000a) surveyed residents of the Florida Keys who would need to travel 400+ miles to leave the state of Florida. In contrast, surveys of Louisiana residents, who live close to states of Arkansas and Mississippi, report higher numbers of out-of-state destinations (Mitchell et al., 2017; Wu et al., 2012).

Table 1. Surveys reporting respondent in-county (IC), in-state (IS), and out-of-state (OoS) evacuation destinations.

Evacuation	Destination		
	IC	IS	OoS
Hurricane Georges (Dash & Morrow, 2000)	19%	81%	0%
Hurricane Floyd (Dow & Cutter, 2002)	9%	32%	56%
Hurricane Ivan (Morrow & Gladwin, 2005)	32%	37%	31%
Hurricane Katrina (Wu et al., 2012)	1%	80%	19%
Hurricane Rita (Wu et al., 2012)	1%	47%	52%
Hurricane Katrina/Gustav/Isaac (Mitchell et al., 2017)	14%	34%	52%
Hurricane Irma (Wong et al., 2018)	17%	34%	49%
Future hurricane in LA (Mitchell et al., 2018) ¹	-	27%	73%

¹Did not report in-county evacuation destinations.

2.2. Surveys of evacuation accommodations

In addition to households' evacuation destinations, prior survey research examines the accommodations where people stay during an evacuation. Actual response surveys observe that approximately 54-70% of U.S. Gulf and Atlantic Coast evacuees stay at the homes of friends and relatives, 16-33% stay at a hotel/motel, 1-6% stay at public shelters, and 8-13% stay in other accommodations, such as second/vacation homes, peer-to-peer rentals (e.g., Airbnb), churches, or recreational vehicles (RVs) (Bierling et al., 2020; Mitchell et al., 2017; Whitehead et al., 2000; Wu et al., 2012). Although few evacuees stay in public shelters or other accommodations, these evacuees often include vulnerable populations (Mesa-Arango et al., 2013; Wong et al., 2018).

Comparatively, intended response surveys of U.S. Gulf and Atlantic coast residents observe that 51-60% of respondents plan to stay with family or friends, 24-33% intend to stay at hotel/motel, 5-12% intend to stay at public shelters, and 4-8% plan to stay in other accommodations (Mitchell et al., 2017; Morrow & Gladwin, 2006; Whitehead et al., 2000). Together, these studies suggest that accommodation intentions correspond with households' actual accommodation observed during hurricane evacuations (Kang et al., 2007). Mitchell et al. (2017), for example, report that Louisiana residents' intention of staying at the home of a family/friend, hotel/motel, public shelter, or other accommodation for a future hurricane typically matched their actual accommodations during Hurricanes Katrina and/or Gustav.

2.3. Factors influencing evacuee decision-making

While prior survey studies observe households' intended and actual destinations and accommodations, research still struggles to explain where people go and stay during a large-scale evacuation. In this regard, empirical studies of social support stand to improve our knowledge of evacuation behavior.

Prior studies examine relationships between households' destinations and accommodations, and various demographic and non-demographic factors. The former include factors such as age (Whitehead et al., 2000), disability/special needs (Ng et al., 2014), home ownership (Lindell et al., 2011), income (Yabe & Ukkusuri, 2020), pet ownership (Whitehead et al., 2000), and race (Mitchell et al., 2017), however, these factors often fail to predict evacuation destinations and distances (Wu et al., 2012). Other studies examine demographic factors related to accommodation decisions, and observe that low-income households with

young children, elderly persons, or persons with disabilities/special needs are more likely to evacuate to homes of family or friends or stay at a public shelter than stay at a hotel (Wong et al., 2018). These studies also report that large families, whites, and high-income households more often stay in hotels/motels and less often stay in public shelters (Lindell et al., 2011; Wu et al., 2012). Additionally, other studies observe relationships between households' hometown and geographic region and their choice of accommodations. Wu et al. (2012), for instance, observe that Texas households were less likely to stay in hotels than Louisiana households during Hurricane Katrina.

In addition to these demographic and non-demographic factors, however, emerging studies of social support (Asfaw et al., 2019) stand to improve understanding of large-scale evacuation behavior. Na and Grace (2022), for example, observe that evacuees plan to travel shorter distances when evacuating to destinations where they can receive assistance from family and friends but travel nearly twice as far when planning to evacuate to destinations where they will lack social support. Lacking empirical studies of social support and social support networks, survey research stands to address critical research questions that can, in turn, inform analyses of large-scale evacuation behavior. These research questions (RQ) include: (RQ1) What are the sizes and ranges of households' social support networks? (RQ2) What are households intended evacuation destinations and accommodations? (RQ3) What factors inform households evacuation destination and accommodation intentions? In this study, we address the above research questions to explore the relationship between social support networks and evacuation decision-making.

3. Methods

Although prior surveys examine the actual and intended destinations and accommodations of households during hurricane evacuations, these surveys do not examine social support available to households, including the homes of family and friends where households might stay during an evacuation. To address this gap, we surveyed Greater Houston households about their social support networks and evacuation and accommodation intentions. Below we describe the survey design and our methods of data analysis. This survey research was approved by a university institutional review board (IRB2023-735).

The survey was administered to an online panel (n=256) of Greater Houston residents from Austin, Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller Counties. According to the 2020 U.S. Census, the adult population of the

region, which includes urban Houston and surrounding suburban and rural areas, numbered 5,393,768 people.

Table 2. Demographics of survey respondents and Greater Houston residents.

	Survey Sample	Greater Houston
AGE¹		
18-24	9%	14%
25-34	20%	19%
35-44	15%	19%
45-54	17%	17%
55-64	13%	15%
65-74	17%	10%
75+	9%	6%
SEX¹		
Female	60%	49%
Male	40%	51%
ETHNICITY/RACE¹		
Hispanic or Latino	16%	37%
White	59%	34%
Black	9%	17%
American Indian	0%	0%
Asian	13%	8%
Hawaiian/Pac. Islander	0%	0%
Other	2%	0%
Multiracial	-	3%
EDUCATION²		
Less than high school	2%	15%
High school	20%	25%
Assoc. degree	19%	27%
Bachelor's degree	35%	21%
Graduate/prof. degree	24%	12%
HOUSEHOLD INCOME³		
\$0-49k	29%	33%
\$50-99k	36%	29%
\$100-149k	20%	16%
\$150,000+	14%	22%
EMPLOYMENT⁴		
In labor force	65%	67%
Employed	85%	95%
Unemployed	15%	5%
Not in labor force	35%	33%

¹U.S. Census Bureau: DP1 DEC 2020

²U.S. Census Bureau: S1501 ACS 2022

³U.S. Census Bureau: DP3 ACS 2022

⁴U.S. Census Bureau: DP3 ACS 2022

Respondents were asked to complete a 34-question survey that included questions related to demographics, evacuation and accommodation intentions, and their social support networks. These questions were informed by prior survey research on evacuation behavior (Bierling et al., 2020; Mitchell et al., 2017) and social connectivity patterns (Liang et al., 2020).

Table 2 compares the demographic information of survey respondents and Greater Houston residents. While not a representative sample, survey respondents generally resemble the general population but overrepresent and underrepresent certain groups. Compared to the general population, survey respondents are more likely to be elderly (65+), female, better educated (with a bachelor's degree or higher), unemployed, and earn between \$50-149K in household annual income. Respondents are also more likely to be White or Asian, and less likely to be Black or Hispanic, than the Greater Houston population. These differences, as well as the absence of data describing characteristics such as home ownership and vehicle access, represent limitations of the study that we discuss in Section 5.2.

Analysis involved calculating descriptive statistics such as frequencies, means, and percentages to understand the size and range of respondents' social support networks (RQ1), respondents' intended destinations and accommodations (RQ2), and the factors that respondents with different social support network sizes consider when selecting an evacuation destination (RQ3).

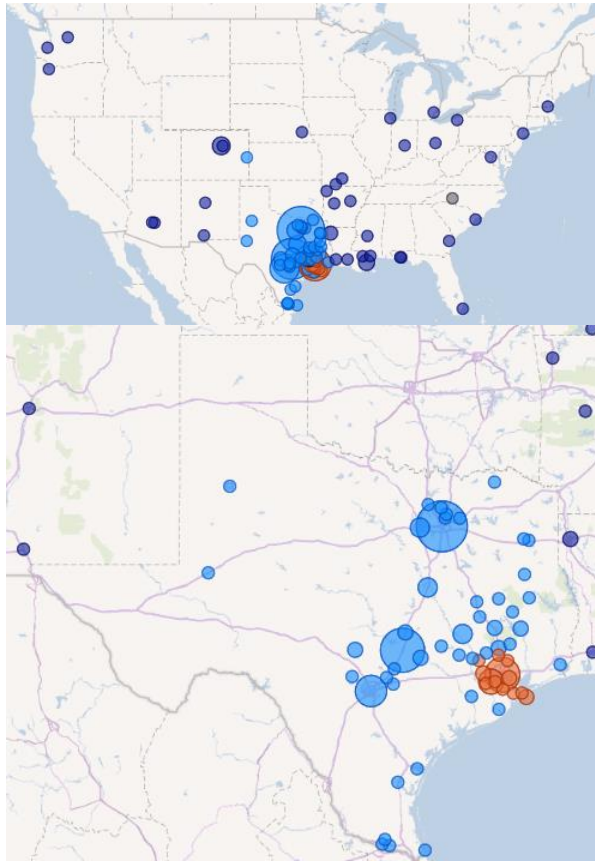
4. Results

In this section, we present the survey findings to describe respondents' evacuation destination and accommodation intentions, as well as the factors that influence their chosen destinations. For insight into the relationship between respondents' social support networks and their evacuation plans, we compare the evacuation destinations and accommodations for respondents grouped according to the size of their social support networks, i.e., how many family members and/or friends (FF) with whom they might stay during an evacuation. This results in comparisons between three groups: respondents without social support (i.e., 0 FF), with a single source of social support (i.e., 1 FF), and multiple sources of support (i.e., 2 FF).

4.1. Size and range of social support networks

Among the 256 surveyed respondents, 179 (70%) identified two relatives and/or friends at whose home they could stay during an evacuation, respectively. Another 52 (20%) respondents identified one relative or friend who could provide them with social support. The remaining 25 (10%) respondents lack a social support network. These respondents did not identify any friends or relatives who could provide them with a place to stay during an evacuation. Thus, while 90% of respondents have a social support network, they differ in size.

Figure 1. Respondents' intended in-county (orange), in-state (blue), and out-of-state (purple) evacuation destinations.



Social support networks also differ in range: some respondents' friends and relatives live close others live far away. Table 3 shows the number of respondents' family and friends who live in the same county, state, or who live outside the state of Texas. Overall, respondents identified 410 friends or relatives in their social support networks. Of these, 15% live in the same county in the Greater Houston region, 60% live in Texas, and 23% live out of state. As shown in Table 3, the geographic distribution of social support is roughly the same for respondents with one or two family and friends in their social support networks.

Table 3. Range of social support networks according to the in-county, in-state, and out-of-state locations of respondents' family and friends (FF).

Range	Size	
	1 FF	2 FF
In County	7 (13%)	53 (15%)
In State	33 (63%)	223 (62%)
Out of State	12 (23%)	82 (23%)
Total	52 (100%)	358 (100%)

Significantly, however, 17 (7%) of all respondents have social support networks that do not extend beyond their home county. These include seven respondents who identified only one source of social support within the same county, and 10 respondents who identified two friends and/or relatives within the same county. As we describe in the discussion, these respondents have local social support networks that may be unavailable or inaccessible due to hurricane paths and evacuation zones that encompass the households' hometowns and those of the family and friends who can provide them with social support.

4.2. Intended destinations

Table 4 shows respondents' intended evacuation destinations, categorized as in-county, in-state, or out-of-state. Consistent with prior surveys of actual and intended evacuation destinations (see Table 1), respondents plan to travel to nearby destinations within the same county, as well as destinations across the state of Texas and the U.S. Notably, most respondents plan to evacuate to destinations within Texas (Figure 1), however, 14 (5%) of respondents do not know where they would go if forced to evacuate from their homes.

Table 4. Intended evacuation destinations.

Destinations	Total
In County	32 (13%)
In State	153 (60%)
Out of State	57 (22%)
Don't Know	14 (5%)
Total	256 (100%)

Table 5 shows respondents' intended evacuation destination based on the size of their social support network. Although few ($n=25$), respondents without social support, i.e., 0 FF, often do not know where they would evacuate during a disaster. In contrast, most respondents with social support from 1-2 family members and/or friends intend to evacuate within the state of Texas. Nevertheless, a small but significant minority of respondents with and without social support plan to remain within the same county during a future evacuation.

4.3. Intended accommodations

Table 6 displays the accommodations where respondents plan to stay during an evacuation. Of 256 survey respondents, a majority (59%) intend to stay at the house of a family member or a friend. This is

followed by 71 respondents (28%) who plan to stay in a hotel or motel, and 13 respondents (5%) who plan to use other types of accommodations, such as an RV or a second home.

Table 5. Intended evacuation destinations among respondents with social support networks including 0-2 family/friends (FF).

Destination	0 FF	1 FF	2 FF
In County	2 (8%)	8 (15%)	22 (12%)
In State	9 (36%)	28 (54%)	116 (65%)
Out of State	7 (28%)	15 (29%)	35 (20%)
Don't Know	7 (28%)	1 (2%)	6 (3%)
Total	25 (100%)	52 (100%)	179 (100%)

Table 7 breaks down the intended evacuation accommodations of respondents based on the size of their social support networks. Unable to stay with family/friends, many respondents without social support intend to stay in hotels/motels (44%), public shelters (32%), and other accommodations compared to respondents with at least one relative or friend with whom they can stay during an evacuation. In contrast, respondents with social support networks including 1-2 family members and/or friends overwhelmingly often prefer to stay at the house of a family member or friend (71% and 64%, respectively). Notably, many respondents with social support still consider staying in a hotel/motel or other accommodations.

Table 6. Intended evacuation accommodations.

Accommodation	Total
House of family/friend	152 (59%)
Hotel or motel	71 (28%)
Other (RV, 2 nd home, etc.)	13 (5%)
Public shelter	12 (5%)
Peer-to-peer rental	8 (3%)
Total	256 (100%)

4.4. Factors influencing evacuation intentions

Figure 2 illustrates the factors that respondents consider when choosing an evacuation destination. The frequency of each factor is shown for respondents by social support network size. Across all three groups (0-2 FF), accommodation availability is most often considered, however, respondents with social support consider this factor more often than respondents without social support. Financial cost is also a frequent consideration among respondents, regardless of social

support network size. Interestingly, respondents with only one family member/friend in their social support network consider the availability of transportation and traffic congestion less than the other groups. As described in the preceding section, most respondents with only one source of social support also intend to evacuate to the home of a friend or relative,

Table 7. Intended evacuation accommodations among respondents with social support networks including 0-2 family/friends (FF).

Accommodation	0 FF	1 FF	2 FF
House of family/friend	0 (0%)	37 (71%)	115 (64%)
Hotel or motel	11 (44%)	12 (23%)	48 (27%)
Other (RV, 2 nd home, etc.)	3 (12%)	2 (4%)	8 (4%)
Peer-to-peer rental	3 (12%)	1 (2%)	4 (2%)
Public shelter	8 (32%)	0 (0%)	4 (2%)
Total	25 (100%)	52 (100%)	179 (100%)

Lastly, respondents with social support consider familiarity of the evacuation destination and the advice of family and friends more often than respondents without social support. Familiarity is considered more important to respondents with social support compared to those without, suggesting the importance of past experience at the homes of friends and relatives. Expectedly, advice from family/friends is more often considered among respondents with social support networks than those who lack assistance from family/friends. Other factors considered when planning where to evacuate include whether the destination is pet friendly or accessible for people with special medical needs.

5. Discussion

The survey results provide preliminary insight into the relationship between households' social support networks and their evacuation decisions. Although this study is limited to households in a specific U.S. metropolitan area, it lays the groundwork for future studies.

Future research can compare social support networks across various regions and delve deeper into the patterns that influence evacuation decisions based on these networks. However, before outlining these future directions and their implications for evacuation management systems, we first interpret our initial

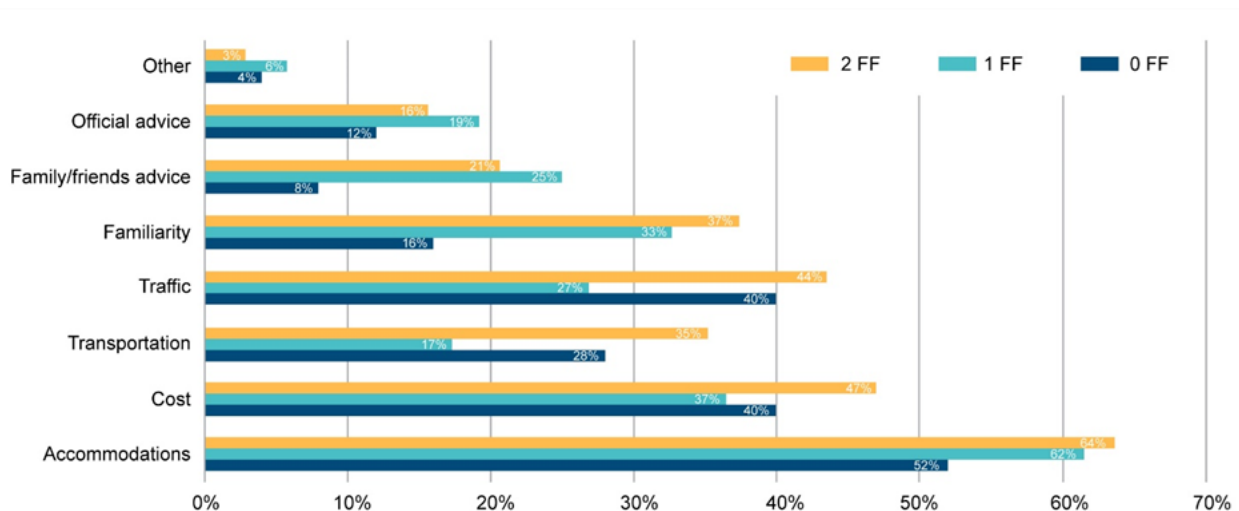


Figure 2. Factors respondents consider when choosing an evacuation destination.

survey findings in the context of prior research on U.S. households' intended and actual responses to hurricane evacuations and outline limitations of the present study.

5.1. Social support networks and evacuation decision-making

The results of the survey present three significant insights. First, we observe differences in the availability of social support and size of social support networks among Greater Houston households. Significantly, 10% of households lack a social support network, leaving them vulnerable if they cannot rent or obtain other accommodations during a future evacuation. Notably, many of these respondents do not know their evacuation destination and intend to stay in hotels/motels, peer-to-peer rentals, public shelters, or "other" accommodations in contrast to respondents with social support. These insights into households' social support networks can inform research that attempts to explain why evacuees choose particular types of accommodations, especially public shelters (Bierling et al., 2020; Lim et al., 2021; Lindell et al., 2011; Smith & McCarty, 2009). Existing research either focuses on relationships between accommodation decisions and demographic characteristics such as age, race, pet ownership, etc. (Mitchell et al., 2017; Smith & McCarty, 2009; Whitehead et al., 2000; Wong et al., 2018), or geographic factors such as distance between an evacuee's home and the coast (Wu et al., 2012).

In contrast, research on households' social support networks reveals that some households simply lack the option of staying at the home of a relative or friend or cannot access this support due to the range of their social support networks, i.e., family and friends live in areas that are too far to reach or inaccessible due to hazard

impacts. Moreover, unlike correlations between demographic and geographic factors and households' intended and actual accommodations that merely suggest rationales for these decisions, understanding households' social support and social support networks offers direct insight into the availability of short-term housing that households consider when making evacuation destination and accommodation decisions (Quarantelli, 1985). In other words, research on social support examines the actual options that enable and constrain the choices households make before and during an evacuation in various global contexts.

Second, we observe differences in the range of social support networks that are likely to influence household evacuation decision-making. By range, we refer to the distance between a household's location and the locations of the family and friends who can provide them with assistance, such as accommodations, during an evacuation. In this regard, context is important as the average range of social support networks among Greater Houston households, and many U.S. regions, is likely greater than geographically smaller and more densely populated areas in Asia and Europe.

Significantly, however, some households' social support networks do not extend beyond their home county. In this survey, 17 (7%) respondents can receive support only from family and friends in the same county. Most of these respondents also intend to evacuate to these family/friends' homes during an evacuation: among the 17 respondents, 13 (76%) intend to evacuate to an in-county destination, representing 40% of all respondents who intend to evacuate within their home county. Although a small sample of respondents, they represent some of the households that evacuate to in-county destinations—between 1-31% of respondents in prior surveys (Dash & Morrow, 2000b;

Dow & Cutter, 2002; Mitchell et al., 2017; Morrow & Gladwin, 2005; Wong et al., 2018; Wu et al., 2012)—as well as households with strong, local social network ties that previous studies report as less likely to evacuate during a hurricane (Collins et al., 2017; Ng et al., 2014), and, if they do evacuate, more likely to evacuate to the homes of family and friends than households with geographically distributed social networks (Bian et al., 2019). In the present study, most respondents with one in-county source of social support also intend to stay with that relative or friend during an evacuation, suggesting these respondents perceive these social network ties to be strong and dependable. As these respondents report no other family or friends inside or outside their home county who could provide them with assistance during an evacuation, these households and their in-county family and friends may be highly vulnerable during disasters that require communities to evacuate to remote, out-of-county destinations.

Third, and lastly, the survey results suggest fewer differences in evacuation destination and accommodation intentions between respondents with varied sizes of social support networks, than between respondents with and without social support networks or respondents with different ranges of social support networks (see preceding discussion). Overall, respondents with one and two relatives and/or friends report similar evacuation destination and accommodation intentions. Most respondents with one and two family/friends intend to evacuate to in-state destinations (54% and 65%, respectively) and stay at the home of a friend or relative (71% and 64%, respectively). Respondents with social support networks, regardless of size, represent most respondents and their destination and accommodation intentions align with those observed in prior intended response surveys (Dow & Cutter, 2002; Mitchell et al., 2017; Wu et al., 2012) and actual response surveys (Bierling et al., 2020; Lindell et al., 2011; Wong et al., 2018). While this study offers only preliminary insight into the relationship between social support network size and evacuation intentions, it suggests the possibility that the availability of social support and social support network range are more significant influences on household decision-making.

However, and importantly, the present study limited respondents to the identification of only two relatives or friends; some respondents likely have larger social support networks than described in this study. This is significant as prior studies observe significant correlations between social network size (including online social networks) and evacuation decisions, i.e., the decision to stay or leave one's home (Ling et al., 2021; Sadri et al., 2017). However, as there exists little research on social support among evacuees, few studies

have investigated the relationship between social network size and household evacuation destination and accommodation decision-making. As we explain below, this presents one of many opportunities for future research.

5.2. Implications for evacuation management systems

This study is part of ongoing work exploring opportunities for information systems to support evacuation management at community and household levels. As “incorporating realistic human behavior into CDM [Crisis and Disaster Management] simulation models” remains a challenge (Coates et al., 2024), such opportunities include studies that translate empirical research on social support networks into models of community evacuation behavior. These can, in turn, improve simulations of evacuation behavior that inform emergency management planning (Lindell et al., 2019).

At the household level, our findings into the *availability* of social support suggest systems that provide households with insight into the *accessibility* of social support in different evacuation scenarios. Households with small, local (e.g., in county) social support networks may not be able to access social support when evacuation zones include their homes as well of those of their family and friends. Furthermore, depending on the hurricane path, mode of transportation, routing, and time of departure, some households may not be able to safely reach destinations where they can stay with friends and relatives. As few households plan for an evacuation (Vásquez et al., 2016), and can lack information for alternative evacuation scenarios, future research can explore households' evacuation planning needs and co-design systems that can support destination, accommodations, and logistics planning for different evacuation scenarios in which social support may be unavailable and/or inaccessible.

5.3. Study limitations and future research

Additional limitations of the survey design and analysis should be considered when interpreting this study's findings. These limitations include data biases resulting from the non-representative sample, panel recruitment method, and intended response survey design, as well as limitations of the preliminary, descriptive analysis.

As described in Section 3, the sample of survey respondents does not accurately represent the characteristics of the general population of Greater Houston. Respondents are more likely to be White, female, elderly (65+), better educated (with a bachelor's

degree or higher), unemployed, and earn between \$50-149K than the general population. These differences reflect the characteristics of the survey panel used to recruit respondents. As a result, the findings presented in this study cannot be generalized to the general population as they include results that may over or under-represent social support network characteristics and evacuation intentions compared to results obtained from a random, representative sample of Greater Houston residents. Moreover, the demographics of Greater Houston differ from those of other U.S. cities. Similarly, social support networks may vary significantly across different countries and cultural contexts. Despite these limitations, the survey findings provide rare insight into households' social support networks and provide the foundation for the design and comparative analysis of future representative surveys.

Additionally, the intended response survey design necessarily introduces the possibility that respondents' intended evacuation destinations and accommodations will vary from their actual behavior during a future evacuation. As described in Section 2, studies find that intended and actual response surveys generally align in their findings (Kang et al., 2007; Mitchell et al., 2017; Whitehead et al., 2000). Moreover, respondents' destination and accommodation intentions align with the range of actual responses observed in prior research (see, for example, Tables 1, 4-5). Nevertheless, future research that compares the intended and actual responses of evacuees with respect to their social support networks remains critical for understanding the relationship between social support and evacuation decision-making and behavior.

Lastly, this study's analysis focuses on descriptive findings and does not, for example, examine statistical relationships between variables such as demographic characteristics, evacuation intentions, and social support size and range. Given the lack of prior empirical research describing households' social support networks, this study addresses an immediate gap in the literature and contributes insights that can guide future statistical analyses. Section 5.1 identifies important variables and relationships that emerge through description of the survey findings which should guide subsequent survey research. Future studies should also incorporate additional variables, including home ownership and vehicle access, analyzed in prior evacuation research (Lindell et al., 2019). Moreover, additional variables might address sociocultural and geographic differences that likely shape social support networks and evacuation intentions across different regions.

6. Conclusion

This study reports findings from a 2023 survey investigating Greater Houston households' social support networks: family and friends who can provide them with accommodations during an evacuation. Findings describe the range and size of these networks in relation to households' evacuation intentions. These findings suggest opportunities for evacuation management systems that can accurately simulate evacuation behaviors and support household evacuation planning.

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