



## 4.0 Behavioral Analysis

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### 4.1 Introduction

In emergency management, as in any profession that must manage the collective actions of large number of individuals, it is clear that people do not always behave in the way emergency managers would like, nor do they always comply with official safety messages. Regarding evacuation orders, entire populations of an area rarely comply with official evacuation orders. Public responses to hurricane threats have been shown to vary with storm-specific circumstances, such as storm category, perceptions of the public (e.g., the perceived safety of their home, etc.) and advice of local officials (i.e., mandatory versus recommended). Under-compliance, where fewer than expected people evacuate from a risk area, place individuals in harm's way and may force emergency management officials to launch rescue efforts during a storm. Alternatively, over-compliance (shadow evacuation), where individuals from outside of an ordered evacuation zone decide to evacuate can also complicate evacuations by loading additional cars on an already taxed evacuation network. To capture the intricacies of human behavior and its impact on evacuation modeling, Dr. Jay Baker of Hazards Management Group conducted the most recent behavioral analyses for the study area. These behavioral analyses provide estimates of public response to a variety of hurricane threats. The complete behavioral analysis can be found in the File Bank.

### 4.2 Purpose

The behavioral analysis is conducted to provide reliable estimates of how the public in the study area will respond to a variety of hurricane threats. These assumptions are not only incorporated into the Shelter Analysis (Chapter Five) and Transportation Analysis (Chapter Six) data and figures, but also help guide emergency management decision making and public awareness efforts.

### 4.3 Objectives

A behavioral analysis is designed to answer the following questions:

- What percentage of the population will evacuate given various hurricane threat scenarios or in response to evacuation advisories?
- When will the evacuating population leave in response to an evacuation order given by local officials?
- How many vehicles will the evacuating population use during a hurricane evacuation?
- How many evacuating vehicles will be towing boats, camper trailers, or other vehicular equipment?
- What are the destinations of the evacuees and what type of shelter will they seek?



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- How will the threatened population respond based upon forecasts of hurricane intensity or other information provided during a hurricane emergency?

Responses to these questions by the evacuating public provide a valuable insight into anticipated evacuee behavior. In addition to the questions listed above, information from state and local officials regarding historical compliance with evacuation orders and behavior during actual events provides a “real world” validation of the data employed in the analysis.

### 4.4 Behavioral Analysis

The Behavioral Analysis section deals with five principle categories of behavioral response typically addressed in the hurricane evacuation study. These five categories are:

1. Evacuation participation rates;
2. Evacuation timing;
3. Type of refuge sought;
4. Destinations for evacuees; and
5. Vehicle use.

Based on these categories, 600 interviews (300 in Zone A/Category 1 and 2 Surge Inundation Zones, 200 in Zone B/Category 3 and 4 Surge Inundation Zones, and 100 in non-surge areas of adjacent coastal communities) were conducted by landline phone in the Connecticut study area. Interviewees were asked a series of questions to document what they would do in three hypothetical hurricane situations. The hurricanes were described as:

- **Category 2 hurricane** (winds of 100 MPH / storm surge 5 to 12 feet high)  
*Evacuation zones include everyone living in areas that would be affected by flooding in a Category 1 or 2 hurricane and everyone living in mobile homes or manufactured housing.*
- **Category 3 hurricane** (winds of 125 MPH / storm surge 7 to 16 feet high)  
*Evacuation zones include everyone living in areas that would be affected by flooding in a Category 1, 2 or 3 hurricane and everyone living in mobile homes or manufactured housing.*
- **Category 4 hurricane** (winds of 140 MPH / storm surge 9 to 22 feet high)  
*Evacuation zones include everyone living in areas that would be affected by flooding in a Category 1, 2, 3 or 4 hurricane and everyone living in mobile homes or manufactured housing.*

Their responses to each of these hypothetical hurricanes are included in this section.



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### 4.4.1 Evacuation Participation Rates

Identifying the evacuation participation rates within the study area is an important first step comprised of many variables. Evacuation participation rates take into consideration one’s intention to evacuate, perception of vulnerability, expectation of evacuation notices, and other considerations as discussed in this section.

#### A. Intention to Evacuate

Connecticut interviewees were told to assume that officials had issued evacuation notices recommending that certain portions of the population evacuate for each of the three hypothetical hurricanes.

Throughout the study area, a high percentage of interviewees indicated their intention to evacuate in the storm scenarios described. Across the three storm intensity scenarios, in Zone A evacuation intentions ranged from 69% to 85%, in Zone B they ranged from 65% to 82%, and in the non-surge zones they ranged from 61% to 79%. Their responses are documented in Table 4-1.

**Table 4-1:** Intention to Evacuate

Category 2			Category 3			Category 4		
A / 1-2	B / 3-4	Non-Surge	A / 1-2	B / 3-4	Non-Surge	A / 1-2	B / 3-4	Non-Surge
69%	65%	61%	76%	71%	68%	85%	82%	79%

#### B. Perception of Vulnerability

Intention to evacuate does not always indicate how people eventually will respond in actual hurricane threats. A better indicator is whether people believe their own home would be safe in a hurricane. Interviewees were asked whether they believed their home would flood dangerously in each of three categories of hurricane, followed by if they believed their home would be safe from both wind and flood. The intensities of the storms were Category 2 (100 MPH), Category 3 (125 MPH), and Category 4 (140 MPH).

Tables 4-2 and 4-3 reflect the perceived vulnerability of interviewees regarding the safety of their home in flood and both wind and flood situations. As depicted, the concern of interviewees in all zones gradually increased with each level of storm.



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**Table 4-2:** Perceived Vulnerability of Home – Believe Home would Flood Dangerously

Category 2			Category 3			Category 4		
A / 1-2	B / 3-4	Non-Surge	A / 1-2	B / 3-4	Non-Surge	A / 1-2	B / 3-4	Non-Surge
42%	22%	13%	57%	42%	25%	72%	63%	36%

**Table 4-3:** Perceived Vulnerability – Believe Home would not be Safe

Category 2			Category 3			Category 4		
A / 1-2	B / 3-4	Non-Surge	A / 1-2	B / 3-4	Non-Surge	A / 1-2	B / 3-4	Non-Surge
42%	32%	28%	56%	48%	32%	66%	59%	46%

### C. Expectation of Evacuation Notices

An evacuation notice from public officials is usually a strong indicator to people that they need to evacuate. Unfortunately many people living in areas ordered to evacuate do not think the order applies to them, particularly when door-to-door dissemination of notices is not conducted. Studies indicate that when asked, people respond that they did not hear an evacuation notice for them specifically. For this analysis, interviewees were asked if they thought emergency management officials in their community would issue an evacuation notice saying they should leave their home to go someplace safer. That is, would officials tell them to evacuate. The question was asked for a Category 2, 3 and 4 hurricanes.

Survey results indicate that most but not everyone in Zones A/1-2 and B/3-4 expect to be told to evacuate in Category 2, 3, and 4 hurricanes, with little difference between the two zones. In non-surge areas, almost half expect to be told to evacuate in Category 2 storms as well as the majority in Category 3 (57%) and Category 4 (75%) storms.

**Table 4-4:** Expectation of Evacuation Notice

Category 2			Category 3			Category 4		
A / 1-2	B / 3-4	Non-Surge	A / 1-2	B / 3-4	Non-Surge	A / 1-2	B / 3-4	Non-Surge
73%	68%	46%	86%	81%	57%	90%	89%	74%

### D. Other Considerations

**Reasons to Evacuate:** Interviewees who stated they would evacuate were then asked to state the main reason they would evacuate their home for each storm scenario. Interviewers recorded up to three answers for each interviewee. These answers included:

- Surge/Waves
- Wind



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- River Flooding
- Home Vulnerability
- Official Notice
- Family Influence
- Electricity/Water Loss
- Isolation
- Do Not Know
- Other

Of the reasons for those intending to evacuate, storm surge, waves, and wind were the most frequently mentioned reasons.

Reasons for Not Evacuating: Interviewees who indicated they would not evacuate if ordered to by officials were asked why they would not comply. They were asked to provide up to three reasons for not evacuating which included:

- Home Will Not Flood
- Home is Well Built
- Not in Evacuation Zone
- Past Experience
- Protect from Looters
- Traffic Concerns
- Job
- Pet
- Do Not Know
- Other

‘Home Will Not Flood, Home is Well Built, and Past Experience’ were the most popular responses. The most significant overall pattern is that the overwhelming majority of reasons provided had to do with perceived safety, not constraints to leaving, such as work, lack of funds, and no place to go.

### 4.4.2 Evacuation Timing

One set of critical behavioral assumptions included in the Chapter 6: Transportation Analysis is the speed of evacuation response by the evacuating population; establishing how quickly the vulnerable population will respond to an evacuation notice or advisory. Behavioral data from past hurricane evacuation research demonstrates that mobilization and actual departures of



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the evacuating population can occur over a very brief time, or over a period of many hours. To account for this variation, clearance times were tested for three evacuation response rates represented by different behavioral response curves. The behavioral response curves shown in Figure 4-1 are generalized scenarios that have been used in past HES efforts and were originally based on work done by Dr. Jay Baker of Hazards Management Group. Every evacuation has a different response curve/footprint. The response curves in Figure 4-1 reflect rapid, medium, and long responses and are designed to include the range of mobilization times that may be experienced in a hurricane evacuation situation.

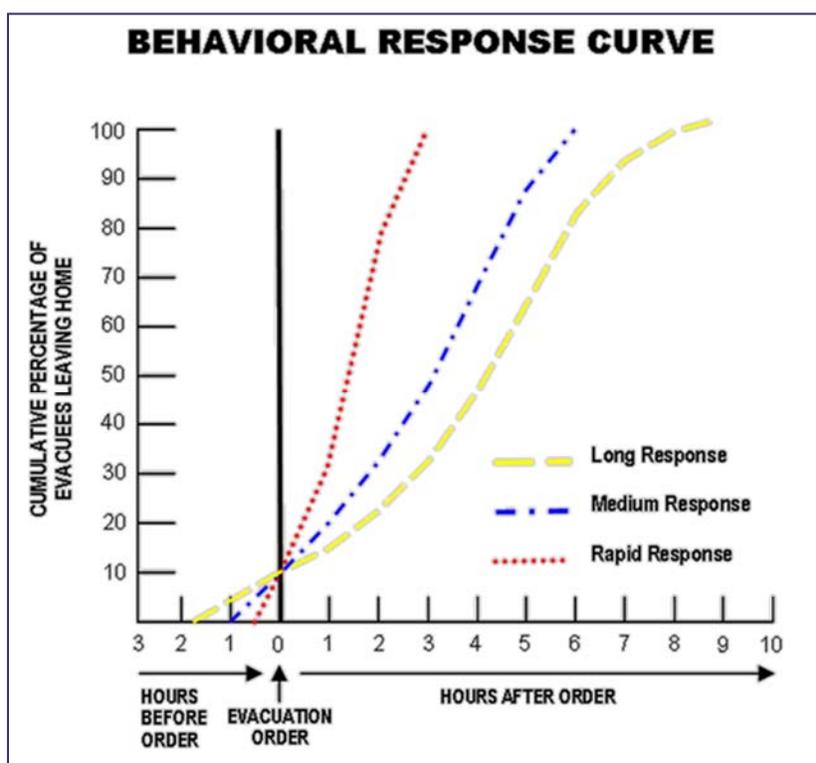


Figure 4-1: Evacuation Response Curve

The response curves depicted above relate to the following real-world examples regarding their use during an actual tropical cyclone response. A long response would be an appropriate clearance time assumption during nighttime hours, or during the middle of a normal weekday when most families are scattered to work, school and other routine activities away from home. A medium response curve would be appropriately applied during weekend days and any evening hours when most families have been rejoined at their residences and can be informed and mobilized in relatively short order. A rapid response relates to periods when most families are together and can be alerted and motivated to respond quickly, such as in the morning before most families have left from normal daytime activities and before schools and businesses are opened.



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### 4.4.3 Type of Refuge

Connecticut interviewees, both those who said they would evacuate in the respective storm scenarios and those who said they would not, were asked what source of refuge they would seek if they evacuated. Refuge options included ‘will not leave, do not know, other, hotel/motel, friend/relative, or public shelter’. Intended Refuge in a Category 3 results are shown in Table 4-5. Of all the interviewees that participated in the survey, a small number insisted that they would not evacuate, and between 12% and 16% said they did not know where they would go if they evacuated in a Category 3 storm. Excluding those who will not leave or do not know, approximately 52% to 66% said they would go to the homes of friends and relatives, 14% to 18% would go to public shelters, 11% to 23% would go to hotel/motels, with the remaining 4% to 8% going to miscellaneous locations such as second homes, churches, and workplaces.

**Table 4-5: Intended Refuge in a Category 3 Hurricane**

	Category 3			Category 3 (excluding Will Not Leave/Do Not Know)		
	A / 1-2	B / 3-4	Non-Surge	A / 1-2	B / 3-4	Non-Surge
Will Not Leave	4%	1%	2%	excluded	excluded	excluded
Do Not Know	12%	16%	14%	excluded	excluded	excluded
Other	3%	4%	7%	4%	4%	8%
Hotel / Motel	15%	9%	19%	18%	11%	23%
Friend / Relative	55%	55%	44%	65%	66%	52%
Public Shelter	12%	15%	14%	14%	18%	17%

The same question concerning intended refuge was asked in all three hurricane scenarios, but the results varied little among storms as shown in Table 4-6.

**Table 4-6: Intended Refuge by Hurricane Category**

	Category 2	Category 3	Category 4
Other	5%	5%	6%
Hotel / Motel	16%	16%	17%
Friend / Relative	64%	63%	60%
Public Shelter	15%	16%	17%

Interviewees were told that public safety officials encourage evacuees to stay with friends or relatives outside the areas being told to evacuate. They were asked if they had friends and



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relatives in safe locations with whom they could stay in an evacuation if necessary. A majority (55% to 60%) said they could stay with friends or relatives if necessary.

### 4.4.4 Destination

Interviewees were asked to indicate the location of the refuge they would seek when evacuating. Responses included ‘do not know, out of state, own state, own community, and own neighborhood’ as shown in Table 4-7. Only 10% to 13% said they would go someplace in their own neighborhood, but in evacuation Zones 1-2 and 3-4, 37% and 31% respectively said they would go to another location in their own community. The majority of other destinations were within Connecticut. Variations among risk zones were small. Responses for Category 2 and 4 scenarios were almost identical to those for Category 3 storms as shown in Table 4-8.

**Table 4-7:** Intended Location of Refuge in a Category 3 Hurricane

	In a Category 3 Hurricane		
	A / 1-2	B / 3-4	Non-Surge
Do Not Know	2%	4%	13%
Out of State	7%	9%	14%
Own State	44%	45%	39%
Own Community	37%	31%	20%
Own Neighborhood	10%	11%	13%

**Table 4-8:** Intended Location of Refuge by Hurricane Category

	By Hurricane Category		
	Category 2	Category 3	Category 4
Do Not Know	4%	4%	4%
Out of State	9%	9%	11%
Own State	44%	44%	43%
Own Community	32%	32%	31%
Own Neighborhood	11%	11%	11%

Of those seeking refuge, almost everyone intending to seek public shelter anticipates the shelter’s location to be in their own neighborhood (36%) or elsewhere in their own community (48%). Most evacuees going to the homes of friends and relatives said those locations would be outside their own community. As shown in Table 4-9, most hotel and motel destinations are anticipated to be either in one’s own community or elsewhere in Connecticut, although 6% could be out of state.



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**Table 4-9:** Intended Location of Refuge by Type

	Public Shelter	Friend / Relative	Hotel / Motel	Other
Do Not Know	5%	2%	10%	12%
Out of State	0%	10%	6%	19%
Own State	10%	53%	38%	46%
Own Community	48%	29%	34%	15%
Own Neighborhood	36%	6%	11%	8%

### 4.4.5 Vehicle Use

Interviewees were asked a number of questions dealing with transportation during an evacuation. Questions asked included:

- How many vehicles were available in their household to use in an evacuation?
- How many vehicles would be used in an evacuation?
- If they would trailer or take a motor home?

Between 4% and 8% of the interviewees said they had no vehicles available to be used in an evacuation. The mean number available ranged from 1.80 to 2.00, and the mean number to be taken during an evacuation ranged from 1.45 to 1.51. The percentage of available vehicles that would be used in an evacuation was 73% in non-surge areas and 83% in Zones 1-2 and Zones 3-4. Only 1% of the non-surge households plan to pull trailers or take a motor home, but 6% of those in Zone 1-2 plan on doing so. Table 4-10 summarizes the responses.

**Table 4-10:** Transportation Modes

	A / 1-2	B / 3-4	Non-Surge
% with No Vehicles Available	4%	8%	4%
Mean Vehicles Available	1.82	1.80	2.00
Mean Vehicles to Take	1.51	1.49	1.45
% Available to Take	83%	83%	73%
% with Trailers / Motor homes	6%	3%	1%

In addition to questions related to modes of transportation, interviewees were also asked to name the main route or routes they would use if they evacuated. Results are shown in Figure 4-2. I-95 was mentioned most often, followed by Route 1 and I-91.



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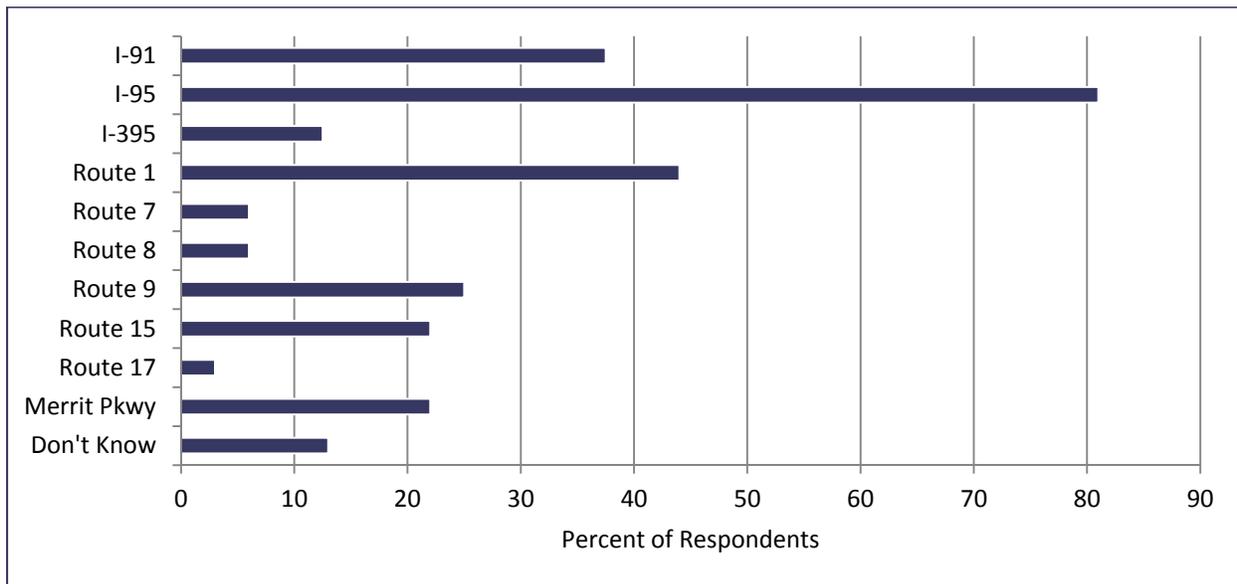


Figure 4-2: Intended Evacuation Routes

## 4.5 Possible Evacuation Obstacles

A variety of obstacles may arise in any evacuation event causing individuals to not evacuate. Interviewees were asked what their obstacles may be if ordered to evacuate and are summarized in this section.

### 4.5.1 Households Needing Assistance to Evacuate

Emergency management officials need to anticipate there will be a number of people who will need assistance in order to evacuate. When asked if someone in their household would need assistance in order to evacuate, 10% or less said yes in each risk area.

Of the 10% or less who would need assistance, they were then asked what type of assistance and source of assistance would be needed in order to evacuate. In Zone 1-2 and Zone 3-4, about a third needed transportation only, but in the non-surge area just 14% required transportation as shown in Table 4-11. Of the households needing assistance, Table 4-12 summarizes the anticipated source of assistance while Table 4-13 identifies those interviewees who indicated the person needing assistance was registered with a local government agency for evacuation assistance.



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**Table 4-11:** Type of Assistance Needed

	A / 1-2	B / 3-4	Non-Surge
Other	4%	15%	14%
Do Not Know	15%	10%	0%
Both	22%	30%	29%
Special Need	26%	15%	43%
Transportation	33%	30%	14%

**Table 4-12:** Source of Assistance Needed

	A / 1-2	B / 3-4	Non-Surge
Other	4%	0%	0%
Do Not Know	22%	20%	0%
Agency	19%	35%	14%
Friend / Relative	22%	15%	14%
Household	33%	30%	71%

**Table 4-13:** Registered as Special Need

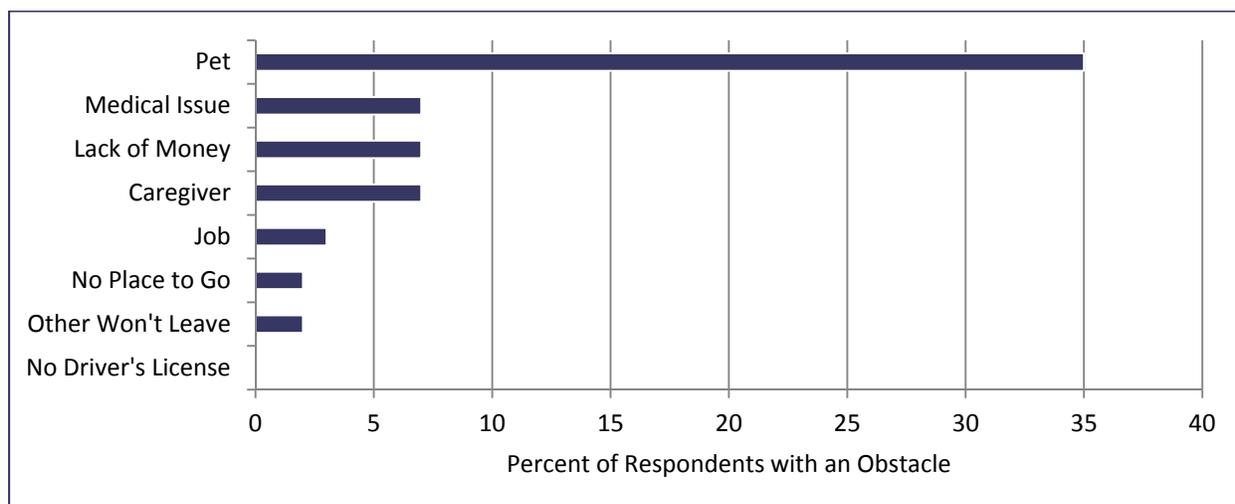
	A / 1-2	B / 3-4	Non-Surge
Do Not Know	15%	0%	43%
No	67%	65%	57%
Yes	18%	35%	0%

### 4.5.2 Other Challenges

All interviewees were asked if there were any obstacles other than a lack of transportation or special need that would prevent the interviewee from being able to evacuate to a safer place during a hurricane threat. Fewer than 10% in any of the three risk areas said that there were such obstacles. Those who said an obstacle existed were asked to describe it, and up to three responses were recorded. The presence of pets in the household was the most common challenge as shown in Figure 4-3.



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**Figure 4-3:** Other Obstacles to Evacuating

More than half of those interviewed were pet owners. Pet ownership was lower in the evacuation zones (51% and 48%) than in the non-surge area (63%). When asked what they would do with their pet during an evacuation, approximately 84% to 87% of the interviewees said they would take their pets with them to their evacuation destinations. At least 75% of those interviewed in the two evacuation zones and 57% in the non-surge areas said they were aware that most public shelters do not allow pets inside. Table 4-14 provides the responses of interviewees when asked if the pet shelter policy would prevent them from evacuating.

**Table 4-14:** Effect of Public Shelter Pet Policy on Evacuation

	A / 1-2	B / 3-4	Non-Surge
Other	2%	4%	11%
Do Not Know	3%	2%	3%
Not Applicable	3%	2%	5%
Go Elsewhere	87%	87%	76%
Keep from Evacuating	6%	4%	5%



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### 4.6 Planning, Information Access, and Home Characteristics

Other important aspects of an evacuation include the readiness of families, accessibility and sources for evacuation information, and housing characteristics. In the following sections, interviewees were asked a series of questions related to these topics to provide emergency planners additional insight into public awareness or evacuation preparedness.

#### 4.6.1 Family Evacuation Plan

Interviewees were asked if they and their family have a definite plan for deciding whether to evacuate and where to go if a hurricane threatens. Responses shown in Table 4-15 reflect that about half of those in the evacuation zones said they did while another 10% to 13% said they did, but it was not very definite. Slightly fewer in the non-surge area said they had a plan.

**Table 4-15:** Family Has Evacuation Plan

	A / 1-2	B / 3-4	Non-Surge
Do Not Know	1%	0%	1%
No	34%	38%	43%
Yes	51%	52%	45%
Not Very Definite	13%	10%	10%

#### 4.6.2 Information Awareness and Access

Interviewees were asked if they had ever seen a map of their community showing areas that would need to evacuate in case of a hurricane. In the evacuation zones, more than half (54% in Zone 1-2 and 58% in Zone 3-4) said they had, and 34% in the non-surge area said they had as shown in Table 4-16.

**Table 4-16:** Saw Map of Evacuation Zones

	A / 1-2	B / 3-4	Non-Surge
Do Not Know	5%	3%	4%
No	42%	39%	62%
Yes	54%	58%	34%

At least 85% of interviewees said they have access to the internet so they could view hurricane information. When asked if they had ever visited their local government website to find hurricane information, only 33% to 34% indicated they had as shown in Table 4-17.



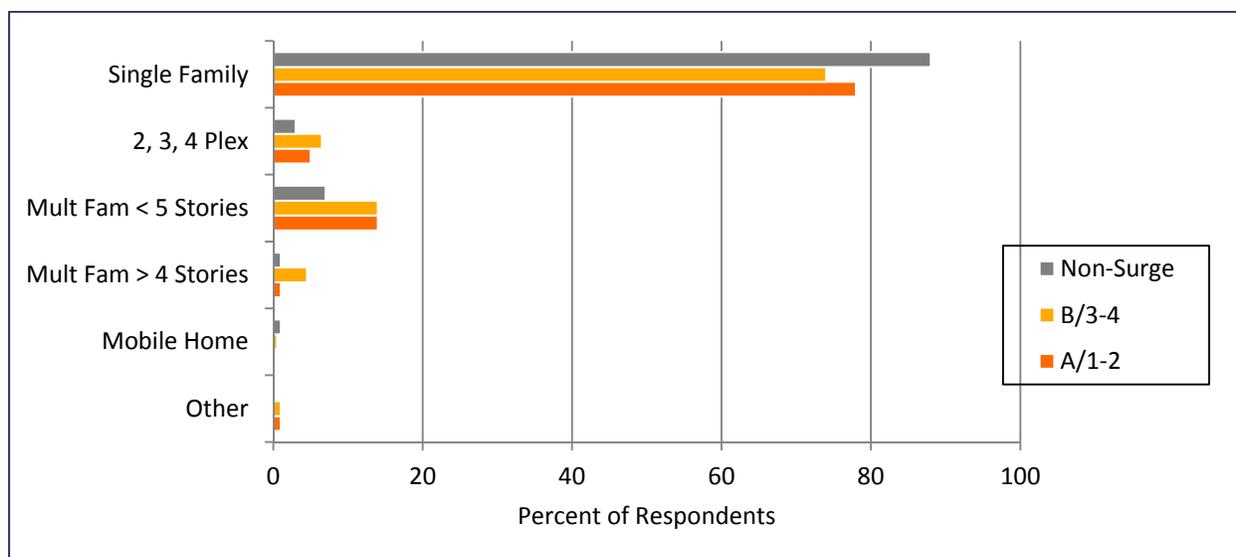
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**Table 4-17:** Visited Local Government Website for Hurricane Information

	A / 1-2	B / 3-4	Non-Surge
Do Not Know	2%	2%	1%
No	64%	65%	66%
Yes	34%	33%	33%

### 4.6.3 Housing Characteristics

A majority of interviewees live in single family detached structures, followed by multi-family buildings fewer than five stories and duplexes, triplexes, and quadraplexes. Less than one percent lives in mobile or manufactured homes as illustrated in Figure 4-4.



**Figure 4-4:** Type of Housing

## 4.7 Past Evacuation Experiences

How interviewees responded in past hurricanes is a good indicator of how they will act in future situations. Given the study area's recent Hurricane Sandy (2012) and Hurricane Irene (2011) events, interviewees were asked questions related to if they evacuated, why they evacuated, what type and location of refuge they sought, and if they would respond differently next time.

### 4.7.1 Hurricane Sandy (2012)

Of those interviewed in 2013, 89% said they had been in the area and at home when Hurricane Sandy threatened in 2012. They were then asked a series of questions related to how they responded.



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In Zone 1-2, 43% said they left their homes to go someplace safer in Hurricane Sandy, followed by 27% in Zone 3-4, and 7% in non-surge areas. Most interviewees said they heard from public officials, either directly or indirectly, that they and people in their location should evacuate to a safer place in Hurricane Sandy. In Zone 1-2, 27% heard they must evacuate followed by 19% in Zone 3-4, and 1% in non-surge areas.

**Table 4-18:** Type of Evacuation Notice Heard in Hurricane Sandy

	A / 1-2	B / 3-4	Non-Surge
Must	27%	19%	1%
Should	41%	40%	19%
None	32%	40%	80%

Hearing evacuation notices (or believing that one heard evacuation notices) had a pronounced effect on whether people left or not. In Zone 1-2, 78% of those who heard mandatory evacuation notices complied, compared to 37% of those who heard recommendations, and 21% of those who heard neither. The effect was similar in Zone 3-4. The non-surge area is misleading because just one person in the sample heard a mandatory notice, and that person evacuated. These results are shown in Table 4-19.

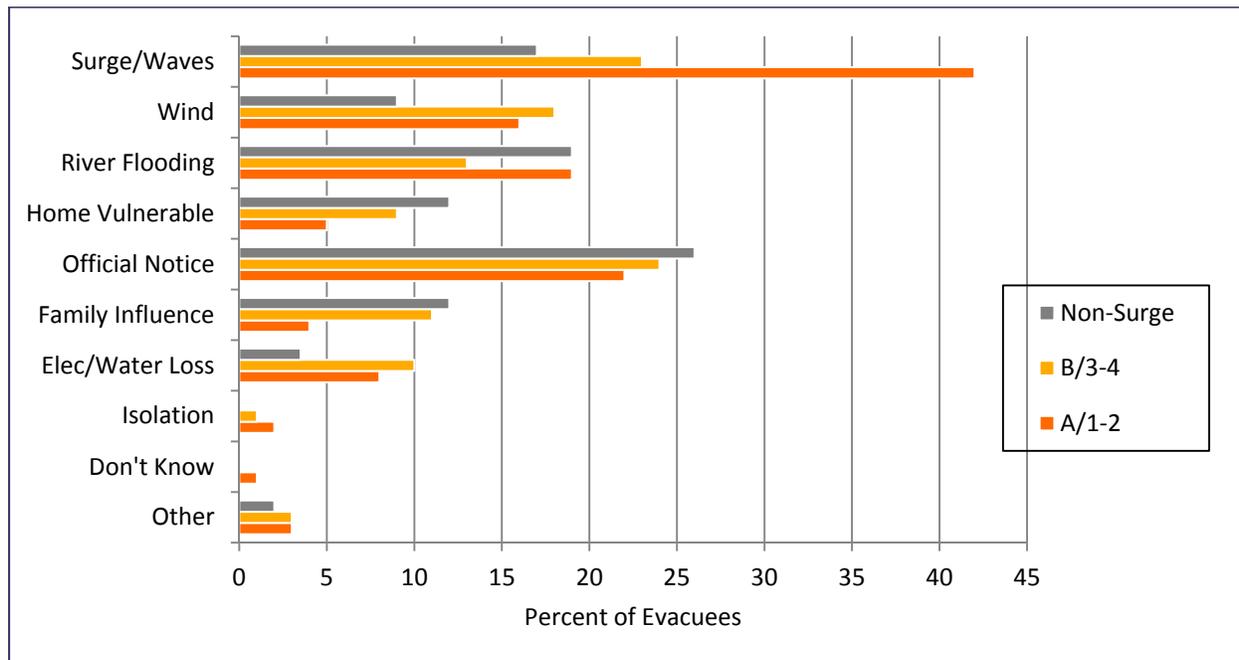
**Table 4-19:** Evacuation in Hurricane Sandy by Type of Notice Heard

	A / 1-2	B / 3-4	Non-Surge
Must	78%	68%	100%
Should	37%	27%	6%
None	21%	7%	5%

When asked to indicate the main reason they evacuated their home in Hurricane Sandy, most cited a concern about hazards from the storm or hearing evacuation notices (with up to three reasons being recorded per interviewee) as shown in Figure 4-5. In Zone 1-2, more than 40% cited concern over storm surge.



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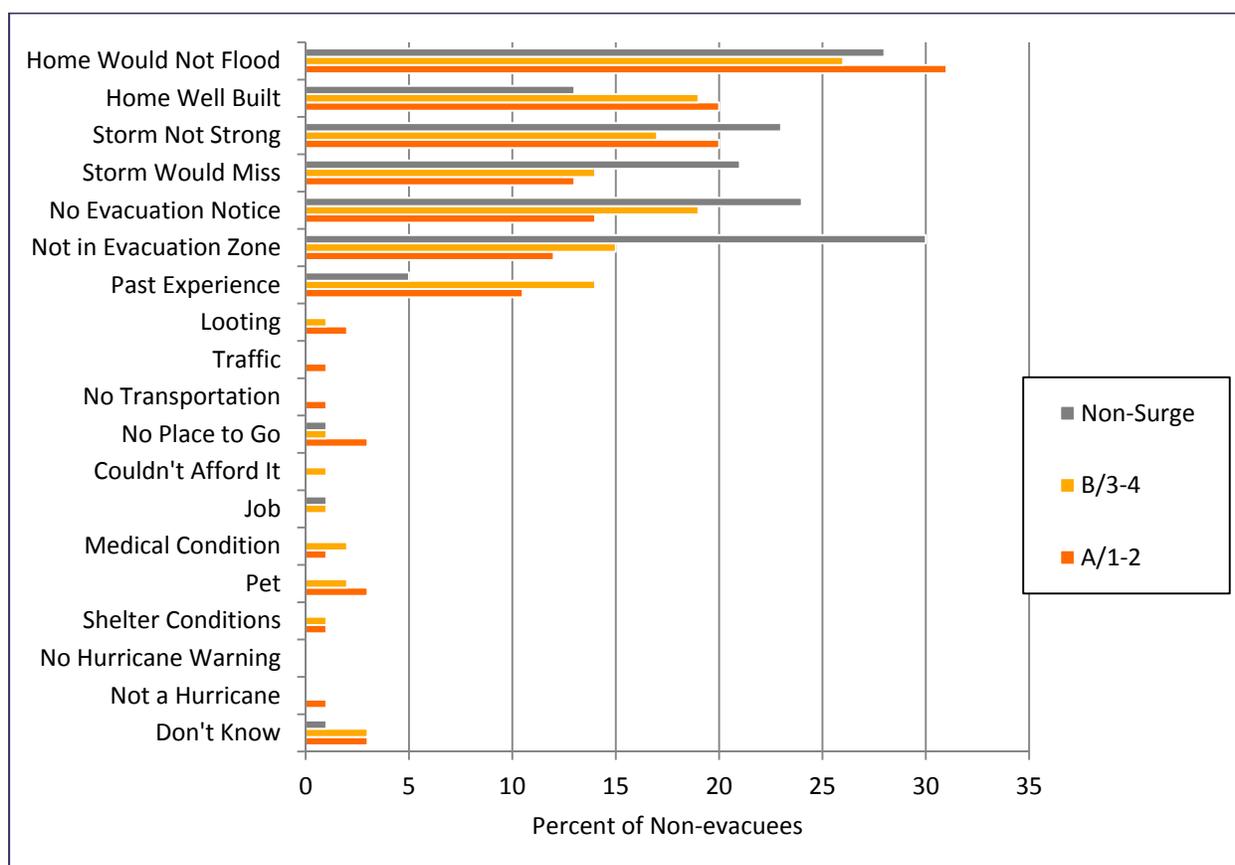


**Figure 4-5:** Reasons Given for Evacuating in Hurricane Sandy

When non-evacuees were asked for the main reason they did not evacuate in Hurricane Sandy, most people cited one or more reasons for why the storm posed little if any threat to their safety as illustrated in Figure 4-6. Non-surge area residents were more likely than others to say they were not in an area told to evacuate. Very few mentioned the fact that Hurricane Sandy was not technically a hurricane near landfall or that the National Hurricane Center did not issue a hurricane warning. Constraints such as a lack of funds, no transportation, and pets were mentioned much less frequently than beliefs about safety.



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**Figure 4-6:** Reasons Given for Not Evacuating in Hurricane Sandy

Most Hurricane Sandy evacuees went to the homes of friends and relatives, followed by hotels and motels. Only 7% to 12% said they used public shelters as shown in Table 4-20. Of those who sought refuge, 35% and 29% stayed within their own community, 47% to 50% stayed within Connecticut, 11% to 33% within their own neighborhood, and 4% to 17% went out of state as shown in Table 4-21.

**Table 4-20:** Type of Refuge in Hurricane Sandy

	A / 1-2	B / 3-4	Non-Surge
Other	6%	8%	33%
Hotel/Motel	16%	6%	17%
Friend/Relative	71%	75%	50%
Public Shelter	7%	12%	0%

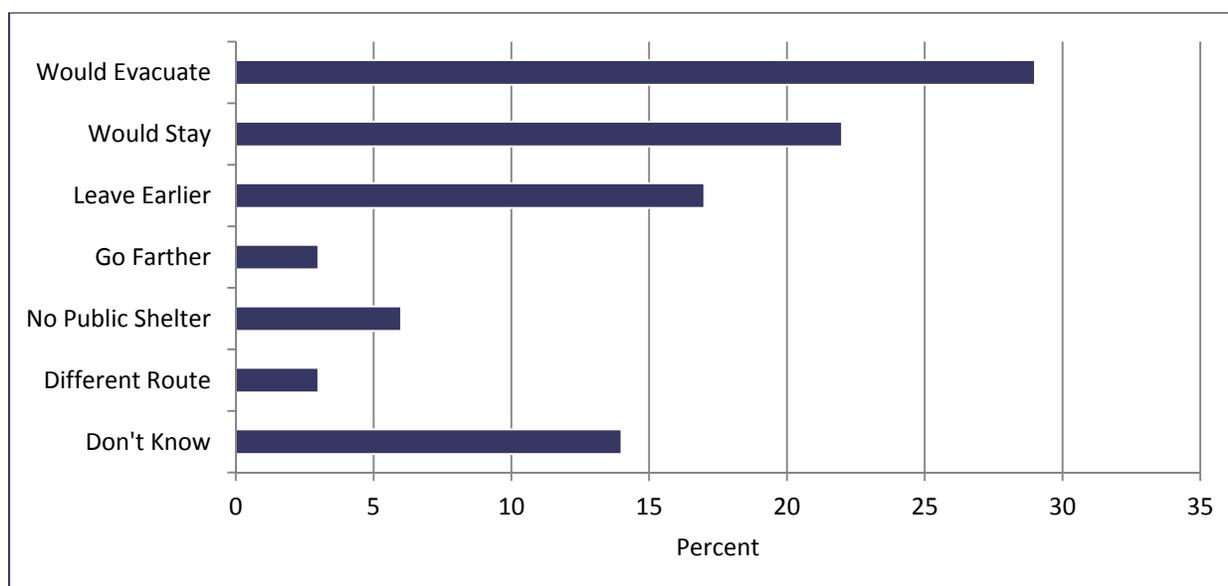


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**Table 4-21:** Location of Refuge in Hurricane Sandy

	A / 1-2	B / 3-4	Non-Surge
Out of State	6%	4%	17%
Own State	47%	49%	50%
Own Community	35%	29%	0%
Own Neighborhood	11%	18%	33%

The great majority (79% to 86%) of interviewees said they would do the same thing if presented with the same situation again. Of those who said they would do something different, approximately 28% who did not leave in Hurricane Sandy said they would in the future, and about 22% of those who did leave in said they would not in the future as shown in Figure 4-7.



**Figure 4-7:** Different Responses Next Time

### 4.7.2 Hurricane Irene (2011)

Of those interviewed in 2013, 88% said they had been in the area and at home when Hurricane Irene threatened New England in 2011. If those respondents were indeed present during that event, then the same questions asked for Hurricanes Sandy and Earl were asked regarding their responses for Hurricane Irene.

Fewer evacuated in Hurricane Irene than in Hurricane Sandy with only 22% leaving from Zone 1-2, 15% from Zone 3-4, and 6% from the non-surge area. Few said they received evacuation notices in Hurricane Irene with 13% in Zone 1-2 and 7% in Zone 3-4 as shown in Table 4-22.



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**Table 4-22:** Type of Evacuation Notice Heard in Hurricane Irene

	A / 1-2	B / 3-4	Non-Surge
None	55%	59%	88%
Should	32%	34%	11%
Must	13%	7%	1%

Those who believed they were told to evacuate were substantially more likely to do so than those who said they were not told. In Zone 1-2, 64% left if they heard mandatory notification, as did 69% in Zone 3-4. Too few heard notices in the non-surge area to place much stock in those responses. All responses are shown in Table 4-23.

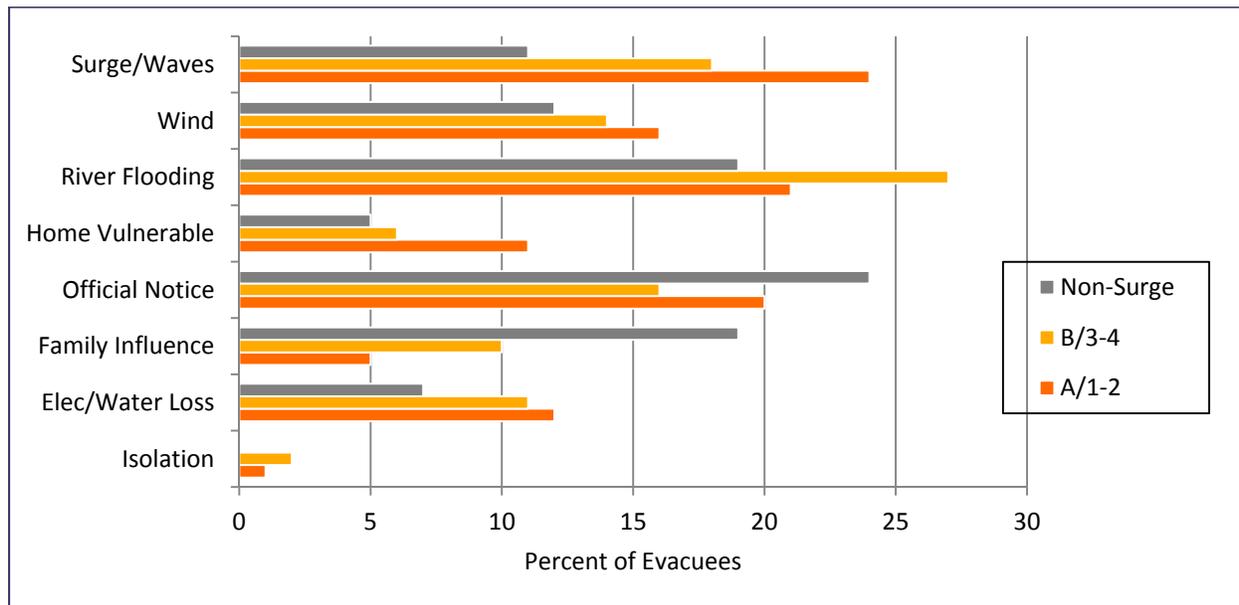
**Table 4-23:** Evacuation in Hurricane Irene by Type of Notice Heard

	A / 1-2	B / 3-4	Non-Surge
None	10%	4%	3%
Should	28%	23%	22%
Must	64%	69%	100%

Reasons given for evacuating in Hurricane Irene were concerns about hazards posed by the storm as illustrated in Figure 4-8. As in Hurricane Sandy, the most frequent reasons for evacuating in Hurricane Irene were due to concern about hazards posed by the storm. Relative to other hazards more people said they evacuated because of concern about river flooding in Hurricane Irene than in Hurricane Sandy. Hearing evacuation notices was mentioned frequently.



## 4.0 Behavioral Analysis

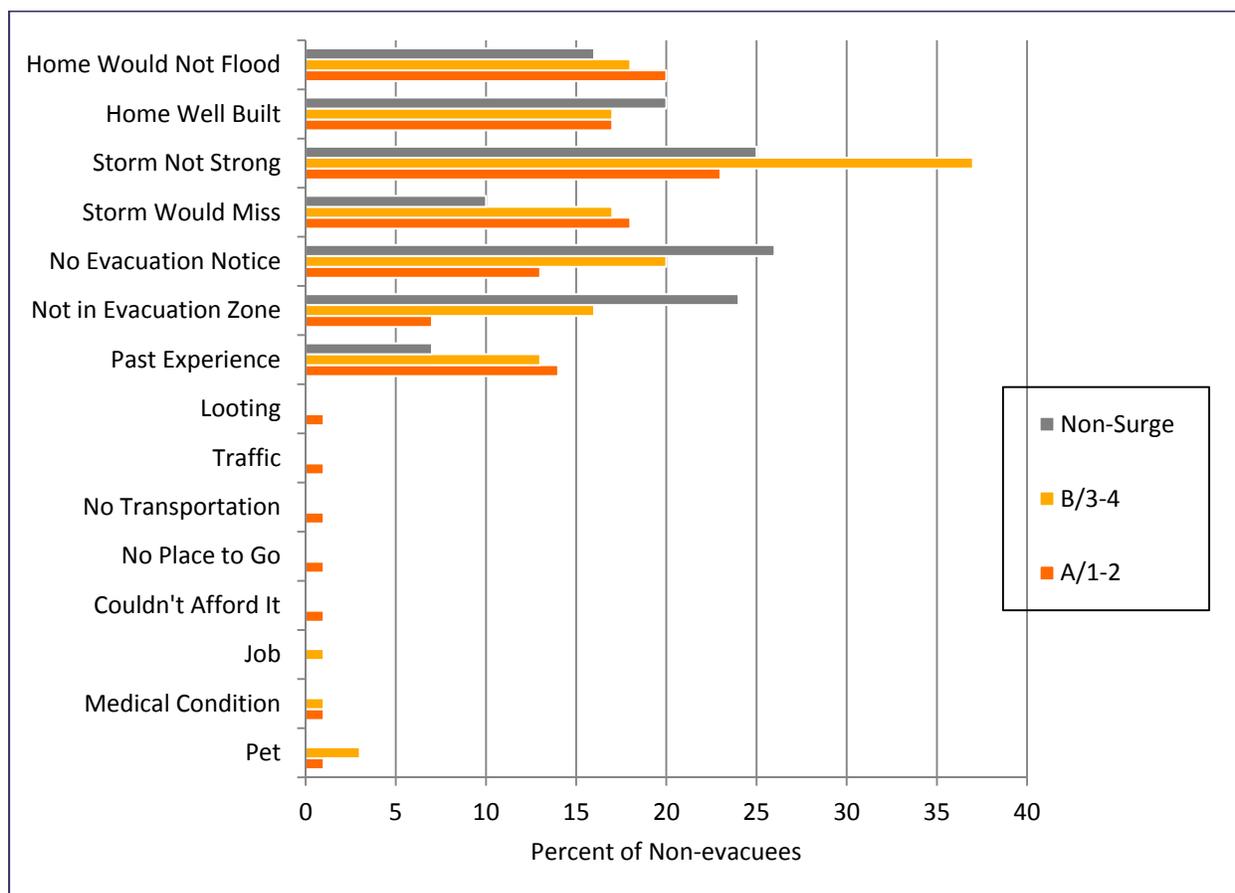


**Figure 4-8:** Reasons Given for Evacuating in Hurricane Irene

The vast majority of reasons given for not evacuating had to do with judgments that the threat was insufficient to merit leaving or that no evacuation notices were received. Very few people cited obstacles to being able to evacuate as their reason for staying. Their responses are illustrated in Figure 4-9.



## 4.0 Behavioral Analysis



**Figure 4-9:** Reasons Given for Not Evacuating in Hurricane Irene

Between 70% and 80% of the evacuees interviewed went to the homes of friends and relatives in Hurricane Irene. Fewer than 5% went to public shelters. Only 2% and 4% went to public shelters as shown in Table 4-24. Of the interviewed evacuees, about a third stayed within their community or neighborhood. Only 12% to 15% went out of state as depicted in Table 4-25. Too few left from the non-surge area for the statistics shown in Tables 4-24 and 4-25 to be reliable.

**Table 4-24:** Type of Refuge in Hurricane Irene

	A / 1-2	B / 3-4	Non-Surge
Other	12%	7%	0%
Hotel/Motel	17%	11%	20%
Friend/Relative	70%	78%	80%
Public Shelter	2%	4%	0%



## 4.0 Behavioral Analysis

**Table 4-25:** Location of Refuge in Hurricane Irene

	A / 1-2	B / 3-4	Non-Surge
Out of State	12%	15%	0%
Own State	51%	59%	60%
Own Community	25%	11%	20%
Own Neighborhood	12%	15%	20%

### 4.7.3 Hurricane Earl (2010)

Of those interviewed in 2013, 68% said they had been in the area and at home when Hurricane Earl threatened the area in 2010. They were then asked the same questions about their responses in Hurricane Earl as those asked about Hurricanes Sandy and Irene.

Very few evacuated in Hurricane Earl with 8% leaving from Zone 1-2, 5% from Zone 3-4, and 5% from the non-surge area. Again, few said they recalled hearing evacuation notices from public officials and even fewer heard mandatory notices to evacuate as shown in Table 4-26.

**Table 4-26:** Type of Evacuation Notice Heard in Hurricane Earl

	A / 1-2	B / 3-4	Non-Surge
None	81%	79%	88%
Should	17%	19%	10%
Must	2%	2%	1%

People who heard evacuation notices in Hurricane Earl were more likely than others to evacuate as shown in Table 4-27. However, estimates for the ‘must’ group are unreliable due to so few hearing mandatory notices.

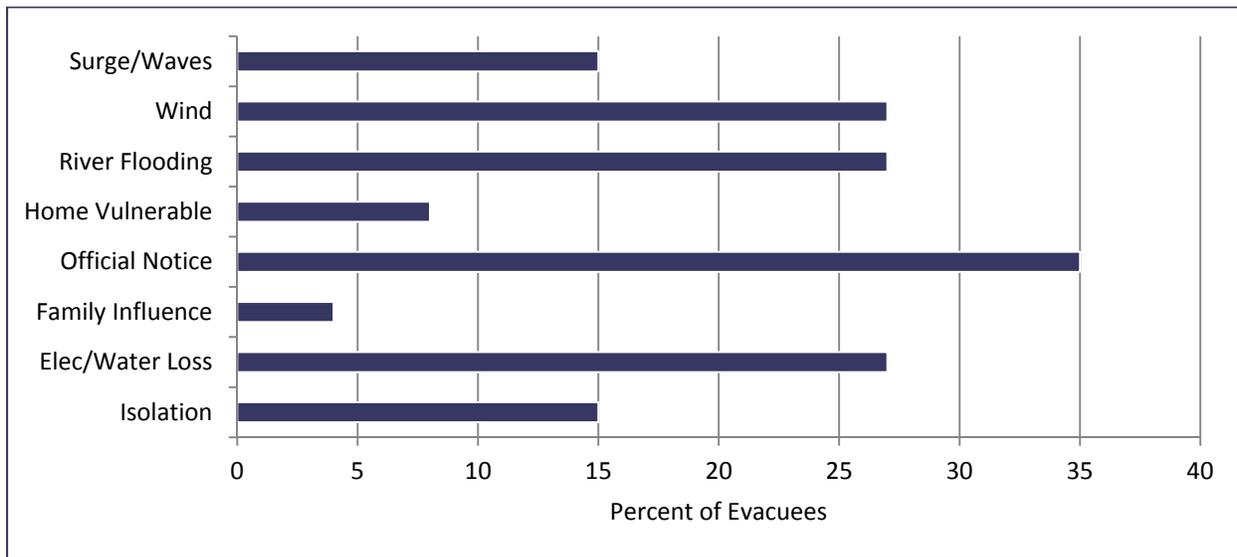
**Table 4-27:** Evacuation in Hurricane Earl by Type of Notice Heard

	A / 1-2	B / 3-4	Non-Surge
None	3%	1%	3%
Should	24%	19%	25%
Must	100%	50%	0%

For those who did evacuate, concern about hazards was mentioned frequently, but hearing evacuation notices was also cited by 35% of the evacuees as illustrated in Figure 4-10. Concerns about loss of utilities and worry about being isolated after the storm was stated more often than in Hurricane Sandy and Hurricane Irene.

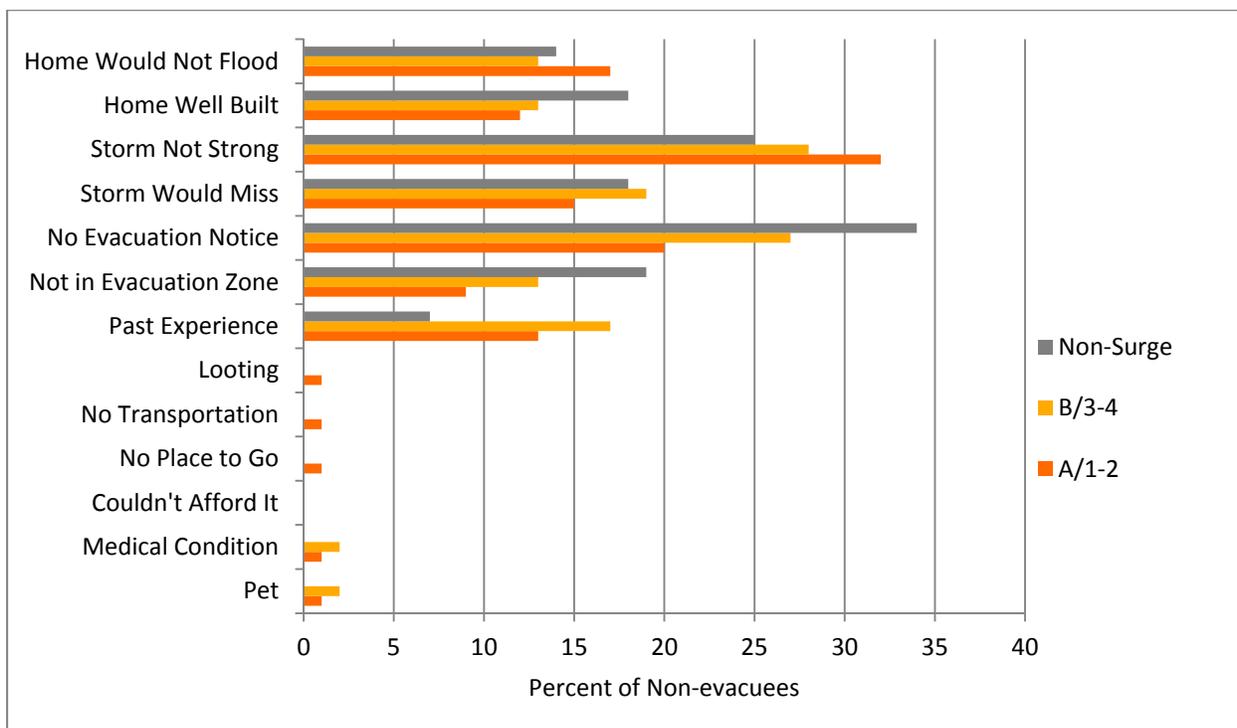


## 4.0 Behavioral Analysis



**Figure 4-10:** Reasons Given for Evacuating in Hurricane Earl

Most of those who did not evacuate indicated that the storm was not strong enough to pose a danger to their safety or that they were not told by officials to evacuate as shown in Figure 4-11. As in Hurricane Sandy, Hurricane Irene, and the hypothetical storm scenarios, few people said that constraints to leaving played a significant role in their decisions to stay.



**Figure 4-11:** Reasons Given for Not Evacuating in Hurricane Earl



## 4.0 Behavioral Analysis

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Due to there being so few evacuees, especially within any single risk area, estimates of where evacuees went in Hurricane Earl are not very reliable. It is clear, however, that very few went to public shelters and most went to the homes of friends and relatives as shown in Table 4-28. Most stayed in state outside of their own community as depicted in Table 4-29.

**Table 4-28:** Type of Refuge in Hurricane Earl

	A / 1-2	B / 3-4	Non-Surge
Other	13%	29%	0%
Hotel/Motel	7%	29%	0%
Friend/Relative	73%	43%	100%
Public Shelter	7%	0%	0%

**Table 4-29:** Location of Refuge in Hurricane Earl

	A / 1-2	B / 3-4	Non-Surge
Out of State	20%	14%	0%
Own State	40%	57%	50%
Own Community	40%	0%	25%
Own Neighborhood	0%	29%	25%