

**Permanent Resident Public Response To Hurricane Lili**  
**(Prepared by Hazards Management Group)**

Hazards Management Group provides the narrative below for the post Hurricane Lili evacuation assessment and focuses on describing the evacuation behavior of permanent residents in Texas and Louisiana during the Hurricane Lili event. A graphical representation has been included to show the locations of the behavioral surveys.

**Introduction**

In May and June of 2003 telephone interviews were conducted with residents in Louisiana and Texas to document their response in Hurricane Lili in October of 2002. Questions dealt with evacuation behavior in Lili and with factors that might help explain variations in evacuation behavior. The complete questionnaire is attached as Appendix C to this report.

A total of 1,802 interviews were completed, with approximately 300 interviews in each of six clusters of counties and parishes. The clusters were defined as follows:

- Texas            Jefferson, Orange, and part of Chambers Counties
- Louisiana 1    Cameron, Calcasieu, and Jefferson Davis Parishes
- Louisiana 2    Vermilion, Acadia, and Lafayette Parishes
- Louisiana 3    Iberia, St. Mary, St. Martin, Iberville Parishes
- Louisiana 4    Terrebonne, Assumption, Lafourche, St. Charles, southern Jefferson, and southern Plaquemines Parishes
- Louisiana 5    Ascension, St. James, St. John, and southern Tangipahoa Parishes

Responses to most questions in the survey are reported in tables with data shown for each of the six clusters of parishes and counties. For brevity, the numbers used in the above list labels Louisiana clusters in the tables. The numbers and clusters increase from west to east. **In all the data tables, figures refer to percent of respondents answering the question posed, unless otherwise indicated, N refers to the number of interviews completed.**



- TEXAS 1**      Jefferson, Orange, Chambers Counties
- LOUISIANA 1**      Cameron, Calcasieu, Jefferson Davis Parishes
- LOUISIANA 2**      Vermilion, Acadia, Lafayette Parishes
- LOUISIANA 3**      Iberia, St. Mary, St. Martin, Iberville Parishes
- LOUISIANA 4**      Terrebonne, Assumption, Lafourche, St. Charles, Jefferson, Plaquemines Parishes
- LOUISIANA 5**      Ascension, St. James, St. John the Baptist Parishes

## Evacuation Behavior in Lili

### Evacuation Participation Rate

In most of interview locations between 40% and 56% the respondents said they left their homes to go someplace safer in Lili. Landfall occurred near Intracoastal City, Louisiana, located in the “LA 2” cluster, where response was highest. The easternmost area (LA 5) included parishes in which officials did not recommend widespread evacuation and which were outside the National Hurricane Center’s warning area for Lili. All other survey locations were within the warning area, except for most of Chambers County in Texas.

#### *Evacuation in Lili, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=299)	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
Evacuation in Lili	40	49	56	54	40	24

In Texas evacuation was recommended for all of the two largest counties in the survey (Jefferson and Orange), but in Louisiana the recommended evacuation areas varied among and within survey clusters. In some cases recommendations applied to entire parishes, and in others to just portions of the parishes. To help break down the Louisiana sample with respect to evacuation recommendation areas and risk, the sample was divided using three indicators: I-10, U.S. 90, and whether the parish fronted the Gulf of Mexico. Respondents were then asked whether they lived north or south of the highways to determine placement of their response into the six clusters. .

Evacuation averaged about 10 percentage points higher south of I-10 than north of I-10, with the difference being greater in the western parishes than in the eastern parishes. Differences north and south of U.S. 90 were smaller, averaging just 5 percentage points. U. S. 90 is south of I-10 throughout most of the Louisiana study area, but there was little difference in response south of U.S. 90 and south of I-10. The greatest distinction was between parishes directly on the Gulf of Mexico versus those inland. Parishes on the Gulf had evacuation participation rates averaging 30 percentage points higher than parishes to their north.

*Evacuation in Lili by interview location in Louisiana north and south of I-10*

	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
North of I-10	37	44	47	35	21
South of I-10	55	59	55	40	26

*Evacuation in Lili by interview location in Louisiana north and south of US 90*

	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
North of US 90	42	58	55	37	29
South of US 90	58	59	56	41	23

*Evacuation in Lili by interview location in Louisiana by Gulf and non-Gulf parishes*

	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
Non-Gulf	46	45	38	57	24
Gulf	91	72	62	35	N/A

**Preparations to Leave**

People who said they did not evacuate were asked whether they would have left if it had looked like Lili was going to hit their location directly. More than half in all locations said they would have evacuated in that case. Respondents who did not evacuate in Lili were also asked whether they had made preparations to go someplace safer in case the threat had worsened. Slightly more than half said they had done so.

*Would have evacuated in Lili if track were more direct, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=180)	(N=155)	(N=133)	(N=138)	(N=183)	(N=224)
Yes	59	57	50	55	60	55
No	33	38	43	41	32	34
Don't Know	8	5	7	4	9	11

*Made preparations to evacuate in Lili by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=180)	(N=155)	(N=133)	(N=138)	(N=183)	(N=224)
Yes	61	56	50	58	57	55
No	39	42	49	42	42	43
Don't Know	1	2	1	0	1	2

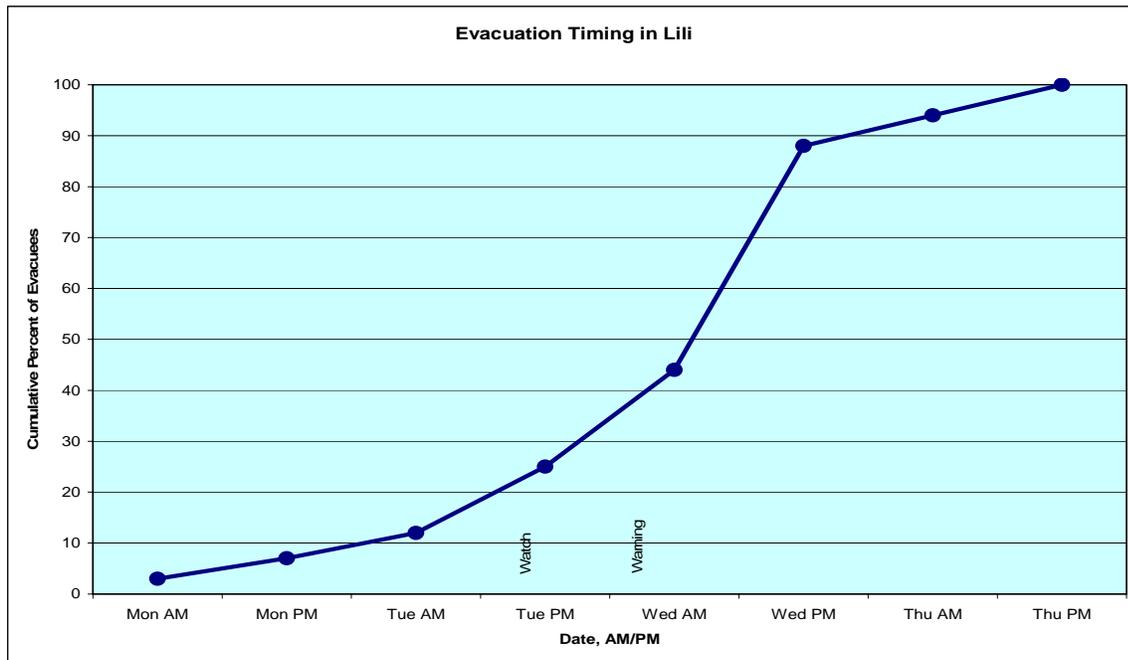
**Evacuation Timing**

A hurricane watch was issued by the National Hurricane Center at 4 PM on Tuesday, October 1, 2002 and included the entire coastal portion of the study area except for the easternmost cluster of parishes in Louisiana. The following morning at 4 AM a hurricane warning was issued for most of the same area, excluding most of Chambers County, Texas. Landfall occurred at 8 AM on Thursday. Timing of evacuation advisories varied among parishes and counties. Respondents who said they evacuated in Lili were reminded of the dates and times when the watch and warning were issued and when landfall occurred, and then asked when they left their homes. About 12% of the evacuees said they couldn't recall the day they left. Departure dates of those who did give a response are shown in the following table. A graph depicting cumulative evacuation for the entire study area is shown also on the following page.

*Evacuation timing in Lili by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=99)	(N=136)	(N=151)	(N=146)	(N=98)	(N=61)
Mon Sep 30 or before	12	2	7	3	12	13
Tues Oct 1	21	16	12	23	22	18
Wed Oct 2	60	71	70	63	50	44
Thurs Oct 3	7	10	11	11	15	25

### Cumulative evacuation response in Lili



If recollections are correct there was substantial evacuation prior to when the warning was issued. However, it was substantial in locations where the eventual evacuation participation rate was highest. That suggests that evacuation probably commenced in all locations around the same time, but continued longer, with more of the population evacuating, in the areas that eventually proved at greatest risk of landfall. According to respondents some evacuation continued on Thursday, even following landfall.

### Travel Times

The time required to reach evacuation destinations is shown in the following table. In all locations most evacuees took 3 hours or less to reach their destinations, with times being longer in Texas than Louisiana. Evacuees were also asked how long they expected the trip to take and how long it normally takes. Actual travel times were longer than anticipated and normal times, but not greatly.

*Travel times in Lili, by interview location (excluding “don’t know” responses)*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=119)	(N=146)	(N=163)	(N=152)	(N=116)	(N=69)
.5 hr	3	9	31	14	22	29
1 hr	9	33	31	26	27	55
1.5 to 3 hrs	37	21	18	26	22	7
3.5 to 6 hrs	35	23	14	22	18	6
Over 6 hrs	16	14	7	13	10	3

*Anticipated travel times in Lili, by interview location (excluding “don’t know” responses)*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=103)	(N=141)	(N=157)	(N=144)	(N=112)	(N=68)
.5 hr	6	11	38	16	25	41
1 hr	9	33	24	27	29	41
1.5 to 3 hrs	47	29	20	31	27	10
3.5 to 6 hrs	31	21	15	21	14	2
Over 6 hrs	8	6	3	6	5	6

*Normal travel times in Lili, by interview location (excluding “don’t know” responses)*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=108)	(N=139)	(N=157)	(N=142)	(N=112)	(N=67)
.5 hr	7	14	41	20	28	43
1 hr	15	32	26	28	29	42
1.5 to 3 hrs	49	34	19	32	26	9
3.5 to 6 hrs	25	17	12	15	15	5
Over 6 hrs	5	3	3	4	3	2

**Type of Refuge**

Most evacuees went to the homes of friends and relatives. Except in the easternmost cluster of parishes in Louisiana, where the threat was lowest and the fewest evacuated, public shelter use

was below 10%. The “other” category included people going to churches, second homes, and places of work.

*Type of refuge used in Lili by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=117)	(N=149)	(N=166)	(N=159)	(N=121)	(N=72)
Public Shelter	9	2	5	7	3	17
Friend/Relative	56	67	69	58	65	67
Hotel/Motel	27	23	15	29	27	8
Other	15	19	21	20	15	9

**Location of Refuge**

Except in the eastern, non-coastal parishes of Louisiana, the majority of evacuees left their own parishes or counties. In Texas 86% of the evacuees left their own counties. Of those who left their counties in Texas, almost all went to destinations in Texas. In Louisiana state destinations varied by location in Louisiana. In the southwestern parishes 41% of the out-of-parish evacuees went into Texas.

*Location of refuge in Lili by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=118)	(N=148)	(N=167)	(N=160)	(N=121)	(N=72)
Own Neighborhood	5	10	24	17	20	51
Own Parish/County	9	18	17	11	17	15
Out of Parish/County	86	73	59	73	63	33

*State where refuge was located, among Lili evacuees leaving their own parish or county, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=102)	(N=109)	(N=99)	(N=116)	(N=76)	(N=24)
Louisiana	1	53	76	66	54	63
Texas	96	41	17	14	5	4
Arkansas	1	3	5	2	1	8
Mississippi	0	2	2	9	22	13
Other	2	1	0	10	17	13

### **Vehicle Use**

In the following table three aspects of vehicle use are shown. Overall, approximately 70% of the vehicles available to evacuating households were used in the evacuation. The actual number of vehicles used per household ranged from 1.14 to 1.53, depending on location. Texas evacuees were more likely than those in Louisiana to pull a trailer or take a motor home.

*Vehicle use in Lili, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=119)	(N=149)	(N=168)	(N=160)	(N=121)	(N=72)
Percent of Available Vehicles Used	70	78	67	66	68	68
Vehicles per Evacuating Household	1.18	1.53	1.36	1.31	1.29	1.14
Pulled Trailer or Took Motor home	11	7	4	5	7	5

In most instances in which no vehicles were available to evacuating households, evacuees left with a friend or relative. Relatively few households required assistance from an agency in order to evacuate or receive special care in a shelter.

*Assistance from agency required in Lili evacuation, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=117)	(N=148)	(N=160)	(N=155)	(N=119)	(N=64)
Assistance Required	2	3	4	6	4	5

**Information Sources**

Interviewees were provided a list of sources of information and asked how much they relied on each for information about Lili. The next table indicates the percentage of respondents saying they relied a “great deal” on the sources. Local television was the most relied-upon source in all locations. The Weather Channel on cable television was the second-most popular source of information except for one of the Louisiana locations where local radio was relied upon more. Fewer than 10% of the respondents in all locations said they relied a great deal on the Internet for storm information. About 20% said they relied on the Internet at least a little.

*Information sources relied upon a “great deal” in Lili, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=299)	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
Local Radio	25	42	50	42	35	43
Local TV	70	74	75	77	77	76
CNN	14	15	15	15	21	20
Weather Channel	44	52	44	47	59	49
Other Cable TV	15	19	19	16	28	21
Internet	8	7	7	8	5	7
AOL	2	4	3	3	4	4
Word of Mouth	11	23	20	19	18	13

People who relied a great deal on local television were more likely than others to evacuate in Lili (45% vs. 37%). Word of mouth was a stronger predictor. Of those who said they relied upon word of mouth a great deal, 52% evacuated in Lili, compared to 39% of others. Reliance on other types of information sources was not related to whether respondents evacuated in Lili.

Fewer than half the respondents felt that any one of the categories of media information sources provided more accurate information than others. Of those who did believe one was more accurate than others, most named local television, followed by The Weather Channel.

*One media information source more accurate than others in Lili, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=299)	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
Yes	44	33	42	39	46	38
No	53	65	56	57	48	59
Don't Know	4	2	2	3	6	3

*Most accurate media information source in Lili, among respondents saying one source was more accurate than others, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=130)	(N=100)	(N=126)	(N=117)	(N=139)	(N=111)
Local Radio	4	8	14	6	4	5
Local TV	47	53	46	53	48	60
CNN	5	3	2	0	1	1
Weather Channel	25	27	29	25	34	17
Other Cable TV	9	2	3	8	5	5
Internet	8	5	2	3	4	5
AOL	1	0	0	0	0	0
Don't Know	2	2	3	6	4	6

Even fewer of the respondents indicated that one of the media information sources provided less accurate information than the others. There was no clear-cut “loser”.

*One information source less accurate than others in Lili, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=299)	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
Yes	10	12	12	10	12	6
No	83	85	83	83	82	90
Don't Know	7	3	5	7	6	3

*Least accurate media information source in Lili, among respondents saying one source was less accurate than others, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=30)	(N=37)	(N=35)	(N=30)	(N=37)	(N=19)
Local Radio	27	3	14	13	5	21
Local TV	13	14	14	10	51	21
CNN	17	8	9	23	8	0
Weather Channel	20	19	17	7	16	26
Other Cable TV	17	5	9	3	5	5
Internet	3	14	0	3	3	0
AOL	0	5	0	3	0	0
Don't Know	3	33	37	37	11	26

A large majority said the information provided by the media about Lili was generally helpful. A comparable percentage said the media information was consistent.

*Information provided by media was generally helpful in Lili, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=299)	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
Generally Helpful	90	92	93	93	89	96
Generally Not Helpful	4	5	4	2	6	3
Mixed	4	2	3	4	4	1
Don't Know	2	1	0	1	1	0

*Information provided by media was generally consistent in Lili, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=299)	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
Generally Consistent	85	89	88	84	83	91
Mainly Consistent	10	6	8	11	9	6
Not Consistent	2	3	3	3	6	2
Don't Know	3	2	1	2	2	1

## Explaining Variations in Response

### Reasons Given for Staying or Leaving

People who did not evacuate in Lili were asked an open-ended question about what made them decide not to leave their home to go someplace safer. The responses for the aggregate sample are given in the following table. Most respondents said they stayed because the storm wasn't strong enough to pose a threat to their safety, given the location and construction of their home. The second most frequent explanation was that the storm was forecast to strike elsewhere. Few respondents offered constraints such as jobs and lack of transportation, although 10% indicated they had no place to go if they evacuated.

*Reasons offered for not evacuating in Lili (percent of non-evacuees; multiple responses given by some respondents)*

Home Safe, Given Strength of the Storm	54
Forecast to Hit Other Location	39
Officials Didn't Say to Evacuate	19
Traffic Heavy/Waited Too Late to Leave	12
No Place to Go	10
Job Required Staying	6
Advice of Friend/Relative	5
Wanted to Protect Property from Storm	3
No Place to Take Pets	3
Wanted to Protect Property from Looters	2

A similar question was asked of those who did evacuate. They were asked what convinced them to go someplace safer, and responses for the aggregate sample are given in the following table. Concerns about the strength of the storm and its effects were mentioned by slightly more than half the sample, but half also cited recommendations made by public officials, which included elected officials, law enforcement, and the National Weather Service.

*Reasons offered for evacuating in Lili (percent of evacuees; multiple responses given by some respondents)*

Concern about Strength of Storm, Severity of Effects	54
Advice from Officials	50
Anticipated Track	22
Advice from Friends/Relatives	23
Advice from Media	14
Experience in Previous Storms	11
National Hurricane Center Watch/Warnings	3

All respondents were given a list of factors and asked which was most influential in their decision to go or stay. A plurality of people wouldn't name a single factor as being most important, and instead attributed their decision to a combination of influences. Interviewees were about equally divided between the forecast track and severity being the most important factors in their decisions. Among those who evacuated, severity of the storm was mentioned more frequently. Among those who did not evacuate, track was mentioned more often.

*Most important factor in decision whether to evacuate in Lili, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=299)	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
Forecast Track	24	16	14	20	19	25
Forecast Severity	18	25	24	17	20	23
Official Statements	8	10	5	8	5	6
Media Statements	13	7	10	17	15	14
Combination	29	37	41	31	35	28
Don't Know	4	2	2	4	3	2

**Notices from Public Officials**

All respondents were asked whether they heard public officials say they should evacuate. Specifically, they were asked whether during the threat they heard, either directly or indirectly,

anyone in an official position – such as elected officials, emergency management officials, and law enforcement – say that the respondent and people in the respondent’s location should evacuate to a safer place. To avoid any misinterpretation, the question was rephrased, and respondents were asked whether state or parish officials issued any kind of evacuation notice that applied to the respondent, that the respondent was aware of at the time it was issued. Interviewees who said they did hear such a notice were asked whether officials recommended that people should evacuate or whether officials said it was mandatory that people must evacuate. Results are shown in the next table.

*Evacuation notice heard from officials in Lili, by interview location*

	Texas (N=299)	LA 1 (N=304)	LA 2 (N=301)	LA 3 (N=298)	LA 4 (N=304)	LA 5 (N=296)
Mandatory Order	6	9	16	28	15	3
Recommendation	47	39	26	30	29	20
Neither	47	53	58	43	56	77

In most locations fewer than half the respondents said they heard any sort of evacuation notice from officials at all, and few in any location said they heard mandatory orders to evacuate. In Louisiana respondents in parishes on the Gulf were more likely than others to hear evacuation notices (57% vs. 36%), and people living south of I-10 were more likely than those north of I-10 to hear them (46% vs. 32%). There were no differences north and south of U.S. 90.

The importance of hearing, or believing that one heard, evacuation notices from public officials is suggested by the data in next table. ***Overall, if residents believed they heard mandatory evacuation notices from officials, 77% evacuated, compared to 53% who evacuated if they heard recommendations, and 30% who evacuated if they heard neither.*** The pattern was found in all six-survey locations, although it was more pronounced in some places than others.

*Evacuation participation rate in Lili, by notice heard from officials, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	<i>Percent Evacuated in Lili</i>					
If Heard Mandatory Order	(N=19) 74	(N=26) 77	(N=48) 83	(N=83) 80	(N=46) 70	(N=10) 80
If Heard Recommendation	(N=140) 50	(N=117) 63	(N=79) 65	(N=88) 49	(N=88) 42	(N=59) 44
If Heard Neither	(N=140) 25	(N=161) 34	(N=174) 44	(N=127) 40	(N=170) 31	(N=227) 17

A substantial majority of respondents in all locations said the information provided by their local officials was helpful in deciding whether to evacuate. Smaller majorities said their local officials seemed very certain in their messages about whether it was necessary to evacuate in Lili. In most locations more than half the respondents said they had a great deal of confidence in the ability of their local officials to decide whether evacuation was necessary in hurricane threats. When asked whether their officials tended to call for evacuation too often, not often enough, or about the right amount of time, most people said their officials called for evacuation about the right amount of time. Respondents were more likely to evacuate in Lili if they said information provided by officials was helpful, if officials were definite in their messages in Lili, and if they had confidence in their officials.

*Helpfulness of information provided by local officials in Lili, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=299)	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
Generally Helpful	78	84	73	77	73	65
Generally Not Helpful	8	10	14	13	16	20
Mixed	3	3	4	3	5	6
Don't Know	11	4	9	6	7	9

*Definiteness of evacuation information provided by local officials in Lili, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=299)	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
Very Certain	51	65	58	61	53	42
Fairly Certain	23	19	19	18	22	20
Generally Not Certain	9	7	9	10	11	16
Depends on Official	3	1	<1	2	1	1
Sometimes Certain	2	2	2	3	2	1
Don't Know	11	6	12	6	11	18

*Confidence in ability of local officials to make evacuation decisions, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
Amount of Confidence	(N=299)	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
Great Deal	49	63	62	57	57	41
Fair Amount	35	26	23	26	24	35
Little	11	7	12	11	11	17
None	2	2	1	4	3	2
Don't Know	3	2	2	2	5	5

*Perceived bias by local officials in calling for evacuation, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=299)	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
Too Often	10	10	10	12	9	14
Not Often Enough	4	8	9	11	7	10
About Right	78	77	71	70	78	64
Don't Know	8	5	9	6	6	11

**Perceived Vulnerability**

Respondents were asked two questions about the safety of their residences in three different intensities of hurricanes. The two questions asked 1) whether one's home would flood

dangerously and 2) if it would be safe to stay in one’s home, considering both wind and water. The three intensities of storm were related to the intensity of Lili at various times: a 145 MPH category 4 at its peak, a 125 MPH category 3 later, and a 95 MPH category 2 at landfall. In each case the storm was described in terms normally used such as “dangerous” or “major” and it was explained that the Saffir-Simpson scale has a maximum category of 5. Interviewees were asked whether their homes would have been safe if Lili had passed directly over their location with winds of each of the three intensities. Results appear in the next six tables.

*Believed home would flood dangerously in 145 MPH hurricane, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=299)	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
Would Flood	57	58	57	59	55	44
Would Not Flood	32	37	40	37	38	52
Don’t Know	11	5	3	4	7	5

*Believe home would be a safe place in 145 MPH hurricane, considering wind and water, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=299)	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
Would be Safe	29	32	25	29	33	35
Would Not Be Safe	63	62	70	66	62	58
Don’t Know	9	6	4	5	6	7

*Believed home would flood dangerously in 125 MPH hurricane, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=299)	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
Would Flood	48	49	42	47	42	38
Would Not Flood	40	44	54	45	49	57
Don’t Know	13	7	4	8	9	5

*Believe home would be a safe place in 125 MPH hurricane, considering wind and water, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=299)	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
Would be Safe	34	42	38	39	46	46
Would Not Be Safe	51	51	58	56	45	49
Don't Know	14	7	4	5	9	6

*Believed home would flood dangerously in 95 MPH hurricane, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=299)	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
Would Flood	32	33	28	30	30	27
Would Not Flood	55	61	70	64	63	69
Don't Know	14	7	2	6	8	4

*Believe home would be a safe place in 95 MPH hurricane, considering wind and water, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=299)	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
Would be Safe	50	58	56	56	57	56
Would Not Be Safe	38	34	41	40	36	37
Don't Know	12	8	4	3	7	7

In category 4 hurricanes slightly more than half the respondents said their homes would flood dangerously, and slightly larger majorities (ranging from 58% to 70%) said their homes would not be safe, considering both wind and water. In Louisiana there was little difference (about 5 percentage points) between respondents living in parishes on the Gulf and inland or in parishes north or south of I-10. In strong category 3 hurricanes fewer than half the interviewees said their

homes would flood dangerously, and 45% to 58% said their homes would be unsafe. In a 95 MPH storm most people said their homes would be safe and would not flood dangerously.

All respondents in the survey were asked how they came to believe their homes would be safe or unsafe in hurricanes, and answers for the aggregate sample are presented in the next table. Most people (67%) attributed their beliefs to personal experience with past storms in their current home. A large number (39%) cited knowledge about how their home was constructed.

*Reasons given for belief about vulnerability of home (percent of evacuees; multiple responses given by some respondents)*

Past Storm Experience in Current Home in LA/TX	67
Knowledge about Construction of Current Home	39
Knowledge about Location of Current Home	22
Past Storm Experience in Other Home in LA/TX	10
Elevation of Home Site	9
Observation of Experience of Others in LA/TX	5
Past Storm Experience in Other Locations	4
Information from Media	4
Information from Builder	4
Information from Officials	4
Observation of Experience of Others in Other Locations	2
Information from Neighbors	2
Don't Know	7

People who believe their homes would be unsafe were more likely to evacuate in Lili by about 20 percentage points (e.g., 51% vs. 32% for category 4 storms). The differential varied from place to place, but the pattern was present in all survey locations.

*Evacuation participation rate in Lili, by perceived safety, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
<i>Perceived Safety</i>	<i>Percent Evacuated in Lili</i>					
Flood in Cat 4	44	54	69	62	49	29
Won't Flood in Cat 4	27	44	37	41	25	20
Safe in Cat 4	34	40	42	36	27	13
Not Safe in Cat 4	45	55	63	62	49	32
Flood in Cat 3	49	56	73	65	52	30
Won't Flood in Cat 3	28	44	45	44	28	21
Safe in Cat 3	30	38	45	36	26	13
Not Safe in Cat 3	48	60	65	67	57	33
Flood in Cat 2	50	50	72	64	56	31
Won't Flood in Cat 2	34	50	50	49	31	21
Safe in Cat 2	34	44	49	45	27	17
Not Safe in Cat 2	46	60	66	68	59	35

Taken together, perceived vulnerability and receiving evacuation orders were strong predictors of evacuation in Lili. *In Louisiana Gulf parishes, for example, 90% of the respondents evacuated in Lili if they said they heard mandatory evacuation orders AND they believed their homes would not be safe in a 125 MPH hurricane. Among people living in Louisiana Gulf parishes that said they did not hear evacuation notices from officials AND said their homes would be safe in a 125 MPH hurricane, only 23% evacuated in Lili.* The difference was almost the same in parishes not on the Gulf (84% vs. 24%).

**Perceived Accuracy of Forecasts**

Everyone in the sample was asked a series of questions about the accuracy of National Hurricane Center forecasts. Many respondents said they didn't evacuate because Lili was forecast to strike

a location other than their own, although a large majority of the respondents lived within the warning area posted by the National Hurricane Center.

The average error made by the National Hurricane Center when forecasting landfall location 24 hours in advance is roughly 100 miles. About a third of the respondents said the error was just 10 miles and another third said it was 50 miles. Between 11% and 17% wouldn't guess. Most people in the sample appear to have more confidence in the track forecast than is justified.

*Perceived accuracy of National Hurricane Center 24-hr landfall location forecast, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=299)	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
10 Miles	24	41	41	32	29	30
50 Miles	34	32	37	41	38	32
100 Miles	19	11	8	11	16	17
200 Miles	3	2	1	2	3	5
Greater Than 200 Mi.	2	1	2	1	<1	2
Don't Know	17	12	11	12	14	14

There is about as much error in forecasting the forward speed of a hurricane as there is in forecasting its direction, thereby affecting forecasts of when landfall will occur. The National Hurricane Center doesn't maintain statistics on the accuracy of arrival time forecasts, but the "along track" forecast, indicating how far along its track the storm will be after a certain number of hours, is approximately the same as the "cross track" forecast error of 100 miles for 24 hours. For a storm moving at 15 MPH (as Lili was when the watch was issued, and not uncommon for storms at that latitude in the Gulf of Mexico), the average 24-hour landfall timing error would be nearly 7 hours.

Approximately 25% of the respondents who ventured an opinion said the average 24-hour landfall error is only 30 minutes. Another 21% said it was one hour, and 24% said it was 3 hours. Thus, 70% of those interviewed and who were willing to offer an opinion said the error is smaller than the actual error, although the practical implications for response (i.e., 3 hours vs. 6 hrs) are not completely clear. Most people offering a judgment said that storms are equally likely to arrive earlier as later than forecast. Of those who thought there was a forecast bias, more thought storms are more likely to arrive later than forecast rather than earlier.

*Perceived accuracy of National Hurricane Center 24-hr arrival time forecast, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=299)	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
30 Minutes	14	34	30	28	19	22
1 Hour	21	17	27	20	19	19
3 Hours	25	18	22	25	25	27
6 Hours	10	13	5	12	9	13
12 Hours	9	5	4	4	7	5
18 Hours	2	2	1	2	2	2
Greater Than 18 Hrs	2	1	2	1	3	1
Don't Know	17	10	9	9	16	10

*Perceived bias in National Hurricane Center 24-hr arrival time forecast, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=299)	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
Sooner Than Forecast	12	21	18	17	15	15
Later Than Forecast	26	22	29	28	26	29
Neither	48	49	46	49	50	48
Don't Know	14	9	7	6	9	8

The next questions inquired about the accuracy of intensity forecasts: “If they’re predicting that in 24 hours the storm will have winds of 115 MPH, for example, on average, how far off do you think they are on their forecasts?” Then respondents were read a list of wind velocities from which to choose. The average error at 24 hours is around 10 MPH. (The Hurricane Center points out that average error can be misleading because in unusual circumstances a storm can intensify much more than predicted, and those are the instances that pose the greatest hazard to safety.) This is why the National Hurricane Center generally recommends that communities prepare for a storm one category stronger than what is forecast.

In this case about a third of the interviewees said the error is smaller than actual, a fourth said it is larger, about 20% wouldn’t guess, and about 20% got it right. When asked whether the National Hurricane Center is more likely to overstate or understate the strength of storms when forecasting intensity, about half the respondents said they didn’t think there was a bias one way or the other. More people said that storms are more likely to be weaker than forecast rather than stronger.

*Perceived accuracy of National Hurricane Center 24-hr intensity forecast, by interview location*

	Texas (N=299)	LA 1 (N=304)	LA 2 (N=301)	LA 3 (N=298)	LA 4 (N=304)	LA 5 (N=296)
2 MPH	10	20	18	14	12	16
5 MPH	16	19	24	23	20	21
10 MPH	21	21	17	20	23	21
20 MPH	22	13	16	17	17	17
50 MPH	6	6	8	8	7	6
Greater Than 50 MPH	2	3	2	4	3	2
Don’t Know	22	17	16	13	17	18

*Perceived bias in National Hurricane Center 24-hr intensity forecast, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=299)	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
Stronger Than F'cast	13	16	16	19	19	18
Weaker Than Forecast	24	26	30	25	29	27
Neither	48	48	45	49	43	46
Don't Know	14	10	9	8	10	10

When asked how well the National Hurricane Center does in forecasting hurricanes, compared to their favorite television weathercaster, most people said both do equally well. Of those who said one does better than the other, most favored the National Hurricane Center, by a better than 4 to 1 margin.

*Perceived accuracy of National Hurricane Center forecast vs. forecasts of favorite television weathercaster, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=299)	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
NHC Better	30	41	31	35	32	35
NHC Worse	8	4	9	7	6	8
Both the Same	55	52	57	54	61	54
Don't Know	7	2	4	5	2	3

In 1992 Andrew weakened significantly just before moving inland over south Louisiana, and interviewees were asked whether Andrew's unanticipated decrease in intensity had any bearing on their expectation of how strong Lili would turn out to be. In the "middle parishes" of Louisiana 44% in one cluster and 52% in another replied affirmatively. In other locations the figure was closer to 25%.

*Effect of Andrew's decrease in strength before landfall on expectation of Lili's intensity, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=299)	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
Affected by Andrew	19	24	44	52	29	27
Unaffected by Andrew	65	60	43	38	58	55
Affected a Little	7	8	7	6	8	11
Don't Know	9	8	7	4	5	6

The implications of misconceptions about forecast error are not clear. People who believe the landfall location error is less than 200 miles were more likely to evacuate in Lili than people who believe it is 200 miles or more (45% vs. 30%). Beliefs about the magnitude of timing error were unrelated to evacuation in Lili, but people who think storms are more likely to arrive sooner than forecast rather than later were more likely to evacuate (52% vs. 42%). Belief about the magnitude of intensity forecast error were also unrelated to evacuation in Lili, but people who believe that storms are more likely to be stronger than forecast rather than weaker were more likely to evacuate in Lili (52% vs. 37%). There was no difference in evacuation in Lili with respect to confidence in National Hurricane Center versus confidence in a favorite television weather forecaster.

**Having to Work**

Between 25% and 33% of the surveyed households said that someone in the home had to work during the Lili evacuation. Between 10% and 23% of those households (3% to 8% of all households) said that the household did not evacuate because of someone being required to work. In an additional 2% to 7% of homes, part of the household did not leave. Between 9% and 18% said their evacuation was delayed because of work. Of the households in which someone had to work, 40% evacuated, compared to 45% of the households in which no one had to work.

*Someone in household required to be working during Lili evacuation, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=299)	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
Yes	33	28	25	29	32	28
No	67	71	75	71	67	72
Don't Know	<1	1	<1	0	1	1

*Effect of work on evacuation in Lili, among households in which someone had to work, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=99)	(N=85)	(N=74)	(N=86)	(N=96)	(N=82)
No Effect	70	60	57	62	58	76
Household Stayed	11	17	23	20	13	10
Some Stayed	5	6	3	5	7	2
Delayed Evacuation	13	18	16	13	15	9
Don't Know	1	0	1	1	7	4

**Concern about Traffic**

Survey participants were asked if, while deciding whether to leave, they had any concerns about attempting to evacuate and being caught on the road in traffic as the storm arrived. Between 36% and 49% percent indicated that they did have that concern. However, people expressing that concern were more likely to evacuate than those without that concern (49% vs. 37%).

*Concerned about being trapped on the road in traffic during evacuation, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=299)	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
Yes	47	45	37	43	49	36
No	52	53	62	56	50	62
Don't Know	2	1	1	1	1	2

When asked the number of hours that would be required to completely evacuate their parish or county in a major hurricane in which all of south Louisiana and east Texas was evacuating, responses varied greatly within survey locations but were similar from one location to another. About 15% of those interviewed wouldn't venture an opinion as to times required to evacuate, and roughly a third said a complete evacuation would take 12 hours or less. Whether respondents evacuated in Lili was not related to their beliefs about the time required for an evacuation.

*Time believed required to evacuate parish/county, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=299)	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
6 Hrs	12	19	14	15	15	16
12 Hours	20	14	16	21	17	16
18 Hours	9	8	13	12	8	15
24 Hours	21	16	13	14	16	16
30 Hours	2	6	5	4	5	3
36 Hours	7	11	8	7	7	9
More than 36 Hours	10	11	15	13	15	12
Don't Know	19	16	17	13	18	14

**Concern about Re-entry Following Evacuation**

Respondents were asked if they had concerns about being able to get back into their community if they evacuated, and in most locations a majority said they did not. Few said they had personally experienced that sort of difficulty in the past.

*Concerned about being able to re-enter home following evacuation, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=299)	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
No	68	60	49	51	49	68
Yes	30	39	50	47	47	30
Don't Know	2	1	1	2	4	2

*Personally experienced re-entry difficulties following past evacuations, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=299)	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
No	89	91	82	76	73	92
Yes	11	9	17	24	26	8
Don't Know	1	<1	1	<1	1	<1

People who said they were concerned about re-entry were slightly more likely than others to evacuate in Lili (48% vs 42%). Respondents who said they had personally experienced re-entry difficulties after previous evacuations were also more likely than others to evacuate in Lili (55% vs. 42%).

**Window Protection**

In most survey locations roughly half the respondents said they had window protection such as storm shutters or plywood panels. In the Louisiana cluster of parishes including Terrebonne, Assumption, Lafourche, St. Charles, southern Jefferson, and southern Plaquemines, 72% said they had window protection. In all the survey locations the most prevalent form of window protection was the use of plywood sheets. In Lili, people without window protection were slightly more likely to evacuate than people with protection (48% vs. 40%).

*Home has window protection, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=299)	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
Yes	42	48	51	56	72	54
No	58	51	49	44	27	45
Don't Know	<1	1	<1	<1	<1	<1

*Type of window protection, among those with protection, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=126)	(N=147)	(N=154)	(N=166)	(N=220)	(N=161)
Plywood Sheets	76	79	79	78	71	76
Roll Down	6	5	4	4	6	7
Metal Panels	4	8	4	5	2	4
Impact Resistant Film	2	1	3	1	1	1
Impact Resistant Glass	8	1	4	6	2	5
Other	5	7	7	6	20	6

**Past Hurricane Experience**

Most people in the survey have never experienced major financial losses in past hurricanes. The “middle parishes” in Louisiana reported greater losses than other locations. Among people who have never experienced property damage in the past, 40% evacuated in Lili, compared to 43% who had experienced up to \$1,000 in damage, and 52% among those who had suffered more than \$1,000 in damage.

*Worst property damage experienced in past hurricanes, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=299)	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
None	70	75	35	31	50	53
Less than \$1,000	13	11	19	18	16	25
\$1,000 to \$5,000	6	7	22	25	18	13
More than \$5,000	5	5	20	21	11	6
Don't Know	6	2	4	5	5	3

Almost all the participants in the survey were living at their current residence when Isidore threatened the area just a month before Lili, but far fewer were living in their current home when Georges (1998) and Andrew (1992) occurred.

*Was living at current address in past hurricanes, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=299)	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
Isidore	89	91	93	93	96	96
Georges	66	66	66	76	75	78
Andrew	56	53	49	60	57	61

Of those present for Isidore, Georges, and Andrew, the evacuation participation rates are shown in the following table. Evacuation in Lili was greater than that in any of the other storms among respondents to this survey. People who did evacuate in the previous storms were much more likely to evacuate in Lili than people who did not leave in the other storms.

*Evacuation participation rate in past hurricanes, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=267)	(N=278)	(N=280)	(N=276)	(N=293)	(N=285)
Isidore	9	11	13	15	24	13
	(N=197)	(N=199)	(N=200)	(N=225)	(N=229)	(N=230)
Georges	14	8	11	15	29	17
	(N=167)	(N=161)	(N=148)	(N=178)	(N=173)	(N=181)
Andrew	33	26	36	49	39	19

*Evacuation participation rate in Lili, by response in previous storms*

	If Evacuated in Previous Storm	If Stayed in Previous Storm
Isidore	83	35
Georges	69	34
Andrew	70	24

### **Other Predictors of Evacuation in Lili**

Several demographic variables were tested to see if they were associated with whether people evacuated in Lili:

- People who had lived in their current home fewer than 5 years were more likely to evacuate in Lili than people who had lived in their homes more than 20 years (51% vs 38%)
- People who had lived in the region fewer than 10 years were more likely to evacuate in Lili than people who had lived in the region more than 10 years (51% vs. 43%).
- People living alone were slightly more likely than others to evacuate in Lili (48% vs. 43%).
- Households with children were more likely than others to evacuate in Lili (49% vs. 38%).
- Households with lower incomes were more likely to evacuate than others (58% in households with earning less than \$12,000/year vs. 36% in households making more than \$80,000 per year).
- Age was related to evacuation but not simply. The most likely people to evacuate were under 40, of whom 51% evacuated. The least likely to evacuate were people between 50 and 60, of whom 34% evacuated. Of those between 40 and 50 and those over 60, 42% evacuated.
- People living in mobile homes were more likely to evacuate than people living in single-family site-built homes (78% vs. 39%).

Evacuation was *not* related to pet ownership, home ownership, or race.

### Intended Responses

Both those who evacuated in Lili and those who did not were asked if they would do anything differently in the future, given the same circumstances as they existed in Lili. Most people said they would do the same thing again. Of those who evacuated in Lili, between 7% and 11% said they would stay if they had it to do over again. Of those who stayed, between 4% and 17% said they would evacuate next time.

#### *Intended future response, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
Left in Lili; Would Stay Next Time	11	7	8	10	7	10
Stayed in Lili; Would Leave Next Time	13	4	4	14	7	17

People who did not evacuate in Lili were asked where they would have gone if they had evacuated. Some resisted the hypothetical and said they would not have left. Of those who did respond, the homes of friends and relatives were mentioned most often, followed by hotels and motels. The percent saying they would go to public shelters was small, but larger than the percent that actually went to public shelters in Lili.

#### *Anticipated refuge of respondents who did not evacuate in Lili, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=180)	(N=155)	(N=133)	(N=138)	(N=183)	(N=224)
Public Shelter	11	7	10	12	14	16
Church	0	7	5	1	1	2
Friend/Relative	42	45	38	36	35	31
Hotel/Motel	23	22	26	23	26	21
Other	11	3	6	5	7	6
Don't Know	7	4	5	6	6	6
Would Not Have Left	7	14	11	17	12	17

Those who didn't evacuate in Lili were also asked what they would have done if Lili had turned toward their location and it appeared that it was too late to evacuate out of their own parish or county. A large majority said they would have stayed home and ridden out the storm. Among those who would not stay home, a substantial burden could be placed on public shelters.

*Anticipated last-resort refuge among respondents who did not evacuate in Lili, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=180)	(N=155)	(N=133)	(N=138)	(N=183)	(N=224)
Stayed Home	72	79	84	78	77	81
Gone Nearby	12	14	14	12	13	12
Gone within Parish/Co	4	2	2	4	2	2
Gone Out of Parish/Co	4	3	2	7	5	2
Don't Know	7	1	0	1	3	3

*Anticipated last-resort refuge of respondents who would not stay home, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=50)	(N=32)	(N=22)	(N=31)	(N=42)	(N=43)
Public Shelter	36	28	64	32	41	40
Church	2	13	9	3	0	5
Friend/Relative	26	28	9	39	36	23
Hotel/Motel	12	16	9	13	7	7
Other	10	9	9	3	2	9
Don't Know	14	6	0	10	14	16

Among both evacuees and non-evacuees, most people by far in the survey said they had identified the safest place in their home to ride out a hurricane if they had to. Those who had not identified the safest place were more likely than others to evacuate in Lili (64% vs. 39%).

*Identified safest place in home to ride out a hurricane, by interview location*

	Texas	LA 1	LA 2	LA 3	LA 4	LA 5
	(N=299)	(N=304)	(N=301)	(N=298)	(N=304)	(N=296)
Yes	78	84	77	81	78	84
No	20	15	21	17	21	15
Don't Know	2	1	2	2	1	1