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**National Planning Center of Expertise  
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**Behavioral Analysis for Mississippi Hurricane Events  
Final Report  
May 2012**

# BEHAVIORAL ANALYSIS FOR MISSISSIPPI HURRICANE EVENTS

**National Hurricane Program**

**FINAL REPORT**

*Prepared for:*

Federal Emergency Management Agency  
National Hurricane Program



# FEMA

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MAY 2012

# MISSISSIPPI HURRICANE EVACUATION STUDY

## BEHAVIORAL ANALYSIS

### EXECUTIVE SUMMARY

This behavioral study was completed by SocResearch Miami under the direction of Drs. Betty Morrow and Hugh Gladwin and submitted through Dewberry to FEMA and the USACE. Over 1100 telephone surveys were completed by a random sample of residents of Hancock, Harrison and Jackson counties. High-risk areas were over-sampled. The final results were weighted according to the 2010 U.S. Census population numbers. Demographically, the sample tends to be older and includes more females. Results were geo-coded and reported by surge and evacuation zones in each county. The cooperation or incidence rate for the entire sample was 69%, meaning that, when the interviewers reached a person, 69% completed the survey. The margin of error was 3% for the total sample, 6% for Hancock County, and 5% for Harrison and Jackson counties.

Most were living in the area at the time of Hurricanes Ivan and Katrina. Many had evacuated for one or both hurricanes and expressed a high level of concern about hurricanes. When asked if they lived in an official evacuation zone, of those whose homes were located in the highest risk evacuation zone, 55% in Harrison County answered yes, as did 57% in Harrison and 43% in Jackson. Recent changes in zones may explain why the rest either thought they did not, were not sure, or did not know. There were few significant differences in hurricane concern and evacuation intent according to actual zone status.

Evacuate intention rates vary dramatically according to a storm's category and whether an evacuation order is given. While 32% say it is very or somewhat likely they will leave for Category 1 or 2 storms, the rate is 72% for higher category storms. Similarly, while 62% say it is very or somewhat likely they will evacuate if voluntary, 86% say they will leave if a mandatory order is given. **Analysis by location indicates a reluctance to evacuate by many in high-risk zones and the intention to evacuate by many living in lower risk areas. Only 46% of those in mobile homes intend to leave for Category 1 or 2 storms and 85% for major storms.** It should be noted, however, that the sample included 86 mobile home residents. Statistical analysis reveals that households with these demographics are more likely to express evacuation intent: Those who had evacuated before, those who had talked about their plans, women, African Americans, and renters. The main reason expressed for their evacuation decisions was the level of safety they felt in their homes.

The total sample was asked a series of questions about various behaviors if they HAD to evacuate.

**The rates needing public transportation were 5% for Harrison, 3% for Hancock and 2% for Jackson. Most could be ready to leave within one day, would plan to stay with family or friends, and would expect to travel at least 200 miles. Only 3% in Harrison, 2% in Jackson and 1% in Hancock indicated they would stay in a public shelter. On average 2.6 persons would leave, taking 1.6 cars per household in Hancock County and 1.5 in Harrison and Jackson.** The vast majority of those with pets would take them. Most expect to return within a few days.

**In summary the results call for further outreach to promote evacuation among those who should leave and cut down shadow evacuation. More specifically, to:**

- **Publicize storm surge risk, including how it can differ among hurricanes of the same category on the Saffir-Simpson Scale;**
- **Educate coastal Mississippians on their evacuation zone status;**
- **Promote the evacuation, even for Category 1 or 2 storms, of those living in areas at risk for surge or flooding;**
- **Promote sheltering in place for those outside evacuation or surge areas;**
- **Promote mitigation incentives, particularly for rental units.**

On the positive side most of these residents have hurricane experience and there is considerable concern about hurricane risk. This should translate into high rates of interest in learning more about their personal level of risk. Findings from this behavioral study can provide guidance for campaigns that target those who should leave but don't intend to, as well as those who intend to leave who may be able to safely shelter at home or within their county.

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## 1 INTRODUCTION

The Federal Emergency Management Agency (FEMA) and the U. S. Army Corps of Engineers (USACE) (Mobile District) contracted with Dewberry for a Behavioral Analysis for the Mississippi Hurricane Evacuation Study. SocResearch Miami was chosen by Dewberry to conduct a behavioral survey of the three counties in coastal Mississippi under the direction of two social scientists with extensive experience in survey research related to citizen and household response to emergencies and disasters, Dr. Betty Hearn Morrow and Dr. Hugh Gladwin. (See Appendix A for summaries of their education and experience.)

Results will be compared to the 2002 Mississippi Hurricane Evacuation Study in which 200 telephone interviews were completed in 1999 after Hurricane Georges and 300 interviews completed in 2000.<sup>1</sup>

## 2 METHODOLOGY

The goal was to gather relevant information about the past and potential evacuation behavior of the coastal Mississippi population in response to a hurricane. The target population was located in Hancock, Harrison and Jackson counties. The random telephone sample included both landline and cell phones. An important feature of the research design is that responses are geo-coded, enabling analysis according to the location of the respondents' households.

### 2.1 THE QUESTIONS

Survey questions were developed by Morrow and Gladwin based on insights gained from past research and input from the agencies involved, as well as a critique by Dr. Susan Cutter at the University of South Carolina. A set of questions was submitted by the USACE to the Office of Management and Budget (OMB) and approved with minor changes. A total of 47 questions solicited information about hurricane concerns, past hurricane response and future intentions. Another 18 questions gathered demographic information for use in the analysis. A copy of the questionnaire is provided in Appendix B.

### 2.2 THE SAMPLE

SocResearch Miami contracted to complete interviews with a minimum of 1,100 households distributed through the coastal Mississippi counties. Phone numbers were purchased from Scientific Telephone Samples according to location specified by Dr. Gladwin. Regardless of population differences, the target was the same for each county, 367 completed interviews. This reflected a minimum number necessary in each county in order to allow for statistical analysis by county risk areas (surge and evacuation zones). The location of completed interviews was carefully monitored throughout the interview process to assure that there were sufficient numbers in each risk area.

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<sup>1</sup> Available at: [http://www.iwr.usace.army.mil/nhp/HES/MS/Current2001HES/Report/MISSISSIPPI\\_HES\\_TDR.pdf](http://www.iwr.usace.army.mil/nhp/HES/MS/Current2001HES/Report/MISSISSIPPI_HES_TDR.pdf)

Table 2.1 provides a comparison of the target and completed samples in each county. In Harrison and Jackson counties more than the targeted number of interviews was obtained. Slightly fewer were obtained in Hancock due to fewer respondents reached in the area code-based cell phone sample.

**Table 2.1. Completed Interviews**

COUNTY	TARGET	COMPLETED LAND LINE	COMPLETED CELL PHONE	TOTAL COMPLETED INTERVIEWS	MARGIN OF ERROR FOR TOTAL COMPLETED INTERVIEWS
<b>Hancock</b>	367	267	49	316	6%
<b>Harrison</b>	367	267	117	384	5%
<b>Jackson</b>	367	267	138	405	5%
<b>TOTAL</b>	<b>1100</b>	<b>801</b>	<b>304</b>	<b>1105</b>	<b>3%</b>

Margin of error is a statistic that expresses the amount of random error in a survey’s results. The larger the margin of error, the less the confidence that the same results would occur if the same population was interviewed again. The margin of error for the total sample was 3%. This is quite small and means that the values estimated for each variable are accurate +/- 3%. In other words when a finding is reported to be 43%, the actual rate for that variable in the general population would be somewhere between 40% and 46%. The margin of error is slightly higher, 5% or 6%, for variables that are examined at the county level due to the smaller samples.

For persons interviewed using landline phones the census block where their homes are located was known. With the cell phone sample, respondents were asked to provide their home address, or at least the names of the closest intersection to their homes. Thus it is possible to analyze respondents’ answers within the context of their home location. Since this survey was about hurricanes, the most vulnerable geographical areas were over-sampled relative to their population.

The following tables provide the number and percent of respondents in each of the evacuation and surge zones for each county. In order to be able to compare across counties the evacuation zones were grouped as follows:

- In Hancock County they are labeled 2, 3 and 5. Here they are labeled 1, 2 and 3.
- In Harrison County they are labeled 1-3 and 4-5. Here they are labeled 1 and 2.
- In Jackson County they are labeled A, B and C. Here they are labeled 1, 2 and 3

In all cases everything outside the designated zones is included in the No Zone category. The surge zones (based on SLOSH MOMs) for all three counties are labeled 1-2 and 3-5.

**Table 2.2. Sample Distribution by Evacuation Zone**

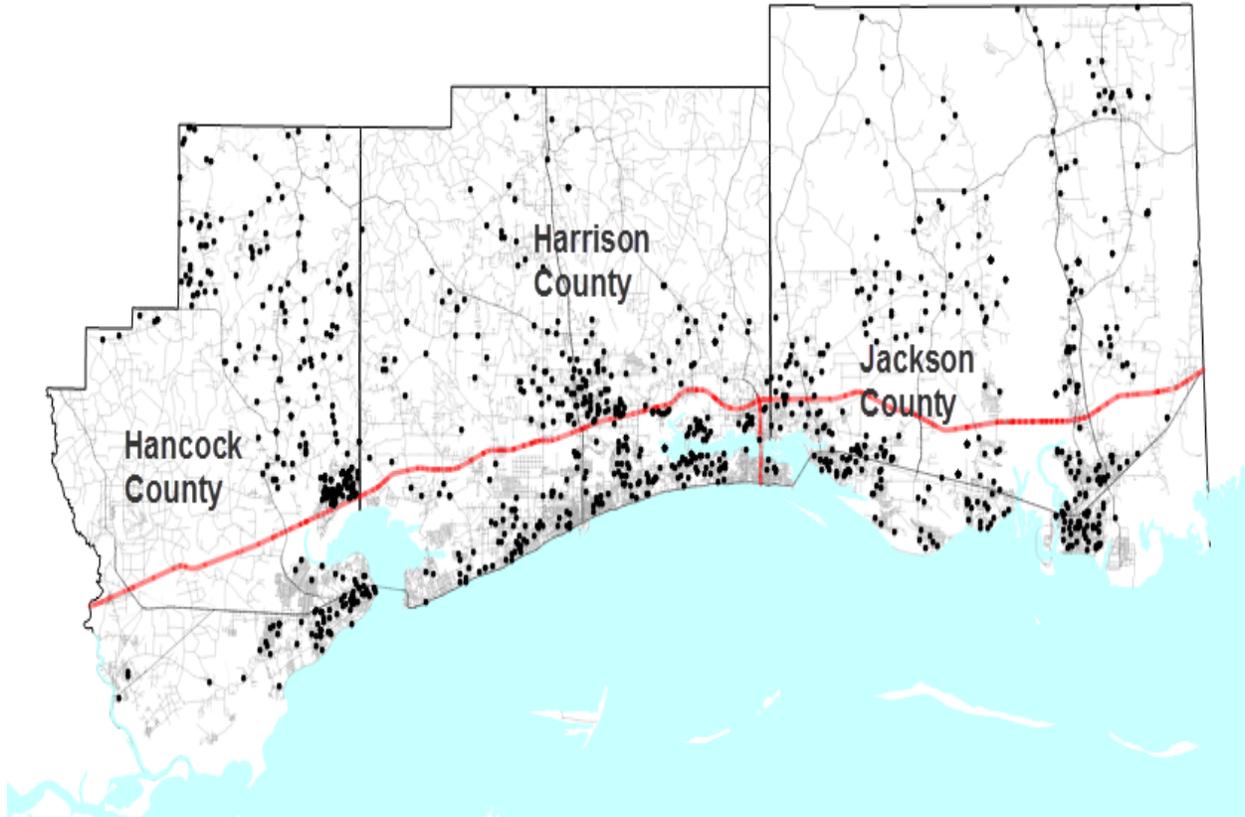
	ZONE 1		ZONE 2		ZONE 3		NO ZONE		TOTAL
	#	%	#	%	#	%	#	%	#
<b>HANCOCK</b>	48	16%	59	19%	27	48%	182	40%	316
<b>HARRISON</b>	131	44%	122	40%	-	-	131	29%	384
<b>JACKSON</b>	117	40%	122	40%	29	52%	137	30%	405
<b>TOTAL</b>	296	100%	303	100%	56	100	450	100%	1105

**Table 2.3 Sample Distribution by Surge Zone**

	CAT 1 & 2		CAT 3-5		NO ZONE		TOTAL
	#	%	#	%	#	%	#
<b>HANCOCK</b>	27	17%	107	22%	182	40%	316
<b>HARRISON</b>	41	26%	199	40%	144	32%	384
<b>JACKSON</b>	90	57%	186	38%	129	28%	405
<b>TOTAL</b>	158	100%	492	100%	455	100%	1105

Even by over-sampling in the high-risk zones, the numbers are smaller due to population differences. However, they are large enough to allow statistical analysis by zones.

The following map denotes the location of each completed interview. As can be seen, most are near the coast. Their location relative to surge and evacuation zones will be shown later in the report.



**Figure 2.1. Location of Completed Interviews**

Table 2.4 compares the demographics of the sample with those reported for coastal Mississippi by the U. S. Census 2010 American Community Survey. It is important to note that interviews were completed with persons over 18 who said they could speak for their households.

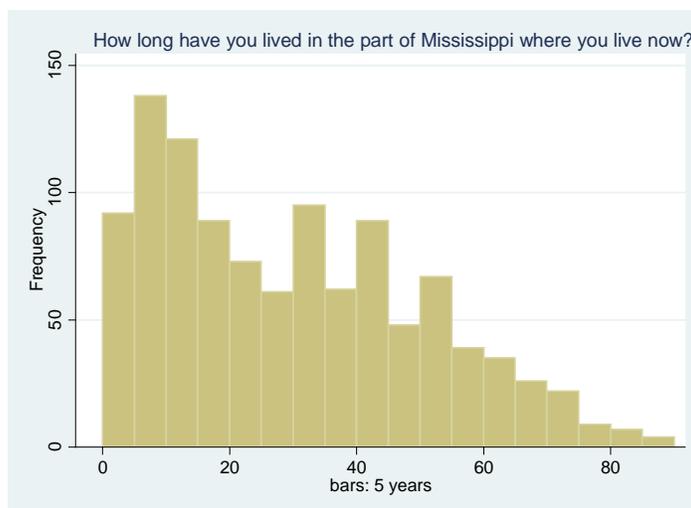
**Table 2.4 Comparison of Demographics**

DEMOGRAPHIC	CENSUS DATA	LANDLINE SAMPLE	CELL PHONE SAMPLE
<b>Highest Level of Education</b>			
Grade School	4%	3%	0%
Some High School	11%	6%	6%
High School Graduate	43%	29%	34%
Some College	25%	2%	31%
College Graduate	12%	21%	16%
Graduate Degree	6%	16%	12%
<b>Gender</b>			
Male	47%	40%	46%
Female	53%	59%	54%
<b>Age</b>			
18 - 30	30%	15%	35%
31 - 45	29%	19%	26%
46 - 60	26%	37%	30%
Over 60	15%	29%	9%
<b>Income</b>			
\$10,000 or Less	7%	10%	10%
\$10,001-\$20,000	10%	16%	16%
\$20,001-\$30,000	11%	14%	12%
\$30,001-\$50,000	21%	18%	21%
\$50,001-\$80,000	24%	20%	21%
Over \$80,000	26%	22%	20%
<b>Race</b>			
White	74%	87%	73%
African-American	26%	9%	24%
Other	3%	3%	3%

Typical for telephone surveys, our sample is more educated, older, and includes slightly more women than Census rates. These characteristics define those who are most likely to be at home and to agree to be interviewed. While there are fewer African Americans in the landline telephone sample than live in the area according to Census data, this is not the case with the cell phone sample. These differences do not have a significant effect on the overall margin of error but should be noted when interpreting variables that show education, age, gender or racial differences. There are no statistically significant county differences on any of the housing and demographic variables. Only 86 respondents, or 8% of the total sample, say they live in mobile homes.

The main purpose of including cell phone interviews in the sample is to see if the results are significantly different, given the extensive use of cell phones today, often in place of landlines. The results are close enough to allow the landline and cell data to be combined for this analysis.

The bar graph in Figure 2.2 shows the years respondents have lived in coastal Mississippi. As shown, many respondents moved there in the last 20 years.



**Figure 2.2. Length of Time Living in Area**

### 2.3 THE INTERVIEWS

Using the Computer-Assisted Telephone Interviewing (CATI) system at NORS Survey, Inc. experienced interviewers called each working number in the sample up to 10 times or until someone answered. The calls occurred mostly in the evenings and on weekends during May 2011 until quotas for each region and risk zone were reached. Most calls did not result in valid interviews for various reasons. Some were non-working or business numbers; others were located outside the target region; others were never answered, were answered by an answering machine, were answered by someone under 18, or were answered by a person who could not speak for the household.

For the landline interviews 1089 calls reached a person who potentially could do the interview, and 801 people who answered agreed to participate, resulting in a **cooperation rate of 74%**. Interviews were completed with a small sample of cell phones to check for bias in response resulting from a listed landline sample. Out of 515 persons reached via cell phones, a total of 304 interviews were completed for a **cooperation rate of 59%**. These were added to the overall sample and verified that survey results are valid for cell phone calls as well as landline. **The cooperation rate for the total sample was 69%**. The cooperation rate measures the amount of non-response that is most likely to bias results given that potential respondents know about the survey when they do not respond.<sup>2</sup> These are excellent results for telephone interviewing, probably accounted for by hurricanes being a very salient topic in coastal Mississippi.

<sup>2</sup> “AAPOR Cooperation Rate 1 (COOP), or the minimum cooperation rate, is the number of complete interviews divided by the number of interviews (complete plus partial) plus the number of non-interviews that involve the identification of and contact with an eligible respondent.” American Association for Public Opinion Research. 2009. *Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys*. 6<sup>th</sup> edition. AAPOR, p. 37.

## 2.4 THE ANALYSIS

In addition to simple frequencies, the results are further analyzed by other relevant variables, such as the household's location and demographic information. As noted, overall margin of error for the study is plus or minus 3%. All cross-tabulations reported as showing a relationship between variables are tested for significance using an appropriate test.<sup>3</sup> Unless otherwise mentioned in this report, all relationships between variables found in tables are significant at the .05 level (95% confidence), meaning that if the survey was redone with a new sample from the same population 95 times out of 100 the strength of the relationship between the variables would not be more than 5% different from that shown in this study. Some data are analyzed spatially and presented in the maps included in this report. A regression model was also developed to help explain the intent to evacuate.

As a result of doing a similar number of interviews for each county, interviews for the smaller counties represent a smaller population than the ones from the larger counties. Some bias can occur as a result of these areas contributing more to the overall results. For example, the three counties have different populations but close to the same number of interviews. Oversampling of high-risk areas was also done to make sure that analysis by those would be statistically significant. To compensate for this, a weight was calculated so that each interview contributed equally to the overall results. This makes the percentages more accurate in the tables but does not reduce the accuracy of results for each individual county since all the interviews done for that county go into calculating statistical significance. The weighting was done at the census block group level through a comparison of interviews in the block group with 2010 US Census data. A lack of statistically significant differences among the counties supports a region-wide analysis on many of the survey variables.

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<sup>3</sup> When both variables were nominal, i.e. are categories, chi square was used as the significance test. If one or both were ordinal, i.e. are ranked in order, gamma was used.

### 3 FINDINGS

Most questions deal with attitudes, behaviors, and future intent related to hurricane evacuation. The results are reported and illustrated in the following tables and figures. Particularly important findings are written in bold type for emphasis. Findings are discussed where appropriate and the major findings are summarized at the end.

#### 3.1 HURRICANE EXPERIENCE

Past behavior is an important predictor of future actions. Research has shown that people who have evacuated for a hurricane are likely to evacuate in the future. In 2004 Hurricane Ivan threatened the eastern part of the Mississippi coastline. The Alabama/Mississippi border was under a hurricane warning. However, when the storm made landfall at Gulf Shores, Alabama, the impact to Mississippi was minimal. In sharp contrast the Mississippi coast was severely impacted by Hurricane Katrina in 2005. At landfall it is estimated to have been an upper Category 3 storm with 120 mph sustained winds (<http://www.nhc.noaa.gov/2005atlan.shtml>). The storm surge varied from 28 feet at Pass Christian to 15 feet at the eastern Mississippi coastline. According to official records 238 people died, most from surge as the hurricane came on land at the Mississippi/Louisiana border.

Given this recent hurricane history several questions were asked to determine the extent to which Ivan and Katrina were experienced by this sample.

Q42. *“Did you evacuate for Hurricane Ivan in 2004?”*

Q44. *“Did you evacuate for Hurricane Katrina?”*

If yes for Q44, *“How did your experience with Hurricane Ivan affect what you did for Katrina?”*

Q47. *“What happened to you and your home as a result of Katrina?”*

About 75% of the total sample stated they were living in the area when Ivan occurred and 87% were there for Katrina. Those who were living there for each storm were then asked if they evacuated. Table 3.1 provides the reported evacuation rates for Hurricane Ivan and Hurricane Katrina for the three coastal Mississippi counties.

**Table 3.1. Evacuation Rates for Ivan and Katrina**

	<b>HANCOCK</b>	<b>HARRISON</b>	<b>JACKSON</b>	<b>TOTAL</b>
<b>Q42. Evacuated for Ivan</b>	31%	23%	39%	30%
<b>Q44. Evacuated for Katrina</b>	70%	52%	63%	59%
<b>Evacuated for Both</b>	16%	14%	24%	18%

**The total reported evacuation rates for coastal Mississippi are 30% for Hurricane Ivan and 59% for Hurricane Katrina, and 18% of the sample say they evacuated for both hurricanes.** There are significant county differences. Jackson County had the highest rate for Ivan and Hancock County for Katrina. This would be expected given their locations relative to landfall predictions. Most say their experience with Ivan had nothing to do with their evacuation decision for Katrina. However, as would be expected, those who evacuated for Ivan are more likely to evacuate for Katrina. **When looking at household differences, households with children under 12 and African American households are more likely to have evacuated for Ivan, Katrina or both.**

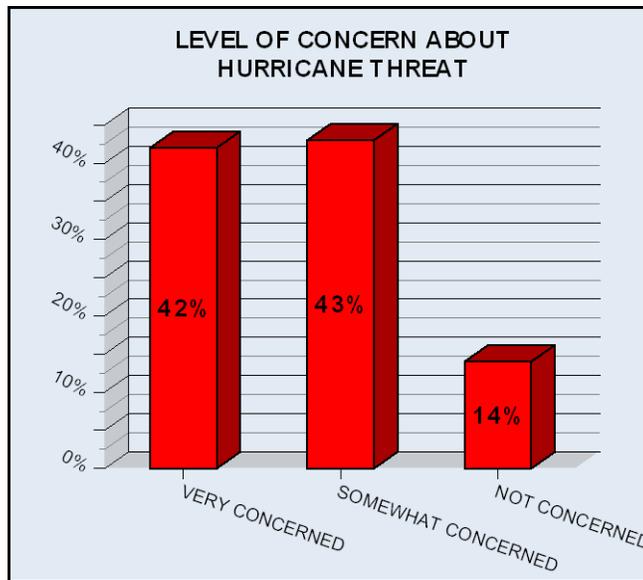
In answer to the open-ended question about what happened as a result of Katrina, about one-third of the sample, particularly in Hancock and Harrison counties, reported major damage, including loss of homes. More than half reported some effects, such as roof damage, trees down, power off and/or flooding.

Evacuation research has established that past hurricane behavior is a good predictor of future behavior. It would be expected that those who evacuated for these hurricanes, both of which caused a great deal of damage, would be more likely to evacuate for similar storms in the future. Many of these people may have also evacuated for Hurricane Georges. It is interesting that on the 2001 survey, of those in the High Risk Zone who did not leave for Hurricane Georges, 38% say they would leave the next time.

## 3.2 RISK FACTORS

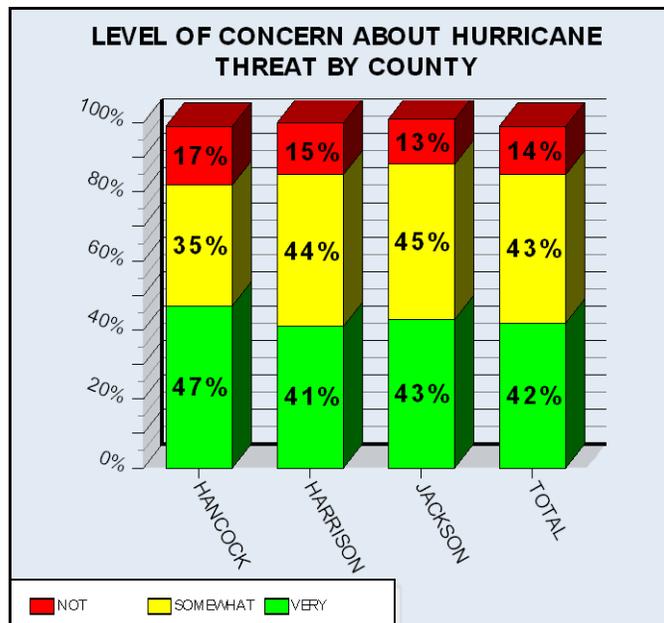
### 3.2.1 Concern About Hurricanes And Home Safety

Before deciding to take precautionary action against a hazard, people must believe they or their loved ones are at risk. If the action is as onerous as evacuation, they must believe the situation to be very serious. Therefore, a major topic of this survey involved questions to measure the extent to which coastal Mississippi residents understand their hurricane risk. Later in the report the relationship of these risk factors to respondents' evacuation zone location will be examined. Q3 asked: *"To what extent are you concerned about the threat of a hurricane? Are you very concerned, somewhat concerned, or not concerned?"* The results in Figure 3.1 indicate **a great deal of concern – 85% are very or somewhat concerned.** This is not surprising, given the area's recent hurricane history.



**Figure 3.1**

Respondents from African American households and lower income households are significantly more likely to say they are concerned. Interestingly, the level of concern was equally high among those who had not been living in the area at the time of Katrina. In order for officials in coastal Mississippi counties to understand how residents perceive their risk, the county results are reported in Figure 3-2. The results are virtually identical. Clearly, most of these Mississippi coastal residents are concerned about hurricanes.



**Figure 3.2**

The next series of questions were:

Q4. “How likely is it that your home would every be seriously damaged or destroyed by the winds of a hurricane or damaged by trees blown down by hurricane winds?”

Q5. “How likely do you think it is that your home would ever be flooded as a result of hurricane storm surge?”

Q6. “How likely do you think it is that your home would ever be flooded as a result of heavy rain from a hurricane?”

As illustrated in Figure 3.3, **35% of the total sample thought it very likely and 42% thought it somewhat likely that their home would ever be seriously damaged or destroyed by hurricane winds.** County differences are not significant. As expected, mobile home residents are significantly more likely to be concerned about wind damage. However, **17% of mobile home respondents say it is unlikely their home will ever be damaged by hurricane winds.** Those with lower household income are more likely to say their homes can be damaged by wind, probably related to the construction quality of the home and its maintenance.

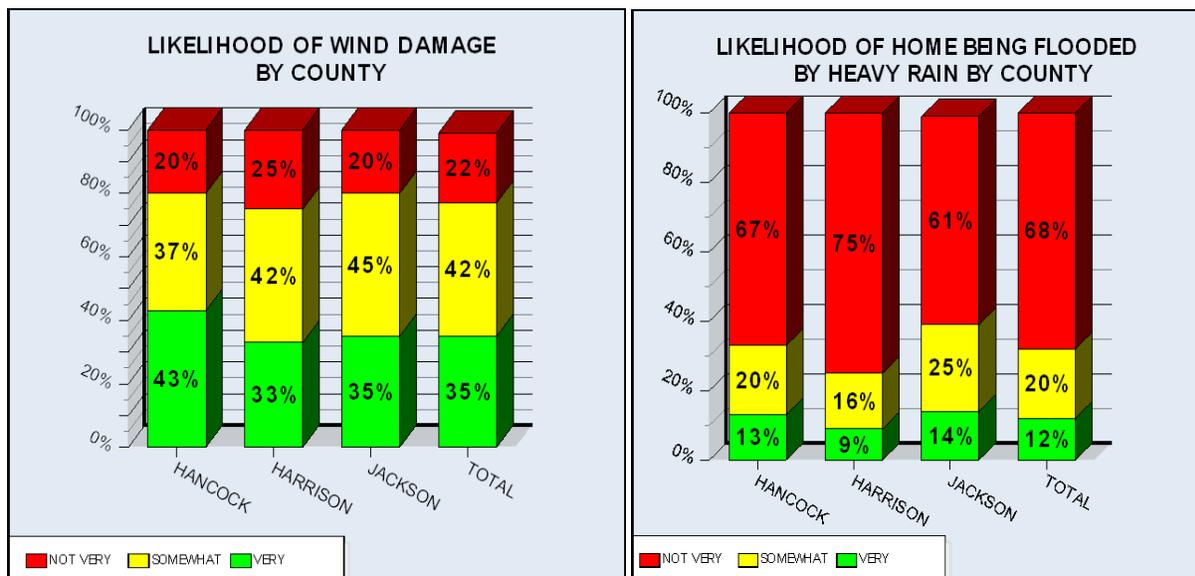
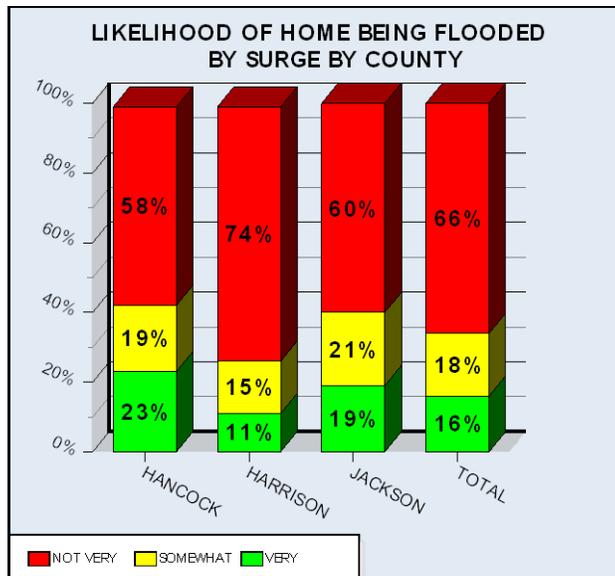


Figure 3.3

Figure 3.4

Similarly, respondents were asked how likely it was that their home would be flooded from heavy rain. **About two-thirds of the total sample thought that it was not very likely.** There are significant county differences, however, with three-quarters of Harrison County participants giving this answer.



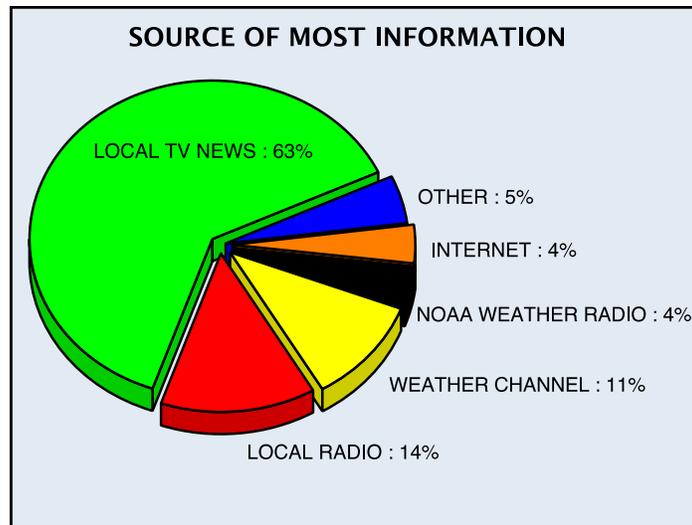
**Figure 3.5**

**Two-thirds of the sample thought it is not very unlikely that their homes will be flooded from storm surge.** County differences are significant, with Harrison County respondents being less concerned about surge. African Americans are more likely to indicate their homes would be flooded by storm surge. Again, these variables will be reexamined according to evacuation or surge zone status later in the report.

### 3.3 EVACUATION DECISION MAKING

#### 3.3.1 Information Sources

Today, weather forecasts, warnings, and evacuation-related messages are available through a variety of media. It is useful for officials to know where citizens are looking for information. Therefore, Q38 asked, “*If a hurricane was threatening your area, where would you get MOST of your information?*” Results are illustrated in Figure 3.6.



**Figure 3.6**

**As expected, the most common source is local television.** There are no significant county differences. A distant second is local radio, followed closely by the Weather Channel. Households with older adults and African American households are even more likely to rely on local television as their main source of hurricane information. Older adults are more likely than the rest of the sample to use local radio as their most common source. Only 4% say they would use a NOAA Weather Radio. The 4% who say the Internet is their main source, were then asked “*What Internet sites will you likely go to for hurricane information?*” The most common answers were various NOAA websites including National Weather Service and National Hurricane Center, employer’s website and Weather Channel website.

Relevant to the warning communication process, they were asked:

Q39. “*Do you have access to the Internet from your home?*”

Q39A. “*Do you have access to the Internet from a mobile device such as your phone?*”

Surprisingly, **82% have Internet access in their homes.** The county rates are Hancock 80%, Harrison 81% and Jackson 84%. No question directly asked if they have a cell phone, but one answer choice to Q39A was “Do not have a cellphone.” Based on this it appears that over **90% of the respondents have a cell phone. In fact 54% say they have access to the Internet from a cell phone, i.e. a smart phone.** Table 3.2 provides an analysis of Internet availability, including via mobile phones, by age and income.

**Table 3.2 Internet Availability by Age and Income**

	<b>INTERNET IN HOME</b>	<b>INTERNET FROM MOBILE DEVICE</b>
<b>Age:</b>		
18 - 30	85%	82%
31 - 45	93%	77%
46 - 60	89%	58%
Over 60	73%	34%
<b>Household Income:</b>		
<\$10,000	64%	49%
\$10,001 - \$20,000	64%	35%
\$20,001 - \$30,000	68%	35%
\$30,001 - \$50,000	92%	62%
\$50,001 - \$80,000	95%	55%

**Even among the lowest income group, 64% have access to the Internet from their home and 49% have access from a mobile phone.** It is expected that younger people and those with higher incomes will have greater access to the Internet, but this adds to the evidence of significant Internet access across socioeconomic levels and ages. **Among African American respondents, 51% say they have access to the Internet from a mobile phone.** There are no significant differences among the three counties. Clearly, the Internet has become an important source of information for most residents of coastal Mississippi.

Only one Mississippi coastal county, Harrison, has a cell phone alert system and it is seriously underused. Only 11% in Harrison County who reported having a cell phone have registered to receive this valuable service.

### **3.3.2 Role Of Social Networks**

The effect of social networks in household evacuation decisions was illustrated in the case of Hurricane Katrina and New Orleans. Many people say that the advice of others influenced their decision to leave or stay. Thus, several questions were included in this survey regarding the possible role of people outside the household in evacuation response.

Q12. *“Would you consult with anyone outside of your household before making your decisions about evacuation?”*

Q13. *“Who would that be?”*

Q14 *“Would assisting others outside your household affect how quickly you would be able to leave?”*

**In answer to the first question in this series, most (54%) say they would consult with someone outside their household.** Women and lower-income households are more likely to do so. The next table depicts their selection for consultation.

**Table 3.3  
Who Will Consult With on Evacuation Decision**

<b>PERSON</b>	<b>PERCENT</b>
Relative or Friend Inside Area	56%
Relative or Friend Outside Area	28%
Employer	5%
Local Authorities	6%
Other	4%

**Most people will consult with friends or family in the area.** There are no significant county differences. More than one response was possible, and about 10% of respondents to this question indicated they will consult with persons in more than one of these categories. In fact 67% of the total responses given, including the multiple responses, are relatives or friends in the area.

Past research has shown that people often have to assist others or be assisted by people outside of their household during evacuation. **In the total sample 51% indicated that assisting others outside their household will affect how quickly they will be able to leave.** In Harrison County the rate rises to 55%. This was especially true for higher income households and households with children. As might be expected, this was less likely to be a factor in older households.

### **3.4 EVACUATION INTENT**

This section gets to the core issue. The purpose of this survey was to provide data to assist emergency managers and other officials in planning hurricane response, including evacuations. It is important to know how many people intend to leave, how they intend to leave, where they intend to go and how they intend to get there. The relationship between intent and actual behavior will be discussed later.

#### **3.4.1 By Hurricane Category**

Respondents were asked:

Q7. *“If a Category 3 or above hurricane, a major hurricane, was threatening your community, how likely is it that you would leave your home?”*

Q8. *“What about for a Category 1 or 2, a lower category hurricane, how likely is it that you would leave your home?”*

The results are illustrated in the following figures.

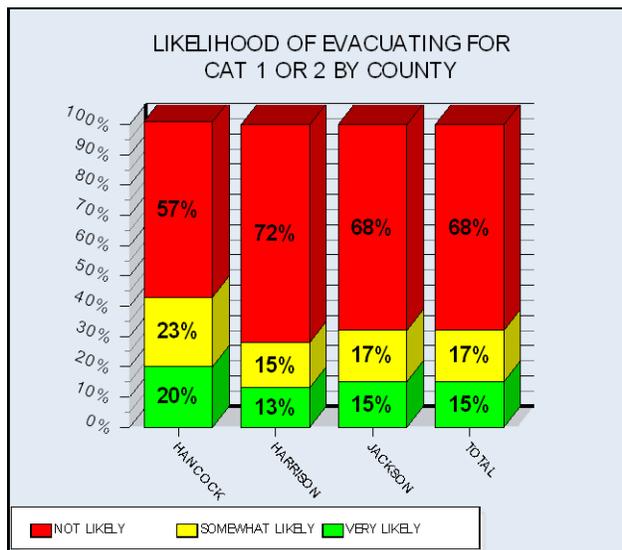


Figure 3.7

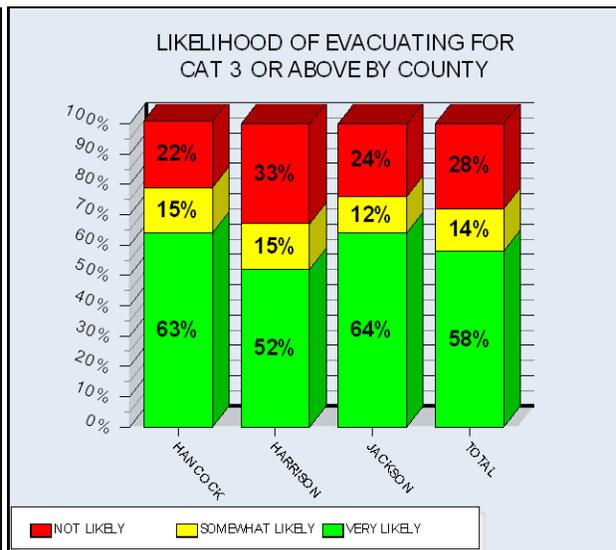


Figure 3.8

The results between the two levels of storms differ dramatically. **A small minority indicates leaving for a Category 1 or 2 storm, but most say they will evacuate for a Category 3 or above hurricane.** Those from Harrison County are less likely to say they would leave for either.

**For both level of storms households with children and African American households are more likely to say they will leave.** In contrast those living in owner-occupied, single family homes are significantly less likely to have evacuation intentions. It is important to note that for a Category 3 or higher storm, 83% of African Americans say it is very likely they will leave. **Of those living in mobile homes, 54% say it is not likely they will evacuate for a Category 1 or 2 hurricane and 15% will not even leave for a Category 3 or higher storm.** The latter corresponds to the rate (17%) of mobile home dwellers saying it is not likely their homes will be damaged by hurricane winds. Rates for evacuation intention for a Category 3 or higher storm are 78% among those who evacuated for Ivan and 77% for those who evacuated for Katrina.

### 3.4.2 Recommended Versus Mandatory

The questions were:

Q9. *“If government officials issue a mandatory evacuation for your area for a hurricane, how likely is it that you would leave your home?”*

Q10. *“If an evacuation was voluntary, but not mandatory, for your specific area, how likely is it that you would leave your home?”*

Past studies have found that people are more likely to evacuate if ordered or mandated, as opposed to merely recommended or voluntary. The difference here is dramatic.

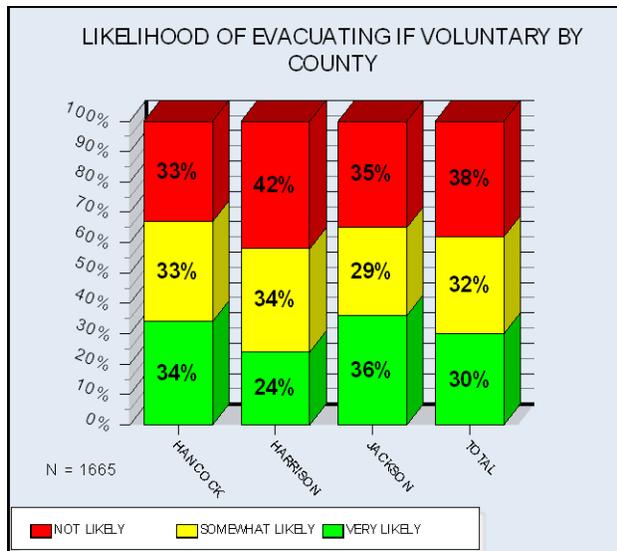


Figure 3.9

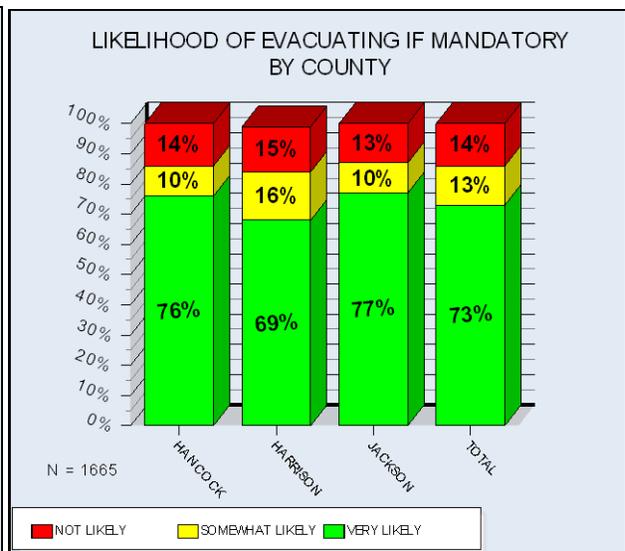


Figure 3.10

While 30% of the total sample indicates it is very likely they will evacuate if it is voluntary, 73% say they will leave if a mandatory order is given. Harrison respondents are less likely to say they will leave, especially if voluntary. The percentage reporting they will very likely leave for an ordered evacuation is remarkably high. There is a tendency for people to overstate their intention to leave, especially if the question includes the terms “ordered” or “mandatory.” Nevertheless, these are very high rates.

Past experience has shown less disparity between stated intention and actual evacuation when the storm threatening the area is a major one, and when people have evacuated before. As expected, those who evacuated for Hurricane Katrina are more likely to say they will evacuate again. **In fact, if a mandatory evacuation is ordered, 86% of those who evacuated for Katrina say they will leave again. If it is voluntary, 41% of Katrina evacuees will leave.** Research has shown that the effect of previous hurricane experience tends to lessen over time.

Women respondents are more likely to say they will evacuate both when recommended and ordered. In fact 80% of the women respondents say they will evacuate if a mandatory order is given. This corresponds to the research literature where it is well established that women tend to be more risk averse and are more likely to take precautionary action when the decision is theirs. If voluntary, 40% of renters say it is very likely they will evacuate. For a mandatory evacuation the rate among renters is 93%.

### 3.5 EXAMINING RISK FACTORS AND EVACUATION INTENT BY LOCATION

Relevant variables are now examined relative to each respondent’s location. County evacuation zones are used for most of the variables. However, the surge-related variables are analyzed in terms of county surge zones.

#### 3.5.1 Knowledge of Evacuation Zone

When asked, “*Is your home located in an official evacuation zone?*” many respondents were either confused or did not know. The table below shows the results by actual zone status for each county..

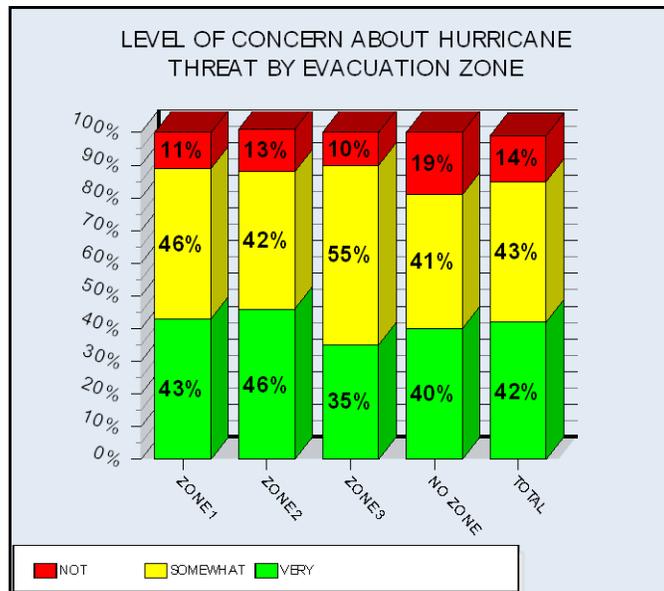
**Table 3.4. Knowledge Of Evacuation Zone By Actual Evacuation Zone Status**

	ZONE 1	ZONE 2	ZONE 3	NO ZONE	TOTAL
<b>HANCOCK COUNTY</b>					
Yes	55%	43%	48%	25%	37%
No	14%	24%	25%	41%	30%
Not Sure/Don’t Know	31%	33%	27%	34%	33%
<b>HARRISON COUNTY</b>					
Yes	57%	37%	0%	16%	35%
No	20%	43%	0%	66%	45%
Not Sure/Don’t Know	22%	19%	0%	19%	20%
<b>JACKSON COUNTY</b>					
Yes	43%	30%	30%	23%	33%
No	27%	44%	35%	50%	39%
Not Sure/Don’t Know	30%	26%	35%	28%	28%

About one-third of the sample in each county is correct in the belief that their home is located in an evacuation zone. Those who thought they were in an evacuation zone and were not ranged from 16% in Harrison County to 25% in Hancock. Those who were unsure or did not know ranged from 20% in Harrison to 33% in Hancock. Jackson County respondents were especially confused, but the results for each county should give evacuation planners reason to be concerned. **Clearly, there is a great deal of uncertainty among coastal Mississippians about whether they live in an evacuation zone.**

#### 3.5.2 Level Of Concern About Hurricane Threat By Zone

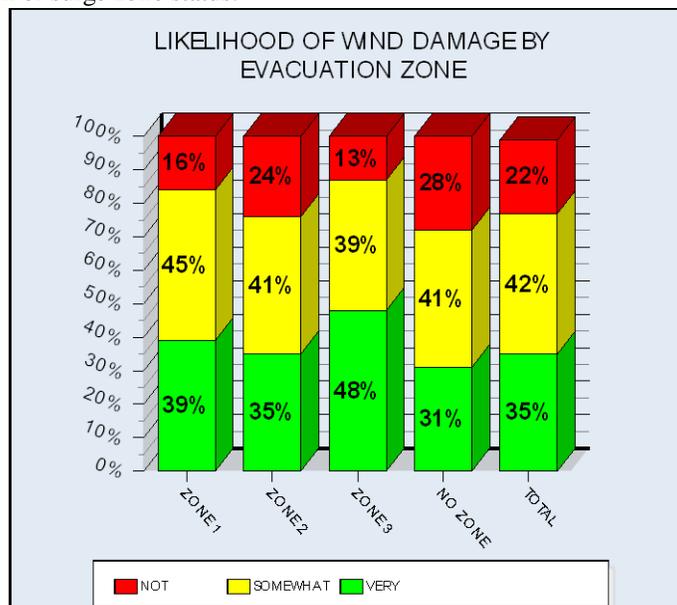
The next figures depict the previously presented variables regarding level of hurricane concern in general and concern about various hazards associated with hurricanes, but this time according to the evacuation or surge zone where the respondents’ homes are located.



**Figure 3.11**

As can be seen, the level of general concern about hurricanes does not seem to vary much across evacuation zones. As expected, concern is somewhat less among those living outside evacuation zones. Nevertheless, **the vast majority is either very or somewhat concerned regardless of their zone.**

Responses on the question about how likely they think it is that their home would ever be seriously damaged or destroyed by the winds of a hurricane or damaged by trees blown down by a hurricane are now presented according to the respondent's evacuation or surge zone status.



**Figure 3.12**

As expected, concern about wind damage is also relatively the same across evacuation zones. It is very similar to general concern about hurricanes.

The question that asked how likely they think it is that their home will ever be flooded as a result of heavy rain or storm surge is now examined according to surge zone status.

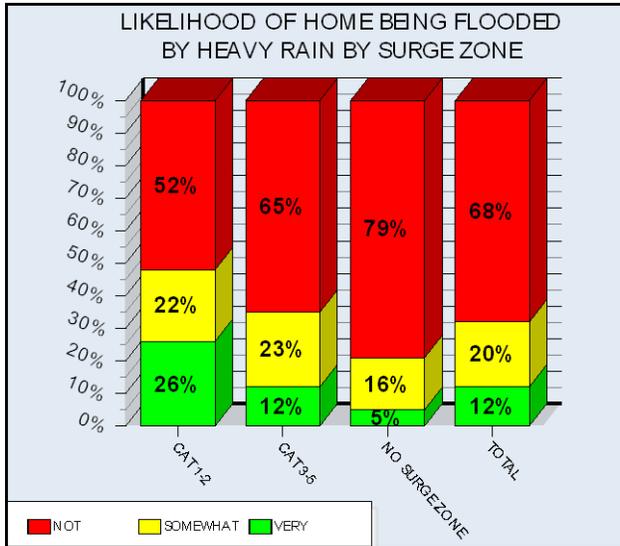


Figure 3.13

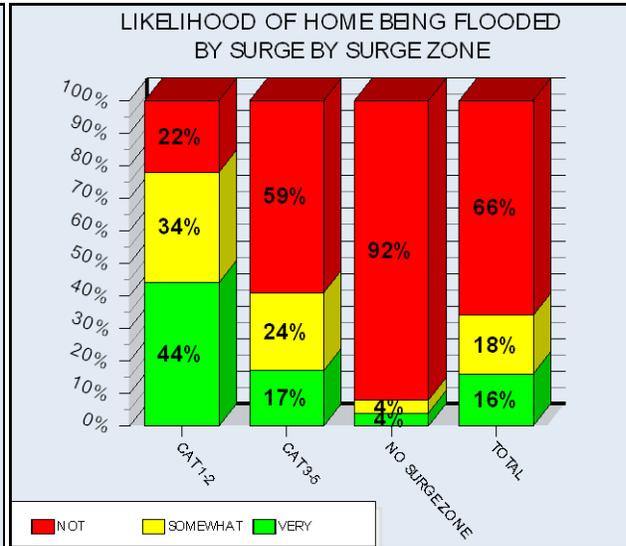


Figure 3.14

Most are not particularly concerned about rainfall flooding associated with hurricanes. As expected, those living in Category 1 or 2 zones are most concerned and those outside surge zones are least concerned.

As expected, concern about surge is highest in the Category 1 and 2 surge zones group, i.e. those expected to evacuate for any hurricane. Nevertheless, nearly one-quarter of them are not concerned about surge. The extent to which others are not concerned is also surprising considering recent surge deaths and destruction from Hurricane Katrina.

This concern about flooding is much less than indicated by the 2001 study. At that time 63% of those in the High Risk Zone (expected to evacuate for all hurricanes) and half in the Medium Risk Zone (expected to evacuate for major hurricanes) were concerned about flooding.

### 3.5.3 Evacuation Intent By Evacuation Zone

Perhaps the most important findings in the survey are examined in this section. The next two figures depict the evacuation intent of respondents to the threat of a Category 1 or 2 hurricane, and to a Category 3 or higher hurricane, according to their actual evacuation zone location.

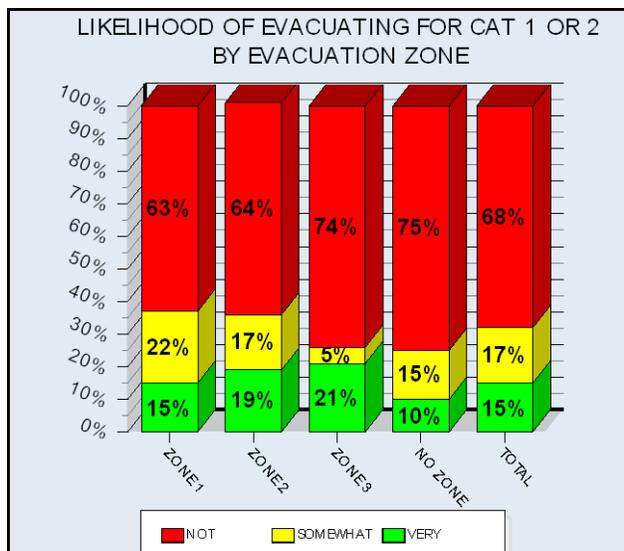


Figure 3.15

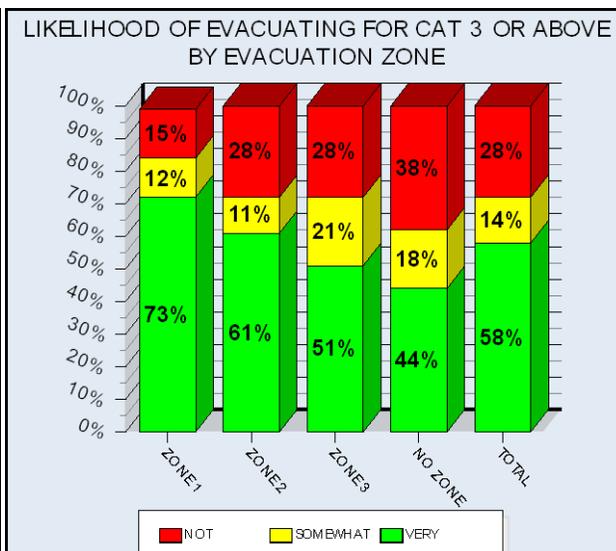
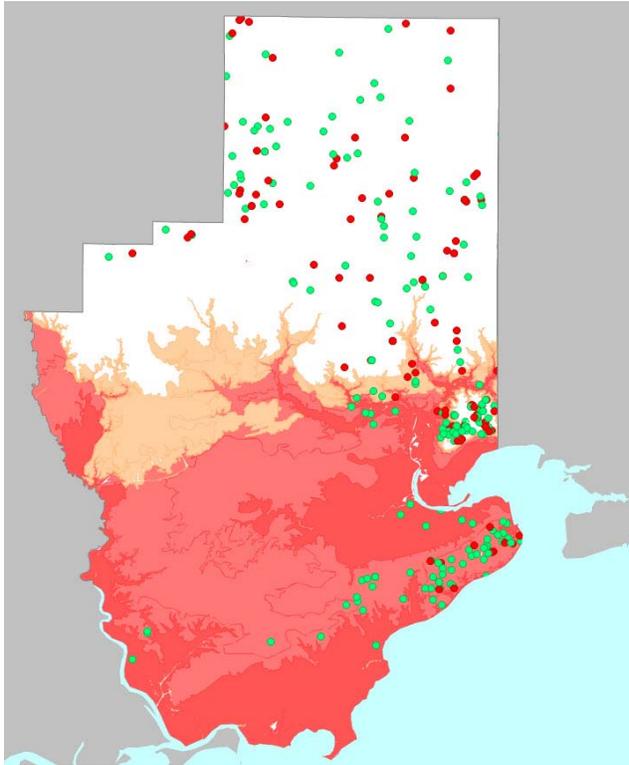


Figure 3.16

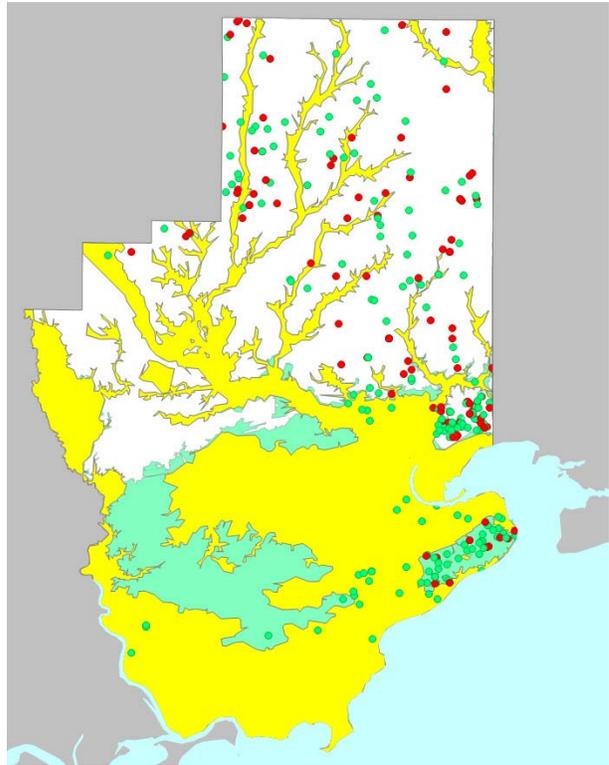
From these two figures it is clear that on the other questions, such as general concern about hurricanes, people are only thinking of major storms. **The lack of evacuation intent for Category 1 or 2 storms by those living where they are expected to evacuate for their own safety should be of concern.** This is especially true when a Category 1 or 2 hurricane poses significant surge threat.

On the other hand the second figure above also presents problems to public officials. **Nearly two-thirds of those who do not live in an evacuation zone say it is somewhat or very likely that they will evacuate.** This portends a very serious shadow evacuation problem in which people who would likely be safe staying either at home or in a safe refuge in the area will be clogging the roads, making it more difficult for those who should be leaving.

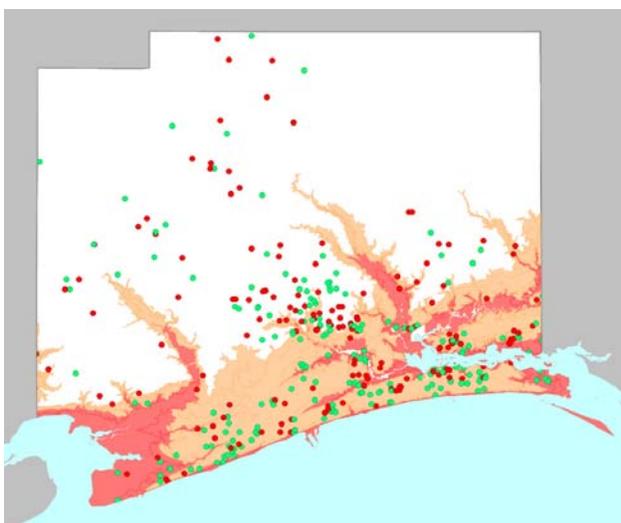
The next six maps depict the actual location of respondents in county surge and evacuation zones, according to whether they say they would evacuate for a major hurricane. **The green dots represent respondents who say it is “Very Likely” they will evacuate for a Category 3 or higher hurricane. The red dots indicate those who said it was “Not Likely” they would evacuate. Those who answered that it was “Somewhat Likely” have been grouped with the “Not Likely” group represented by red.** The fact that they are not sure they will leave for a major storm when they live in a high-risk area should be of concern to officials.



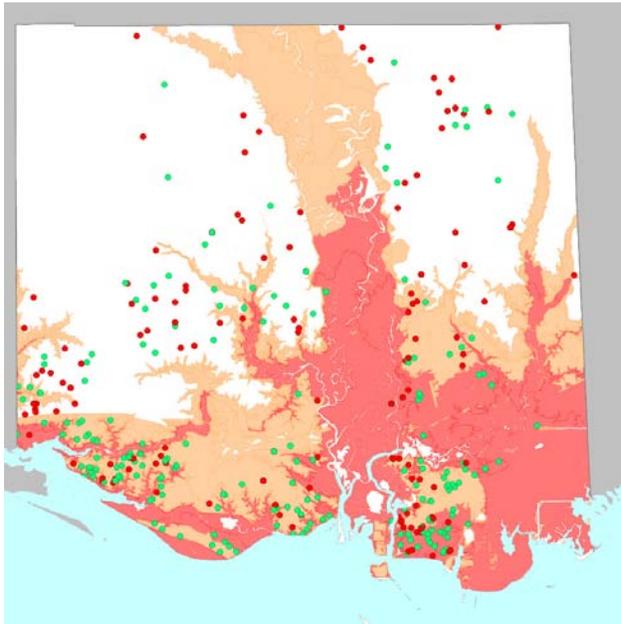
**Figure 3.17. Hancock County Evacuation Intent By Surge Zones**



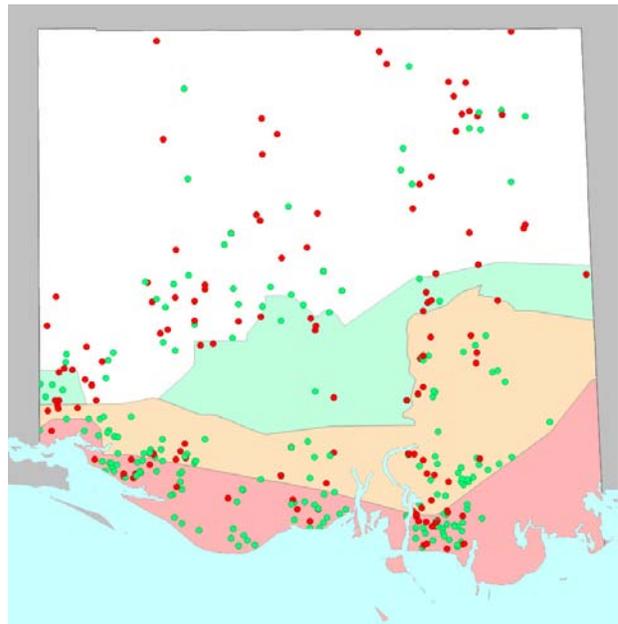
**Figure 3.18. Hancock County Evacuation Intent By Evacuation Zones**



**Figure 3.19. Harrison County  
Evacuation Intent by Surge Zones**



**Figure 3.20. Harrison County  
Evacuation Intent By Evacuation Zones**



**Figure 3.21. Jackson County  
By Jackson County Surge Zones**

**Figure 3.22. Jackson County  
Evacuation Intent By Evacuation Zones**

These maps highlight the **limited relationship between evacuation intent for a major hurricane and actual location relative to surge and evacuation zones**. This is true in all three counties. It highlights two serious problems: too many red dots in surge and evacuation zones and too many green ones in areas outside of the zones. Based on this sample officials can expect many to stay who should leave and many to leave who would probably be safe sheltering in place or in the local area.

The next two figures depict evacuation intent by evacuation zone status both when the evacuation is voluntary and when a mandatory evacuation order has been given.

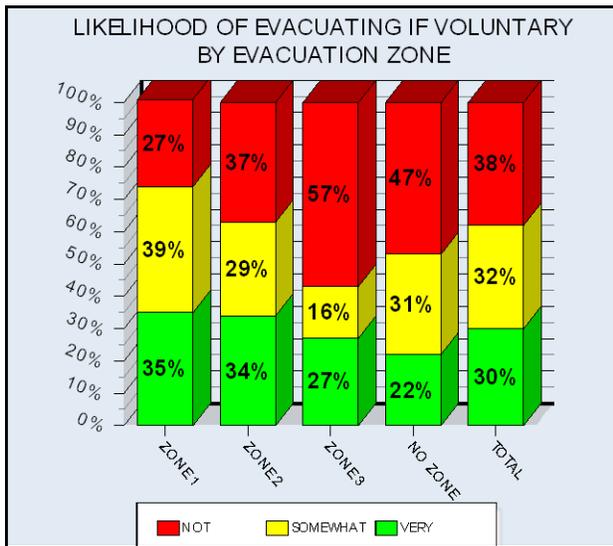


Figure 3.23

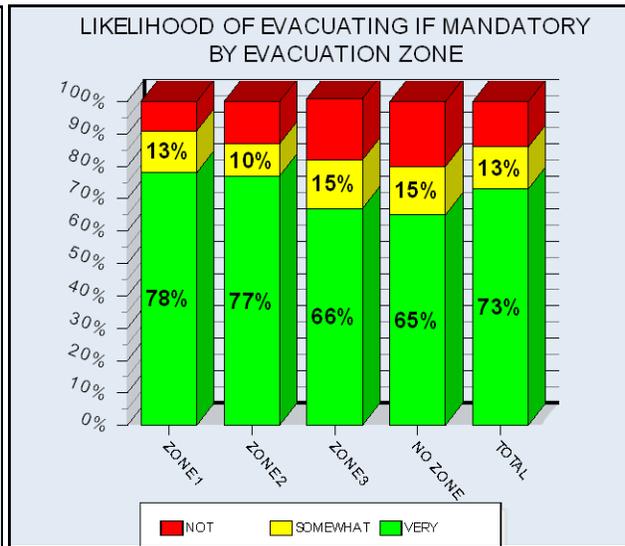


Figure 3.24

**The extreme effect of a voluntary recommendation over a mandatory order remains across all evacuation zones.**

### 3.6 EXPLAINING THE EVACUATION DECISION

Respondents were asked:

Q15. *“Please tell me the most important reasons that could make you feel you would have to evacuate your home for a hurricane.”*

If they answered that their home would not be safe, they were asked: *“Why would your home not be safe in a hurricane?”*

If their answer to Q15 was that they had household members with health concerns, they were asked, *“What are the health concerns or medical needs of a person in your household that would be a reason to evacuate?”*

Q18. *Please tell me the most important reasons that might make you think evacuating for a hurricane would NOT be a good idea?”*

**The most common reason given for evacuating was concern about the safety of household members.** In a similar vein others say they will leave because their house or building would not be safe in a hurricane. When they were asked to be more specific, there is far more concern about wind damage than flooding. About equal numbers are concerned about flooding from heavy rain and from storm surge. Other reasons included the need to protect children or elderly, not wanting to be in the area after the storm, and leaving because of special health or medical needs. When those who mentioned leaving because of special health or medical needs were asked to be more specific, most said they were concerned about needing medicines or medical procedures.

**The most common reason given for NOT intending to evacuate was the belief that their home was safe, closely followed by traffic concerns.** About 10% are concerned about protecting their home from looting and 5% mentioned pets as a reason for not leaving. In other behavioral studies a common reason given for not leaving is the belief that hurricanes always go somewhere else. Given the recent hurricane history of coastal Mississippi, it is not surprising that few people felt this way.

Another important factor found to affect evacuation behavior is whether the household has a plan for hurricane response. When these Mississippians were asked, “*Has your household or family talked about where you would go if you had to evacuate your home for a hurricane?*” nearly three-quarters say yes. Those living in the highest risk zones were slightly more likely to have had this family discussion. **Further analysis showed the expected significant correlation between evacuation planning and evacuation intent.** Similarly, research indicates a strong association between having evacuated in the past and future evacuation intent. **This expected association was also supported. The correlation between having evacuated for Hurricane Katrina and future evacuation intention for either Category 1 or 2, or Category 3 or higher storms is statistically significant.**

Some of the variables used to explain evacuation behavior are likely associated with each other. For example, African Americans are more likely to have lower measures on socioeconomic variables like income and home ownership. Regression analysis builds a model to explain something, such as evacuation intent, by measuring the extent to which each variable makes a unique contribution to the model. For example, if it turned out that African Americans are more likely to leave regardless of socioeconomic status, there is something unique with many African American households that increases the tendency to evacuate.

The following regression model (Table 3.5) includes variables that are usually considered to be significant in explaining whether a household intends to evacuate. As noted, it shows the *unique* contribution each makes. The colors indicate the extent to which each variable by itself makes a significant contribution. If the number is negative, the presence of this variable reduces the likelihood of evacuation; if positive, it increases the likelihood of evacuation. For example, the variables Having evacuated for Hurricane Katrina, Being African American, and Having Talked About Evacuation all significantly increase the likelihood that the household will evacuate. In these regressions the dependent variable measuring evacuation intent is a combination of questions 7-10. These questions all measure evacuation intent, but they also measure other things like probability of different level storms and attitudes toward government authorities. To get a single common measure of evacuation intent a factor analysis was done. One clear underlying factor resulted that can be assumed to purely measure evacuation intent. A variable created from this factor was then used in the regressions.

Table 3.5 shows six different combinations of variables explaining evacuation intent. This makes it possible to see the contribution of a factor among similar variables, and then in the last column with all the variables. In most cases the effects persist in combination with all the variables, but in one case it does not. Having pets has a strong effect among other measures of household demographics in that it makes a household less likely to evacuate, but it has no effect when all variables except ones concerning hurricane experience or discussion are included. When included with all variables it has a weak effect.

**Table 3.5. Regression Analysis of Evacuation Intent\***

	EXPERIENCE	SOCIO-ECONOMIC CHARACT-ERISTICS	MINORITY STATUS	FAMILY AND HOUSEHOLD	ALL VARIABLES EXCEPT EXPERIENCE VARIABLES	ALL VARIABLES
How long have you lived in the part of Mississippi where you live now?	0.001**					0.002
Did you evacuate for Hurricane Katrina?	0.878					0.824
Has your household or family talked about where you would go if you had to evacuate your home for a hurricane?	0.226					0.306
Respondent's years of education		0.018			0.013	0.012
Household income (by \$10K)		0.000			0.001	0.001
Owns single-family home		-0.439			-0.372	-0.282
Respondent is African-American			0.633		0.557	0.579
How many people living in your household are 65 or older?				-0.039	0.107	0.084
How many of the people living in your household are 12 years old or younger?				0.126	0.071	-0.048
Respondent is female				0.250	0.285	0.282
Household has pets or animals				-0.267	-0.121	-0.167
<i>R2 (approximate amount of variation explained)</i>	0.258	0.043	0.057	0.042	0.123	0.361
<i>Constant</i>	0.850	1.701	1.487	1.586	1.413	0.624

**COLOR CODE:**

Variable very significantly increases likelihood of not evacuating.  $p \leq .01$

Variable somewhat significantly increases likelihood of not evacuating.  $.05 \Rightarrow p > .01$

Variable somewhat significantly increases likelihood of evacuating.  $.05 \Rightarrow p > .01$

Variable very significantly increases likelihood of evacuating.  $p \leq .01$

No color = not significant at  $p > .05$  level

\* Dependent Variable = Factor score from questions 7, 8, 9, and 10.

Score goes from 0 = very unlikely to evacuate to 3 = very likely to evacuate.

\*\* Numbers in table cells: Positive regression coefficient means this variable increases the likelihood of evacuating. Negative regression coefficient means this variable reduces likelihood of evacuating.

When interpreting this table, a positive number means this variable, by itself, increases the chances that a household will evacuate. Therefore, having evacuated for Katrina, having talked about where they would evacuate, being African American, and being a woman all play a significant role in promoting evacuation, independent of the effects of other variables. In explaining the tendency not to evacuate the most important variable is living in an owner-occupied single family home. Having pet has a slight effect. An important finding is that neither income nor

age is statistically significant explanatory variables by itself. Also it appears that in fact there is something about being an African American household, regardless of income level, that makes it more likely to evacuate.

### 3.7 EVACUATION CONDITIONS

All respondents (regardless of evacuation intentions) were asked a series of questions about conditions should they HAVE to evacuate.

Q30. *“How many people in your household would leave?”*

Q31. *“Is there anyone living in your household who would probably stay in the area even if other people were leaving?”*

Q32. *“If so, what is the reason they would stay?”*

#### 3.7.1 Who Would Go

If they HAD to leave, interviewees were asked how many people from their household will go. The distribution is illustrated in the next table.

**Table 3.6 How Many Would Leave From Household\***

	HANCOCK	HARRISON	JACKSON	TOTAL
<b>One</b>	<b>14%</b>	<b>18%</b>	<b>14%</b>	<b>16%</b>
<b>Two</b>	<b>42%</b>	<b>36%</b>	<b>42%</b>	<b>39%</b>
<b>Three</b>	<b>17%</b>	<b>18%</b>	<b>16%</b>	<b>17%</b>
<b>Four</b>	<b>9%</b>	<b>15%</b>	<b>16%</b>	<b>14%</b>
<b>Five or More</b>	<b>16%</b>	<b>11%</b>	<b>11%</b>	<b>12%</b>

\* Columns do not add to 100% because some indicated no one would leave even though they were to assume they would HAVE to evacuate.

**The average number that would leave per household is 2.6 persons.** Households are slightly larger in Hancock and Jackson than in Harrison County.

Respondents were asked, *“Is there anyone living in your household who will probably stay in the area even if other people are leaving?”* **About 16% of the total sample indicates that someone will stay behind.** The rate are slightly higher for households with children (20%) and those living in owner-occupied single family homes (17%), and lower for African American households (10%) and households with older adults (11%). There are no important county differences. It should be noted that **11% of households living in mobile homes indicate someone will stay.**

A number of reasons were given for someone staying behind. The most often-mentioned reasons for staying are

- To protect home after the storm
- Job responsibilities
- Just not being willing to evacuate.

### 3.7.2 Pets

Post-evacuation research has shown that some people do not evacuate because they do not want to leave their pets. Many jurisdictions are making transportation and shelter plans for evacuees to bring their pets. **In this survey 65% of the respondents indicated they had pets (Q36).**

**Of those who have pets, a majority (86%) will take their pets with them if they evacuate, 9% will leave them at home, 3% will leave them with family or friends, and 2% will board them.** No important differences appeared among the counties.

### 3.7.3 Time Needed To Evacuate

A series of questions dealt with the conditions associated with respondents' intended evacuation:

Q24. *“If you had to evacuate, how long would it take for you and your household to get ready to leave?”*

Q25. *“If a hurricane is predicted to impact your area three days from now and you decided to evacuate, would you leave today, tomorrow or two days from now?”*

As illustrated in the next figure, **62% of the sample indicated they can be ready in less than a day with most of the rest being ready in one day.** There are no important differences at the county level. Interestingly, 67% of households with older adults say they can be ready in less than one day. Men are more likely than women respondents to say they can be ready to leave in less than a day.

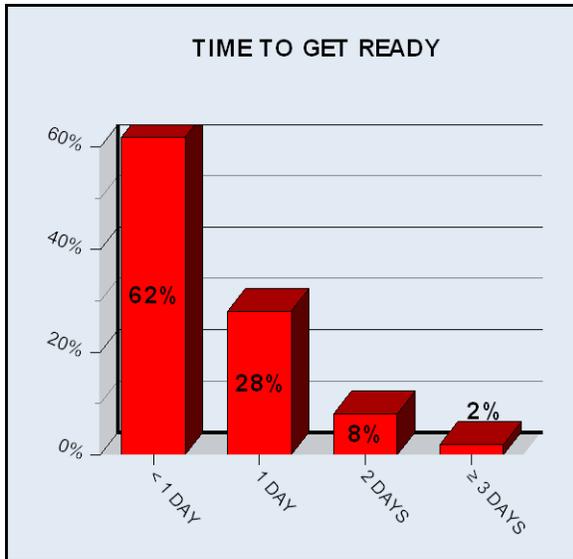


Figure 3.25 Time Needed to Get Ready

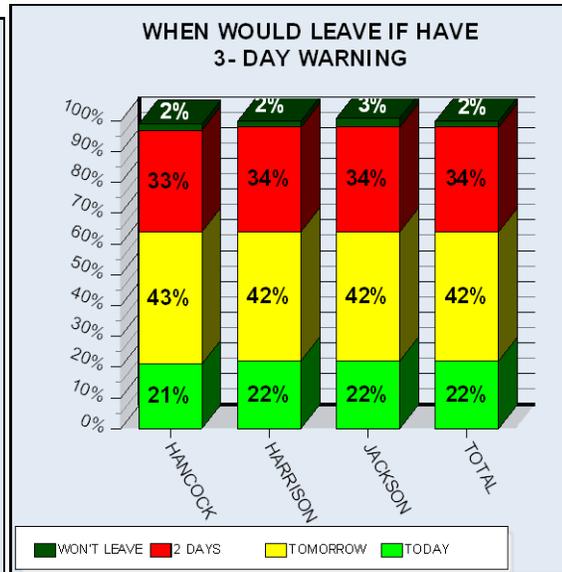


Figure 3.26. When Leave If Landfall Predicted in Three Days

About one-fifth say they would leave today, but most would leave tomorrow, and a third would leave in two days. The results are very similar for each county. As might be expected, home owners would tend to leave somewhat later.

### 3.7.4. Transportation

The transportation questions included:

Q22. “If you HAD to evacuate for a hurricane, would you need public transportation or government assisted transportation?”

Persons from Harrison and Hancock counties were then asked Q23: “If yes, have you registered for government transportation assistance?”

Q33. “How many cars would your household take in the evacuation?”

Q34. “Are there any other kinds of vehicles you would likely take, such as recreational vehicles, trailers or other vehicles?”

For the total sample, 4% indicated a need for public/government transportation. The county rates are:

- Hancock 3%
- Harrison 5%
- Jackson 2%.

It is important to remember that these county rates are based on very small samples and the confidence level is plus or minus 5%-6%, making them difficult to interpret. As might be expected, the need for public transportation was higher in households with income of \$10,000 or

less (13%). Only five people in Hancock and three in Harrison indicated they had registered for public transportation.

When asked how many cars they will take if they HAVE to evacuate, respondent's most common answer was one. However, many households will take multiple cars. As a result, the average number of cars was 1.6 for Hancock County and 1.5 for Harrison and Jackson counties. This is slightly higher than reported in the 2001 study, but in line with the findings of recent studies in other regions.

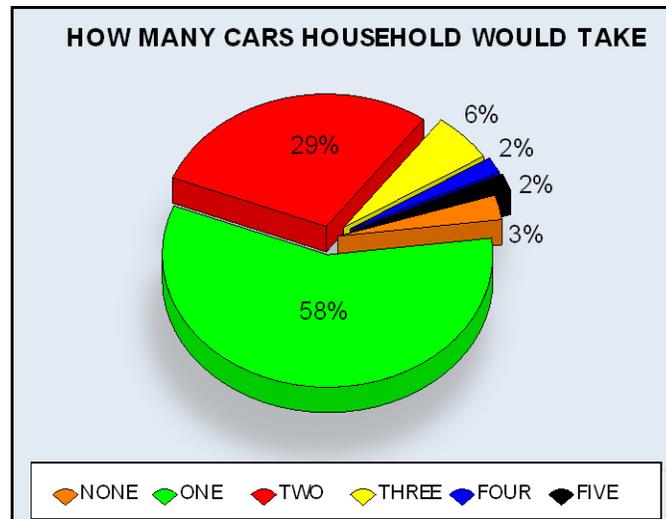


Figure 3.27

The following table shows the average number of cars that would evacuate by zone within each county.

Table 3.7 . Average Number of Cars Leaving Per Household by County Evacuation Zones

TYPE OF ZONE	ZONE	HANCOCK	HARRISON	JACKSON
SURGE	1-2	2.160	1.290	1.762
	3-5	1.587	1.528	1.397
	NO	1.391	1.628	1.536
EVACUATION	1	1.687	1.459	1.558
	2	1.538	1.527	1.398
	3	1.903	-	1.792
	NO	1.477	1.630	1.525

As far as other vehicles, 15% say they also will take another type of vehicle. These included campers, motor homes, motorcycles, trucks, tractors, horse trailers, even an airplane and a blimp!

### 3.7.6 Route and Destination

Several questions asked about intended routes and destination.

Q20. "If you HAD to evacuate your home, would you likely seek shelter inside your county or would you go to another county?"

Q21: "If you HAD to evacuate outside the county, where would you MOST likely go? Would you go the home of a relative or friend, another property you own, a public shelter, a hotel, or someplace else?"

Q26. "If you felt it necessary to evacuate for a hurricane, how far do you think you would probably go?"

Q27. "What is the city or county and state where you would most likely go when you evacuate?"

Q28. "If it became necessary for you to evacuate, what is the main road you would take leaving your neighborhood?"

Q29. "If you have to leave your city or county to evacuate, what is the main highway or highways your would take once you got out of your city or county?"

When asked whether they will seek shelter inside or outside of their county should they HAVE to evacuate, **80% say they will leave the county**. The 2001 study reported that half of the Georges evacuees left the county in 1998.

A very important factor in community evacuation planning is the type of refuge people choose.

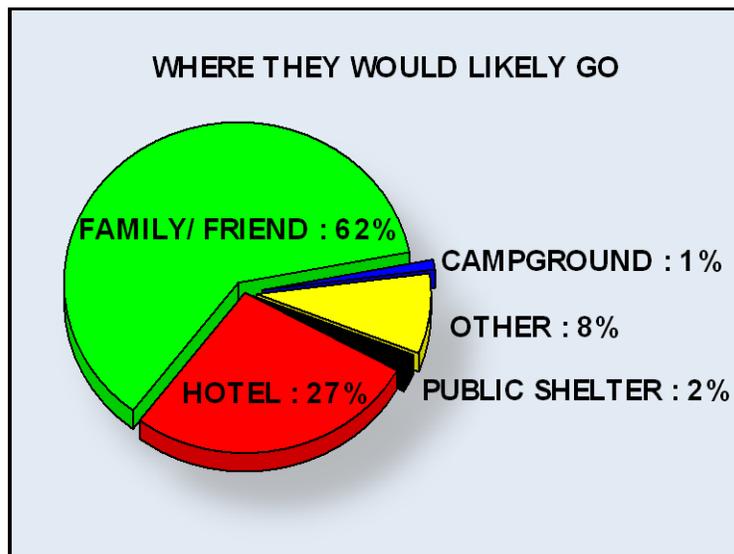


Figure 3.28

**Most intend to go to the homes of family or friends, followed by hotels.** The county rates are nearly identical. **The percentage that will use a public shelter differed by county: Hancock 1%, Harrison 3% and Jackson 2%.** Once again these rates are based on small samples.

Past evacuation research indicates that actual shelter use tends to be considerably less than stated intentions on behavioral surveys. As expected, intention to use public shelters was associated with income, increasing to 8% for those with incomes between \$10,000 and \$20,000. The rate for African Americans was 5%. **Only 9 persons (.8%) in this entire survey indicated they had functional needs that will require extra assistance in a public shelter.** It should be kept in mind, however, that persons with functional needs are less likely to respond to a behavioral survey.

Hurricane Katrina evacuees were asked where they went (Q46). Their responses are quite similar to those in the preceding figure.

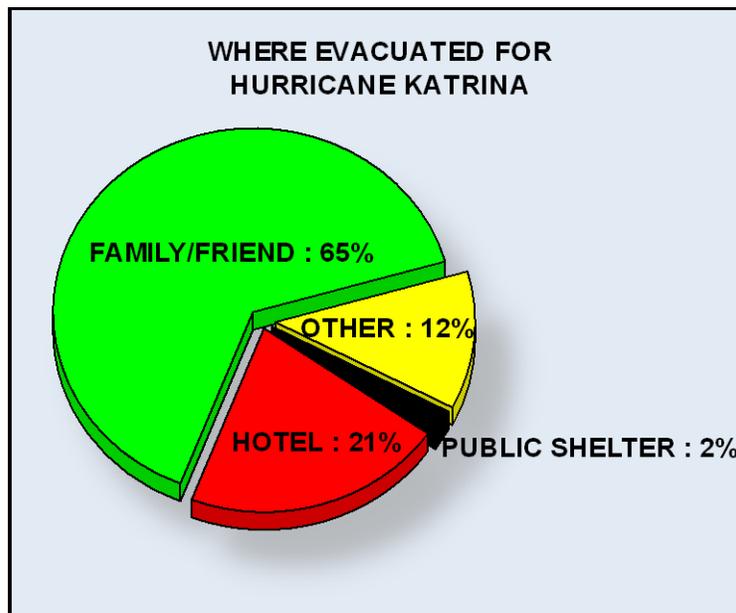
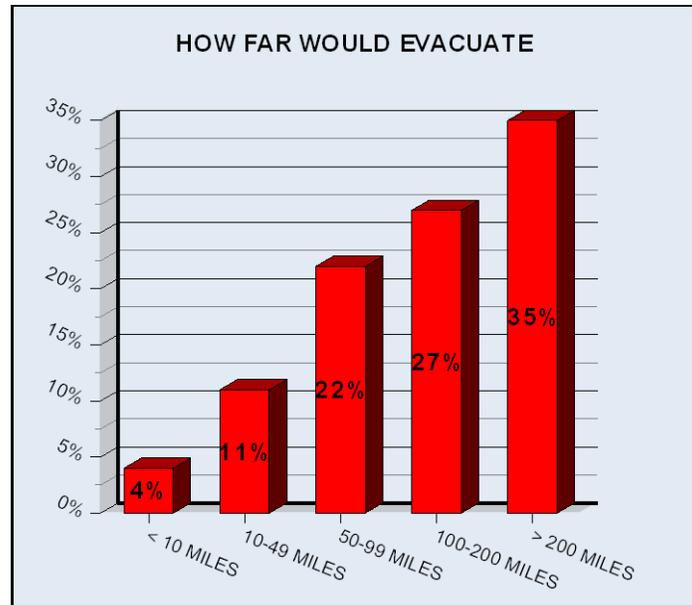


Figure 3.29

Most went to homes outside the area, followed by hotels. There are no important differences among the counties. The reported rate for shelter use was 2%. This compares to 3% reported on the Hurricane Georges survey. This similarity gives extra credibility to the findings.

When respondents were asked how far they will go, **the most common answer (35%) was more than 200 miles, followed by 100 to 200 miles, and then 50 to 99 miles.** Clearly, this hurricane-experienced population will not plan to stay in the area.



**Figure 3.30**

When asked what county, city, or state they will likely go to if they HAD to evacuate, more than one-third will stay in Mississippi and the most often mentioned city was Jackson. The next was Atlanta, Georgia. Other states mentioned included Tennessee, Texas. Louisiana and Alabama. Many didn't know or said it will depend on the direction of the storm.

The main highways they will take once out of their cities or counties are given in the next tables. In the first one the percentages are computed by county. In other words 40% of the respondents of Hancock County say, if they HAD to evacuate, the main highway they will use will be I-59 while in Harrison and Jackson only 4% will use that highway.

**Table 3.8 Main Highways for Evacuation by County**

HIGHWAY	HANCOCK		HARRISON		JACKSON		TOTAL	
	#	%	#	%	#	%	#	%
I-59	124	40%	33	4%	18	4%	175	16%
US 49	32	10%	169	44%	68	17%	269	24%
MS 63 US 98	3	1%	3	1%	69	75%	75	7%
I-10 West	58	18%	75	20%	88	22%	221	20%
I-10 East	52	16%	80	21%	100	25%	232	21%
US 90 West	8	3%	3	1%	10	2%	21	2%
US 90 East	8	3%	8	2%	17	4%	33	3%
Other	95	30%	86	22%	126	31%	307	28%
TOTAL	380	120%*	457	119%	496	122%	1333	121%

\* Total exceeds 100% because respondents could give more than one answer.

The next table provides the same data but the percentages are computed by road rather than by county. In other words of these coastal residents using I-59 if all three counties were evacuating, about 71% will likely be from Hancock County, 19% from Harrison and 10% from Jackson.

**Table 3.9 Main Highways for Evacuation by Highway**

HIGHWAY	HANCOCK		HARRISON		JACKSON		TOTAL	
	#	%	#	%	#	%	#	%
I-59	124	71%	33	19%	18	10%	175	100%
US 49	32	12%	169	63%	68	25%	269	100%
MS 63 US 98	3	4%	3	4%	69	92%	75	100%
I-10 West	58	26%	75	34%	88	40%	221	100%
I-10 East	52	22%	80	21%	100	43%	232	100%
US 90 West	8	38%	3	14%	10	48%	21	100%
US 90 East	8	24%	8	24%	17	52%	33	100%
Other	95	31%	86	28%	126	41%	307	100%
TOTAL	380	29%	457	34%	496	37%	1333	100%

### 3.7.10 When Expect To Return

Respondents were asked Q37, “After how many days would you expect to be able to return to your home?” **It’s clear that most expect to be able to return within three days.** There are no significant county differences.



**Figure 3.31**

If the area was impacted by a major hurricane, these are unrealistic return expectations.

## 4 DISCUSSION OF RESULTS

This study captures the knowledge, attitudes, and intentions of a random sample of coastal Mississippians in response to the threat of a hurricane. The information it provides is intended to guide evacuation planning by emergency management and transportation officials. The random sample was chosen to represent households in three counties: Hancock, Harrison and Jackson. The survey was conducted via both landline and cellular telephones. A summary of some of the main findings and their implications follows. As there are only slight differences among these three counties, most of the results are discussed for the entire sample of coastal Mississippi.

### 4.1 CONCERN ABOUT HURRICANES AND HOME SAFETY

The findings of this survey are positive regarding the extent to which coastal Mississippians are concerned about hurricanes. The good news is that over 80% in all three counties is either very concerned or somewhat concerned. On the flip side this means that about 15%-20% are not

concerned, rather surprising given the extent to which the area has been impacted in the past. The general concern about hurricanes is relatively stable across all evacuation zones.

More people are concerned about wind damage than about flooding. In all three counties more than three-quarters are concerned about wind, about one third are concerned about flooding from surge, and slightly fewer are concerned about flooding from heavy rain. The county differences are small but people from Hancock County are more likely to be very concerned about wind damage and those from Jackson County slightly more likely to be concerned about flooding.

An alarming finding is the 17% of mobile home residents say it is not likely that their home will be damaged by hurricane winds.

Women respondents are more likely to be concerned. This is consistent with research findings that women are more likely to be concerned about risk (Phillips and Morrow 2008).

About one-third of the population believes it lives in an area that might be impacted by storm surge. Yet, according to the location of most respondents relative to the surge zones, far more could have their homes impacted by surge from a major storm. Nearly one-quarter of those located in Category 1 or 2 surge zones are not concerned about surge. Even after the Katrina surge event there still seems to be insufficient concern about storm surge. A lack of understanding of surge risk, and how it is not always directly correlated with the wind, has led the National Weather Service to separate surge from the Saffir-Simpson scale. They are searching for ways to better explain and communicate surge risk.

## **4.2 EVACUATION DECISIONS**

All three of these coastal Mississippi counties have surge zones, as well as evacuation zones. These are used by officials to determine who needs to evacuate and when. From this study it is clear that many residents, in some cases most, are not aware of their zone status.

Most respondents get their forecasts from local television. Radio was a distant second. However, it is important to note the growing numbers that are using newer media such as the Internet and cell phones, if not as a primary source, as a secondary one. The vast majority of these residents have computers and cell phones. In over half the sample there was a smart phone in the household. Rates are high even among lower income and elderly households. This coincides with the findings of recent research related to the prevalence of these technologies even among the most vulnerable households (Kiefer et al. 2008). At the same time an important segment of the population continues to rely on radio.

It is important to note that the majority says it will consult with family and friends before deciding whether to leave. Harrison County has a cell phone alert system and 11% of its residents reported having enrolled in it.

The most important part of this survey for planning purposes dealt with evacuation intent. There is a huge difference in evacuation intent based on level of storm. While around 15% say they will

very likely leave for Category 1 or 2 storms, the rate jumps to nearly 60% for Category 3 or higher hurricanes. Another huge factor is whether the evacuation is voluntary or mandatory. If voluntary about 30% state it is very likely they will leave, but the rate jumps to about 75% if a mandatory evacuation is called. Clearly, most people will leave for a major hurricane IF ordered. The situation for a less severe storm, or for a voluntary evacuation, is more mixed.

When examined across zones, the likelihood of evacuation for a Category 1 or 2 storm does not vary much. There's slightly more variability for Category 3 or higher hurricanes with nearly 75% in Zone 1 saying they will leave. Yet many, even those living in the most vulnerable surge zone, say they will not leave. This is particularly true for a Category 1 or 2 storm. Another important point is that between 40-45% who live outside evacuation zones say they will also leave. Many respondents living in areas where evacuation for storm surge is not required say they will evacuate anyway. This indicates a potentially large shadow evacuation population.

These evacuation rates are comparable to those reported in the 2001 Behavioral Study. About 60% of the respondents reported having evacuated for Hurricane Georges, and more say they are watching the storm and if it had posed a greater threat, they would have left. Of those in the High Risk Zone who did not leave, 38% say they would the next time. In fact between 75% and 80% say they will leave for a Category 3 or higher storm. The compliance rates are very high among those who had heard the mandatory evacuation order for Georges. However, very few reported hearing it.

Certain households are more likely to leave. These include households with young children, African American households and renters. This is consistent with findings on other surveys.

It is significant that the main reason given by the evacuees for leaving is concern about the safety of family members. Similarly, the next most common answer is that they do not feel their home will be safe in a hurricane. Other studies report similar findings (Morrow and Gladwin 2009; Whitehead et al. 2000). As might be expected, the main reason given by those who say they will NOT leave is that they think their home is safe. A distant second reason for not intending to evacuate is traffic concerns.

It is important to note that there is a difference between evacuation intent and actual evacuation. Making evacuation decisions at the individual or household level has been shown to be a complex process (Gladwin, Gladwin and Peacock 2001). Typically, fewer people evacuate when the time comes than say they will. This holds particularly true among those with limited hurricane experience and for minor storms (Dash and Gladwin 2007). With experience the decision gets well established, and this is likely the case for coastal Mississippians. People in the Florida Keys, for example, often have to evacuate. They tend to be pretty well set as either evacuees or non-evacuees. Their behavior becomes easier to predict.

Coastal Mississippi has been impacted by several hurricanes in recent years, the most devastating being Hurricane Katrina that killed at least 238 people when it came onshore. The region was also impacted, by lesser degrees, by Hurricane Ivan in 2004 and Hurricane Georges in 1998. Most of the respondents in all three counties have evacuated at least once. Since past evacuation has been found to be a good predictor of future evacuation, this is a positive finding in terms of

getting people out of harms way (FEMA and USACE 2009; Dash and Gladwin 2007)<sup>4</sup>. The caveat is that many of them likely would not have to leave in order to be safe. It appears that hurricane experience has influenced a large segment of the population outside evacuation zones to leave, portending a significant shadow evacuation.

### **4.3 EVACUATION CONDITIONS**

An average of 2.6 persons per evacuating household was reported, and they will take an average of 1.5 vehicles per household. The number for vehicles compares with data taken after Hurricanes Lili, Katrina, and Rita when an average of 1.6 vehicles were taken per household (Lindell and Prater 2009). A small minority will take other vehicles such as trailers, campers and boats. About 4% will need public transportation in order to evacuate. This number contrasts with a recent Florida study where 6% say they will need assistance during evacuation (Baker 2009). Of those households that plan to evacuate, about 16% say they will leave someone behind, usually to be there for a specific purpose such as protecting the structure or because of job demands. This rate is considerably higher than usually found on hurricane behavioral studies. Two-thirds of these households have pets, and most will take them with them if they evacuate.

Most say they can be ready to go in less than a day, but if a storm is predicted to make landfall in three days, they will leave tomorrow. Most say that assisting others outside the household will affect how quickly they can be ready to leave.

Only 3% of the total sample reported intentions to go to a public shelter. This is considerably lower than usually reported. In recent studies in Alabama and in Virginia the expressed shelter needs are 10% and 11% respectively (FEMA and USACE 2009; Morrow and Gladwin 2009). However, post-storm studies of actual shelter use typically fall somewhere between 3% and 5% (Lindell and Prater 2008; FEMA and USACE 2005). This may be another case where recent hurricane experience results in better congruence between intent and behavior. The preferred place of refuge for most was the home of friends and families. Most will travel less than 200 miles and about one-third plan to travel less than 100 miles. About one-third will stay in Mississippi.

Based on this behavioral study it appears that coastal Mississippians are concerned about hurricanes and intend to evacuate for a major storm, especially if it is mandated. In fact there will likely be large numbers of people leaving who probably should stay in their homes or at least shelter in the area. Shadow evacuation could be a problem. Another concern is that a great deal of attention appears to be paid to the category of the storm. Many who should evacuate do not plan to leave for Category 1 or 2 storms, including those living in surge zones. Many do not know their evacuation or surge zone status. In summary these findings suggest that there could be considerable confusion when the next hurricane threatens the area and many may stay who should leave, while many who could safely stay may evacuate the area.

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<sup>4</sup> The cited references are not intended to cover the relevant literature, but rather to provide examples.

## 5 IMPLICATIONS AND RECOMMENDATIONS

This survey provides considerable information about the attitudes and intended behavior of a sample of coastal Mississippians in response to the threat of a hurricane. The research methodology supports generalizing the results to the total population of each targeted county. The cell phone sample supplements the landline sample by providing responses from a slightly different, and younger, population. The spatial analysis provides valuable information not only about what respondents say but where they are located—making it especially useful for planning purposes.

Survey results support several actions:

- Launch outreach campaigns to educate citizens about their evacuation and/or surge zone status, including providing this information on county websites.
- Increase the use of new technologies, such as the Internet and cell phones, in evacuation planning and warning communications;
- Develop risk communication initiatives to better acquaint citizens about the dangers of surge and inland flooding from even minor hurricanes;
- Promote mitigation and preparation initiatives to increase safety and security and thus decrease unnecessary evacuation among African American households, lower income households and renters.
- Develop public information campaigns to urge citizens outside surge zones to shelter in place or in the area;
- Increase publicity for cell phone alerts where they are available;
- Target women and children as leaders in educational campaigns to promote appropriate response;
- Address citizen concerns about traffic problems during evacuation.

These initiatives imply a multi-pronged approach to provide relevant information to targeted groups through educational and outreach programs that help the citizens of coastal Mississippi understand their risk, especially related to surge, and that promote responsible evacuation decisions.

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## APPENDIX A: PRINCIPAL RESEARCHERS

**Dr. Betty Hearn Morrow** is Professor Emeritus at Florida International University and former Director of the Laboratory for Social and Behavioral Research at the International Hurricane Research Center. Her research focus on the effects of human and social factors on the ability of individuals, families, and communities to respond to hazards is reflected in her contribution to *Human Links to Coastal Disasters*, published by the Heinz Center for Science, Economics, and the Environment. She is co-editor of *The Gendered Terrain of Disaster* and, more recently, co-editor of *Women and Disasters*. She was part of a team of social scientists who analyzed the effects of Hurricane Andrew on South Florida funded by the National Science Foundation (NSF) and resulting in the co-authored book, *Hurricane Andrew: Ethnicity, Gender and the Sociology of Disaster*. She was the 2003 recipient of the Mary Fran Myers Award from the Gender and Disaster Network. Retired from academia, Morrow continues an active research agenda as a consulting sociologist, primarily focusing on issues related to warning messages, evacuation, social vulnerability and community resilience. Recent projects include *Examining the Hurricane Warning System* (NSF-funded through National Center for Atmospheric Research), *Providing Access to Resilience-Enhancing Technologies* (Oak Ridge Associated Universities), *Risk Behavior and Resilience Communication* (NOAA Coastal Services Center), *Alabama Hurricane Evacuation Project* (Dewberry & Davis), *Post Storm Assessment Hurricanes Gustav and Ike for Alabama and Mississippi* (Dewberry & Davis), and *Building Resilience in Diverse Communities* (RTI International for Department of Homeland Security Center for Faith-Based and Community Initiatives).

**Dr. Hugh Gladwin** is the director of the Institute for Public Opinion Research (School of Environment and Society) and Associate Professor in the Department of Global & Sociocultural Studies (joint anthropology/geography/sociology) at Florida International University. His major area of research is the application of survey research and GIS tools to understand large urban settings of high cultural and demographic diversity. Within that framework, a particular interest is to better model the interactions between the human population and natural systems such as the South Florida ecosystem and natural events like hurricanes and climate change. For this latter area, integrating human decision models with GIS is a major focus. He is a co-editor (with Walter Gillis Peacock and Betty Hearn Morrow) and contributor to the book *Hurricane Andrew: Ethnicity, Gender, and the Sociology of Disaster* and author of numerous publications and presentations on disaster mitigation, public health, and public opinion. He is a research scientist in Florida Coastal Everglades Long-term Ecological Research project (FCE-LTER) and the Mexico/US LTER Hurricane Research network. In Miami-Dade County Gladwin serves as a member of the Steering Committee of the Local Mitigation Strategy and was appointed by the County Commission to be on the Climate Change Advisory Task Force. (<http://www.miamidade.gov/derm/climatechange/taskforce.asp>).

## APPENDIX B: QUESTIONNAIRE

### Behavioral Study Protocol. Coastal Mississippi Hurricane Survey - May 2011 OMB Control #0710-0001

[Q1] Hello, I'm \_\_\_\_\_ and I'm calling on behalf of the Federal Emergency Management Agency. We have some questions that will help local, state and federal officials plan for your safety during hurricanes. It will take no more than a short time and your answers will be confidential. We are interviewing Mississippi residents 18 years and older. Participation is completely voluntary. May I ask you these questions?

- 1 YES
- 2 NO

[Q2] Your personal answers will be kept completely confidential and will not be shared with anyone outside the study. This interview may be monitored for quality control purposes. If you have any questions please stop me and ask. Let's begin!

- 1 CONTINUE
- 2 STOP

[Q3] To what extent are you concerned about the threat of a hurricane? Are you very concerned, somewhat concerned, or not concerned?

- 1 VERY CONCERNED
- 2 SOMEWHAT CONCERNED
- 3 NOT CONCERNED
- 4 DON'T KNOW
- 5 NO RESPONSE

[Q4] How likely is it that your home would ever be seriously damaged or destroyed by the winds of a hurricane or damaged by trees blown down by hurricane winds? Is it very likely, somewhat likely, or not very likely?

- 1 VERY LIKELY
- 2 SOMEWHAT LIKELY
- 3 NOT VERY LIKELY
- 4 DON'T KNOW
- 5 NO RESPONSE

[Q5] How likely do you think it is that your home would ever be flooded as a result of hurricane storm surge? Is it very likely, somewhat likely, or not very likely?

- 1 VERY LIKELY
- 2 SOMEWHAT LIKELY
- 3 NOT VERY LIKELY
- 4 DON'T KNOW
- 5 NO RESPONSE

[Q6] How likely do you think it is that your home would ever be flooded as a result of heavy rain from a hurricane? Is it very likely, somewhat likely, or not very likely?

- 1 VERY LIKELY
- 2 SOMEWHAT LIKELY
- 3 NOT VERY LIKELY
- 4 DON'T KNOW
- 5 NO RESPONSE

[Q7] If a Category 3 or above hurricane, a major hurricane, was threatening your community, how likely is it that you would leave your home? Is it very likely, somewhat likely, or not very likely that you would leave?

- 1 VERY LIKELY
- 2 SOMEWHAT LIKELY
- 3 NOT VERY LIKELY
- 4 DON'T KNOW
- 5 NO RESPONSE

[Q8] What about for a Category 1 or 2, a lower category hurricane, how likely is it that you would leave your home? Is it very likely, somewhat likely, or not very likely that you would leave?

- 1 VERY LIKELY
- 2 SOMEWHAT LIKELY
- 3 NOT VERY LIKELY
- 4 DON'T KNOW
- 5 NO RESPONSE

[Q9] If government officials issue a mandatory evacuation order for your area for a hurricane, how likely is it that you would leave your home? Is it very likely, somewhat likely, or not very likely?

- 1 VERY LIKELY
- 2 SOMEWHAT LIKELY
- 3 NOT VERY LIKELY
- 4 DON'T KNOW
- 5 NO RESPONSE

[Q10] If an evacuation was voluntary but not mandatory, for your specific area, how likely is it that you would leave your home? Is it very likely, somewhat likely, or not very likely?

- 1 VERY LIKELY
- 2 SOMEWHAT LIKELY
- 3 NOT VERY LIKELY
- 4 DON'T KNOW
- 5 NO RESPONSE

[Q11] Has your household or family talked about where you would go if you had to evacuate your home for a hurricane?

- 1 YES
- 2 NO
- 3 DON'T KNOW

4 NO RESPONSE

[Q12] Would you consult with anyone outside of your household before making your decision about evacuation?

- 1 YES [ASK NEXT]
- 2 NO [SKIP TO Q14]
- 3 DON'T KNOW [SKIP TO Q14]
- 4 NO RESPONSE [SKIP TO Q14]

[Q13] Who would that be? [INTERVIEWER: IF THEY SAY FAMILY OR FRIENDS, ASK: "Would that person be located inside or outside the county?"]

[Open-End] [Multiple Response]

- 1 RELATIVES OR FRIENDS IN THE AREA
- 2 RELATIVES OR FRIENDS OUTSIDE THE AREA
- 3 EMPLOYER
- 4 LOCAL AUTHORITIES
- 5 OTHER, SPECIFY
- 6 DON'T KNOW/NO RESPONSE

[Q14] Would assisting others outside your household affect how quickly you would be able to leave?

- 1 YES
- 2 NO
- 3 DON'T KNOW
- 4 NO RESPONSE

[Q15] Please tell me the most important reasons that could make you feel you would have to evacuate your home for a hurricane. [INTERVIEWER: CHECK ALL THAT MATCH; IF YOU ARE NOT SURE WRITE ANSWER IN "OTHER, SPECIFY" CATEGORY]

[Open-End] [Multiple Response]

- 1 HOUSE OR BUILDING WOULD NOT BE SAFE FROM WIND OR FLOOD IN HURRICANE
- 2 PERSONAL SAFETY OF HOUSEHOLD MEMBERS
- 3 HAVE HOUSEHOLD MEMBERS WITH HEALTH CONCERNS OR MEDICAL NEEDS
- 4 HAVE CHILDREN OR ELDERLY TO PROTECT
- 5 WOULD NOT WANT TO BE HERE AFTER THE STORM
- 6 CARE FOR PETS OR ANIMALS
- 7 WOULD NEVER EVACUATE NO MATTER WHAT
- 8 OTHER, SPECIFY
- 9 DON'T KNOW/NO RESPONSE

[Q16] [ASK IF Q15=1] Why would your home not be safe in a hurricane? [INTERVIEWER: CHECK ALL THAT MATCH; IF YOU ARE NOT SURE WRITE ANSWER IN "OTHER, SPECIFY" CATEGORY]

[Open-End] [Multiple Response]

- 1 STORM SURGE/FLOODING
- 2 WIND DAMAGE, MOBILE HOME OR WEAK CONSTRUCTION
- 3 WIND DAMAGE, NO SHUTTERS OR OTHER PROTECTION
- 4 WIND DAMAGE, IN GENERAL
- 5 OTHER, SPECIFY
- 6 DON'T KNOW/NO RESPONSE

[Q17] [ASK IF Q15=3] What are the health concerns or medical needs of a person in your household that would be a reason to evacuate [INTERVIEWER: CHECK ALL THAT MATCH; IF YOU ARE NOT SURE WRITE ANSWER IN "OTHER, SPECIFY" CATEGORY]

[Open-End] [Multiple Response]

- 1 NEED OXYGEN
- 2 NEED MEDICINES OR MEDICAL PROCEDURES
- 3 NEED ELECTRICALY POWERED DEVICES
- 4 HAVE PHYSICAL HANDICAP
- 5 OTHER, SPECIFY
- 6 DON'T KNOW/NO RESPONSE

[Q18] Please tell me the most important reasons that might make you think evacuating for a hurricane would NOT be a good idea. [INTERVIEWER: CHECK ALL THAT MATCH; IF YOU ARE NOT SURE WRITE ANSWER IN "OTHER, SPECIFY" CATEGORY]

[Open-End] [Multiple Response]

- 1 HOME IS SAFE
- 2 HURRICANE USUALLY GOES SOMEWHERE ELSE
- 3 STAY TO PROTECT HOME FROM LOOTING
- 4 STAY TO PROTECT HOME FROM STORM EFFECTS
- 5 NO MONEY/RESOURCES TO LEAVE
- 6 NO PLACE TO GO
- 7 HEALTH OR AGE REASON
- 8 PETS OR ANIMALS
- 9 STAY WITH OTHER PERSON IN HOUSEHOLD NOT LEAVING
- 10 STAY WITH PERSON OUTSIDE HOUSEHOLD NOT LEAVING
- 11 TRAFFIC CONCERNS
- 12 HAVE JOB REQUIREMENT TO BE IN AREA DURING STORM
- 13 OTHER, SPECIFY
- 14 DON'T KNOW/NO RESPONSE

[Q19] Is your home located in an official evacuation zone?

- 1 YES
- 2 NO
- 3 NOT SURE
- 4 DO NOT KNOW
- 5 NO RESPONSE

[Q20] If you HAD to evacuate your home, would you likely seek shelter inside your county or would you go outside your county?

1. INSIDE THE COUNTY
2. OUTSIDE THE COUNTY
3. NOT SURE
4. NO RESPONSE

[Q21] If you HAD to evacuate outside of your county, where would you MOST likely go? Would you go to the home of a relative or friend, another property you own, a public shelter, a hotel, or someplace else? [INTERVIEWER, IF RESPONDENT SAYS "WOULD NOT EVACUATE FOR A HURRICANE SAY: "this question is about a situation where for some serious reason you HAVE to evacuate"]

- 1 HOME OF A RELATIVE OR FRIEND
- 2 ANOTHER PROPERTY YOU OWN
- 3 CAMPGROUND
- 4 PUBLIC SHELTER [ASK 21A]
- 5 HOTEL
- 6 SOMEPLACE ELSE OR OTHER, SPECIFY
- 7 DON'T KNOW
- 8 NO RESPONSE

[Q21A] If PUBLIC SHELTER, would anyone in your household have functional needs, such as oxygen, or disabilities that might require extra assistance in a public shelter?

- 1 NO
- 2 YES. Describe \_\_\_\_\_

[Q22] If you HAD to evacuate for a hurricane, would you need public transportation or government transportation assistance?

- 1 YES [ASK NEXT FOR HARRISON AND HANCOCK COUNTIES]]
- 2 NO [SKIP TO Q24]
- 3 DON'T KNOW [SKIP TO Q24]
- 4 NO RESPONSE [SKIP TO Q24]

[Q23] [HARRISON AND HANCOCK COUNTIES ONLY] If yes, have you registered for government transportation assistance?

- 1 YES
- 2 NO
- 3 DON'T KNOW
- 4 NO RESPONSE

[Note: Interviewers will have the phone numbers to offer Harrison and Hancock respondents.]

[Q24] If you had to evacuate, how long would it take for you and your household to get ready to leave? Would it take less than one day, one day, two days or three days or more?

- 1 LESS THAN ONE DAY
- 2 ONE DAY
- 3 TWO DAYS
- 4 THREE DAYS OR MORE

- 5 DON'T KNOW
- 6 NO RESPONSE

[Q25] If a hurricane is predicted to impact your area three days from now and you decided to evacuate, would you leave today, tomorrow or two days from now?

- 1 TODAY
- 2 TOMORROW
- 3 TWO DAYS FROM NOW
- 4 DON'T KNOW
- 5. SAYS WILL NOT LEAVE
- 6 NO RESPONSE

[Q26] If you felt it necessary to evacuate for a hurricane, how far do you think you would probably go? Do you think you would need to go less than 10 miles, 10 to 50 miles, 50 to 100 miles, 100 to 200 miles or more than 200 miles?

- 1 LESS THAN 10 MILES
- 2 10-50
- 3 50-100
- 4 100-200
- 5 MORE THAN 200 MILES
- 6 OTHER, SPECIFY
- 7 DON'T KNOW
- 8 NO RESPONSE

[Q27] What is the city or county and state where you would most likely go when you evacuate? [INTERVIEWER, IF ANSWER DOES NOT SPECIFY A CITY OR COUNTY ASK: "Do you know what city or county that would be in or near?"]

[Open-End] [Multiple Response]

- |                    |                     |
|--------------------|---------------------|
| 1. HATTIESBURG, MS | 8. KNOXVILLE, TN    |
| 2. JACKSON, MS     | 9. LITTLE ROCK, AR  |
| 3. MERIDIAN, MS    | 10. DALLAS, TX      |
| 4. VICKSBURG, MS   | 11. TALLAHASSEE, FL |
| 5. MEMPHIS, TN     | 12. OTHER,          |
| 6. ATLANTA, GA     | SPECIFY _____       |
| 7. CHATTANOOGA, TN |                     |

[Q28] If it became necessary for you to evacuate, what is the main road you would take leaving your neighborhood? [Open-End]

- |                                    |                    |
|------------------------------------|--------------------|
| 1. 604/607 (SHUTTLE PARKWAY)       | 5. 57              |
| 2. 43/603 (NICHOLSON AVENUE)       | 6. 611/613         |
| 3. US 49 (25 <sup>TH</sup> AVENUE) | 7. OTHER. SPECIFY: |
| 4. I-110                           |                    |

[Q29] If you have to leave your city or county to evacuate, what is the main highway or highways you would take once you got out of your city or county? [Multiple Response]

[Open-End]

- |                |                |
|----------------|----------------|
| 1. I-59        | 6. US 90 WEST  |
| 2. US 49       | 7. US 90 EAST  |
| 3. MS 63/US 98 | 8. OTHER       |
| 4. I-10 (W)    | :SPECIFY _____ |
| 5. I-10 (E)    |                |

[Q30] How many people from your household would leave? [ENTER NUMBER, ENTER 88 FOR DON'T KNOW, 99 FOR NO RESPONSE]

[numeric, range: 0-99]

[Q31] Is there anyone living in your household who would probably stay in the area even if other people are leaving?

- 1 YES [ASK NEXT]
- 2 NO [SKIP TO Q33]
- 3 DON'T KNOW [SKIP TO Q33]
- 4 NO RESPONSE [SKIP TO Q33]

[Q32] What is the reason they would stay?

- 1 EMERGENCY OFFICIAL
- 2 MILITARY
- 3 HAVE OTHER JOB REQUIRING STAY DURING HURRICANE
- 4 STAY TO PROTECT HOME AFTER STORM
- 5 WOULD NEVER EVACUATE
- 6 OTHER, SPECIFY
- 7 DON'T KNOW
- 8 NO RESPONSE

[Q33] How many cars would your household take in the evacuation? [ENTER NUMBER, ENTER 88: DON'T KNOW; 99 FOR NO RESPONSE; PUT ZERO IF THEY DON'T HAVE A CAR]

[numeric, range: 0-99]

[Q34] Are there any other kinds of vehicles you would likely take, such as recreational vehicles, trailers or other vehicles?

- 1 YES [ASK NEXT]
- 2 NO [SKIP TO 35]
- 3 DON'T KNOW [SKIP TO 35]
- 4 NO RESPONSE [SKIP TO 35]

[Q35][Ask if Q34=1] What type and how many other vehicles? [MARK ALL THAT APPLY]

- 1 Boat. Give number.
- 2. Trailer. Give number
- 3. Recreational Vehicle. Give number

4. Other: Specify:

[Q36] If you have a family pet or pets what would you do with them if you had to evacuate? Would you leave them at home, take them to a boarding place, leave them with family or friends, take them with you, or don't you have any pets?

- 1 LEAVE THEM AT HOME
- 2 TAKE THEM TO A BOARDING PLACE
- 3 LEAVE THEM WITH FAMILY OR FRIENDS
- 4 TAKE THEM WITH YOU
- 5 DON'T HAVE ANY PETS
- 6 DON'T KNOW
- 7 NO RESPONSE

[Q37] After how many days from when you evacuated would you expect to be able to return to your home? [INTERVIEWER, IF RESPONDENT SAYS "as soon as possible", ASK: "Realistically, how many days do you think that would be? [88 = DON'T KNOW; 99 = NO RESPONSE]

[numeric, range: 0-99]

[Q38] If a hurricane was threatening your area, where would you get MOST of your information?

- 1 LOCAL TV NEWS
- 2 WEATHER CHANNEL
3. NATIONAL TV SUCH AS CNN OR FOX
- 4 INTERNET [IF YES, GO TO 38A]
- 5 LOCAL RADIO
- 6 NOAA WEATHER RADIO
- 7 FRIENDS OR FAMILY
- 8 OTHER, SPECIFY
- 9 DON'T KNOW
- 10 NO RESPONSE

[38A] [ASK ONLY IF ANSWERED 4 ON Q38]

What Internet sites would you likely go to for hurricane information? [MARK ALL THAT APPLY.]

1. LOCAL TV STATION WEBSITE
2. NATIONAL TV NEWS WEBSITE
3. NATIONAL HURRICANE CENTER WEBSITE
4. NATIONAL WEATHER SERVICE WEBSITE
5. WEATHER CHANNEL WEBSITE
6. OTHER WEATHER WEBSITE WEBSITE
6. LOCAL EMERGENCY MANAGEMENT WEBSITE
7. OTHER WEBSITE: SPECIFY
8. DON'T KNOW
9. NO RESPONSE

[Q39] Do you have access to the Internet from your home?

- 1 YES
- 2 NO
- 3 DON'T KNOW
- 4 NO RESPONSE

[39A] Do you have access to the Internet from a mobile device such as your phone?

- 1 YES
- 2 NO
- 3 DO NOT HAVE A CELL PHONE
- 4 DON'T KNOW
- 5 NO RESPONSE

[Q40] [Ask for Harrison County only.] If you have a cell phone, have you registered it with any government alert or notification service such as Reverse 911?

- 1 YES
- 2 NO
- 3 DO NOT HAVE A CELL PHONE
- 4 DON'T KNOW
- 5 NO RESPONSE

[Note: Interviewers will have the phone number for Harrison County.]

[Q41] Were you living in the area where you are now for Hurricane Ivan?

- 1 YES
- 2 NO [SKIP TO Q43]
- 3 DON'T KNOW [SKIP TO Q43]
- 4 NO RESPONSE [SKIP TO Q43]

[Q42] [IF Q41=1] Did you evacuate for Hurricane Ivan in 2004?

- 1 YES
- 2 NO
- 3 DON'T KNOW
- 4 NO RESPONSE

[Q43] Were you living in the area where you are now for Hurricane Katrina in 2005?

- 1 YES [ASK Q44-Q47]
- 2 NO [SKIP TO Q48]
- 3 DON'T KNOW [SKIP TO Q45]
- 4 NO RESPONSE [SKIP TO Q45]

[Q44] [If Q43=1]. Did you evacuate for Hurricane Katrina?

- 1 YES
- 2 NO [SKIP to Q47]
- 3 DON'T KNOW
- 4 NO RESPONSE

[Q45] [If Q43=1] How did you experience with Hurricane Ivan affect what you did for Katrina?  
[Open-End][INTERVIEWER DOES NOT READ RESPONSES]

1. HAD NO EFFECT
2. TRAFFIC PROBLEMS FOR IVAN MADE ME DECIDE NOT TO EVACUATE FOR KATRINA
3. TRAFFIC PROBLEMS DURING IVAN MADE ME EVACUATE EARLIER FOR KATRINA
4. DID NOT EVACUATE FOR IVAN; REALIZED IT WAS A MISTAKE SO EVACUATED FOR KATRINA
5. DID EVACUATE FOR IVAN, REALIZED IT WAS NOT NECESSARY, SO DID NOT EVACUATE FOR KATRINA
6. OTHER, SPECIFY:
7. NO RESPONSE

[Q46] Where did you go when you evacuated for Katrina? Did you go to the home of a relative or friend, another property you own, a public shelter, a hotel, or someplace else?

- 1 HOME OF A RELATIVE OR FRIEND
- 2 ANOTHER PROPERTY YOU OWN
- 3 PUBLIC SHELTER
- 4 HOTEL
- 5 SOMEPLACE ELSE OR OTHER, SPECIFY
- 6 DON'T KNOW
- 7 NO RESPONSE

[Q47] What happened to you and your home as a result of Katrina?  
[Open-End]

[Q48] We're almost done! I just have a few general background questions and we will be finished! Do you live in a single family home, a duplex, a condominium, an apartment, a mobile home, or someplace else?

- 1 SINGLE FAMILY HOME
- 2 DUPLEX
- 3 CONDOMINIUM
- 4 APARTMENT
- 5 MOBILE HOME
- 6 OTHER, SPECIFY
- 7 DON'T KNOW
- 8 NO RESPONSE

[Q49] Do you -- or your family -- own your home or apartment or do you rent?

- 1 OWN
- 2 RENT
- 3 OTHER, SPECIFY
- 4 DON'T KNOW

5 NO RESPONSE

[Q50] May I ask how old you are? [INTERVIEWER ENTER THE ACTUAL AGE, DON'T KNOW/REFUSED = 999]  
[numeric, range: 0-999]

[Q51] How long have you lived in the part of Mississippi where you live now? [INTERVIEWER TYPE NUMBER OF YEARS; 1 = ONE YEAR OR LESS, 999 = NO RESPONSE]  
[numeric, range: 0-999]

[Q52] Including yourself, how many people live in your household? [INTERVIEWER ENTER THE ACTUAL NUMBER, DON'T KNOW/REFUSED = 99, IF ONLY ONE PERSON LIVING IN HOUSEHOLD = 1] [PROGRAMMER USE STANDARD SKIP CODING FOR Q49-Q53]  
[numeric, range: 0-99]

[Q53] How many of the people living in your household are under 12 years old? [INTERVIEWER ENTER THE ACTUAL NUMBER, DON'T KNOW/REFUSED = 99]  
[numeric, range: 0-99]

[Q54] How many people living in your household are 12 to 18 years old? [INTERVIEWER ENTER THE ACTUAL NUMBER, DON'T KNOW/REFUSED = 99] [INTERVIEWER IF ONLY ONE PERSON LIVING IN HOUSEHOLD & AGE = 18 PLEASE ENTER 1]  
[numeric, range: 0-99]

[Q55] How many people living in your household are 19 to 64 years old? [INTERVIEWER ENTER THE ACTUAL NUMBER, DON'T KNOW/REFUSED = 99] [INTERVIEWER IF ONLY ONE PERSON LIVING IN HOUSEHOLD & AGE BETWEEN 19 TO 64 PLEASE ENTER 1]  
[numeric, range: 0-99]

[Q56] And how many people living in your household are 65 OR OLDER? [INTERVIEWER ENTER THE ACTUAL NUMBER, DON'T KNOW/REFUSED = 99] [INTERVIEWER IF ONLY ONE PERSON LIVING IN HOUSEHOLD & AGE >= 65 PLEASE ENTER 1]  
[numeric, range: 0-99]

[Q57] What is your marital status?  
1 SINGLE  
2 MARRIED  
3 OTHER, SPECIFY  
4 DON'T KNOW  
5 NO RESPONSE

[Q58] What is your zip code? [INTERVIEWER ENTER THE ACTUAL NUMBER, DON'T KNOW/REFUSED = 99999]  
[numeric, range: 99999]

[Q59] What is the highest level of education you've completed?

- 1 GRADE SCHOOL
- 2 SOME HIGH SCHOOL
- 3 HIGH SCHOOL GRAD
4. VOCATIONAL OR TECHNICAL SCHOOL
5. COMMUNITY COLLEGE OR SOME COLLEGE
6. COLLEGE GRADUATE
7. GRADUATE DEGREE
8. DON'T KNOW
9. NO RESPONSE

[Q60] Do you consider your ethnicity to be:

- 1 HISPANIC
- 2 NON-HISPANIC
- 3 DON'T KNOW
- 4 NO RESPONSE

[Q61] What is your race? You may give multiple answers.

- 1 WHITE
- 2 BLACK OR AFRICAN AMERICAN
- 3 NATIVE HAWAIIAN OR OTHER PACIFIC ISLANDER
- 4 OTHER
- 5 DON'T KNOW
- 6 NO RESPONSE

[Q62] Approximately, what is your annual household income -- is it...?

- 1 \$10,000 or less
- 2 \$10,001 - \$20,000
- 3 \$20,001 - \$30,000
- 4 \$30,001 - \$50,000
- 5 \$50,001 - \$80,000
- 6 OVER \$80,000
- 7 DON'T KNOW/NO RESPONSE

[Q63] Well, that concludes the interview. I'd like to thank you for taking the time to complete it. Do you have any comments that you would like me to write down on what we have discussed in this survey?

- 1 YES
- 2 NO
- 3 DON'T KNOW/NO RESPONSE

[Q64] WRITE COMMENTS IF ANY

[Q65] [INTERVIEWER PLEASE ENTER THE GENDER OF THE RESPONDENT, ASK ONLY IF SEEMS NECESSARY]

- 1 MALE
- 2 FEMALE