

BARRIERS TO ACCESSING NATURAL DISASTER INFORMATION BY
UNDOCUMENTED IMMIGRANTS

THESIS

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CHAPTER I

INTRODUCTION

Methods of disseminating accurate and reliable information prior to, during, and after a natural disaster are important adjuncts to the reactions and behaviors of impacted populations toward disaster response and relief. Ethnically diverse populations can face even greater challenges due to different cultural and linguistic needs. Many federal and state agencies have developed comprehensive strategies specifically tailored to meet the needs of minority communities. Much has been done to address low-income citizens' needs in times of disaster, for example providing transportation for evacuation, temporary shelters, and even financial assistance. However, undocumented Hispanic immigrants to the United States comprise a minority population group that has not been specifically accounted for in disaster-preparation efforts and there is little information about how they respond to disasters in the United States. Because of their legal status, the actual number of undocumented immigrants in a particular geographic area is difficult to calculate, therefore emergency management planners may not account for everybody. Although efforts (like the decennial U.S. census) are trying to count everyone, most undocumented immigrants avoid detection (Passel *et al.* 1984).

Undocumented immigrants face not only economic barriers, but also barriers that prevent them from reacting like the rest of the population does in emergency situations. Because of their legal status, they are disadvantaged when preparing for the onset of

disaster, for evacuation, when looking for response and recovery resources, and during the post-disaster period.

This research examines the barriers to communication about hazards encountered by undocumented Hispanic immigrants. They may share the barriers that other minority groups experience (regardless of their financial circumstances) but additional barriers they face may be linked to their legal status and these can affect the accuracy and timing of the information they receive, disabling or delaying prudent responses. Some of the barriers I will explore relate to language, social networks, finances, access to economic assistance, and their perceptions of the risk of prosecution due to their undocumented status. These barriers will be analyzed to identify: 1) the mechanisms that affect the reception of hazard and emergency information by undocumented immigrants, 2) the degree to which legal status creates barriers to clear and accurate emergency information, and 3) other barriers to information because of their undocumented status.

CHAPTER II

BACKGROUND

Hurricane Ike Background

Galveston Island is a barrier island located approximately 50 miles to the southeast of Houston. The history of Galveston reflects extensive hurricane experience. The most devastating hurricane on record in the United States (in terms of its death toll) was the Hurricane of 1900, which killed 6,000 or more people. That storm prompted the construction (beginning in 1902) of a 17-foot-high seawall to protect the island's population. Since its completion in 1904, eight major hurricanes have come ashore at Galveston (the hurricane of 1915, the hurricane of 1943, Carla (1961), Fern (1971), Alicia (1983), Rita (2005), and Ike (2008)). Each storm impacted the seawall, but Ike left so little sand underneath the seawall that major reconstruction will need to take place. Hurricane Ike nearly eliminated all of the buildings on the shoreline; houses, businesses, hotels, and gas stations required a significant workforce in order to be returned to use. Galveston Island had become a tourist destination and had attracted wealthy residents (who built their houses near the beach) or a rather substantial working class to support tourism (tourist businesses, restaurants, and hotels).

Hurricane Ike Timeline

On Thursday, September 11, 2008, a mandatory evacuation was issued for thirteen zip codes along the coasts of Houston. The zip codes of 77541, 77550, 77551,

77554, 77650, 77058, 77059, 77062, 77520, 77546, 77571, 77586, and 77598 included the Friendswood, Clear Lake, Baytown, and La Porte areas. Later on the afternoon of September 11, Harris County Judge Ed Emmett declared a “state of disaster.” On Friday, September 12, there was a call for everyone to be off area roads by 6:30 p.m. A curfew was called on the afternoon of September 12, starting at 7:00 p.m. and affecting the designated evacuation zones (As noticed in *The Observer Newspaper* article on September 19, 2008).

Hurricane Ike made landfall at Galveston on Saturday, September 13, as a Category 2 hurricane. According to the National Hurricane Center wind speeds topped 100 miles per hour. The same afternoon people began to return to their houses, and clean up began around the area. Power was restored to some areas. By midnight Ike had weakened to a tropical storm and rain had tapered off and wind speed had diminished. By Sunday morning, the storm's center was in southeastern Oklahoma.

Purpose/Research Question

Although undocumented immigrants face the same barriers to access to information as any of the minorities groups in the United States regardless of their legal status, there are other barriers tied directly to their undocumented legal situation that prevent them from accessing disaster information as any other member of the society. The intention of this research is to find out if either the information that they received is of the same quality information that a legal American received or the way they perceive the information disseminated is the same as an legal American perceived. To do so, the barriers have been separated into five areas, some of them applicable to any citizen, for example numbers 1, 4, and 5, and some of them applicable only to undocumented

immigrants, for example numbers 2 and 3. The following areas are hypothesized as possible barriers:

1. *Family Situation*
2. *Language*
3. *Risk Perception*
4. *Economic/Financial Situation*
5. *Disaster Experience*

To accomplish this study undocumented immigrants in Galveston, Harris, Brazoria, and Chambers counties, Texas were interviewed. Texas has a standard list of counties in the Houston metropolitan area that should be evacuated, during hurricane-warning periods and its composition varies in accordance with the impending hurricane's magnitude. This list is created and maintained by the Harris County Homeland Security & Emergency Management Agency. The study area is confined to the zip codes of the above counties that were given "mandatory" evacuation orders during Hurricane Ike, which made landfall in Galveston on September 13, 2008 (Table 1, Figure 1).

Table 1. Zip Codes with Mandatory Evacuation Orders (Highlighted in Red).

Zip-Zone Coastal				
77541	77550	77551	77554	77617
77623	77650			
Zip-Zone A				
77510	77518	77531	77539	77563
77565	77566	77568	77573	77577
77586	77590	77591		
Zip-Zone B				
77058	77059	77062	77422	77507
77511	77515	77517	77520	77534
77546	77571	77598		
Zip-Zone C				
77011	77012	77013	77015	77017
77023	77029	77034	77049	77061
77075	77087	77089	77480	77486
77502	77503	77504	77505	77506
77521	77530	77536	77547	77562
77578	77581	77583	77584	77587

Courtesy: City of Houston

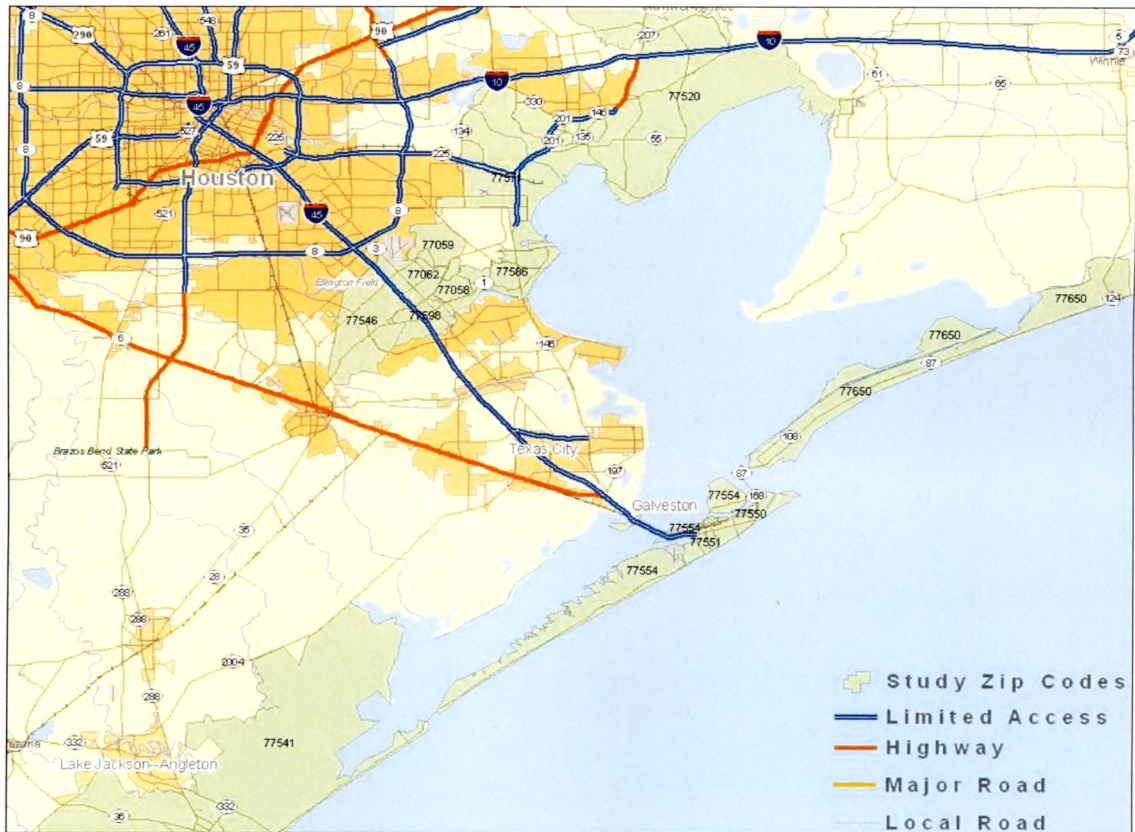


Figure 1. Map of the Study Area.

Thirteen zip code areas were selected (Fig. 1) and surveyed populations within the study area have been identified using snowball-sampling procedures. My research area focused on zones with the highest concentrations of Hispanics (Table 2). Based on that basic premise, I inquired about immigrants' access to risk information and the experiences related to evacuation prior to and during the storm. Surveys were designed to explore immigrants' experiences during Hurricane Ike.

Table 2. Zip Codes, County, Total Population, and Hispanic Percentage. Zip codes that were issued a mandatory evacuation with the city, county, total population, and the percentage of population classified as Hispanic.

Zip Code	City	County	Total Population	Hispanic Percentage of Population
77058	City of Houston	Harris	17,946	10.03
77059	City of Houston	Harris	18,361	5.50
77586	Seabrook	Harris	21,962	7.30
77062	City of Houston	Harris	28,494	8.80
77546	Friendswood	Galveston, Brazoria, Harris	33,350	11.60
77571	La Porte	Harris	38,430	17.38
77598	Webster	Harris	22,815	18.06
77520	Baytown	Chambers, Harris	42,634	40.13
77541	Freeport City	Brazoria	18,484	39.80
77554	Galveston City	Galveston	11,301	7.38
77550	Galveston City	Galveston	29,097	26.25
77650	Port Bolivar	Galveston	2,871	8.22
77551	Galveston City	Galveston	23,679	26.87

Data from U.S. Census Bureau, State and County Facts 2005

CHAPTER III

CONCEPTUAL FRAMEWORK

Access to Information in Anticipation of an Event

How different communities access information and what information they consider reliable in an emergency varies according to the population and the kind of event (Sutton *et al.* 2008). People with less access to reliable information are more at risk of serious damage from disasters than those who received more accurate information from reliable sources (Burnside *et al.* 2007). Most of the research on evacuation behavior shows that the more information about an impending event an individual possesses, the more likely they are to take action to mitigate their risk. When an individual realizes that a crisis could be associated with an impending danger they usually seek more information (Brashers *et al.* 2000). When the process of information seeking has been prompted by perceived risk, individuals tend to seek and provide information within their own social networks, and avoid relying solely on officials and mandates to take action (Mileti *et al.* 2006). The multiple sources of information are important determinants of evacuation behavior in case of hurricanes (Burnside 2006). Sutton *et al.* (2008) argue that although multiple grassroots processes of information dissemination are available as new technological and social networks develop, television and radio are the conventional sources used for dissemination of information. This fact is reinforced by Daw *et al.* (1998)'s research conducted after Hurricane Fran in September 1996. They found that

important influences in evacuation decisions were the media and the Weather Channel, in particular. The mass media is expected to be the primary source of information prior to an event, but not everyone reacts in the same way to media's warnings (Spence *et al.* 2009).

Information dissemination is affected by new information technologies available for forecasting, monitoring, and alerting the public in a crisis (Alexander 1991). However the technological advances to disseminate information can fail to reach the entire population. Educational achievement and literacy influence access to information about disaster risks and telecommunications are not always easily understood by the entire population (Tierney 2006). Although the use of internet and cell phones are widespread in the United States, income, education, race and age are strong predictors of technology use (Hoffman and Novak 1998, Jackson *et al.* 2003). Low-income and low-status members of populations have less access to new technologies (Shlovski *et al.* 2008). According to Norris *et al.* (2002) Hurricane Katrina exemplified this as low-income African-Americans from New Orleans who had never been outside of their neighborhoods were less likely to have had experience with and access to technology such as cell phones and computers, and they relied on the government for advice and guidance. The internet, text messaging, and emails are among the emerging information technologies that are being used to raise hazard awareness and emergency preparedness (Fisher 1998), and the public's understanding of hazard has been expanded by the use of social media (Sutton *et al.* 2008).

Effective information dissemination is a process that depends upon both the information provider and the message recipient (Duggan *et al.* 2004). The recipient must

be willing to receive the information that is provided by the source (who must be trusted) through a technology (which must be accepted) for the message to be effective. Not all information, however, is received in the same way by everyone. Understanding of emergency communiqués varies by age, for instance. Information availability happens to help build resilience in communities, but the trust extended to the sources of information varies significantly and can be affected by trust in the technology chosen to convey those messages; younger people are more likely to understand communication technology more than older generations and therefore are more likely to trust and are therefore more willing to receive the message (Chin *et al.* 2004, Longstaff, 2005).

Risk Communication to Minorities and Special Populations

Creation of an accurate understanding of the risk that a person may face during a crisis is a constant challenge for risk communicators. Ramirez (2003) found that cultural competence is a key element in improving communication between non-minority providers and minority patients. Culture is an integrated system of shared belief, values and customs, and the risk information must be communicated in a culturally appropriate way in order to have the effect desired by the information provider (Huerta *et al.* 1999). For the risk communication to be effective the communicators have to regard the diversity of the population for which the information is intended. Andrulis *et al.* (2007) found that during Hurricane Katrina, there was a general lack of focus on diversity while communicating risk and that left the less fortunate (the minorities) at even greater risk. Many researchers also found minorities as a group are being affected to a higher degree by environmental hazards compared to non-minority groups. Tiefenbacher *et al.* (1999)

found that Texas counties with a higher concentration of minorities were more likely to have higher toxic releases.

The effectiveness of risk communication channels depends on the populations to which the messages are directed. For example, Hispanic populations derive from collectivist cultures (by contrast Anglo populations tend to be individualistic) (Huerta *et al.* 1999). The collectivist culture focuses more on the family at risk than on the risk it faces. Therefore, familial connections may be the best channel through which risk can be communicated within a predominantly Hispanic population. Race and culture are not the only two factors affecting the effect of risk communication, however.

According to Lopez and Lujan (2002) it is uncertainty that causes people to perceive risk differently. Mass media have been the main channels for risk communication for slowly developing events, but in fast-onset events people tend to look for more personal sources of information – for instance emergency officials, friends or neighbors (Sorensen and Mileti 1988). African-American communities rely more on social networks than on mass media when making evacuation decisions (Perry and Lindell 1991). Ethnic minorities are less likely to believe and follow authorities (especially those who are of the ethnic “majority”), as they do not consider them credible sources of information (Perry and Mushkatel 1984). Race is not a determinant of the effort put toward information seeking even though racial minorities are hit the hardest during natural disasters (Spence *et al.* 2007). Research shows that minorities (and the poor) are less likely to receive the risk message from non-personal networks (Lindell and Perry 2004) and they are less prepared for disasters than non-minorities and wealthier populations (Perry and Mushkatel 1986). Though socioeconomic differences of

population segments affected by natural disasters have been studied, more research is needed to assess the importance of disaster management and mitigation among ethnic groups (Peacock 2003, Elliot 2006). Oliver-Smith *et al.* (1999) studied factors that contribute to vulnerability in societies and found that class, gender, race/ethnicity, and age/life-cycle were the most influential attributes. Tiefenbacher (2006) uses the term vulnerability as the characteristics of a person, place, community, or system that made them more likely to be impacted by a severe event. In the case of immigrants, their unique characteristics may increase their vulnerability to be affected by extreme events. Immigrant status and literacy can figure prominently in some U.S. disasters and the effects of race and ethnicity have been documented in a number of U.S. disasters (Bolin and Stanford, 2002)

There is also a relationship between disaster experience and risk perception. Some studies have rejected the notion that experiencing the impact of a major hurricane will promote better preparedness for future storms. Those who experienced Hurricane Andrew were actually less willing to go to a shelter than those who did not (Rincon *et al.* 2001).

Communicating Risk to Hispanic Undocumented Immigrants

Although little research has been done on the risk perceptions of undocumented immigrants, those populations have been characterized as having the same views as other minorities in United States. It is assumed that because undocumented immigrants to the United States are socioeconomically similar to native-born minority group members (Hunter 2000), they face levels of environmental risk equivalent to native-born minorities. There have been several studies that suggest that risk perception varies by

ethnicity. According to research by the Texas Department of Health (2004), approximately 32 percent of the population of Texas is Hispanic and 21.4 percent speak “little or no” English. The hardest-to-reach Hispanic population is that which does not speak English and are non-native, undocumented residents.

People with limited English proficiency will miss critical information that they need to prepare for emergencies. Outreach to these communities in Spanish is necessary to inform them of the services available prior to, during, and after a natural disaster. Language is an obvious and widely known barrier to effective dissemination of disaster information yet warnings in the U.S. are still often broadcast only in English (Carter-Pokras *et al.* 2007). Most federal and state agencies lack sufficient multilingual personnel to manage emergencies in multiethnic or multilingual communities (Maestas 2002). Emergency-response experience has taught us that federal and state agencies lack linguistic resources to adequately communicate risk. Spanish-language radio stations tended to focus on human-interest stories after the Whittier Narrows earthquake, and even though the listeners were receiving disaster information, it was often incorrect or generated by non-experts (Bolton *et al.* 1993). Language has been an important health-service barrier, and English proficiency has been strongly tied to adults’ understanding of medical emergencies, to medical insurance acquisition, and to medical assistance (Graham *et al.* 2007). Compounding the language barriers is the lack by many U.S.-born and immigrant Hispanics of familiarity with organization structures and legal requirements that impede access to public and private resources (Carter-Pokras *et al.* 2007).

Furthermore, risk perception can be a matter of the community itself rather than a function of “purely” racial or ethnic factors (Fothergill *et al.* 1999). Foreign-born residents are more risk averse and skeptical about sources of information about environmental risk than are native-born residents (Adeola, 2007). Additionally, minorities, including Hispanic immigrants, are less likely to even receive warnings (Paul *et al.* 2003). Hispanic homeowners prefer to use friends and family members as sources for disaster-preparation information (Peguero 2006). And to further complicate the communication of risk, undocumented immigrants have reduced desire to interact with others members of the community due to their legal status (Weintraub, 1984). As implied above, economics also plays an important role in risk perception. Poorer communities in the United States are more susceptible to the impacts of natural hazards (Fothergill *et al.* 2004). The location of residence, the types of dwellings, and marginalization enhance their susceptibilities. The disaster associated with Hurricane Andrew illustrated how the poor, the elderly, female-headed households, and recent residents were at greater risk throughout the disaster cycle (Morrow 1999).

Undocumented Immigrants in Disasters

There are several factors that affect the movements, behaviors and assumptions of undocumented immigrants in the United States particularly as they relate to the spatial distribution of hazards and disasters and their efforts to cope with the disaster cycle. Economic factors determine their settlement and social factors limit their strategies for survival in disaster areas.

An important factor affecting the recovery of those living on low incomes, particularly Latinos, the elderly and farm workers, is the availability of affordable

housing (Bolin *et al.* 2002). The affordability of housing is a critical determinant in choice of residence for unskilled, low-wage immigrant workers (Borjas 1992). After disasters, people of all socioeconomic groups may be forced to relocate and the areas affected (particularly the hazard-prone places) may attract people searching for more affordable housing, increasing the coincidence of undocumented immigrants in areas of higher risk. Hurricane Andrew led to the settlement of many immigrants in southeastern Florida (Brunsma *et al.* 2005). After Andrew, Hispanic owners and renters were more likely to be found in the disaster zones (Smith *et al.* 2006). The availability of employment for un-skilled laborers also attracted undocumented immigrants to high hazard areas. A survey of New Orleans reconstruction workers after Katrina, found that 77% of undocumented workers did not live in New Orleans before Hurricane Katrina (Pham *et al.* 2007). The work available for undocumented immigrants after the storm was “Largely clean up and demolition work, it demanded thousands of unskilled workers who were willing to work under very difficult conditions without the usual protections afforded to U.S. workers” (Brunsma *et al.* 2005). Language barriers, government policies towards immigrants, and hostility toward new immigrants, drove undocumented Mexican immigrants to settle in areas where they were not a new ethnic group in the community (Zuñiga 2006). Those communities usually had poorer schools, poorer quality housing, lower wages, and an abundance of dangerous jobs.

Although undocumented immigrants face some of the same obstacles as other minorities in the United States, there are particular problems that apply only to undocumented immigrants when disaster strikes. Undocumented immigrants often do not seek recovery assistance for fear of being discovered and deported (Fothergill *et al.*

1999). Access to information about recovery resources is limited for undocumented immigrants. FEMA, for instance, did not provide recovery assistance to undocumented immigrants following the Northridge earthquake (Kamel 2004). And hostility toward undocumented immigrants became apparent after the Los Angeles earthquake on January 17, 1994 (Hadley 1995). Debate after the earthquake focused on whether undocumented immigrants were entitled to aid. Long-term earthquake relief to undocumented immigrants was denied and disaster-aid agencies were required to determine the residency status of relief applicants. After Hurricane Katrina the undocumented and uninsured encountered a multitude of barriers to health care (DeAnne *et al.* 2007). The tragedy following Hurricane Katrina confirmed that effective implementation of public health preparedness programs and policies will require consideration of all racial and ethnic populations (Andrulis *et al.* 2007).

CHAPTER IV

METHODOLOGY

Data Collection

This research uses qualitative data collected from face-to-face interviews. Interviews were conducted in apartment complexes throughout the study area but the responses are “mapped” based on the location of the respondent’s residence at the time of Hurricane Ike.

To better understand individual experience, questions were focused on the information they received at the time of Hurricane Ike. A survey form (shown below) was used as a basis for the interviews, but the actual interviews flowed more spontaneously and were not limited to yes- or-no questions. The questions focused on the information delivered to them, the means by which information was delivered to them, and the decisions they made.

Thirteen zip code areas were issued a mandatory evacuation orders during Hurricane Ike and these were studied. A snowball-sampling methodology was used. After an interviewee was selected and their interview was completed, they were asked to refer other Ike-survivors they may know who live (presently) in the same location and are undocumented immigrants. In addition, each respondent was asked to forward this invitation to their contacts and email the researcher regarding any desired participation by their contacts. The interview was not tape recorded because it was conducted in a more

informal conversation setting. All questions below were asked and the interviewee was encouraged to explain and expand his/her explanation as much as they wanted. The interviews lasted an average of 13 minutes each.

Interview

The interviews focused on five areas and were conducted in Spanish:

1. *Family Situation*
2. *Language Barriers*
3. *Risk Perception*
4. *Economic/Financial Situation*
5. *Disaster Experience*

Present and Past Family Situation

The purpose of these questions was to determine if the presence of other family members in the household made the head of household more or less likely to evacuate and thus to answer the question: What are the differences in the ways single people react to a mandatory evacuation order in comparison to heads of families?

1. Do you live with family members? Who lived with you back in September of 2008?
2. Are there any kids in the household? What ages?
3. Did you and your family evacuate, or will you evacuate in case of a natural disaster?
4. Are there any family members that require close medical attention? Any elderly people living with you?

Language Barriers

The purpose of these questions was to identify the type of information people received in languages other than English. The goal was to determine whether the information received in Spanish was as accurate and precise as the information available in English during or about the event.

1. Do you speak, understand, and read English?
2. Did you hear any warnings? If yes, what did you hear? Did they talk about the intensity of the risk?
3. Did you hear any warnings in Spanish? Did you read a warning in Spanish? When did you hear first about the evacuation in Spanish? Was it a family member, the news, radio, friends?
4. What TV channels do you have access to? What kind of television broadcasting do you have access to (i.e. antenna only, basic cable, digital cable, satellite)?
5. Are you familiar with severe/bad weather warnings? Do you or have you watched a weather channel?
6. How did you hear about Rita, Ike, or other hurricanes?

Risk Perception

Risk perception is a constant process for undocumented immigrants that live in the shadows of society. They fear deportation, and this influences the way they live, the places they frequent, the people they talk to, the jobs they look for, and it may determine the way they react to emergency situations. The purpose of these questions was to understand the familiarity each individual had with regard to access to aid and assistance,

and to determine whether risk perception of legal prosecution was a factor that affected evacuation decision making.

1. What is the legal status of the people living with you? (This question will be directed mostly through an informal conversation, rather than a yes/no question.)
2. Would you evacuate if instructed to do so? Tell me what you would do?
3. Do you know anybody that has been deported from the United States? Can you tell me about their experience?
4. Have you heard about evacuation procedures (e.g., getting on buses, going to hotels, etc.)?
5. Have you heard of FEMA? What have you heard about FEMA? Would you call FEMA if you needed help?
6. Do you know any groups or churches that help with evacuations?

Economic/Financial Situation

The purpose of these questions was to explore the relationship between personal financial conditions and decisions to evacuate. If there seemed to be a link, I attempted to determine whether undocumented immigrants were more likely to evacuate by their own means or if they will seek evacuation assistance.

1. What is your occupation? And what brought you first to this area? Did you have any family or friends that lived here before you arrived?
2. In case of facing a mandatory evacuation, do you have enough savings to evacuate your family on your own or with minimal help from friends and family?
3. Can you tell me how past hurricanes affected you?
4. Have you worked on hurricane reconstruction in any disaster areas?

5. Would you move to Galveston or other affected areas to work?
6. What is your first consideration for choosing the city or town in which you want to live?

Bounded Rationality/Past Disaster Experience

Past experiences influence the way people react in different situations. These questions were designed to determine how past experience (of a natural disaster) might have influenced evacuation decisions. Questions number 5 and 6 (below) are intended to determine, based on the zip code, where they were when they first heard about the mandatory evacuation order, and if that date coincided with the date that the mandatory evacuation was ordered.

1. Where are you from originally? Where did you live previous to your present location?
2. Can you tell me about your past experience in natural disaster? Hurricane? Floods? Tornados? Etc., if any?
3. Can you tell me what natural hazards mean to you?
4. Is evacuation important to you? If so, why? If not, why not?
5. Were you in Houston when Hurricane Ike hit? If so, can you talk about what did you experienced?
6. Did you evacuate? And if so, when did you first hear the mandatory evacuation notice?
7. Have you been displaced by the destruction caused by Hurricane Ike?
8. Do you have any family or friends who were displaced by Hurricane Ike?

9. Looking back into your memories, do you remember what happened, or what you heard or what you did on September 11, 12, and 13 of 2008?

CHAPTER V

ANALYSIS

Data from the survey were analyzed to identify patterns and connections among variables. A spatial database was created to record the information from the interviews. Every record in the database represented one interviewee and a point was located “spatially” at the place of residence at the time of Ike’s passage. The analysis is premised on the hypothesis that there is a direct association between five hypothetical variables (Family Situation, Language, Fear, Economic/Financial Situation, and Bounded Rationality/Past Disaster Experience) and the access to information that undocumented immigrants had prior to the event. The interview-generated data are qualitative data upon which qualitative methods of coding were performed for the purpose of descriptive statistical analysis. The variables have been tabulated and cross tabulation has been used to identify relationships among the variables. All the data reported in this thesis were recorded and a verbatim Spanish transcript was translated into English. From the data collected only interviews that met the following requirements were used in the analysis:

1. The interviewee was a Hispanic undocumented immigrant.
2. The interviewee was living in one of the thirteen zip codes that faced mandatory evacuation during Ike on September 11, 2008.

From each interview selected information was pulled out and recorded into a database.

Table 3. Selected Fields, Description, and Domains. Data fields in survey database with a list of possible values.

Field Name	Description	List of Possible Values (if applicable)
Gender	Gender	[Male, Female]
Age	Age	N/A
ZipCode	Zip code of respondent's residence	N/A
Res2008	Respondent's residence in 2008	[alone, family, friends]
PSAge	Number of preschool age children	N/A
SAge	Number of school age children	N/A
EvacIke	Evacuated during Ike	[Yes, No]
EvacIkeMethod	Method of evacuation	[own, group, gov]
EvacNext	Will evacuate for next hurricane	[Yes, No]
English	Understands English	[Yes, No]
HearSpWarn	Heard warning in Spanish	[Yes, No]
ReadSpWarn	Read warning in Spanish	[Yes, No]

Table 3 Continued.

Field Name	Description	List of Possible Values (if applicable)
FirstWarnMethod	Method of first warning received	[family, friends, kids, radio, newspaper, TV]
SpanishTVAccess	Access to Spanish language TV	[Yes, No]
TVService	TV service type	[antenna, basic cable, digital cable, satellite]
WeatherChannel	Familiar with the Weather Channel	[Yes, No]
Radar	Familiar with weather radar	[Yes, No]
LegalStatus	Legal status of the household	[all undocumented, undocumented with documented kids, undocumented with documented and undocumented kids]
EvacStatusConcern	Concern about legal status during evacuation	[Yes, No]
DeportExp	Experience with deportation	[Yes, No]
EvacProcessKnow	Knowledge of the evacuation process	[Yes, No]
FEMAKnow	Knowledge of FEMA	[Yes, No]
OtherGroupKnow	Knowledge of other aid groups	[Yes, No]

Table 3 Continued.

Field Name	Description	List of Possible Values (if applicable)
WhyHere	Why respondent moved to 2008 residence	[family, job, school, transportation]
EvacMoney	Enough money to evacuate	[Yes, No]
Origin	Region of origin	[South America, Central America, Mexico]
DisasterExp	Experience with disasters	[Yes, No]
IkeDisplace	Displaced by Ike	[Yes, No]

The screenshot shows a database form titled "tblResponses". The form contains several sections of input fields:

- Personal Information:** ID (text), Gender (dropdown: F), Age (text: 33), ZipCode (text: 77058), Res2008 (dropdown: family), Pre-school age (text: 1), School age (text: 0).
- Emergency Preparedness:** Evac for Ike? (checkbox), Evac for next hurricane? (checkbox), Understand English? (checkbox).
- Warning and Information:** Hear Spanish warning? (checkbox), Read Spanish warning? (checkbox), First warning method (dropdown: friends), Spanish TV access? (checkbox), TV service type (dropdown: antenna), WeatherChannel (checkbox), Radar (checkbox), LegalStatus (dropdown: updk).
- Knowledge and Experience:** Knowledge of FEMA? (checkbox), Knowledge of other groups? (checkbox), Why respondent moved here (2008)? (dropdown: family), Enough money to evac? (checkbox), Origin (dropdown: CenAm), Prior disaster experience? (checkbox), Displaced by Ike? (checkbox), Status concern during evac? (checkbox), Deportation experience? (checkbox), Knowledge of evac process? (checkbox).

At the bottom, there is a record navigation bar showing "Record: 1 of 135".

Figure 2. Data Entry – Database Form. A form was used to enter data into the database.

The database was queried combining each of these fields with the decision to evacuate. The evacuation parameter (Evacuated during Ike, yes or no) was used as the dependent variable upon which access to information was evaluated. Data were only collected in mandatory evacuation areas, and my assumption was the magnitude of Hurricane Ike would have encouraged people to evacuate if they received and perceived the risk information in a timely manner. The variables were analyzed for correlations to determine the roles that each of the five potential barriers had on the decisions made. Eighty-eight of the 135 people interviewed evacuated during the Hurricane Ike period.

CHAPTER VI

RESULTS AND DISCUSSION

Respondent Overview

A total of 135 interviews were completed in 27 apartment complexes in thirteen zip codes. All of the respondents lived in mandatory evacuation zones when Ike made landfall. There were 73 females (54%) and 62 males (46%) interviewed. Participants ranged in age from 18 to 79 years old. Due to the practical access factors, the sample equally distributed by zip code (Table 4). Snowball sampling, and the lack of broadcasting of the predominance of Hispanics in residence at specific apartment complexes, served to obfuscate identification of apartment complexes where Hispanic residents tended to be found in some zip codes (specifically 77551, 77571, 77650, and 77541). Since the total number of undocumented immigrants is unknown, judgment of the representativeness of the sample is impossible. Presumably this population is concentrated in areas of high demand for low-skilled labor, however the results show that zip codes 77058 and 77598 have more low-skilled laborers. This is and is reflected as well in the fact that 92% of the interviewees worked in these areas.

Table 4. Number of Interviews Completed per Zip Code.

Zip Code	Number of Interviews
77058	22
77059	9
77062	13
77520	8
77541	5
77546	15
77550	9
77551	4
77554	7
77571	4
77650	4
77586	15
77598	20

Family Situation

Of the 135 interviewees, 83 (61.5%) did not have pre-school age children in the household, and the rest had either one or two pre-school age kids. The results suggest an 11% difference between those households without pre-school age children that evacuated and those who did not evacuate (47 vs. 36). However, for the households with preschool-aged children the percentage of evacuation was highly different from those who did not evacuate 41 (78.6%) who evacuated vs. 11 (21.4%). There seems to be a direct relationship between the evacuation decision and the presence of young children in the household.

Table 5. Evacuation vs. Presence of Preschool-aged Children in the Household.

<i>Evacuation</i>	<i>Number of preschool-aged children</i>	<i>Number of households</i>
Yes	0	47
Yes	1	29
Yes	2	12
No	0	36
No	1	7
No	2	4
Total		135

Comparing the percentage that evacuated to the first-warning method and the English proficiency of the adults in the households (Table 6), one sees that 17 of the households that evacuated (41.6%) had preschool-aged children from whom they heard about Ike for the first time, and 12 of these (70%) did not have an adult that understood English. One of the interviewees commented:

“My son is 4, and he came back home from preschool telling me that the teacher said the school may close next week because of the Hurricane Ike. I have heard about the Hurricane Ike and that it was in Cuba during my shift at work. I watched on Univision, but we don’t have Spanish TV at home. My son translated for me all the news we heard on CNN.”

Another interviewer commented:

“I had my kid talking to the police officer that showed up at our house Thursday morning. He was very nice and willing to talk to a four year old. We evacuated that night”

Table 6. Evacuation vs. Presence of Preschool-aged Children, Notification Method, and English proficiency.

<i>Evacuation</i>	<i>Number of Households</i>	<i>First-warning Method</i>	<i>English Proficiency</i>
Yes	5	Kids	Yes
Yes	12	Kids	No

Similar circumstances occurred in many households that had school-aged children. School-aged children help to disseminate information and ultimately influence the evacuation of their families. Forty-eight of the 135 people (35.5%) interviewed had at least one and as many as four school-aged children (Table 7). Forty-four (91.6%) of the families with school-aged children evacuated and only 4 (8.4%) did not.

Table 7. Evacuation vs. Presence of School-aged Children in the Household.

<i>Evacuation</i>	<i>Number of school-aged children</i>	<i>Number of Households</i>
Yes	0	44
Yes	1	22
Yes	2	14
Yes	3	7
Yes	4	1
No	0	43
No	1	3
No	2	1
Total		135

Unpacking the information about the sources of the first warning received in households with school-aged children that evacuated (Table 8), we see that 32 (72.7%) first heard about Ike from either their kids or a note from their kids' school. In those households, only 11 (34%) had at least one adult with proficiency in English. However, according to some English proficient interviewees, language did not matter at that time,

because they relied on information provided by their kids. One of the interviewees commented:

“My daughter was in charge of all the arrangements for us to go in the buses on Thursday afternoon, I speak English, but she understands better than me what the officials were saying at all times”.

Some felt that the media in Spanish was not providing the necessary information for their areas; they had to rely on their children to translate English-language news to fill their information gaps:

“All we heard on Telemundo was drama and past stories of people that have survived hurricanes, we lived in Texas City, and they did not provide any information regarding a number to call to know what routes to take and things like that. However the English channels offer information for all the counties with help phone numbers, and my daughter was writing all of that for us. Thank God we had her to help us”.

Table 8. Evacuation vs. Presence of School-aged Children, Notification Method, and English Proficiency.

<i>Evacuation</i>	<i>Number of Households</i>	<i>First-warning Method</i>	<i>English Proficiency</i>
Yes	11	Kids	Yes
Yes	21	Kids	No

The type of household (i.e. the presence of family or friends) was indicative of evacuation behaviors (Table 9). Ninety-nine of the interviewees (73.3%) resided with family, 19 (14%) lived with friends, and only 17 (12.7%) were living alone when Ike struck. Of those who lived with family members, 78 (78.8%) evacuated. Of the 19 living with friends, 16 (84.2%) were males and only 3 (15%) of these people evacuated.

Table 9. Evacuation vs Residence in 2008 (Alone, Family, or Friends).

<i>Evacuation</i>	<i>Respondent Residence in 2008</i>	<i>Number of Households</i>
Yes	Alone	7
Yes	Family	78
Yes	Friends	3
No	Alone	10
No	Family	21
No	Friends	16
Total		135

This analysis revealed a rather hidden group with different characteristics. Of the 16 men living with friends, only 1 was proficient in English and 9 (56%) had no access to television or other media (Table 10). During the interviews, several of these men pointed out their lack of access to traditional news sources. All 16 had the same characteristics. They lived with coworkers. The company for which they worked placed them in an apartment complex, paid their rent, and transported them between home and work daily. They spent most of their time at work, and a most of the information they received came from their bosses. One explained:

“We are 4 men living here, the boss paid the rent for the apartment and the food, but we don’t have TV or radio. He told us to make sure we had enough food or water for the next week or so until the work would come back to normal.”

And another:

“I was disappointed when I found out about the evacuation order from a police officer that knocked at my door. My two roommates were out, and I was not able to leave without them, we had heard from our boss that the storm would be bad you know, but like any other hurricane is bad until it passes. He told us there was

nothing to worry about, but we actually had to come back to Mexico without money for 4 months after the storm”

In contrast to the residents that have family networks, this group of men had to be self-reliant in response to a potentially dangerous situation. With limited resources and lack of access to any independent source of information (radio, television, or internet) some of the interviewers explained how they had to take the initiative to evacuate by themselves:

“Our boss left with his family 3 days before we even found out that there was a mandatory evacuation. We wandered the streets for half of a day trying to figure it out how to get out of here. Finally one of the managers, a younger guy picked us up in the back of his truck.”

Table 10. Evacuation vs. English Proficiency and Access to Television Broadcast.

<i>Evacuation</i>	<i>Residence in 2008</i>	<i>English Proficiency</i>	<i>Gender</i>	<i>Number of Males and Females</i>	<i>Television Broadcast</i>
Yes	Friends	No	F	1	None
Yes	Friends	No	F	1	Antenna
Yes	Friends	No	M	1	None
No	Friends	Yes	M	1	Antenna
No	Friends	No	F	1	Antenna
No	Friends	No	M	9	None
No	Friends	No	M	5	Antenna
Total				19	

Language

To determine whether the lack of ability to speak or comprehend English is a barrier to reception of emergency information, a comparison between evacuation behavior and English-proficiency was made (Table 11). Forty-nine (36.2%) of the 135

interviewed, were in households that had at least one English-proficient adult present. Of the 88 (61.2%) of the total interviewees who evacuated, 40 (46%) were from households with at least one English-proficient adult present. However, of the 47 (38.8%) of those who did not evacuate, only 9 (19.2%) had an English- proficient adult in their homes. It appears that the 38 who did not evacuate, could not access information in English and were limited by the lack of English communication. The data suggest that there's an extraordinarily large difference between the evacuation behaviors of people in households with either access to information or capacity to communicate in English: Only 19% decided to stay put.

Table 11. Evacuation vs. English Proficiency.		
<i>Evacuation</i>	<i>English Proficiency</i>	<i>Number of Households</i>
Yes	Yes	40
Yes	No	48
No	Yes	9
No	No	38
Total		135

Another variable in the analysis regards whether households without English-proficient adults received accurate warning information from Spanish-language media (Table 12). The number of interviewees in households that had access to Spanish-language television was 102 (74.8%) versus households without access to Spanish-language television was 33 (25.2%). However for those households without English proficient adults that did evacuate, 41 (81%) had access to Spanish-language television, and only 7 (9%) did not have access to Spanish-language television. The analysis indicates that there are no substantial differences in evacuation behaviors for those

households without an English-proficient adult and did not evacuate during Ike as 21 (55%) had access to Spanish-language television and 17 (45%) did not. There must be others reasons why those interviewees decided to remain in place.

Table 12. Evacuation vs. English Proficiency and Spanish TV Access.

<i>Evacuation</i>	<i>English Proficiency</i>	<i>Number of Households</i>	<i>Access to Spanish Television</i>
Yes	Yes	34	Yes
Yes	Yes	6	No
Yes	No	41	Yes
Yes	No	7	No
No	Yes	6	Yes
No	Yes	3	No
No	No	21	Yes
No	No	17	No

Hearing warnings in Spanish would only be useful for those who do not understand English as well. The following analysis regards only those interviewees living in households without English-proficient adults (Table 13). Eighty-six of those interviewed lived in homes without an English-proficient adult and of these, 48 (55.8%) evacuated. Of these 48 evacuees, 33 heard warnings in Spanish; the other 38 interviewees who did not evacuate included 20 (52.6%) who had heard evacuation warnings in Spanish and 18 (47.4%) who had not.

Table 13. Evacuation of Non-English Proficiency vs. Hearing Warnings in Spanish.

<i>Evacuation</i>	<i>English Proficiency</i>	<i>Number of Households</i>	<i>Hear warnings in Spanish</i>
Yes	No	33	Yes
Yes	No	15	No
No	No	20	Yes
No	No	18	No

Contrary to the hypothesis that the lack of warnings in Spanish will decrease the likelihood of evacuation by undocumented migrants with limited English-proficiency, the results demonstrate that a lack of warnings in Spanish may not be a barrier to acquisition of emergency guidance. Consequently, there may be other variables creating bigger barriers. Of the 38 interviewees who were not proficient in English and did not evacuate, 20 received the warnings in Spanish (Table 13).

Interviewees with limited English proficiency, but who heard warnings in Spanish and evacuated numbered 33. Of these, 21 (63.3%) were concerned about their legal status as they considered the prospect of evacuation (12 were not concerned) (Table 14). Twenty (low English proficiency interviewees) who heard warnings in Spanish but did not evacuate included 18 (90%) who were concerns about the implications of their legal status and 2 who were not.

Table 14. Evacuation of Non-English Proficient Interviewees that Heard Warnings in Spanish vs. Legal Status Concern.				
<i>Evacuation</i>	<i>English Proficiency</i>	<i>Number of Households</i>	<i>Hear Warnings in Spanish</i>	<i>Legal Status Concern</i>
Yes	No	21	Yes	Yes
Yes	No	12	Yes	No
No	No	18	Yes	Yes
No	No	2	Yes	No

These results suggest that concern about one's legal status concern is very likely to have an important influence on whether or not to evacuate. Although a sample of 20 is too small to draw significant meaningful conclusions from, 14 of the 18 who were concerned stated that they were greatly concerned about being prosecuted while

evacuated, and eight of them reported that they were concerned enough to not even open the door to police officers.

One of the interviewees commented:

“We knew there was a huge risk to stay, but my husband was in Mexico already, and I could not take the risk of being separated from the kids. I have heard that immigration officials look for these opportunities to find more people to deport.”

Despite the number of people that heard warnings in Spanish and did not evacuate, many of the respondents indicated that Spanish-language media were not addressing the situation in the same way that English-language media did. One interviewee who did not evacuate commented:

“I was afraid of immigration, and I was afraid of leaving my house. I lost my TV connection Thursday around noon, and by that time none of the Spanish channels had mentioned that our area had to be evacuated, then we kept hearing sirens until the next day. We did not evacuate, and thank God we only suffered some exterior damage in our apartment and a few leaks here and there.”

Information propagated through Spanish-language channels represented a barrier to receiving accurate information for some of the interviewees. Another participant described how not only was Spanish-language television inaccurately representing risk, but they also provided little useful information:

“They kept saying to call a number if you need help evacuating and need a Spanish operator, but the phone line they provided had a busy signal all the time.”

Familiarity with and ability to comprehend weather radar images were analyzed as barriers to accurate information (Table 15). The outcome of the survey seems to indicate that the oldest members of the population reject the use of this information tool. Some of the older interviewees confessed a lack of knowledge about radar graphics, and further that they lacked interest in familiarizing themselves with them in order to understand weather patterns.

Table 15. Evacuation vs. Familiarity with Radar Images.		
<i>Evacuation</i>	<i>Familiarity with radar images</i>	<i>Number of Households</i>
Yes	Yes	34
Yes	No	54
No	Yes	8
No	No	39
Total		135

A man in his late 60s commented:

"I do not watch that because I do not understand what they mean. I am not going to learn how to use a computer now, and I would prefer to be told about the risk rather than seeing radar."

In fact, of the 88 interviewees that evacuated, 54 (62.5%) were not familiar with radar images. It does not seem that familiarity with radar images is related to the decision to evacuate, however. Of the 47 who did not evacuate, however, only 8 (17%) were familiar with radar images. Some reported that looking at radar graphics on the news was the ultimate factor in their decision to evacuate, because their perception of the hazard was immediately changed.

“When we saw the big ball coming to us, and it was bigger than Houston, we were really scared.”

Another participant commented:

“It does not matter if I did not understand what they were saying I saw on the news the size of the storm coming. I told my wife, we were going to leave and not to worry about what the neighbors think.”

Risk Perception

Sixty-five (48.1%) households contained only undocumented residents and seventy (51.9%) contained parents who were undocumented and children who were either all legal U.S. residents or a combination undocumented and documented kids. Fifty-seven (81.4%) of the 70 households with children who were citizens evacuated, the other 13 (18.6%) did not. Contrary to the notion that undocumented parents with children who are citizens are less likely to evacuate for fear of being separated from their kids, the presence of children, whether documented or not was enough to motivate parents to evacuate (Table 16).

Table 16. Evacuation vs. Legal Status.

<i>Evacuation</i>	<i>Legal Status</i>	<i>Number of Households</i>
Yes	All Undocumented	31
Yes	Undocumented parents with documented kids	37
Yes	Undocumented parents with documented and undocumented kids	20
No	All Undocumented	34
No	Undocumented parents with documented kids	11
No	Undocumented parents with documented and undocumented kids	2
Total		135

Of the thirteen households with documented kids that didn't evacuate, nine stated that they had heard that if immigration asked for documentation that families could be separated and children who had legal status would be taken to a safe place. None of these nine knew anyone to whom that had happened, but the idea was a deterrent to evacuation.

Concern about their status during evacuation influenced evacuation rates (Table 17). This suggests that there is a strong relationship between households' decisions to evacuate and their concern about their residence status. Of the 47 (34.8%) households that did not evacuate, 38 (80%) were concerned about their legal status during evacuation. This analysis does not, however, take into account other factors, such as English proficiency and the presence of children.

Table 17. Evacuation vs. Legal Status Concern.		
<i>Evacuation</i>	<i>Legal Status Concern</i>	<i>Number of Households</i>
Yes	Yes	52
Yes	No	36
No	Yes	38
No	No	9
Total		135

One's deportation experience (either knowing someone that had been deported or having been deported personally) might also influence risk perception. From the 135 interviewees, 72 (53.3%) either had been deported or knew someone that had been deported. Of the 88 interviewees that evacuated, fewer than half (N=48) had experience with deportation, and of the 47 that did not evacuate 32 (68%) had deportation experience.

Table 18. Evacuation vs. Knowing Someone that Has Been Deported.

<i>Evacuation</i>	<i>Any Deportation experience</i>	<i>Number of Households</i>
Yes	Yes	40
Yes	No	48
No	Yes	32
No	No	15
Total		135

Are there relationships between deportation experience, evacuation experience, and legal status concerns during evacuations? Many respondents expressed their fears of legal prosecution related to being undocumented. Of the 47 respondents that did not evacuate, 32(68%) had deportation experience and were concerned about their legal status. Many were afraid to ask for evacuation assistance, and they feared that that they would have to show identification to get on evacuation buses. None of them had experienced this kind of situation in the past, but they stated that they had heard stories from family and friends. One respondent commented:

“I did not understand the directions they were giving over the loudspeaker, and I had police knocking at the door. My husband and I did not open the door, we could not have evacuated anyway, because there was no time to find gas for the car, and they wouldn’t even let us on the buses without an ID.”

Her family did not try to board a bus; they just assumed that officials would ask for documentation.

On the other hand of the 88 interviewees who evacuated, 48 (54.5%) had no deportation experience, and of those, 30 (62.5%) were not concerned about their legal status at the time of evacuation. It appears from these interviews that past deportation experience affected one’s fear of deportation during evacuation. Although officials from

FEMA claimed that nobody would be questioned at the time of evacuation, undocumented immigrants seemed to have felt that they were not considered to be part of the evacuation activities. Fifteen people with deportation experience that had evacuated and had concerns about their status during evacuation responded that they were hesitant to evacuate at the beginning, but eventually decided to evacuate as weather conditions worsened. These same people felt that the authorities were more interested in White and Black residents:

“All the warnings from the loud speaker were in English, in this apartment complex we are mostly from Mexico”.

Inaccurate perceptions caused by people telling stories seem to have created barriers for access to information. Of the 72 people who had deportation experience, only two people had ever been deported. The rest were relatives or friends of people who had been deported. The preconception that immigration enforcement was happening on the evacuation routes prevented people from getting the right information, and they perceived a greater threat from deportation than from the hurricane. One of the respondents commented:

“There is a lot of gossip among all of the members of the church. They said that La Migra (immigration officials) will intercept trucks with Mexican-looking passengers.”

Another woman commented:

“We did not evacuate because during Rita immigration was all along Highway 290, and we took another way, but my sister and her family were intercepted and taken to a temporary shelter, and then deported.”

Table 19. Evacuation by People with or without Deportation Experience vs. Legal Status Concern during Evacuation.

<i>Evacuation</i>	<i>Any Deportation experience</i>	<i>Number of Households</i>	<i>Legal Status Concern</i>
Yes	No	30	No
Yes	No	18	Yes
Yes	Yes	6	No
Yes	Yes	34	Yes
No	No	4	No
No	No	11	Yes
No	Yes	5	No
No	Yes	27	Yes

Another example of the way that misconceptions can create barriers to information regards familiarity with evacuation procedures, (i.e., getting on the buses, securing homes, and finding temporary shelters). Familiarity with evacuation procedures was examined to determine the relationship between awareness of procedures and access to accurate information. Of the 48 people that do not evacuate, 44 (93.6%) were unaware of evacuation procedures. Of the 46 households that evacuated on their own, 30 (65.2%) were unaware of evacuation procedures. Of the 25 households that evacuated with a group or a church congregation, 16 (64%) were unaware of evacuation procedures, and of the 17 households that evacuated with government help (FEMA- or city-provided transportation on buses) only one was unaware of evacuation procedures (Table 20). People having some familiarity with evacuation procedures seem much more likely to accept government assistance to evacuate. Of the 22 households that evacuated either with a group or on their own and were familiar with evacuation procedures, 18 had learned about evacuation procedures from a family member or friend; they remained

concerned about the risk that they would face by evacuating with the aid a government body.

Table 20. Evacuation by Evacuation Method vs. Familiarity with Evacuation Procedures.

<i>Evacuation</i>	<i>Evacuation Method</i>	<i>Number of Households</i>	<i>Familiarity with evacuation procedures</i>
Yes	Government	16	Yes
Yes	Government	1	No
Yes	Group	6	Yes
Yes	Group	19	No
Yes	Own	16	Yes
Yes	Own	30	No

To determine whether the lack of relief network is a barrier for undocumented immigrants to access information, familiarity with FEMA and familiarity with other relief groups are examined. The difference between those who evacuated and those who did not evacuate in terms of their familiarity with FEMA appears to be insignificant (Table 21). Out of the 73 people that had heard of FEMA, 69 (94.5%) did not know what FEMA did and they would certainly not call FEMA for help. Of those 69, 25 claimed that FEMA only helps legal residents and 30 said that FEMA only helps with household repairs for house owners. Only two of the participants identified FEMA as the federal agency that would help provide shelter, food, and clothes.

Table 21. Evacuation vs. Familiarity with FEMA.

<i>Evacuation</i>	<i>Familiarity with FEMA</i>	<i>Number of Households</i>
Yes	Yes	56
Yes	No	32
No	Yes	17
No	No	30
Total		135

However, contrary to the minimal familiarity with FEMA, other groups and churches seem to have an impact on information dissemination to undocumented immigrants and influence how receptive immigrants are to information. The results showed that of the 88 households that evacuated, 51 (57.95%) were familiar with the relief work done by churches or other groups and that they also helped with evacuation (Table 22). Of those 51 households, 46 said they relied on these groups for information. One participant stated:

If it was not for the church I don't know what I would have done. I had no money to evacuate. I don't even have a car, and I was not even sure how to evacuate, where to go and when to go."

Of the 47 households that did not evacuate, 13 (27%) were familiar with churches or groups that assist with evacuation, but even though they knew where to find these groups, assistance and resources were limited. Eight of these 13 interviewees explained that they did not have the means to evacuate and all church vehicles were full. Even the shelters to which the churches were heading were full. However, some of the undocumented immigrants that turned to churches to ask for help with shelters were given information about other resources, phone numbers to call, and even wood to use to cover their homes' windows:

"Friday morning most of the people from the apartment complex had left, I and my roommate walked down to the Nazarene church, and there was a man who offered us bottles of water and canned food. They were not taking more people to the shelter, it was too late to leave but at least we got some help from them. We were not that close to the coast, but still needed water and flash lights."

Table 22. Evacuation vs. Familiarity with Relief Groups or Churches.

<i>Evacuation</i>	<i>Familiarity with other groups</i>	<i>Number of Households</i>
Yes	Yes	51
Yes	No	37
No	Yes	13
No	No	34
Total		135

Economic/Financial Situation

Of the 88 people that evacuated, 67 (76%) stated that they did not have enough money to evacuate on their own. The balance, 21 (24%), had enough money to evacuate on their own. The lack of money did not prevent evacuation, however. Forty-four (93.6%) households that did not evacuate stated that they lacked enough money to evacuate on their own. Three (6.4%) had enough money to evacuate but decided not to do so. The 44 were asked whether they would have changed their mind about evacuation if they had money to evacuate and 39 (88.6%) considered evacuation to be too risky because either the amount of time, gasoline, or shelter was in short supply. Moreover, of this group 35 (79%) reported that they knew the situation was urgent, but they unable to get family members or friends to assist.

Table 23. Evacuation vs. Having Enough Money to Evacuate.

<i>Evacuation</i>	<i>Enough Money to evacuate</i>	<i>Number of Households</i>
Yes	Yes	21
Yes	No	67
No	Yes	3
No	No	44
Total		135

Bounded Rationality/Past Disaster Experience

Of the 88 households that evacuated, 56 (63.3%) had previous disaster experience. Of the 47 households that did not evacuate, 14 (29.7%) had previous disaster experience. Of the 70 households that had disaster experience, 56 started seeking information about the pending hurricane very early.

Table 24. Evacuation vs. Prior Disaster Experience.		
<i>Evacuation</i>	<i>Prior Disaster Experience</i>	<i>Number of Households</i>
Yes	Yes	56
Yes	No	32
No	Yes	14
No	No	33
Total		135

The types of experiences people had seemed to influence their perception of the impending danger. One interviewee commented:

"I was not expecting that kind of storm and I was not ready for that. I have been in tropical storms in Nicaragua, but this is the worst storm I have been in. I had no electricity, no phone, broken glass all over, water leaking through the ceiling...."

Bounded rationality seemed to be a barrier to information for a small number of those interviewed. Eleven people from Central America and Mexico who had disaster experience thought they knew what to do, how to stay safe:

"We had enough food and water, a battery-powered radio, flash lights, blankets and everything we would need, but we were not considering that the water would

actually enter our apartment, our furniture was soaked and we had to move ourselves to the second-floor apartment.”

Another interviewee who evacuated during Hurricane Rita in 2005 believed that evacuation was unnecessary and a hassle. Their disaster experience created a risk perception barrier. Most interviewees who did not evacuate this time but had evacuated during Rita confessed they did not believe the news. One interviewer said:

“Rita was a big deal. They cleared out the coast, we all evacuated and it was hours and hours of sitting in traffic. This time we just got groceries and water.”

CHAPTER VII

CONCLUSIONS

This study has compared hurricane evacuation behavior among undocumented immigrants with several variables expected to create barriers to access of emergency information. While undocumented immigrants share linguistic limitations to accessing information as other minorities in the United States, their undocumented status sets them apart with an additional barrier. The results indicate that some previously known barriers do interfere with access to information, but some new barriers have been identified.

The presence of family is overcomes barriers because of the ability of children (particularly those of school-age) to overcome the cultural and linguistic barriers to accessing accurate emergency information. Households with children acquired more accurate information either from their children or from their children's schools. Older children play a critical role to facilitate communication between officials and their families. Moreover, families were more likely to evacuate than people either living alone or with friends.

English-language proficiency is required for undocumented immigrants to access emergency information. Examination of evacuation relative to the interviewees' English proficiency shows that evacuation is directly related to knowledge of English. Of all interviewees who did not evacuate, 80% were not proficient in English. To further assess non-evacuation behavior and access to information, four more variables were considered:

access to Spanish-language television, the reception of warning information in Spanish, the capacity to understand radar images broadcast on television, and the level of concern about one's legal status. Access to Spanish television was a significant factor only for those who evacuated. Eighty-one percent of those not proficient in English that evacuated actually had access to Spanish-language television and 45% that group that did *not* evacuate did not have access to Spanish-language television.

Access to warnings in Spanish appears not to reflect a barrier to emergency information. Results indicate that there is no significant difference in evacuation response from those who heard warnings in Spanish and those who did not. Familiarity with radar images may influence evacuation as a lack of familiarity was more prominent among those who did not evacuate. Possession of an understanding of the images seems to affect perception of the threat as many of those interviewed concluded that the situation was more urgent because they saw and understood the radar images. For older interviewees, the issue is not familiarity but rather they tend to conclude that the images contain no relevant information that would change their perception of the threat. When these three variables were tabulated, we can see that comprehension and trust in the information they receive is much more important, in terms of promoting evacuation behavior, than whether warnings in Spanish were received.

Households with children, regardless of the legal status of the kids, are more likely to evacuate than households without children, and indeed, access to information is enhanced by the presence of children, particularly if they are or have been in school in America. Children are not a barrier to access to information, and they may even promote the making of safer choices.

Immigrants' concern about their legal status does create a barrier to accessing information and they tend to evacuate less often if they are afraid of deportation. The testimonials reflect the effect of legal status as undocumented immigrants refused to exposing themselves to help offered by police and other emergency personnel who were attempting to promote evacuation.

Deportation experience – that is, knowing someone who has been deported or having experienced deportation firsthand – affected the willingness of the respondents to seek information and/or evacuate. This variable increased in importance in those people who had deportation experience and were very concerned about exposing their legal status at the time of evacuation.

Lacking understanding of evacuation procedures seems to eliminate willingness to seek information for both people who did not evacuate and for those who evacuated on their own. Nine in ten (93.6%) people who did not evacuate were unfamiliar with evacuation procedures and 65.2% of people who evacuated on their own knew little about formal, organized evacuation procedures.

One's familiarity with evacuation procedures seems to reflect a "double" barrier to emergency information. Interviewees who were unaware of these procedures were less likely to evacuate and four-fifths (81.1%) of the people who claimed to have familiarity with evacuation procedures had misconceptions of those procedures or believed bad things they had heard from someone else. The mistaken belief that identification was required to board evacuation buses was very common among the interviewees that said they were familiar with evacuation procedures.

Unfamiliarity with FEMA appears not to be a barrier for access emergency information as 94.5% of the interviewers that claimed to have heard of FEMA either did not know what FEMA does or wrongly understood FEMA's services. But lacking familiarity with relief groups or churches did create an information barrier. Nine of ten (90.2%) of the households that evacuated and expressed familiarity with churches or relief groups actually contacted these groups for information (in Spanish) or for resources.

Economic wherewithal, measured through questions about having "enough money to evacuate" did not create a barrier to accessing emergency information. In fact, lacking money did not stop people from evacuating when they had finally accumulated enough accurate information regarding the hazardousness of Ike as it approached the coast.

Past disaster experience and the lack thereof both represented barriers in for undocumented immigrants. Depending on where they had lived before, respondents had different perceptions of the geography of coastal areas and of the hazards associated with hurricanes. Interviewees with disaster experience who evacuated claimed that they knew what to expect, and they had no doubts about evacuating. Interviewees with previous disaster experiences who did not evacuate claimed they had anticipated neither the strength of Hurricane Ike nor the magnitude of damage it caused because they had not seen anything like it before. There were 14 interviewees who did not evacuate that said they had experienced a disaster. Thirteen of these 14 evacuated during Rita in 2005, and they felt the Hurricane Ike situation was overdramatized and would be similar to what

happened with Rita. These thirteen interviewees confirm the “crying wolf” theory suggested by Dow *et al.* (1998) in their study of hurricane evacuation orders.

A number of limitations of this study should be mentioned. First, the total population of undocumented immigrants in the United States and in any specific geographic area is unknown. Only estimates can be made based on immigration models and other probabilistic methods. The sample number here (135) may not be a statistically significant sample representative of the undocumented immigrant population in the thirteen zip codes sampled. Second, interviews were conducted face to face. In some cases the interviewees may have felt intimidated by questions about their legal status in the United States, which may have influenced the veracity of their answers.

New barriers have been identified from this research, such as the importance networks of family or friends among immigrants new to the country. Younger men who live with coworkers tend not to evacuate – only one out of 16 evacuated. This subset of the population has no network other than the people they work and live with and are usually in their same legal, linguistic, and social situation.

Based on the results of this research, emergency management organizations should be better able to develop plans for emergency communication to undocumented immigrant populations, especially in parts of the southwestern United States known to have higher concentrations of undocumented immigrants and where emergencies are more common. Future research could explore the relationship between evacuation behavior and information access barriers further by conducting a more extensive (in spatial terms) study that could establish legitimate statistical significance and more

clearly explore geographic patterns of evacuation behavior among undocumented immigrants in the United States.

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