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Understanding Local Vulnerability in the Rio Grande Valley

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UNDERSTANDING LOCAL VULNERABILITY

IN THE RIO GRANDE VALLEY

A Thesis

by

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ABSTRACT

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Located on the Texas-Mexico border, the Rio Grande Valley (RGV) is characterized by its geographical susceptibility to disasters. Many prevailing conditions have established the RGV as a vulnerable region compared many to others. This research utilizes data from the Our Voice/Nuestra Voz survey, conducted through the Center for Survey Research & Policy Analysis (CSRPA) at UTRGV to understand disaster vulnerability in the area.

Trained student interviewers from the CSRPA conducted random-digit dialed telephone interviews in English and Spanish to adults (18 and older) residing in Cameron, Hidalgo, and Starr Counties during the months of April through July 2018. Through a cross-sectional design, 728 interviews were performed. Among other topics, Our Voice/Nuestra Voz survey included sociodemographic and disaster preparedness information. Data was analyzed using univariate and multivariate statistical models.

Participants were primarily Hispanic (90%), and mostly female (54%). Statistical associations were found between emergency preparedness and preferred survey language (B=-4.2; $p<.10$).

DEDICATION

This work is dedicated to all who have in some way help accomplish it:

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CHAPTER I

INTRODUCTION

From loss of life to large-scale destruction, natural and technological hazards continue to create costs for society. For instance, on May 22, 1987 in Saragossa, Texas, 22 fatalities and 121 injuries resulted from a tornado that destroyed half of the community due to the limitations of the local warning system (Aguirre 1988). Similarly, in 1989, about 60,000 residents in South Carolina were reported homeless due to hurricane Hugo, a storm resulting in unprecedented financial loss of $5 billion (Federal Emergency Management Agency 1989). In 1992, hurricane Andrew struck Florida driving no fewer than 11 insurance companies into bankruptcy as Federal and state payouts reached $6.5 billion (Changnon and Easterling 2000). Events such as these have fundamentally changed our outlook on disaster preparation. Although hurricanes, floods, and tornadoes are inevitable, their effects can nevertheless be managed. Failing to do so exposes communities to economic disruption, damage to infrastructure and local agriculture, disruption of food and water supplies, harm to ecosystems, as well as upset societal, political, and environmental interactions, leading to other types of crises such as famines or food shortages (Morss, et al. 2011). Therefore, adequate attention to such threats is imperative. Through an empirical approach, this paper aims to shed light on the prevalent conditions augmenting vulnerabilities in the Rio Grande Valley, especially in the face of potential catastrophes.

Before proceeding, it is important to clarify key definitions pertaining to disaster response, mitigation, and preparedness. First and foremost, a disaster should be regarded not as a natural event, but rather as a social phenomenon, and accordingly must be understood in social terms (Quarantelli and Dynes 1977). Vulnerability, for example, is the product of a prevailing social condition (such as, high rates of economic inequality) through which disasters are made more likely and harmful (Lewis 1999). Using the term "natural hazard" in place of "disaster" can be considered a misrepresentation, as it is seen to ignore catastrophic events brought about by technological agents (Quarantelli and Dynes 1977), and therefore we will refrain from its use. It may be then concluded that vulnerability to a disaster is a pre-existing condition of society, which lies within the local social and cultural structures of a community, and therefore, social vulnerability and its origins must become a focus of study in order to protect the public (Dolan and Walker 2006).

CHAPTER II

REVIEW OF LITERATURE

On Social Vulnerability

How should we go about addressing the problem of vulnerability if, indeed, vulnerability is of social origin? Nethengwe (2007) argues that vulnerability is the product of socioeconomic, political and environmental factors within the community, a sentiment echoed by Lewis (1999), who agrees vulnerability is caused by decisions and policies created within society by those in power, or those seeking power. Furthermore, Wisner, et al. (1994) suggests that political factors promote vulnerability, as they determine the distribution of resources within communities. Notably, vulnerability exposes populations and communities to disproportional risks at every stage of the disaster process. For instance, while some disaster aid reaches its destination, often times segregated communities fail to receive help due to poverty, racial discrimination, and a host of other factors. It is important to understand that vulnerability is deeply embedded within the culture and institutions of communities, oftentimes expressed through dysfunctional government agencies, socioeconomic inequality, racism, gender inequality, age discrimination, and other factors.

Thus, addressing existing social inequalities may produce a stronger and more resilient community than the protection from natural hazards themselves (Dolan and Walker 2006). Finally, vulnerability generates from a socio-cultural and local context; and although this

condition prevails globally, it cannot and may not be assessed in such terms (Lewis 1999). Therefore, in order to address risk exposure and vulnerability, authorities must define, know and understand, the characteristics and needs of their communities, as they arise under different social and political contexts.

Socioeconomic Status

People's vulnerability may be traced to remote and general causes such as social, economic, and political processes influencing how hazards affect people (Wisner, et al. 1994). Low-income families and the unemployed are more vulnerable to severe weather disasters than households with higher levels of income and education (Musyoki, Thifhulufhelwi and Murungweni 2016). Often lacking insurance and savings, the poor have been shown to suffer the greatest disaster losses and oftentimes experience difficulties recovering destroyed homes and businesses (Fothergill and Peek 2004). Therefore, impoverished people are often most exposed to environmental harm, have fewer options in life, suffer more practical constraints, and enjoy fewer recovery resources (Enarson, Fothergill and Peek 2007). However, while studying the Ormoc and Cabalian Bay storm surges in the Philippines, Predo (2010) found that most respondents, despite their low socioeconomic status, sought to minimize disaster's impacts by following early warning systems such as evacuation, fortifying housing units, and relocation. This attitude was driven by immediate financial assistance to households and the community during and immediately after the disaster (Predo 2010), indicating that economic provisions to communities will increase their coping capacity. In conclusion, economic resources play an important part of severe weather preparedness and response, as low income levels limit the awareness of a population's environment regarding sudden climate change. Economic assets then

become vital under such circumstances, as they are key elements that allow people to respond to disasters effectively.

Race and Ethnicity

As with socioeconomic status, race and ethnicity play an important and established role in shaping how communities prepare for and recover from inclement weather. Insurance disparities may act as one mechanism through which minorities are made vulnerable to disaster. Uninsured groups face significant challenges from natural hazards given that home insurance is directly linked to the likelihood of housing recovery (Peacock, Morrow, and Hugh 1997). In relation to ethnicity, Darlington et al.(1999) observes low rates of insurance coverage among Mexican-Amerians in comparison to Caucasian-Americans. When it comes to minority households, house insurance is often inadequate as minorities suffer racial discrimination by larger insurance companies, as they are more likely to target Caucasian-Americans (Peacock, Morrow and Hugh 1997). Darlington et al. (1999) also found that Caucasian-Americans are not only more inclined than Mexican-Americans to prepare for possible disasters, but, by implication, they also become more resilient to said disasters. Warning communication and response among Mexican-Americans tends to follow social network channels (family and friends), as well as mass media, as they find these forms to be more reliable. In contrast, Caucasian-Americans and African-Americans are less likely to use social networks, and find official warnings more trustworthy (Darlington, Fothergill and Maestas 1999).

Other groups lacking social captial may be expected to be vulnerable to disster. Migrants, for instance, have sparser social networks in comparison to residents and may furthermore share a reluctance—particularly among those undocumented— to seek aid through

state institution (Donner and Rodriguez 2008). Language becomes an issue when linguistic differences for non-english speakers are ignored. An example of this is the Tornado warning failure in Saragosa, Texas, in 1987, as both the media and government officials did not fully account for the Mexican-American population within the area (Aguirre 1988). Government agencies and authorities within severe weather preparedness programs should be aware of, and adjust to, lingusitic differences of their respective communities, as well as knowing the best method to reach these communities, and thus, efficiently assist those in need.

Gender

Peacock, Morrow and Hugh, 1997, invite us to explore the unique experiences of women and men and to work away from a gender neutral social systems, which may generalize practices or events. When it comes to disaster, it becomes imperative not to generalize women's experiences with men's, but to embrace this complex intersection of experiences with other social dimensions such as race/ethnicity, culture, and class (Peacock, Morrow and Hugh 1997). While describing potential losses, men more often refer to infrastructure, roads, vehicles, etc.; they often downplay the hazard and refer to government strategies for community preparedness (Vasseur, Thornbush and Plante 2015). In contrast, women are notably more affected by hazardous conditions than men. Females are generally the poorest of the poor; thus, when disasters occur, they are left even more impoverished; consequently, they have a hard time recovering (Enarson, Fothergill and Peek 2007). In confronting winter storms in Atlantic Canada, women have been shown to be more vulnerable compared to men - however, through social interaction, experience, social knowledge, and use of technology, women can become more resilient to inclement weather (Vasseur, Thornbush and Plante 2015). In comparison to men, women also appear to respond to disaster in remarkably different ways, perhaps due to

radically different socialization experiences. As far as their experiences and preparedness, women show far greater concern with their homes and the welfare of families. As primarily caregivers of dependent children, elderly relatives, and those with special medical needs (Bateman and Edwards 2002), women find disaster warnings more credible and act on the knowledge by taking protective actions for themselves and their families (Enarson, Fothergill and Peek 2007; Peacock, Morrow and Hugh 1997)- During Hurricane Andrew, women relied on word of mouth to locate emergency and relief aid (Peacock, Morrow and Hugh 1997). In the event of evacuation, it falls to women to create and re-create a sense of security for children (Enarson, Fothergill and Peek 2007).

Children and the Disabled

Because of their size, levels of psychological and behavioral development, and dependence on adults, children are often considered among the most vulnerable (Brody, Peek and Zahran 2008). They require different forms of mental, social, physical, and emotional support; however, often times they cannot articulate their needs, assuming help is available (Peek 2008). Residing in poor communities, losing a parent, being separated from a family member, or experiencing malnutrition contributes to the risk and vulnerability of a child (Brody, Peek and Zahran 2008). While not all children are affected at the same magnitude by such catastrophes, it has been noted and criticized that both children and people with disabilities are often excluded from emergency preparedness planning at different levels of government (Peek and Stough 2010).

Furthermore, Peek and Stough (2010) address different factors of vulnerability affecting disabled individuals who may neither receive nor understand warning messages due to poverty

and exclusion from preparedness actions. Additionally, those with mobility limitations find it difficult to evacuate when disasters occur, thus may be less likely to abandon the area, putting themselves at a higher risk for injury or death. Furthermore, shelters aimed to provide essential services may not always be equipped with the necessary resources to care for disabled individuals (Donner and Rodriguez 2008). Medical aid can be significantly compromised for those with physical and mental disabilities, as loss or separation from their caregivers may lead them to suffer from life-threatening consequences (Peek and Stough 2010). People with physical or mental disabilities are more prone to illness and disease, as they have fewer opportunities to acces medical items and equipment after a disaster (Donner and Rodriguez 2008).

In conclusion, weather disturbances are also psychological stressors, as communities face potential scarcity of food, lack access to health care and transportation (Vasseur, Thornbush and Plante 2015). To yield more successful preparedness and coping strategies, it is important to promote cost effective, but, more importantly, efficient, hazard mitigation and structural mitigation plans (Morss, et al. 2011). While not all risks can be avoided, efficient and effective emergency response systems are needed to provide adequate assistance to victims – thus, it is vital for populations to familiarize with the different processes of the response systems available (Miller 1997). It becomes crucial to focus on addressing societal conditions at the community level that may enhance vulnerability and harm (Morss, et al. 2011). Donner (2007) proposes a look at the human ecological complex, which allows researchers to develop an understanding of catastrophes by looking at the social and environmental factors within a community, as it has been inferred within this paper that the characteristics of vulnerability are embedded within a community.

It should not be assumed that weather can be faced or managed by policies or planning alone, as false confidence can easily jeopardize response and recovery efforts such as rates of survival, especially for those places with low income levels; to ensure safety, people and communities need to be actively involved in order for those measures to be meaningful and successful.

CHAPTER III

METHODS

Research Setting:

As this study seeks to understand vulnerability in the Rio Grande Valley, we wanted to learn from experiences of individuals throughout the area as all experiences are unique and provide a different perspective of the prevailing conditions of the RGV. We have formed this study with the help of Our Voice/Nuestra Voz survey data collected through the Center for Survey Research & Policy Analysis at The University of Texas Rio Grande Valley. The Our Voice/ Nuestra Voz survey has allowed us to look at different aspects of vulnerability existing within our communities by capturing social behaviors regarding emergency preparedness. All data was analyzed using univariate and multivariate tests to assess prevalent conditions of vulnerability in the Rio Grande Valley. This study was approved by the Institutional Review Board at UTRGV:

Study Background, Data Collection, Sampling and Variables:

Our Voice/ Nuestra Voz Survey:

The Our Voice/Nuestra Voz Survey sought to highlight attitudes and opinions on policies affecting communities in the Rio Grande Valley. The survey included information on sociodemographic characteristics, and disaster preparedness that were used in this study.

The Our Voice/Nuestra Voz survey was a random digit dialed telephone survey collected by trained student interviewers through UTRGV's Center for Survey Research and Policy Analysis (CSRPA). In total, 728 telephone surveys were administered by trained bilingual (in English and Spanish) UTRGV students to a random sample of adults aged 18 and older in Cameron, Hidalgo, and Starr counties. Data collection took place from April through July 2018.

A preparedness scale (E_kit) was constructed adding all the emergency preparedness variables in the survey which asked respondents about items they had previously purchased in preparation for a hurricane including a 3-day water supply, non-perishable food, a first aid kit, duplicate documents, baby supplies, pet supplies, flashlight, extra batteries, extra clothing, generator, paper maps, sandbags, extra gasoline; and whether the participant had discussed the development of an emergency response plan among his/her household. As a result, the "E_kit" scale was used as the dependent variable in a linear regression analysis. Due to the geographical location of the area, presenting a scale that measures hurricane preparedness gives an insight of current conditions of the sample.

Integrating the findings from the review of literature, the following independent variables were used in the linear regression model as follows:

- Spanish: language in which the survey was answered (English, Spanish)
- Hispanic: whether the participant is from Hispanic or Latinx origin
- Age: age of the participant at the time of the interview. For the purposes of this study all participants were 18 years or older.
- Sex: gender of participant

- Employment status: current employment status of participant at the time of interview.
- Lives in colonia: whether the participant residence can be considered a colonia; a makeshift shantytown in which the region's poor and indigents reside.
- Education attainment: highest level of education achieved by respondent.
- Household annual income: yearly household income.

Model was performed using Stata/IC 15 with the following hypothesis tested:

$$E\_kit = \alpha + \beta_1(\text{SPANISH}_i) + \beta_2\,(\text{HISPANIC}_i) + \beta_3\,(\text{AGE}_i) + \beta_4\,(\text{SEX}_i) + \beta_5(\text{EMPLOYMENT STATUS}_i) + \beta_6(\text{LIVES IN COLONIA}_i) + \beta_7\,(\text{EDUCATIONAL ATTAINMETN}_i) + B_8\,(\text{HOUSEHOLD INCOME}_i) + \varepsilon_i$$

CHAPTER IV

RESULTS

Table 1 provides an overview and analysis of the sociodemographic information gathered from Our Voice/Nuestra Voz Survey compared to regional sociodemographic information. Graph 1 illustrates the percentage of respondents who reported having the following items in preparation for a hurricane. Table 2 presents multiple linear regression results and Table 3 shows covariance analysis results.

Table 1. Sociodemographic Profile		
	Our Voice/ Nuestra Voz % or mean (N=609)	RGV* % or mean (N=1,344,999)**
County of residence: Cameron Hidalgo Starr	 28% 59% 13%	 31% 64% 5%
Hispanic Origin Mexican origin	90% n/a	90% 84%
Completed survey in Spanish	37%	n/a
Speaks Spanish at home	35%	61% 18 and older
Age (mean; Standard deviation (S.D.))	45 years S.D. 18	29.7 years
Female	54%	51%
Married	51%	60%
High School graduates	72%	64%
Unemployed	11%	5%
Lives in a colonia	40%	n/a
# of adults in household (mean; Standard deviation (S.D.))	3.4 S.D. 2.0	3.5
# of children in household (mean; Standard deviation (S.D.))	1 S.D. 1.3	2.7
Annual household income: Less than $10,000 $10,000- $19,999 $20,000- $49,999 $50,000 or more	 19% 19% 30% 32%	
Percentages might not add up to 100 due to rounding *Includes Cameron, Hidalgo, Starr, & Willacy Counties **Based on 2013-2017 ACS 5-year estimates		

Table 2. Graph 1

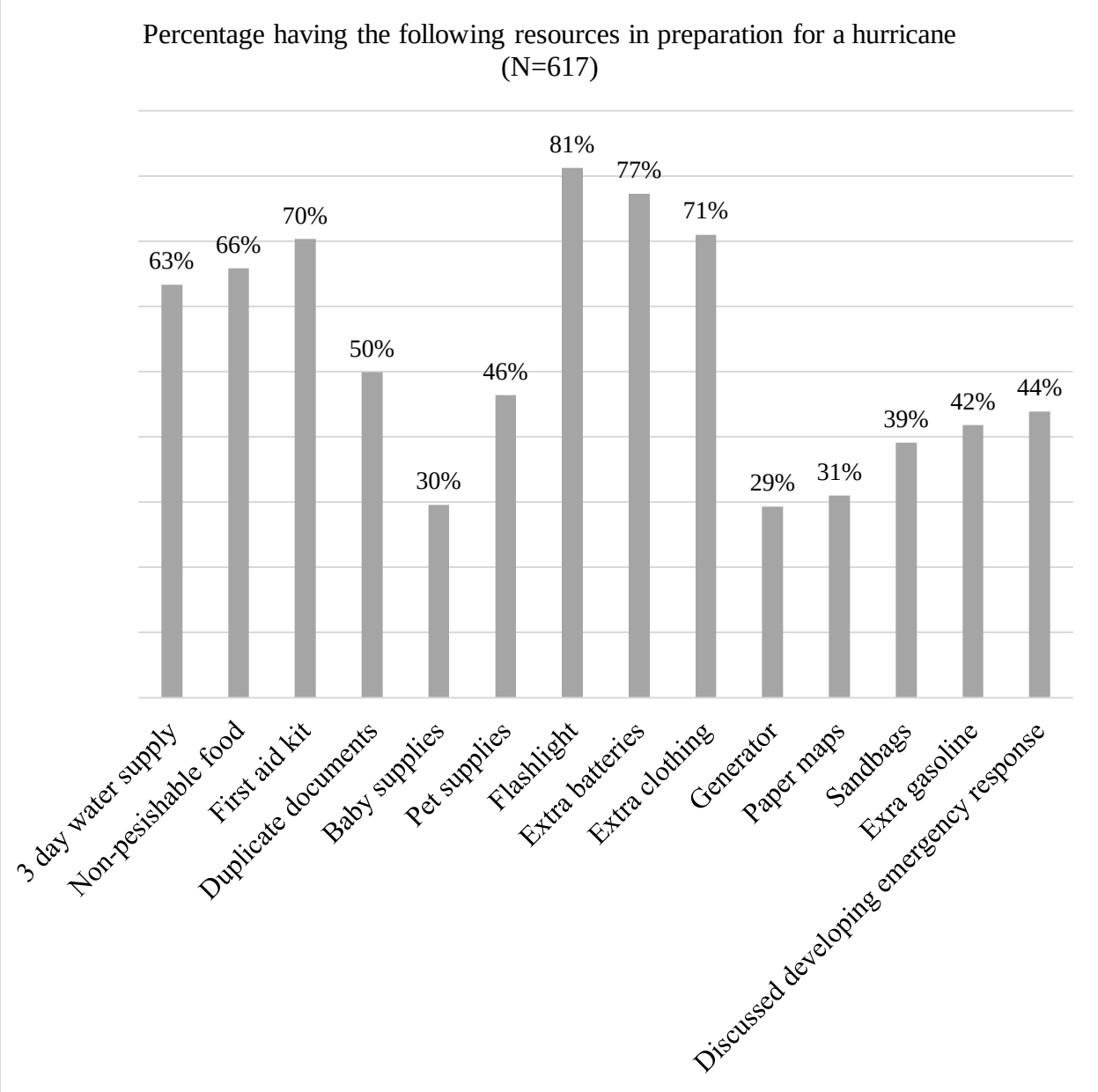

Table 3. Covariance Matrix

	E_kit	**Spanish**	**Hispanic**	**Age**	**Sex**	**Emp. status**	**Lives in a colonia**	**Ed. attainment**	**Hh income**
E_kit	1.0000								
Spanish	0.0074	1.0000							
	0.8550								
Hispanic	-0.0212	0.0012	1.0000						
	0.6032	0.9754							
Age	-0.0349	0.3302	0.0827	1.0000					
	0.4085	0.0000	0.0479						
Sex	-0.0092	-0.039	0.2705	0.0057	1.0000				
	0.8219	0.3379	0.0000	0.8913					
Empl. status	-0.0082	0.0154	0.3871	0.0266	0.3890	1.0000			
	0.8399	0.7033	0.0000	0.5258	0.0000				
Lives in a colonia	-0.0181	-0.043	0.0849	-0.0569	-0.0256	0.1314	1.0000		
	0.6564	0.2868	0.0356	0.1736	0.5279	0.0011			
Ed. attainment	-0.0006	-0.006	0.1171	-0.0264	0.3626	0.495	0.0503	1.0000	
	0.9890	0.8797	0.0037	0.5276	0.0000	0.0000	0.2140		
Hh income	0.0389	0.0602	0.1273	0.0109	0.1427	0.2161	0.1152	0.1719	1.0000
	0.3408	0.1367	0.0016	0.7958	0.0004	0.0000	0.0044	0.0000	

Table 4. Multiple Regression

E_kit	Coef.	Std. Err.	t	P>|t|	Beta
Spanish	-4.293855	2.455476	-1.75	0.081	-.0792313
Hispanic	-.0535626	.1749119	-0.31	0.760	-.0130959
Age	-.0132548	.064764	-0.20	0.838	-.0092519
Sex	-.0450006	.1871583	-0.24	0.810	-.0102035
Employment status	.0014836	.1670412	0.01	0.993	.0003784
Lives in colonia	-.0359501	.0567898	-0.63	0.527	-.0272473
Educational attainment	.0451449	.2621759	0.17	0.863	.0073396
Household income	.047513	.0342701	1.39	0.166	.0592196
_cons	25.13651	3.147959	7.99	0.000	.

R^2= 0.0105
Adj. R^2= -0.0039

Analysis

In order to understand "The Valley" it is important to know the conditions under which our population resides in. Our descriptive results show an overwhelming majority are of Hispanic origin: almost 40% of the participants preferred to answer the survey in Spanish, and about 40% of our respondents live below federal poverty levels. Furthermore, considering the high percentage of those who preferred to answer a survey in Spanish, there is perhaps an implied challenge to authorities in charge of emergency preparedness systems, to not only integrate but serve this population whether it is through warning systems, or policy recommendations. It is also important to mention the high levels of unemployment and poverty of which the sample is characteristic as the literature mentions these factors increase

vulnerability as the impoverished are often exposed to harm and have fewer resources to protect themselves and recover.

Table 2 depicts a dramatic pattern; considering the depth and breadth of controls, preferred language (B=-4.2; p<.10) holds a strong, negative association with emergency preparedness. Controls notwithstanding, Spanish speakers scored on average 4 points lower on the preparedness outcome when compared to respondents whose preferred language was English. Educational attainment, origin, and sex, among other variables (see table 2), were not significant predictors of preparedness.

Discussion

The purpose of this study is to understand local disaster vulnerability in the Rio Grande Valley. While disaster vulnerability is a global condition, vulnerability nevertheless originates at the local levels, and thus in order to confront the challenge of building resilient communities, we should focus on the immediate context under which groups are exposed to excess risk in the natural environment. Our Voice data suggests great challenges in this regard when it comes to the Hispanic community in the Rio Grande Valley. In a subpopulation with high unemployment and high poverty levels, it was expected to see these factors as play a role in emergency preparedness. As this is not the case, it is important to highlight that such findings should not be taken to mean that employment status and economic resources are not important when it comes to disaster vulnerability. The use of the "E-kit" variable is composed of mechanisms used by the RGV residents to prepare for disasters and therefore, reduce vulnerability; despite the results, unemployment and income, among other factors can be seen as possible predictors of vulnerability.

While the literature in this study focuses mostly on Mexican Americans, and the country/ies where the respondents are from are unknown, assumptions can only be made about the possible effects of race/ethnicity on vulnerability in this sample. However, as our sample mirrors the percentage of Hispanics in the Rio Grande Valley, and having obtained the percentages of Mexicans in the RGV (84%) thanks to the American Community Survey; it can be assumed that a majority population in our sample also is from a Mexican descent. This implies the RGV has potentially low resilience levels when it comes to disasters.

Furthermore, language was a surprising factor to see having such a strong association with preparedness. As was seen in the results, Spanish speakers appear to be much less prepared in comparison to their English-speaking counterparts. What is it that makes Spanish speakers less prepared, and therefore more susceptible to vulnerability? Is it that too much information is provided in English only? Or that information is not efficiently targeted to minority populations? Or, perhaps, that the subtleties of communication are lost when messages are translated from English to Spanish? Is it fear of prejudice and discrimination that prevents Spanish speakers to come forward and make their needs known? More research is needed to determine the precise mechanisms by which language preference appears to reduce preparedness.

CHAPTER V

LIMITATIONS, FUTURE RESEARCH, AND CONCLUSION

As with any other study there are limitations; those pertaining to this work are worth mentioning to truly address the topic of vulnerability. Perhaps most notably are potential issues with measurement. While the list of acquired resources gives us an overview of the items local residents purchase in preparation for a hurricane or flood, the question ignores those items by which people safeguard their homes, and therefore might mistakenly imply security by the use of the word "safer" within the question. Among the most common supplies respondents purchase in preparation for a hurricane are flashlights, extra batteries, clothing, and first aid kit are the most common. It is worth mentioning these items are oftentimes conventional in households as they serve multiple purposes when compared to a generator, a paper map, or baby supplies. Thus, potential validity issues may be present in the preparedness construct: does possession of preparedness items signal a psychological intention to prepare, or, rather, does the measure simply represent the acquisition of common household commodities? Future studies should address whether preparedness scales measure preparedness proper or something more prosaic. Furthermore, Our Voice/ Nuestra Voz survey asks if people discussed developing an emergency response with their families, however, it is unknown if an emergency response plan was actually set up. These questions were used to create our variable "E-kit", so these limitations, if addressed could improve quality of the scale. Second, the use of a cross sectional design allows only for

analysis of observed associations. Third, variables such as immigration status and average household number could be added to the model to assess other aspects of preparedness.

Future research should look at those variables that were not significant in this model. Moreover, considering the significance of language in emergency preparedness, the use of media and social capital variables will be useful methods to understand how Spanish speakers learn about emergencies. Further work will also be needed to examine the impact of institutions and authorities on Spanish speakers to better understand their levels of preparedness.

While the aspects that make a population vulnerable cannot all be defined, as all communities are different and unique in backgrounds and experiences, this study has shed a light on some of the factors that influence vulnerability in the area of the Rio Grande Valley. The easiest way to improve disaster resiliency in this community is to integrate Spanish in emergency preparedness systems, which will improve the resilience of the local Spanish-speaking community. As far as unemployment or poverty levels, these are issues known to be harder to address not only in the context of vulnerability but also in social terms. However, a community constantly looking for the improvement of its members can and will in itself find opportunities to do so. If we intend to address local disaster vulnerability, researches and authorities must step forward to understand the population they serve, from the small pockets of vulnerability existing within our communities to the more prominent ones.

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BIOGRAPHICAL SKETCH

Yajaira I. Ayala earned her BA degree in Sociology at the University of Texas Rio Grande Valley in 2016. Consecutively, in 2017, she also received her MA in Disaster Studies at the same institution in May 2019. During this time she became a research assistant to Dr. Suad Ghaddar, working on health disparities and emergency preparedness related projects.

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