

# Vietnamese Americans' Experiences With Hurricane Harvey: Diversities and Unequal Challenges With Recovery

Mai Do, School of Public Health and Tropical Medicine, Tulane University, USA\*

 <https://orcid.org/0000-0002-2965-4812>

Jannette Diep, BPSOS-Houston, USA

NhuNgoc K. Pham, School of Public Health and Tropical Medicine, Tulane University, USA

 <https://orcid.org/0000-0003-3584-2147>

## ABSTRACT

Immigrant populations in the United States continue to receive inadequate attention in disaster preparedness, response, and recovery despite the increasing frequency and intensity of disasters and catastrophic events. This analysis documents the experiences and challenges of Vietnamese Americans in the Houston metropolitan area after 2017 Hurricane Harvey. Findings highlight diverse experiences and unequal successes and challenges among this population. It is critical for planners and emergency managers to take into account such recovery asymmetries to better prepare for and plan their responses to natural disasters and the current or future pandemics.

## KEYWORDS

Challenges, Disaster Recovery, Diversities, Hurricane Harvey, Vietnamese Americans

## INTRODUCTION

There is an assumption among the public that when a disaster occurs, government agencies like the Federal Emergency Management Agency (FEMA) are responsible for assistances and compensation for damages and losses caused by the disaster (Greer, 2015; Schneider, 2008). In areas where natural disasters tend to occur frequently, it is therefore critical to understand the extent to which residents feel that they can trust and rely on agencies and organizations that provide assistance in disaster recovery processes. It is also important for local agencies to have the capacity to not only assess but also communicate residents' needs and priorities for assistance, and challenges in accessing resources, should a catastrophic event occur. In the absence of such capacity, the federal government and other agencies are likely unable to effectively respond and assist in the recovery. Our analysis aims to document perceptions of government and non-governmental agencies' disaster responses from the perspective of a major immigrant population.

DOI: 10.4018/IJDREM.322775

\*Corresponding Author

This article published as an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>) which permits unrestricted use, distribution, and production in any medium, provided the author of the original work and original publication source are properly credited.

Little attention has been paid to the post-disaster recovery of immigrant populations; they have been called the “silent victim” of disasters (Johnson, 2008). Immigrants are likely at an increased vulnerability to disasters since they have limited capacity to prepare for, respond to, or recover from them (Lindell & Perry, 2003). Such vulnerabilities have been attributed to immigrants’ limited language skills, geographical isolation, and lack of social acculturation (Kaplan & Huynh, 2008; Mathew & Kelly, 2008; Nguyen & Salvesen, 2014; Seidenberg, 2005; Shiu-Thornton et al., 2007). Immigrants, like Vietnamese Americans (VA), who experienced previous, repeated traumas related to the Vietnam War and the hardship of migrating to the United States may also be more adversely impacted by disasters than other immigrant groups (Nygaard et al., 2017; Rasmussen et al., 2012; Steel et al., 2002). Yet, disaster response strategies continue to be built around culturally neutral frameworks (Nguyen & Salvesen, 2014; Vitiello, 2009); even if state officials recognize the needs for culturally sensitive responses, it often is not a priority. Unless equities are consciously and intentionally built into planning strategies, challenges will remain in disaster preparedness and responses that are sensitive to the diversity and vulnerability of immigrant populations.

Hurricane Harvey made landfall near Rockport on the Texas coast as a category 4 hurricane on August 25, 2017. Flash flooding spread widely across most of Harris County as the rainfall continued through August 30<sup>th</sup>; a third of the Houston area was under water. The storm affected 13 million people within Texas, Louisiana, Mississippi, Tennessee, and Kentucky, destroyed about 12,000 homes, and damaged another 200,000 (Brasier & Thompson, 2018; FEMA, 2017; Moravec, 2017). Responses to the disaster were expansive: two months after the hurricane, it was estimated that at least 400,000 hurricane survivors applied for individual assistance from FEMA (McLaughlin, 2017).

The Houston metropolitan area has been one of the most rapidly growing and diverse populations in the nation (Capps & Soto, 2018). Immigrants are concentrated in Harris County and had quickly grown in the population size between 2010 and 2017. Asian immigrants had grown 29% during this period, second only to those from Central America. Vietnamese immigrants were the fourth largest immigrant group in the Houston area in 2017 with more than 90,000 people (Capps & Soto, 2018) and is estimated to continue growing in size. Nevertheless, little is known about how immigrants fared after Hurricane Harvey struck the region. The impact of the hurricane on the Vietnamese community has remained undocumented, despite Houston being home to the second largest Vietnamese population in the country. This analysis sheds light on how this population were affected by the hurricane.

The focus on the Vietnamese population in the current study was due primarily by two drivers: 1) the lack of evidence on the scope of adverse impacts and the extent of support received among immigrants in general, and VA in particular, after a natural disaster, and 2) meanwhile, the limited number of studies that included a very small sample of VA, indicated significant disparities in post-disaster support and recovery between ethnic groups. A recent review of the literature indicated that there were very few studies that documented the impacts of Hurricane Harvey on Asian populations (Flores, Collins, Grineski et al., 2020); when they did, the sample of Asian population was very small and often aggregated to one group of Asian and Pacific Islanders, which masked the diversity of experiences of this group (see, for example, Bozick, 2021; Bevilacqua et al., 2020; Schwartz et al.; 2018). Yet, this small number of studies already pointed to significant disparities between ethnicities in their experiences in coping with the aftermath of disasters. For example, Flores et al. (2021) summarized that racial/ethnic minority groups had more constrained access to resources for disaster impact mitigation prior to Harvey, compared to other groups, and were also bore disproportional impacts of the hurricane on their physical and mental health. While studies that included Vietnamese or Asian populations did not include similar conclusions due to the small samples, they all highlighted strong, positive associations between personal and property exposures to the hurricane with worse health outcomes (Bozick, 2021; Bevilacqua et al., 2020; Schwartz et al.; 2018). This study will fill the gap by documenting immediate challenges faced by Vietnamese Americans in the aftermath of Hurricane Harvey.

## DATA

Data came from a structured survey of 120 VAs randomly selected from approximately 600 VA clients of Boat People SOS-Houston (BPSOS-Houston), a Vietnamese non-profit social and legal services provider. The survey took place between November 2018 and February 2019, with ethical approval from Tulane University. Participants were selected based on the following criteria: 1) be a Vietnamese American aged 18 or older; 2) have experienced Hurricane Harvey; and 3) have received some direct or indirect assistance related to the hurricane through BPSOS.

While the data were collected in a cross-sectional survey, participants were asked retrospectively about their experiences with Hurricane Harvey, which happened just over a year before the survey. The survey included questions about hurricane related damages and losses, assistance from government and non-government agencies, and health related questions. Participants were also asked about acculturation with regard to English language skills, preferred language used at home and social gatherings, social contacts, and food preferences. Two measures of acculturation were used in the analyses: an English language skill score and an overall acculturation score that consisted of all components mentioned above. Higher scores indicate higher levels of assimilation to the U.S. society and better English.

Descriptive analyses were conducted to document the impact of the hurricane, participants' perceptions of government and non-government sectors' responses, and variations in such perceptions by participant's characteristics and levels of losses and damages. Cluster correspondence analyses (Sourial et al., 2010; van de Velden et al., 2017), in combination with multivariable analyses, were used to identify individuals or groups that may be more likely to experience challenges after the disaster. We examined such associations with whether one reported any difficulty and if one reported many difficulties (i.e., 3 or more difficulties out of 8), compared to others. Acculturation was excluded from these analyses because of its correlation with English language skills. Similar correspondence analyses were conducted with perceptions of disaster responses, but the small sample size and their correlations with hurricane related damages and challenges prevented us from implementing multivariable analyses on these outcomes. All analyses were conducted with Stata 15 statistical software (StataCorp, 2017).

## RESULTS

Table 1 shows a diverse group of participants with regard to age and gender. Nearly everyone owned the place that they were living in at the time of the survey; about 40% were living in a condo or an apartment. English language skills and the acculturation score suggested that participants on average were neither Vietnamese- nor American-oriented, with the average scores being in the middle of the range. In other words, they were likely bicultural. About three in five participants were currently married, more than half (~55%) had less than 12 years of schooling; and Catholicism and Buddhism were the two major religious groups, accounting for 88% of all participants (results not shown).

Property damages and losses due to the hurricane were widespread. Three in four participants reported some property damages; 45% reported severe damages or total destruction by Hurricane Harvey. Nearly 30% reported loss values of \$25,000 or more; yet only one in three participants had insurance to cover some of the property losses. Another one-third of participants reported losing jobs since the hurricane.

### Difficulties in the Immediate Aftermath of the Disaster

Table 2 shows the challenges that VAs faced with in the first few weeks post-Harvey. Financial problems, living in a crowded or unsanitary condition, and humiliation and embarrassment related to these challenges were most frequently reported, by nearly 70% of participants. In terms of severity, crowded and unsanitary living conditions remained the most frequently reported challenge with nearly one-third of participants reported having "a lot" or "extreme difficulty" with it. It was followed by

**Table 1. Characteristics of participants**

	Percent (%) or Mean (s.d.)
Total (N)	100.00 (120)
Age	
64 or younger	71.43
65 or older	28.57
Gender	
Female	53.33
Male	46.67
Ownership of house currently lived in	
No	5.00
Yes	95.00
Types of housing	
Apartment/condo	40.21
Single home	59.79
English skills (range = 0-23)	11.71 (4.68)
Acculturation (range = 0-36)	18.62 (6.85)
<b><i>Hurricane Harvey related characteristics</i></b>	
Unemployment since the hurricane	
No	66.67
Yes	33.33
Property damages	
No or minimal damages	24.17
Moderate damages	30.83
Severe damages/total destruction	45.00
Estimated loss values	
Less than \$25,000	70.80
\$25,000 or more	29.20
Having insurance to cover property losses	
Yes	33.33
No	66.67

**Table 2. Difficulties in the first few weeks after Hurricane Harvey**

Difficulty	Percent (%)				
	None	A Little	Some	A Lot	Extreme Difficulty
Shortages of food, water or clothing	39.66	21.55	18.10	12.93	7.76
Problems getting needed medicines or medical attention	60.87	17.39	7.83	12.17	1.74
Financial problems	32.17	23.48	19.13	13.04	12.17
Crowded/unsanitary living conditions	31.62	22.22	13.68	22.22	10.26
Family arguments	75.44	9.65	9.65	3.51	1.75
Embarrassment or humiliation	32.74	24.78	21.24	13.27	7.96
Fears of crimes	42.61	12.17	16.52	14.78	13.91
Lack of information from the authorities	45.69	21.55	14.66	12.93	5.17

fears of crimes (approximately 29% reporting having “a lot” or “extreme difficulty”) and financial problems (about 25%).

Table 3 shows associations between individual’s characteristics and factors related to Hurricane Harvey’s impacts with the likelihood of experiencing any and/or many difficulties in the first few weeks after the disaster. For each outcome, column (1) showed the percentage of individuals reporting the outcome among each sub-group, while column (2) showed the adjusted odd ratios of the associations when controlled for all other factors. Results were fairly consistent between the two outcomes. Among the socio-demographic characteristics, a low level of English skills, having lived in an apartment or condo, and not having ownership of residence were associated with higher probabilities that one would report any, as well as many difficulties, in the first few weeks post-disaster. Only the English skill level showed a statistically significant association with either outcome. The percentage of participants who reported many difficulties was higher among males (53.6%), compared to females (45.3%), but it was not significant.

**Table 3. Associations between individual's characteristics and having difficulties in the aftermath of Hurricane Harvey**

	Having Any Difficulties		Having Many Difficulties	
	% (1)	Adj. OR (s.e.) (2)	% (1)	Adj. OR (s.e.) (2)
Age				
64 or younger	74.12	1.00	49.41	1.00
65 or older	70.59	.41(.29)	50.00	1.01 (.71)
Gender				
Female	73.44	1.00	45.31	1.00
Male	73.21	.71 (.41)	53.57	1.31 (.74)
Ownership of house currently lived in				
No	83.33	1.00	66.67	1.00
Yes	72.81	.95 (1.23)	48.25	.12 (.16)
Types of housing				
Apartment/condo	74.36	1.00	46.15	1.00
Single home	68.97	2.26 (1.59)	41.38	2.04 (1.38)
English skills		*	*	*
Low	81.67	1.00	60.00	1.00
High	65.00	.25 (.16)	38.33	.25 (.16)
<b><i>Hurricane Harvey related characteristics</i></b>				
Unemployment since the hurricane				
No	72.37	1.00	46.05	1.00
Yes	73.68	.82 (.51)	55.26	2.02 (1.18)
Property damages	*		***	+
No or minimal damages	62.07	1.00	27.59	1.00
Moderate damages	64.86	.73 (.49)	37.84	1.75 (1.31)
Severe damages/total destruction	85.19	2.42 (2.06)	68.52	4.24 (3.48)
Estimated loss values	*		***	*
Less than \$25,000	68.75	1.00	38.75	1.00
\$25,000 or more	87.88	4.42 (5.19)	75.76	5.39 (4.17)
Having insurance to cover property losses	**		**	
Yes	55.00	1.00	30.00	1.00
No	82.50	3.77 (2.41)*	58.75	2.74 (1.69)

+ p<.10; \*p<.05

Three out of four factors related to the hurricane also showed significant associations with reporting any or many difficulties post-disaster, with the exception of job loss. The percentage of participants reporting any or many difficulties was highest among those with the most property damages (85.2% and 68.5%, respectively), followed by those with moderate damages (64.9% and 37.8%, respectively); it was lowest among those with the least amount of damages ( $p < .05$  and  $p < .001$ , respectively). Similarly, an estimated loss of \$25,000 or more in property damages was associated with a significantly higher percentage of those reporting difficulties, compared to those with lower loss estimates. The same pattern was observed between those that had insurance to cover property losses versus those who did not. With regard to job loss since the hurricane, there were no differences between those who lost their job and those who did not with regard to reporting any difficulties, but the percentage of reporting many difficulties in the immediate aftermath was higher among those who became unemployed, compared to those who did not, even though this difference did not reach the statistical significance level of .05.

Results from the cluster correspondence analyses are shown in Figures 1 and 2. Both figures indicated a strong degree of clustering between different measures of property damages and having difficulties in the first few weeks after the hurricane. Unemployment, consistently with the multivariable analyses, did not show a strong clustering pattern with any of the other measures. Having little or moderate damages was not “clustered” with any other hurricane related factors, nor was it with reporting difficulties.

### Disaster Responses

Given the frequency and severity of these challenges, it is critical that information of responses by the government and non-government sectors was widely available to communities and individuals.

Figure 1. Correspondence analysis map of hurricane related factors and reporting any difficulty in the hurricane immediate aftermath among Vietnamese Americans in Houston, 2018

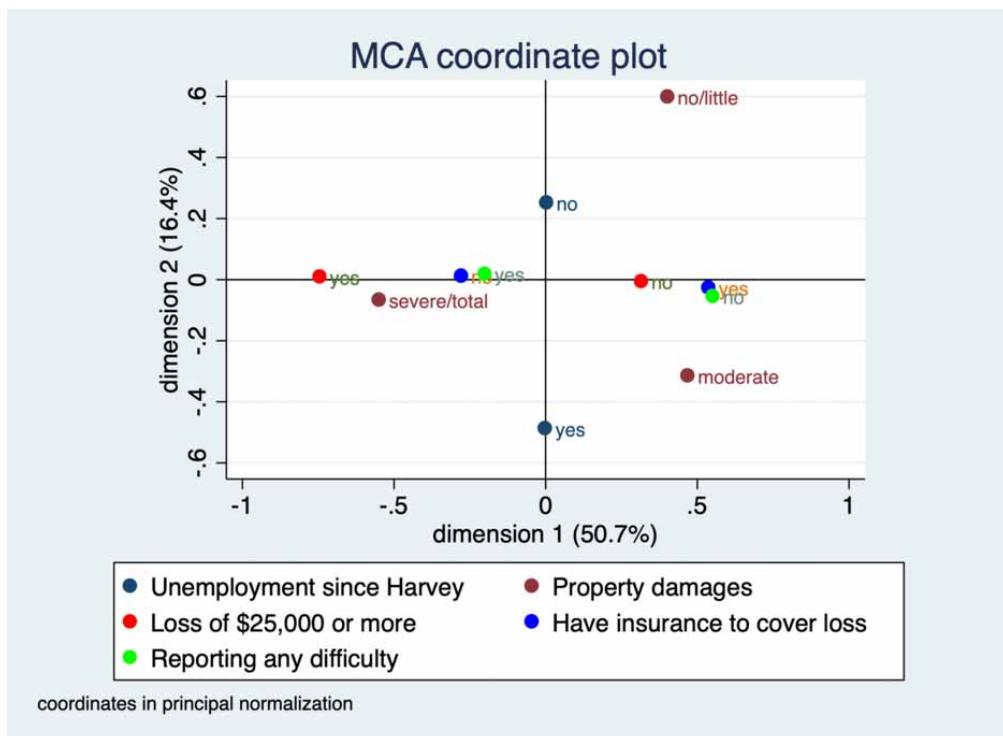
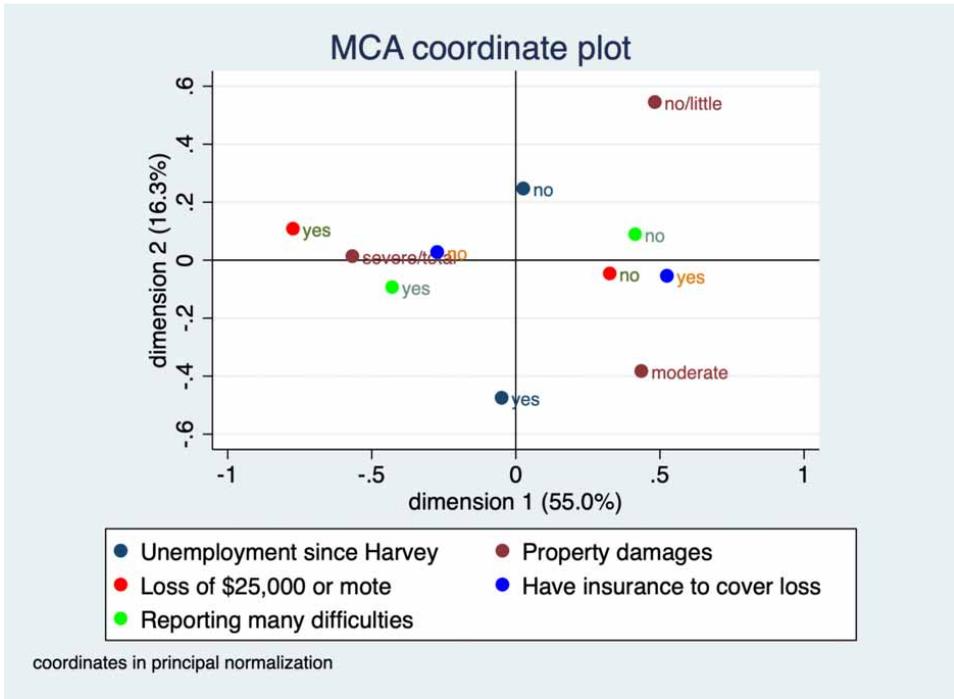
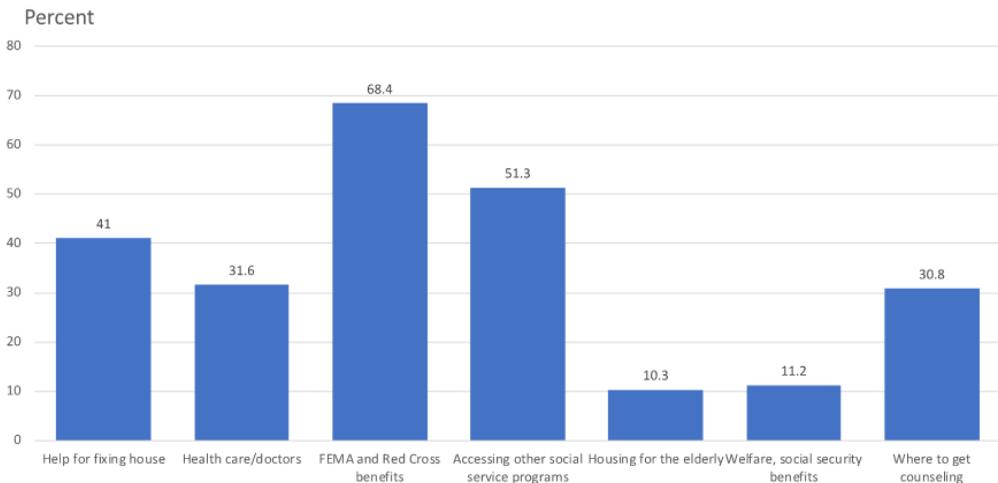


Figure 2. Correspondence analysis map of hurricane related factors and reporting many difficulties in the hurricane immediate aftermath among Vietnamese Americans in Houston, 2018



However, it did not seem to be the case as shown in Figure 3. Information about assistance programs and services from FEMA and the Red Cross, the two most well-known agencies, was reportedly not available to a third of the participants. Only half of the participants were aware of other social service programs; just over 10% was aware of information on welfare and social security benefits in general. While housing was one of the key challenges post-Harvey, only two in five participants reported

Figure 3. Information available in the neighborhood in 12 months after the storm



information available on how to fix the house. Housing for older people, in particular, was available to only one in ten participants. Information on access to health care and where to get counseling if needed, which is critical to maintain continuity of care and reduce disaster related stress and anxiety, was not available, as less than one-third of the participants reported having this type of information in the few weeks after Hurricane Harvey.

The vast majority (92%) of participants had applied for disaster aid from at least one of these organizations: FEMA, Red Cross, and other voluntary and religious organizations (results not shown). Assistance from FEMA was the most popular with 88% of participants having applied for, followed by voluntary and religious organizations; just over half (53%) of participants had applied for assistance from Red Cross. Participants were asked to assess the responses to the public by various agencies in general, not necessarily limited to those they had applied to. Participants’ perceptions of the extent of responses were presented in Table 4, and those of the timing of responses were presented in Table 5.

Overall, three out of eight agencies were ranked as having a “poor” or “very poor” response, with the median being 2 (42.5% participants ranked 2 or more agencies with this type of response). Two-thirds (65.8%) of participants rated at least one agency as having a poor response. FEMA, Red Cross, and other relief agencies had the highest percentages of participants considering their responses to the disaster as “good”, “very good” or “excellent”, with FEMA leading the group. As participants expressed concerned about crimes, they also did not rank responses by the police or armed forces very high. Insurance companies had the lowest ranking overall – they had the highest percentage of participants ranking their responses as “very poor” or “poor” and the lowest percentage ranking them as “very good” or “excellent”. Coupled with participants’ report of property losses and insurance coverage, this finding can be quite concerning about the disaster’s long-term financial impacts.

The overall numbers with regard to the timing of responses were similar. On average three agencies were rated as having a “poor” or “very poor” timing of response. Sixty-five percent of participants ranked at least one as having a poor timing of response. FEMA, Red Cross, and other relief agencies, unsurprisingly, received the top rankings as having “good”, “very good” or “excellent” timing of responses. Insurance companies, again, had the highest percentages of participants who ranked their timing of responses as “very poor”, “poor” or “fair”.

We then examined variations in ratings of the extent and timing of responses by participant’s characteristics and level of losses. Regardless of ownership, people who were living in a single home at the time of the hurricane had a higher percentage ranking at least one agency as having a poor response, as well as ranking more agencies as having a poor response, compared to those living

**Table 4. Ratings of the extent of responses from government and non-government agencies**

Agency	Percent (%)					
	Very Poor	Poor	Fair	Good	Very Good	Excellent
FEMA	1.79	7.14	28.57	32.14	21.43	8.93
The state and local police	1.02	3.06	40.82	37.76	11.22	6.12
Other parts of state and local government	1.01	4.04	42.42	38.38	13.13	1.01
National guards and the armed forces	1.06	4.26	46.81	31.91	11.70	4.26
Red Cross	--	5.88	32.35	44.12	13.73	3.92
Other relief agencies	.95	1.90	31.43	43.81	18.10	3.81
Insurance companies	7.69	15.38	45.38	24.18	3.30	1.10
The American public	2.88	4.81	30.77	39.41	14.42	7.69

Table 5. Ratings of the timing of responses from government and non-government agencies

Agency	Percent (%)					
	Very Poor	Poor	Fair	Good	Very Good	Excellent
FEMA	.91	6.36	29.09	34.55	18.18	10.91
The state and local police	--	5.94	37.62	35.64	14.85	5.94
Other parts of state and local government	1.01	5.05	38.38	36.36	15.15	4.04
National guards and the armed forces	--	6.45	45.16	29.03	12.90	6.45
Red Cross	--	6.00	35.00	38.00	18.00	3.00
Other relief agencies	--	5.71	29.52	40.40	19.05	5.71
Insurance companies	6.52	16.30	46.75	28.26	1.09	1.09
The American public	.98	8.82	32.35	39.22	11.76	6.86

in a condo or an apartment ( $p < .10$  and  $p < .01$ , respectively). Similar patterns were found when we compared participants with a high acculturation score and those with a low score ( $p < .10$  in both cases). Variations in ratings of timing of responses followed the same patterns. Participants who were older than 65, and those who lost more than \$25,000 in values also showed the same patterns, when compared with others, although these differences were not statistically significant.

Results from the correspondence analyses of perceptions of the extent and timing of disaster responses indicated some clustering between poorer assessments of the responses and higher levels of damages and losses due to the hurricane, similar to what was observed with difficulties reported (results not shown). Those with less extensive damages and losses were also less likely to have critical assessments of disaster responses.

## DISCUSSION

This current study filled the gap in the recent literature in how VA populations coped with challenges and difficulties in the aftermath of a natural disaster. Our analysis documented experiences of VAs with Hurricane Harvey, their financial and property losses, difficulties and challenges in the immediate aftermath, and their perceptions of assistance provided by government and non-governmental organizations in the recovery process. The levels of damages reported by VA participants were in line with what was reported earlier by the Kaiser Family Foundations for the general population; however, the previous authors did not provide a breakdown by immigration and ethnicity (Hamel et al., 2018). They also reported that immigrants, both legal and those potentially undocumented, were more likely to report not getting the help they needed than did native born residents (Hamel et al., 2018).

Our findings were consistent with previous studies, where we documented strong associations between more severe hurricane-related personal and property damages and losses with challenges faced in the hurricane aftermath. Those who reported more damages and losses were more likely to be faced with challenges, and also more likely to be dissatisfied with the government's responses. Limited English skills further contributed to the asymmetric access to resources and information that will be discussed later. These findings indicate that community-based organizations that work closely with communities can play a critical role in identifying those most vulnerable and in need of support to allocate their resources, particularly in the scarcity of government resources. The findings also underline the importance of participatory approaches to involving these organizations in disaster planning, preparedness and responses, as discussed later.

The housing situation of VAs is worth commenting on. Follow-up conversations with the leadership of BPSOS-Houston and the community revealed that many residents owned condos that were converted from rental apartments in dilapidated and poorly maintained buildings in low-income neighborhoods. This explained the high home ownership in the sample. On the other hand, many residents cannot purchase home insurance because either the home is too old or poorly maintained, or they cannot afford it. Consequently, they will most likely be in dire situation and need government assistance next time a hurricane hits.

We also found that many VAs were more critical of the recovery responses than others. Our findings that the level of satisfaction with the extent and timing of disaster responses varied by type of housing and immigrants' level of acculturation and were in line with previous studies on assistance application (Rivera, 2019) and disaster recovery (Nguyen & Salvesen, 2014). While home damage could motivate individuals to apply for FEMA aid, Rivera (2019) argued that informational asymmetries might have played a role, in which those who did not suffer damage but were qualified for FEMA aid might not be aware of such available assistance, and consequently did not apply for it. In our study, there could be a similar scenario, where individuals living in a single home and lost more in monetary values were more aware of assistance programs and/or expected more of them; therefore, they were more critical of those programs than others. The same could be said with those who were more acculturated or had better English skills, as they might have more access to and better understanding of assistance programs than those who were less acculturated. Another informational asymmetry revealed in our assessment and conversation with BPSOS-Houston was that many VAs returned to their damaged homes and decided to fix them on their own, or with help from their friends and neighbors, similar to what we had seen among VAs in New Orleans after Hurricane Katrina (Vu et al., 2009). While doing so, VAs were less likely to become aware of assistance programs available than others. This could have a long-term consequence as our community partner reported that many houses were not gutted and fixed properly, e.g., mold was left in the walls and only painted over. It can negatively affect health and increase costs to further repair or rebuild the homes. The potential lack of understanding in the long-term health consequences of poor mold repair coupled with the unavailability of health care information among the VA community underscore the need for improvement in the coordinated efforts of emergency support functions (ESFs) #15 and the ESF #8 in public information and warning post-disaster to account for the unique needs of population groups. An objective of both ESF #15 and ESF #8 is to ensure that recovery instructions, public health, behavioral health, disease, and injury prevention information should be transmitted to members of the general public in multiple and accessible formats and languages in a culturally and linguistically appropriate manner that is understandable to all. This appears to be a gap within the Hurricane Harvey response.

Asymmetries in information with regard to disaster assistance resources could present a real barrier for a significant proportion of VAs to speedy recovery. More recently, with increased frequency and intensity of natural disasters, and with the recent COVID-19 Pandemic, inequities in disaster preparedness, responses, and recovery have gained attention among the emergency management community. For example, emergency managers and public health specialists were paying attention on how to disseminate information on COVID-19 preventive and control measures effectively to immigrants with unique cultural needs and limited language proficiency. The fast-changing nature of disasters as well as the pandemic requires that cultural considerations need to be well embedded in the response footprint to ensure that everyone has access to information and resources (Biedrzycki & Koltun, 2012; Louissaint, 2017).

From the research perspective, it is critical to investigate the extent of possible information asymmetries in disaster assistance among immigrant groups and effective strategies to provide such information, in order to reduce disparities in disaster recovery. Understanding how immigrant groups may respond differently to disasters is also important for the training of disaster managers and planners on cultural needs and assets of diverse population groups, contributing to improved

planning for disaster preparedness and response (Nguyen & Salvesen, 2014). Some major metropolitan cities, such as Seattle-King's County, have found success in building community resilience post-disasters by working to reduce potential disparities in response and recovery resources before the disaster through interagency collaborations (King County Office of Equity and Social Justice, 2016; Louissaint, 2017). Cities like Boston, New York, Austin, and Baltimore have adopted a similar approach (Louissaint, 2017). Most recently, the Commonwealth of Virginia has taken the initiative to develop a Health Equity Work Group (HEWG) embedded within the COVID-19 response unified command and control structure to ensure equal representation within response and recovery activities to account for the Commonwealth's diverse immigrant and vulnerable populations' needs (Commonwealth of Virginia, 2020).

Another important aspect of disaster recovery is that it is crucial that immigrant communities are involved in the planning process even before a disaster happens, and trust is built with the communities in question. Citizen and community-based participatory approach to disaster planning and preparedness needs to be more widely embraced. Previous studies have suggested that heterogenous communities may face a greater challenge in disaster recovery compared to homogenous, tight-knit communities (Storr & Haeffele-Balch, 2012). In those heterogenous communities, community-based organizations (CBOs), formal or informal, serve a key role to connect community members with both informal and formal social resources, mobilizing strengths and resources within the community, and leveraging connections with resources outside of the communities (Abramson et al., 2015; Storr & Haeffele-Balch, 2012). Previous experiences of VAs after Hurricane Katrina have suggested that being part of a large immigrant population with ethnic group peers could have protective effects on the well-being and recovery post-disasters (Fussell, Sastry and VanLandingham, 2010). Nurturing strategic relationships with VA-serving CBOs can benefit government agencies in multiple ways: (1) it increases reach and engagement with a broader section of residents and (2) it helps agency staff understand the community's current level of understanding and needs in disaster preparedness and response, so culturally and context-appropriate actions can be taken. Such partnerships are also important in reducing misperceptions and mistrust of government agencies to reduce contentiousness during disaster responses as well as to maintain communication channels for keeping residents informed during prolonged disaster events. CBOs, like BPSOS-Houston, could serve as advisors to governmental task forces, work groups, and committees tasked with the decision-making that can impact immigrant communities without a clear understanding of their needs and challenges. This has proven effective within the innovative efforts of the Commonwealth of Virginia HEWG (Commonwealth of Virginia, 2020). In our case, BPSOS-Houston played that critical role within the VA community in the greater Houston area, providing information, direct assistance, advocacy as well as helping residents apply for federal and local disaster assistance. Government partnership with CBOs like BPSOS-Houston would likely enhance cultural competency in government agencies' response and recovery plans, as well as increase their ability to translate issues into relevant framing and discourse appropriate to the VA community in future disaster events.

This analysis is relevant to current dialogues between the emergency management community and the immigrant communities as we prepare for hurricanes with likely heightened frequencies and intensities, and particularly in the current COVID-19 Pandemic responses. Populations in the Gulf Coast are likely to face two major disasters at once if a major storm hits the region during a pandemic. Besides the challenges of getting information to immigrant communities effectively, federal and local government agencies will need to detail how COVID-19 control measures, such as social distancing and personal protective equipment, may work during evacuation and sheltering before and during a hurricane. It is critical for government agencies and CBOs to work closely together to provide information and training to prepare immigrant communities for disasters and to apply for assistance resources during disaster responses. All of these measures will need to be planned and implemented with considerations of the unique challenges and needs that immigrant populations face, rather than from a culturally neutral angle.

A limitation worth mentioning is that our participants were selected from BPSOS-Houston clients, who sought assistance related to the hurricane. Consequently, our sample therefore was not representative of the VA population in the Houston metropolitan area; and we were not able to perform an analysis of BPSOS-Houston's role and performance during the recovery process. In addition, it is not possible for us to compare the experiences of VAs with other populations within the scope of this study. Intentional comparisons between VAs, and Asian Americans with mainstream and other ethnic groups should be considered in future research. Another limitation of the survey is potential recall and self-reporting biases, as individuals with more severe damages and losses due to the hurricane may better recall their experiences, while being more critical of disaster responses. Nevertheless, the analysis still provides useful insight to disaster responses of an important immigrant population. Natural disasters of massive scales, like Hurricanes Katrina and Harvey, are believed to happen more frequently, and will require larger-scaled and sophisticated plans for preparedness, response, and recovery. For example, with Hurricane Harvey, FEMA alone provided enormous assistance through individual assistance, public assistance, and hazard mitigation grant programs (Brasier & Thompson, 2018). The total funding for FEMA's public assistance programs figured at approximately 91 billion dollars in the ten year period 1998-2018 (Brasier & Thompson, 2018). The financial, and non-financial, commitments from government and non-governmental agencies underline the need to ensure that these resources are made available, distributed, and used efficiently by all communities to promote equitable disaster recovery.

## **CONCLUSION**

Our analysis documented difficulties and challenges during the recovery process after a major natural disaster among VAs, a major immigrant population often neglected in disaster research and practices. Findings highlighted diverse experiences and unequal successes and challenges among this population. We also documented groups of VAs that may be most vulnerable to constrained resources for disaster preparedness and responses, as well as its adverse impacts. The findings will assist CBOs in identifying and allocating resources to assist these groups of individuals. It is critical for planners and emergency managers to consider such recovery asymmetries to better prepare for and plan their responses to natural disasters and the current or future pandemics.

## REFERENCES

- Abramson, D. M., Grattan, L. M., Mayer, B., Colten, C. E., Arosemena, F. A., Bedimo-Rung, A., & Lichtveld, M. (2015). The resilience activation framework: A conceptual model of how access to social resources promotes adaptation and rapid recovery in post-disaster settings. *The Journal of Behavioral Health Services & Research, 42*(1), 42–57. doi:10.1007/s11414-014-9410-2 PMID:24870399
- Biedrzycki, P. A., & Koltun, R. (2012). Integration of social determinants of community preparedness and resiliency in 21st century emergency management planning. *Homeland Security Affairs, 8*(1), 1–8.
- Brasier, R., & Thompson, J. (2018). FEMA to Play Long-Term Role in Recovery from Harvey. *Southwest Economy, (Q2)*, 15–17.
- Capps, R., & Soto, A. G. R. (2018). *A Profile of Houston's Diverse Immigration Population in a Rapidly Changing Policy Landscape*. Academic Press.
- Commonwealth of Virginia. (2020). *Commonwealth of Virginia Equity Leadership Task Force*. Retrieved July 17 from <https://www.vdh.virginia.gov/health-equity/>
- FEMA. (2017, September 22). *Historic Disaster Response to Hurricane Harvey in Texas*. <https://www.fema.gov/news-release/2017/09/22/historic-disaster-response-hurricane-harvey-texas>
- Greer, A. (2015). *Household residential decision-making in the wake of disaster: Cases from hurricane sandy* [Unpublished Doctoral dissertation]. University of Delaware.
- Hamel, L., Wu, B., Brodie, M., Sim, S.-C., & Marks, E. (2018). *One Year After the Storm: Texas Gulf Coast Residents' Views and Experiences with Hurricane Harvey Recovery*. Retrieved from <http://files.kff.org/attachment/Report-One-Year>
- Johnson, K. R. (2008). Hurricane Katrina: Lessons about immigrants in the administrative state. *Houston Law Review, 45*, 11.
- Kaplan, A. S., & Huynh, U. K. (2008). Working with Vietnamese Americans in disasters. *Ethnocultural Perspectives on Disaster and Trauma, 321-349*.
- King County Office of Equity and Social Justice. (2016). *King County Equity and Social Justice Strategic Plan 2016-2022*. <https://aqua.kingcounty.gov/dnrp/library/dnrp-directors-office/equity-social-justice/201609-ESJ-SP-FULL.pdf>
- Lindell, M. K., & Perry, R. W. (2003). *Communicating environmental risk in multiethnic communities* (Vol. 7). Sage Publications.
- Louissaint, N. (2017). Building Community Resilience Through Health Equity. *DomPrep Journal, 13*(4), 13–14.
- Mathew, A., & Kelly, K. (2008). *Disaster preparedness in urban immigrant communities*. A Tomás Rivera Policy Institute and Asian Pacific American Legal Center Report.
- McLaughlin, E. (2017). *Thousands rescued as Harvey's waters rise*. CNN. <https://www.cnn.com/2017/08/28/us/harvey-houston-texas-louisiana/index.html>
- Moravec, E. R. (2017). Texas officials: Hurricane Harvey death toll at 82, 'mass casualties have absolutely not happened.' *The Washington Post*. [https://www.washingtonpost.com/national/texas-officials-hurricane-harvey-death-toll-at-82-mass-casualties-have-absolutely-not-happened/2017/09/14/bff3ffea-9975-11e7-87fc-c3f7ee4035c9\\_story.html](https://www.washingtonpost.com/national/texas-officials-hurricane-harvey-death-toll-at-82-mass-casualties-have-absolutely-not-happened/2017/09/14/bff3ffea-9975-11e7-87fc-c3f7ee4035c9_story.html)
- Nguyen, M. T., & Salvesen, D. (2014). Disaster recovery among multiethnic immigrants: A case study of Southeast Asians in Bayou la Batre (AL) after Hurricane Katrina. *Journal of the American Planning Association, 80*(4), 385–396. doi:10.1080/01944363.2014.986497
- Nygaard, M., Sonne, C., & Carlsson, J. (2017). Secondary psychotic features in refugees diagnosed with post-traumatic stress disorder: A retrospective cohort study. *BMC Psychiatry, 17*(1), 1–11. doi:10.1186/s12888-016-1166-1 PMID:28056884

- Rasmussen, A., Cramer, M., Baser, R. E., Chu, T., & Gany, F. (2012). Onset of posttraumatic stress disorder and major depression among refugees and voluntary migrants to the United States. *Journal of Traumatic Stress*, 25(6), 705–712. doi:10.1002/jts.21763 PMID:23184423
- Rivera, J. D. (2019). Deciding to apply for federal disaster assistance: A preliminary investigation of disaster decision-making using a bounded rationality framework. *Journal of Homeland Security and Emergency Management*, 16(3), 20180039. doi:10.1515/jhsem-2018-0039
- Schneider, S. (2008). Who's to blame? (Mis)perceptions of the intergovernmental response to disasters. *Publius*, 38(4), 715–738. doi:10.1093/publius/pjn019
- Seidenberg, J. (2005). *Cultural competency in disaster recovery: Lessons learned from the Hurricane Katrina experience for better serving marginalized communities*. University of California, Berkeley School of Law.
- Shiu-Thornton, S., Balabis, J., Senturia, K., Tamayo, A., & Oberle, M. (2007). Disaster preparedness for limited English proficient communities: Medical interpreters as cultural brokers and gatekeepers. *Public Health Reports*, 122(4), 466–471. doi:10.1177/003335490712200407 PMID:17639649
- StataCorp. (2017). *Stata Statistical Software: Release 15*. StataCorp LP.
- Steel, Z., Silove, D., Phan, T., & Bauman, A. (2002). Long-term effect of psychological trauma on the mental health of Vietnamese refugees resettled in Australia: A population-based study. *Lancet*, 360(9339), 1056–1062. doi:10.1016/S0140-6736(02)11142-1 PMID:12383986
- Storr, V. H., & Haeffele-Balch, S. (2012). Post-disaster community recovery in heterogeneous, loosely connected communities. *Review of Social Economy*, 70(3), 295–314. doi:10.1080/00346764.2012.662786
- Vitiello, D. (2009). The migrant metropolis and American planning. *Journal of the American Planning Association*, 75(2), 245–255. doi:10.1080/01944360902724496
- Vu, L., VanLandingham, M. J., Do, M., & Bankston, C. L. III. (2009). Evacuation and return of Vietnamese New Orleanians affected by Hurricane Katrina. *Organization & Environment*, 22(4), 422–436. doi:10.1177/1086026609347187 PMID:20871780

*Mai Do received an MD degree from the Hanoi Medical University (Vietnam), and an MPH and a DrPH (Doctor of Public Health) degrees from the Johns Hopkins University (Maryland). She is currently an associate professor at Tulane University School of Public Health and Tropical Medicine. Her research interests include the health and well-being of Vietnamese immigrants, and access to and quality of health care services.*

*Jannette Diep is the Executive Director for Boat People SOS–Houston (BPSOS–Houston) a nonprofit organization with a 43-year history of meeting the needs of the Vietnamese and Asian community. She is a graduate from Louisiana State University and currently is serving on the Mayor's Advisory Council of New Americans, Empowering Community Initiative Leadership Council, and Connect for Healthcare Collaborative. Her research interests include health equity, mental health, social and economic factors that impact health.*

*NhuNgoc K. Pham received her MPH and Ph.D. (passed with honors) from Tulane University School of Public Health and Tropical Medicine in New Orleans, Louisiana. At Tulane, she serves as research analyst on several projects focused on behavioral health, health equity, and disaster impacts on well-being and quality of life. Her research interests include population dynamics, social determinants of health, mental health, post-traumatic growth, and natural and man-made disasters recovery and resiliency. She has conducted research and provided technical and analytical support in both the international and domestic settings.*