Original Article

Hurricane Katrina: prior trauma, poverty and health among Vietnamese-American survivors

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CHEN A.C.-C., KEITH V.M., LEONG K.J., AIRRIESS C., LI W., CHUNG K.-Y. & LEE C.-C. (2007) Hurricane Katrina: prior trauma, poverty and health among Vietnamese-American survivors. *International Nursing Review* **54**, 324–331

Background: The flooding of New Orleans after Hurricane Katrina revealed the disproportionate vulnerability of ethnic minority communities for emergency preparedness, disaster relief and health. Nurses need to analyse Katrina's health consequences for the most vulnerable segments of our society.
Aim: To examine factors contributing to differential health outcomes among the New Orleans Vietnamese community in response to Katrina.
Methods: A sample of 113 adult Vietnamese Katrina survivors from New Orleans was recruited. A mixed-method approach, including survey and focus groups, was used to collect data. Survey questions were modified from standardized instruments to evaluate survivors' health status and factors contributing to health outcomes. Multivariate and content analysis were used to investigate effects of prior trauma, financial strain, social support and acculturation level in predicting survivors' health outcomes.
Results: Findings suggested financial strain was the strongest risk factor for Vietnamese survivors' post-traumatic stress disorder (PTSD) symptoms, and physical and mental health post-disaster; while social support was a strong protective factor for health. Survivors who perceived higher impact from previous traumatic experiences had poorer physical health, but not PTSD symptoms or poor mental health after controlling for financial strain and social support, suggesting complex relationships among these measures in predicting PTSD symptoms and health. Less-acculturated individuals also reported higher levels of PTSD symptoms and poorer physical health.
Conclusions: Catastrophic events like Katrina can result in disproportionate risk of negative health outcomes among vulnerable populations. Nurses should take into account prior trauma, financial strain, social support network and acculturation level, to adequately address survivors' needs.

Keywords: Health, Katrina, Post-Traumatic Stress Disorder, Poverty, Prior Trauma, Social Support, Vietnamese

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Introduction

Research literature has demonstrated positive correlations between poor physical and mental health and residence in poor neighbourhoods (Blank 2005; LeClere et al. 1997). For instance,

individuals who live in poor neighbourhoods experience higher mortality (LeClere et al. 1997), are more depressed (Aneshensel & Sucoff 1996; Ross & Mirowsky 2001), and report higher prevalence of chronic diseases (Robert 1998) and poor health (Franzini et al. 2005; Schulz et al. 2000).

Before Hurricane Katrina made landfall in August 2005, Louisiana already experienced widespread poverty as 22% of the total population and 30% of the children in the state lived in poverty. Furthermore, Louisiana ranked 50th out of 50 states in the United States of America (USA) regarding the health of its population (Abramson & Garfield 2006). Almost 2 years later, the storm's aftermath continues profoundly to impact the livelihood and health of those who have experienced the trauma of evacuation, displacement, the return to and rebuilding in Louisiana. Abramson & Garfield (2006) pointed out that mental health was a significant issue for both parents and children displaced by Hurricanes Katrina and Rita: almost 50% of the parents said that at least one child in the household have had emotional or behavioural problems that did not exist prior to hurricane and more than 50% of female caregivers reported clinically significant mental problems. A phone survey by the Centers for Disease Control and Prevention (CDC) nearly 2 months after Katrina found that over 50% of adults living in New Orleans, the area most affected by Hurricane Katrina, had clinically significant stress (CDC 2006).

Ample evidence suggests that vulnerable populations, including those who live in poverty and are subject to discrimination, suffer disproportionate immediate and long-term negative health consequences during and after disasters (see Fothergill & Peek 2004). Prior to Katrina, the Vietnamese residential enclave in New Orleans East was populated by 42% Vietnamese refugees, immigrants and their US-born offspring, with about one-third living below the poverty line (U.S. Census Bureau 2000). Furthermore, literature has suggested the profound psychological impact of trauma and forced displacement on Vietnamese war refugees (e.g. Steele et al. 2002). Vietnamese in the enclave suffered a second forced evacuation and lost all their belongings in their lifetime, first from the Vietnam War 30 years ago and now by Katrina. Thus, many of the Vietnamese survivors of Hurricane Katrina may be at particularly high risk for physical and mental health problems owing to their previous traumatic experiences, residence in high poverty areas and the greater economic dislocation experienced post-hurricane. This already vulnerable population is likely to experience short-term and long-term physical and mental health problems because of another stressful life event (the hurricane) which resulted in numerous stressors, including loss of property and stress associated with relocation and disruption of social, neighbourhood and familial relationships.

Scholarly works that incorporate racial and class disparity issues in analysing events surrounding Katrina are just beginning to appear (see Bobo & Dawson 2007; Childs 2006; Cutter & Emrich 2006). However, empirical results from vulnerable Katrina survivors' own voices are still very limited (for an exception, see Elliott & Pais 2006), in particular among impoverished Vietnamese. It is critical for nurses to understand that Hurricane Katrina resulted in significant loss and stress in relation to individuals' socio-economic status and previous trauma in order to provide timely and adequate services to this population in its resettlement and rebuilding. Our study aimed to ameliorate this gap in the literature by investigating the relationships among prior trauma, financial strain, social support, acculturation level, and physical and mental health among Vietnamese survivors who resided in eastern suburbs of New Orleans, an area that was hard hit by Katrina.

Theoretical framework

We adapted Flaskerud & Winslow's (1998) vulnerable populations framework to examine resource availability, relative risk and health status among Vietnamese Katrina survivors. The vulnerable populations framework suggests that individual health status, measured by morbidity and mortality, reflects the dynamic interplay between resource availability and relative risk. In this framework, resource availability refers to financial and external resources available for health promotion and disease prevention such as human capital, social status, healthcare quality, or differential access to care. Relative risk reflects situations that increase general exposure to health risks such as unequal opportunity of receiving preventive care and exposure to stressful events (e.g. abuse, crime). Increased morbidity and mortality can further increase exposure to risks as well as further impoverish available resources. Using a combination of pre- and post-Katrina (p-K) indicators, we evaluated how these factors influenced Vietnamese's well-being in the aftermath of Katrina.

The research questions were:

1 What are the prior trauma, financial strain (p-K), perceived social support (p-K), acculturation level, post-traumatic stress disorder (PTSD) symptoms (p-K), physical and mental health (p-K) among Vietnamese Katrina survivors?

2 How do prior trauma, financial strain, perceived social support and acculturation level affect Vietnamese's PTSD symptoms when controlling for other socio-demographic variables?

3 How do prior trauma, financial strain, perceived social support and acculturation level affect Vietnamese's physical and mental health when controlling for other socio-demographic variables?

Methods

Sample, sampling design and procedures

This analysis was based on data from two sources: the self-reported survey data from 113 Vietnamese aged 18 and older collected from February 2006 to February 2007; and two focus groups, one with six participants in New Orleans, LA and one with five participants in Houston, TX. We used a purposive sampling strategy to recruit potential participants because the study aimed to understand and obtain information from a target population and sample representativeness was not the primary concern (Trochim 2006). Our collaboration with religious and community leaders proved to be effective in reaching the target population. The Vietnamese survivors were mostly recruited during the annual weekend long Vietnamese New Year *Tet* celebration held at a local church during February 2006. The celebration was well attended by those who had permanently returned to the community as well as by those still living with family elsewhere in the New Orleans metropolitan area or in neighbouring states. To assure sample diversity, we paired with bilingual Vietnamese research assistants to recruit participants who speak no or limited English. Participants received a small cash incentive put in red envelopes, a symbol of 'lucky money' for the Vietnamese New Year celebration, which appeared to be a culturally appropriate and effective way to encourage participation. The Institutional Review Board of Arizona State University and Ball State University approved the study. We obtained participant consents before conducting the study.

Measures

We adapted questions from existing valid and reliable instruments to examine research questions and developed guiding questions for our focus groups. Study materials were translated into Vietnamese and back-translated into English based on Brislin's (1970) model. The materials, evaluated by the two expert panels consisting of researchers, clinicians and lay people, were administered to five Vietnamese adults to evaluate the cultural and linguistic equivalence between the two versions of the measures before conducting the study. We also audiotaped or videotaped the focus group discussions with permission.

We used *The Impact of Event Scale-Revised* (IES-R; Weiss & Marmar 1997), a measure designed to assess subjective distress parallel to the Diagnostic and Statistical Manual of Mental Disorders-IV criteria for PTSD in the past 7 days to examine survivors' PTSD symptoms. The IES-R has 22 items, including eight items assessing intrusion, eight items assessing avoidance and six items tapping hyperarousal symptoms such as anger and irritability, heightened startle response, difficulty concentrating, and hypervigilance. Respondents rate the items on a scale from 0 (not at all) to 4 (extremely), with higher scores suggesting more severe PTSD symptoms. The three sub-scales have shown good predictive validity in detecting changes in clinical status over time and relevant differences in the response to traumatic events (Weiss & Marmar 1997). High internal consistency of the three sub-scales from four different samples were reported (intrusion: 0.87–0.92; avoidance: 0.84–0.86; hyperarousal: 0.79–0.90; Weiss & Marmar 1997). Our study results demonstrated a high internal consistency (Cronbach's $\alpha = 0.96$).

We measured Katrina survivors' health-related quality of life using SF36 v2 (Ware & Sherbourne 1992). SF36 includes eight health concepts: physical functioning, role limitations because of physical problems, role limitations owing to emotional problems, vitality, mental health, social functioning, bodily pain and general health perceptions. The eight sub-scales are hypothesized to form two distinct higher-ordered components: physical health and mental health. Each response item in the SF36 scale was recoded with a value from 0 to 100 with a higher score indicating better health (Ware et al. 2000). We reworded item 2 as 'compared to before Katrina, how would you rate your health now?' to accurately reflect health status of Katrina survivors. Most reported reliability coefficients exceed 0.80 for the eight sub-scales and exceed 0.90 for physical and mental health summary scores. The scale also shows adequate content, concurrent, criterion and predictive validity (Ware et al. 1996). Our study used physical health and mental health as separate outcome measures and demonstrated a satisfying internal consistency of 0.92 for physical health and 0.87 for mental health.

We added one additional item 'have you ever experienced a forced relocation or evacuation as result of a life-threatening event' to the original 11-item *History of Traumatic Event Exposure Scale* (Freedy et al. 1993) to measure respondents' previous traumatic experiences prior to Hurricane Katrina. Other types of traumatic event include military combat, accident at work or in a car, a previous natural disaster, physical or sexual threat or assault, being attacked with or without weapon, being injured seriously or suffered physical damage, being in a situation in which they might be killed or seriously injured, witnessing someone being seriously injured or violently killed, or any other extraordinarily stressful situation or event. We also added a magnitude measure that ranged from 1 (minimal influence) to 10 (has influenced my life tremendously) to understand the degree of impact of each reported traumatic event. The summed score of the degree of impact of each identified traumatic event was used to present survivors' previous traumatic experiences ranged from 0 to 120.

The *Perceived Social Support Scale* (Sherbourne & Stewart 1991) was used to measure various dimensions of social support.

The scale has 18 items and four sub-scales to assess different types of support, including emotional/informational, tangible, affectionate and positive social interaction. Respondents rate the frequency of availability of each kind of support on a scale from 0 (never) to 3 (mostly) with a higher score indicating more support. The previous reported alphas for the scale were above 0.90 and the scale was shown to be stable over time. The Cronbach's α was 0.96 for the perceived social support scale in our sample.

We measured *Financial Difficulty* by asking how difficult it was for Katrina survivors to meet the monthly payments on their bills. The response ranged from 1 (not difficult at all) to 5 (extremely difficult). We chose this item instead of family/household income to measure respondents' financial difficulty because the latter usually has a considerable number of missing responses owing to lack of knowledge of family income or not feeling comfortable revealing such information. This single item also better captured respondents' perceived financial difficulty than the objective measure of family/household income.

Sociodemographic characteristics included in the survey were age, gender, education and acculturation level. Acculturation level was based on respondents' preferences for spoken and written language, language choice for media use (e.g. TV, magazine) and choice of cultural foods. Responses ranged from 1 (never) to 5 (always). The four items were reverse coded so a higher score suggested a higher acculturation level. We included the variable 'time since event happened', which measured the difference between the time Katrina made landfall and survey completion, in the analysis to control for the potential temporal bias on outcome measures.

Analyses

Descriptive statistics (mean, standard deviation, percentage) were used to describe major characteristics of the sample. Multivariate analysis was performed to investigate relative effects of prior trauma, financial strain, social support and acculturation level on PTSD symptoms and the physical and mental health of Vietnamese Katrina survivors, controlling for other social-demographic factors. Given that the majority (79%) of respondents did not hold a bachelor degree and the high correlation between respondents' education and acculturation level, education level was dropped from multivariate analyses. Furthermore, because of the low level of missing data (<5%), we substituted the group mean for missing data when appropriate. Results from non-imputed and imputed data-sets showed no substantial differences.

The two focus groups in Houston and New Orleans took place in March and June 2006. Each focus group lasted 1–1.5 h long and was audiotaped. A bilingual (Vietnamese/English) translator was present and verbally translated the questions and answers during the session. The tapes were transcribed and translated by another bilingual research team member. We organized the focus group data along particular themes, and presented the findings in the discussion session as they related to the survey data.

Results

The socialdemographic profile of the sample indicated that on average, respondents were about 40 years of age, 54% were male, 79% did not have college degrees and were less likely to be acculturated ($M = 2.03$, $SD = 1.04$). On average, 7.1 months elapsed between Hurricane Katrina and response to the survey. Regarding post-disaster health status, respondents reported a mean score of 39.51 on PTSD symptoms and 59.24 and 53.47 on the physical and mental health measures respectively. Although levels for all three health measures suggested that respondents fell into the mid-range of scores, it was instructive that almost 17% of the sample scored one standard deviation above the mean on PTSD symptoms score, and 16%, and 10% one standard deviation below the mean on physical and mental health scores respectively. Although the mean previous traumatic experience score (degree of impact) was not high ($M = 20.35$, $SD = 23.58$), 83% of respondents reported to have one or more previous traumatic experiences prior to Katrina. Respondents also reported slightly above mid-range in terms of financial strain ($M = 3.13$, $SD = 1.22$) and social support ($M = 1.80$, $SD = 0.76$) post Katrina.

PTSD symptoms

Multivariate analyses revealed that financial strain was the most robust predictor of PTSD symptoms (Table 1). Respondents who reported more financial difficulty post Katrina also reported more PTSD symptoms. This relationship was slightly attenuated when social support was added in Model IV. Furthermore, more acculturated Vietnamese reported fewer PTSD symptoms, although the relationship was significant only at the 0.10 level. Respondents who perceived higher impacts from previous traumatic experiences initially indicated experiencing more PTSD symptoms post Katrina (Model II), but this relationship was no longer significant once financial strain was controlled. Thus, financial strain mediated the effects of previous traumatic experiences on respondents' post-Katrina PTSD symptoms.

Physical health

Prior experiences with traumatic events and financial strain following Katrina were also associated with poorer physical health among respondents, while social support was associated with better physical health (Table 2). Financial strain accounted for some of the relationship between previous trauma and physical

Table 1 Prediction of PTSD symptoms among Vietnamese Katrina survivors ($n = 113$)

Variables	*Model I*	*Model II*	*Model III*	*Model IV*
	β	*β*	*β*	*β*
Male	0.08	0.05	0.06	0.04
Age	−0.05	−0.06	−0.01	0.02
Months post-Katrina	−0.09	−0.10	−0.07	−0.09
Acculturation	−0.19†	−0.21*	−0.20†	−0.18†
Previous traumatic experiences (degree of impact)		0.17†	0.09	0.11
Financial strain post-Katrina			0.33**	0.31**
Perceived social support post-Katrina				−0.12
Adjusted R^2	0.01	0.03	0.12	0.13

**$P < 0.01$; *$P < 0.05$; †$P < 0.10$.
β, standardized regression coefficient.

Table 2 Prediction of physical health among Vietnamese Katrina survivors ($n = 113$)

Variables	*Model I*	*Model II*	*Model III*	*Model IV*
	β	*β*	*β*	*β*
Male	−0.07	−0.03	−0.03	−0.01
Age	−0.17†	−0.16	−0.19†	−0.25*
Months post-Katrina	0.04	0.05	0.03	0.08
Acculturation	0.18†	0.23*	0.21*	0.18†
Previous traumatic experiences (degree of impact)		−0.29**	−0.23*	−0.27*
Financial strain post-Katrina			−0.22*	−0.17†
Perceived social support post-Katrina				0.23*
Adjusted R^2	0.07	0.15	0.18	0.22

**$P < 0.01$; *$P < 0.05$; †$P < 0.10$.
β, standardized regression coefficient.

health (Model II vs. Model III), while social support accounted for some of the relationship between financial strain and physical health (Model III vs. Model IV). It was noteworthy that the regression coefficient of previous traumatic experiences on physical health increased when social support was controlled (Model III vs. Model IV). Thus, once similar levels of social support were taken into consideration, Vietnamese who have been greatly impacted by prior trauma reported poorer physical health. Younger and more acculturated respondents were in better physical health, with everything else being equal.

Table 3 Prediction of mental health among Vietnamese Katrina survivors ($n = 113$)

Variables	*Model I*	*Model II*	*Model III*	*Model IV*
	β	*β*	*β*	*β*
Male	−0.04	−0.01	−0.01	0.01
Age	−0.10	−0.09	−0.13	−0.20†
Months post-Katrina	0.11	0.11	0.08	0.14
Acculturation	0.05	0.08	0.07	0.04
Previous traumatic experiences (degree of impact)		−0.18†	−0.10	−0.15
Financial strain post-Katrina			−0.27**	−0.22*
Perceived social support post-Katrina				0.25*
Adjusted R^2	0.002	0.02	0.08	0.13

**$P < 0.01$; *$P < 0.05$; †$P < 0.10$.
β, standardized regression coefficient.

Mental health

Consistent with findings regarding physical health, Table 3 indicated that Vietnamese experiencing more financial hardship, reported poorer mental health, and those who received more social support had better mental health. Social support also partially mediated the detrimental impact of financial strain on mental health. Also consistent with the findings for physical health, the effects of previous traumatic experiences were mediated by financial strain.

In summary, Vietnamese who reported higher levels of financial strain post disaster had greater PTSD symptoms and poorer physical and mental health. Perceived social support in the aftermath of the hurricane, on the other hand, was associated with better physical and mental health. Furthermore, a higher degree of impact from previous traumatic experiences and lower acculturation level, were associated to some degree with poorer physical health.

Discussion

Poverty/financial strain and health during and post disaster

In a review on poverty and disaster in the United States, Fothergill & Peek (2004) concluded that the impact of disasters on victims varied by social class not only during the

period of emergency response, but also during recovery and rebuilding. Poor populations, compared with the more affluent, were more vulnerable to disasters both physically and psychologically. Pastor et al. (2006), analysing Katrina's impacts in the social-environmental context, also found that individuals with low-income and ethnic minority status suffered from higher financial stress and greater environmental exposure to toxins and hazardous wastes that led to negative health outcomes.

Our survey findings suggested that financial strain was the strongest predictor of Vietnamese's PTSD symptoms, and physical and mental health post disaster. Hurricane Katrina may have exacerbated the impact of poverty on the health of Vietnamese in New Orleans East because of the limited resources available for disaster preparation and rebuilding. Respondents reported having great difficulty obtaining employment and assistance in the aftermath of Katrina, which added more stress to the financial status and health. Legal and language barriers also contributed to respondents' greater financial strain after the disaster. For instance, one focus group participant who arrived in the USA 6 months prior to Katrina explained that immigration status influenced her eligibility for receiving governmental assistance.

Our survey findings also suggested that less acculturated Vietnamese had greater PTSD symptoms and poorer physical health when sociodemographic characteristics (e.g. age) and previous traumatic experiences were controlled. English proficiency was the core aspect of respondents' acculturation level and was associated with respondents' capacity of accessing resources including applying for monetary compensation and dealing with complex insurance issues post disaster. One focus group participant stated that 'FEMA [would say] "we have an interpreter that speaks your language," but then we have to be in the line for 15 minutes. By the time [the interpreter was located] they hang up.' Several programmes offered disaster assistances to qualified immigrants such as food, short-term cash, rental and mortgage assistance, and temporary housing allowances. However, Vietnamese may not have enjoyed full access to those resources without speaking fluent English and/or understanding their right to request such resources. Thus, Vietnamese's legal and language barriers could contribute to more severe financial strain and consequently contribute to negative health outcomes.

Prior trauma and health

The impact of previous traumatic experiences on survivors during subsequent events is controversial in the literature. Thomas (2003) showed that prior experience may benefit individuals by increasing their preparedness and protective behaviours, and consequently reduce psychological morbidity following a disaster. Other empirical evidence suggested that previous life trauma can heighten PTSD symptoms or psychological morbidity during subsequent trauma (Breslau et al. 1999; Brewin et al. 2000; Chang et al. 2005; Martz 2005). Furthermore, immigrants (Webster et al. 1995), war refugees, or those with previous natural disaster experiences (Ai et al. 2006) were found to be more vulnerable to post-disaster morbidity. Our study findings further contributed to this debate. The survey data suggested that Vietnamese who perceived a higher impact from previous traumatic experiences had poorer physical health, but not PTSD symptoms or poorer mental health after controlling for financial strain and social support, suggesting the complex relationships among these measures in predicting health outcomes. Further, a few Vietnamese focus group participants reported increased resiliency when responding to Katrina. This finding could be owing to no immediate Katrina-associated deaths reported among the Vietnamese community in our study area. Moreover, most Vietnamese evacuated with family members and relatives that provided greater sense of security, as one respondent stated 'it is harder leaving from your culture. Hurricane is nothing. In the hurricane, you have your family with you all the time.'

The role of social support during and after Katrina

Social support post Katrina has been found to be a strong protective factor for physical and mental health in the current study. Social support may buffer traumatic experiences by creating a meaningful attachment relationship, promoting emotional security and increasing the sense of safety. Because of language barriers and lack of political power to voice community concerns, Vietnamese turned to family and friends as resources. 'All the help we got was from the Vietnamese community, we didn't get any help from the government', stated by one focus group participant. Many respondents stayed at a shelter provided by other Vietnamese Catholic Churches in Houston and Baton Rouge and thus had access to information in Vietnamese and translation services, in addition to a sense of continued community. We learned from both survey and focus group data that a majority of Vietnamese evacuated with religious leaders and the critical roles religious leaders played during evacuation. One Buddhist respondent stated that his family received assistance from Buddhist congregations locally. Among the Catholic survivors, the pastor of the Catholic church provided significant leadership before, during and after the hurricane. The pastor's English and Vietnamese proficiency was particularly important to the elderly and recent immigrants.

Religious institutions, organized around ethnic identity, provided resources and assistance to the entire Vietnamese

community. Even though religious membership contributed to social networks among this particular community, religiosity did not significantly explain the three health outcome measures during initial multivariate analyses. Part of the reason for this was that reported religiosity remained consistently high p-K and exhibited insufficient variation.

Conclusions

Catastrophic events like Katrina can result in a disproportionate risk for negative health outcomes among vulnerable populations, including the Vietnamese living in impoverished neighbourhood with legal and/or language barriers, who historically lacking the political power to voice their own concerns. This study, limited by the circumstances resulting from Hurricane Katrina and the mass evacuation, nonetheless presents significant avenues for further research and interventions concerning the roles previous trauma, poverty, social support and acculturation level played in shaping the impact of Katrina.

Implications for practice

We agree with Norris & Alegria (2005) that healthcare providers, including nurses, should assess community needs early and often post disaster, and work collaboratively and proactively to provide easily accessible services. Informed by findings of this study, nurses should look at health issues beyond individual level and be sensitive to needs among populations with different socio-economic profiles and previous traumatic experiences. By taking survivors' previous traumatic experiences, socio-economic status, social support network and acculturation level into account, nurses would be able to more adequately address survivors' needs after a large-scale tragedy such as Hurricane Katrina.

Acknowledgements

The authors would like to thank U.S. National Science Foundation for grant funding (0555135 and 0555086) to support this study. We are indebted to all participants and community liaisons for their time and insights, especially to Cyndi and Thu Nguyen, Father The Vien Nguyen, and VIET volunteers in New Orleans and Houston; Maanulwa Mukule and the Multicultural Alliance in Houston. Kim Le at the Arizona State University provided translation assistance and Hung Nguyen of the National Congress of Vietnamese Americans Alliance provided back-translation.

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