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Social Capital and Disaster Preparedness Among Low Income Mexican Americans in a Disaster Prone Area

Belinda M. Reininger, DrPH¹, Mohammad H. Rahbar, PhD², MinJae Lee, PhD³, Zhongxue Chen, PhD⁴, Sartaj Alam Raja, MA⁵, Jennifer Pope, MA⁶, and Barbara Adams, MPH, CPH⁷

¹Associate Professor, Health Promotion & Behavioral Sciences, UT School of Public Health-Brownsville, 80 Fort Brown, Brownsville, TX 78520, USA, 956-882-5161, 956-882-5152 (fax), Belinda.M.Reininger@uth.tmc.edu

²Professor, Epidemiology and Biostatistics, UT School of Public Health-Houston, 6410 Fannin Street, suite 100.21, Houston, TX 77030, USA, 713-500-9166, 713-500-0766(fax), Mohammad.H.Rahbar@uth.tmc.edu

³Assistant Professor of Clinical & Translational Sciences, UT School of Public Health-Houston, Assistant Professor of Clinical & Translational Sciences, 6410 Fannin Street, Houston, TX 77030, USA, 713-500-7964, MinJae.lee@uth.tmc.edu

⁴Assistant Professor of Clinical & Translational Sciences, UT School of Public Health-Houston, Assistant Professor of Clinical & Translational Sciences, 6410 Fannin Street, Houston, TX 77030, USA, 713-500-7985, Zhongxue.Chen@uth.tmc.edu

⁵Statistical Analyst, UT School of Public Health-Houston, 6410 Fannin Street, Houston, TX 77030, USA, Sartaj.alam@uth.tmc.edu

⁶Sr. Research Assistant, Non-Clinical, UT School of Public Health-Brownsville, 80 Fort Brown, N1.100, Brownsville, TX 78520, USA, 956-882-5165, 956-882-5152(fax), Jennifer.Pope@uth.tmc.edu

⁷Public Health Preparedness Program Manager, Texas Department of State Health Services, Region 11, 601 W. Sesame, Harlingen, TX 78550, 956-423-0130, Barbara.Adams@dshs.state.tx.us

Abstract

Examination of social capital and its relationship to disaster preparedness has grown in prominence partially due to world-wide need to effectively respond to terrorist attacks, viral epidemics, or natural disasters. Recent studies suggested that social capital may be related to a community's ability to plan for and respond to such disasters. Few studies, however, have examined social capital constructs among low income populations living in disaster prone areas and accounted for the influence of social capital at the individual and community level. We examined social capital as measured by perceived fairness, perceived civic trust, perceived reciprocity and group membership.

Corresponding Author. Belinda M. Reininger, DrPH, Associate Professor, Health Promotion & Behavioral Sciences, UT School of Public Health-Brownsville, 80 Fort Brown, Brownsville, TX 78520, USA, 956-882-5161, 956-882-5152 (fax), Belinda.M.Reininger@uth.tmc.edu.

We undertook a multistage random cluster survey in three coastal counties in Texas (U.S.) noted for their high levels of poverty. Individuals from 3088 households provided data on social capital, socioeconomic and demographic characteristics, and self-reported level of preparedness for a hurricane. We used multivariable logistic regression to test potential associations between social capital measures and disaster preparedness.

After adjusting for age, gender, marital status, ethnicity, education, employment, household income, acculturation, self-reported health, special needs persons in household, household size, and distance to the shore we found a higher prevalence of preparedness among individuals who reported the highest perception of fairness [AOR=3.12, 95% CI: (1.86, 5.21)] compared to those individuals who reported lowest perceptions of fairness. We also found a higher prevalence of preparedness [AOR= 2.06; 95% CI: (1.17, 3.62)] among individuals who reported highest perceptions of trust compared to individuals who reported lowest perceptions of trust. Perceived reciprocity and group membership were not associated with preparedness.

These results extend previous findings on social capital and disaster preparedness and further characterize social capital's presence among a low income population living in a hurricane prone area.

Keywords

social capital; Mexican Americans; preparedness; disaster; fairness; trust; low-income

INTRODUCTION

Recent research suggests that social capital provides an important public health framework for enhancing disaster preparedness, which can save lives and money.(Kage, 2010; Chamlee-Wright, 2010; Allen, 2006; Beaudoin, 2007; Dynes, 2006; Hausman, Hanlon, & Seals, 2007; Koh & Cadigan, 2008; Mathbor, 2007; Moore et al., 2004; Nakagawa & Shaw, 2004; Pelling, 1998; Buckland & Rahman, 1999) Examining social capital and its relationship to disaster preparedness has grown in prominence partially due to world-wide need to more effectively and proactively respond to terrorist attacks, viral epidemics, or natural disasters. (Aldrich, 2012a; Aldrich, 2012b; Koh & Cadigan, 2008; Ada & Bolat, 2010) Also the focus on social capital is a result of its strong predictive power in effective disaster response and recovery at the community and individual levels. (Beaudoin, 2007; Dynes, 2006; Koh & Cadigan, 2008; Nakagawa & Shaw, 2004; Chamlee-Wright, 2010; Aldrich, 2010a; Aldrich, 2012b; Aldrich, 2012c; Aldrich, 2011a; Aldrich, 2011b; Aldrich, 2011c)

Although conceptual variations exist, broadly speaking, social capital is understood as resources resulting from social cohesion that may be drawn upon by individuals for collective action and collective benefit. (Brune & Bossert, 2009; Lochner, Kawachi, & Kennedy, 1999; Ostrom, 2009) It is distinguished from, but viewed as interdependent with 'economic capital', such as financial resources, and 'cultural capital', such as education and knowledge that elevate social status. (Bourdieu, 1986) Social capital research on disaster preparedness and response collectively emphasizes that social capital is a resources that should not be disregarded by disaster management professionals. (Buckland & Rahman,

1999; Pelling, 1998; Aldrich & Crook, 2008; Aldrich, 2010a; Aldrich, 2010b; Aldrich, 2011a; Aldrich, 2011b; Aldrich, 2012a; Aldrich, 2012b)

Social capital is conceptualized in light of social connections among homophilous network members (bonding social capital)(Putnam,1995; Putnam, 2000), across heterogeneous networks and organizations (bridging social capital)(Putnam,1995; Putnam, 2000; Schuller, Baron, & Field, 2000) and to those with higher status and power (linking social capital) (Szreter & Woolcock, 2004). In this sense, an individual's preparedness is reciprocally determined through such things as the amount of available material and intellectual resources (e.g., emergency funds and personal disaster kits; timely access to disaster alerts and knowledge of evacuation routes), their social support networks (e.g., families, churches, local response organizations), the community-level preparedness (e.g., relationships between emergency services, nongovernmental organizations, local businesses, community organizations) and the ability of the community to access and leverage resources from those in power (public officials, federal or international aid agencies).(Dynes, 2006; Federal Emergency Management Agency (FEMA), 2004) Disaster preparedness and response activities are also credited in the creation of new types of social capital, such as the phenomena of volunteerism and charity work, or the cooperation fostered between groups for mutual benefit in the planning phase.(Koh & Cadigan, 2008)

Of those studies that have examined social capital and preparedness, most focused on examining community-member network characteristics (such as density, size, diversity) and levels of preparedness finding that the composition of the network is associated with when and who activates their network. (Haines, Hurlbert, & Beggs, 1996; Hurlbert, Haines, & Beggs, 2000; Hurlbert, Beggs, & Haines, 2001; Kirschenbaum, 2004; Murphy, 2007) This present study extends the examination of social capital and preparedness to include four social capital factors simultaneously as individual and community level factors using multilevel analysis techniques. Studies of social capital and other population health outcomes have documented the importance of taking a multilevel perspective to more fully account for the influence of the community context within which individual actions occur (De Clercq et al., 2012; Kawachi, Kim, Coutts, & Subramanian, 2004; Subramanian, 2004)

Studies associate multiple constructs with their measurement of social capital including a) community member trust, norms of reciprocity, membership in civic organizations(Kawachi, Kennedy, & Glass, 1999); b) groups and networks, collective action, social inclusion, information and communication (Measuring the Dimensions, 2011); c) groups and group memberships in a society, levels of trust, and civic engagement.(Fukuyama, 2001); d) voter turn-out (Aldrich, 2012a; Aldrich & Crook, 2008) and e) number of new community-level nonprofit organizations (Aldrich, 2011b). Brunie (2009) proposed social capital characterizations to include relational, collective and generalized approaches. Relational approaches focus on actors establishing and maintaining relationships to obtain resources. Collective approaches focus on groups of actors working together for action. Generalized approaches focus on individual attributes that affect interactions with others or society. Within the field of public health measures of fairness, trust, civic engagement, and norms of reciprocity are often the focus.(Baum, 1999; Hawe & Shiell, 2000; Moore, Shiell, Hawe, & Haines, 2005; Muntaner, Lynch, & Smith, 2001) In the present study we measure the

following four social capital factors: perceived fairness, perceived civic trust, perceived reciprocity and group membership.

Recognition of the role of social capital as a mechanism for ameliorating pain and suffering associated with disasters is particularly important given the burgeoning research showing that marginalized populations are unequally and negatively impacted by disaster. (Chamlee-Wright, 2010; Aldrich, 2010a; Aldrich, 2010b; Aldrich & Crook, 2008; Kage, 2010) These studies have demonstrated that women, children, the elderly, those of lower social status, and other marginalized communities are vulnerable during and after disaster strikes because they are often unable to penetrate the social networks to access aid in the same way or at the same rate as non-marginalized populations. (Buckland & Rahman, 1999; Beaudoin, 2007; Dynes, 2006; Hawkins & Maurer, 2010; Aldrich & Crook, 2008; Aldrich, 2010a; Aldrich, 2010b; Aldrich, 2011b; Aldrich, 2011c; Aldrich, 2012a; Aldrich, 2012c)

Studies have yet to examine social capital's association with disaster preparedness among marginalized populations who live in an area where the threat of natural disaster is common. Assessing whether factors of social capital are related to preparedness is important if public officials wish to bolster population preparedness in advance of natural disasters such as hurricanes. In this regard, our study sought to investigate to what extent social capital acts as a mechanism for household-level disaster preparedness in a socially and economically disadvantaged population along a Gulf coast region in the U.S. We hypothesize that among persons living in a naturally, disaster-prone area that higher levels of social capital as measured by perceived fairness, perceived civic trust, perceived reciprocity and group membership will be associated with higher levels of preparedness.

METHODS

As a full description of the study design and methods for this study have been reported (Reininger et al., 2008; Reininger et al., 2012) we will summarize the parent study design and methods here. A stratified, two-stage cluster sampling methodology was used. The stratification was based on county in three coastal counties of Texas, United States. From each of these three counties, in the first stage, census-tracts were selected based on simple random sampling (SRS). Once a census tract was selected, we used a 1-in-10 systematic sampling of housing units and then randomly identified one person per household aged 18 years or older who was invited to participate in the study. This study was approved by the Committee for the Protection of Human Subjects for the University of Texas Health Science Center Houston (HSC-SPH-08-0332).

Trained teams of outreach workers collected information by starting at the epicenter of each census tract. Households were chosen randomly in all four directions from the epicenter by interviewing every 10th household from a random starting point among the first 10 houses. In case a selected house was vacant or the individuals were unwilling to participate, the 11th or the 9th household was selected. Outreach workers obtained informed consent from one adult whose birthday was nearest per selected household. This process of household selection continued until over 30 surveys from each census tract were completed. Consent and interview were administered in the language of choice (English or Spanish). If a

household declined participation; a refusal log was maintained documenting reason for refusal. A total of 3088 usable surveys were collected during 2008. This represents responses from the 74% of households that agreed to participate across the three counties.

A 73 item door-to-door in-person survey was used to collect socioeconomic / demographic characteristics including age, gender, household income, and acculturation; social capital variables including perception of fairness, perception of civic trust, perception of reciprocity and group membership; and disaster preparedness variables including perceptions of preparedness, barriers to evacuation and patterns of evacuation. This instrument was based on a previous assessment of hurricane preparedness among coastal counties in 2007(Blendon et al., 2007) but was modified to include measures of social capital, regional barriers to evacuation, and awareness of local resources for preparedness. The survey was translated into Spanish using forward and backward translation techniques. Disaster preparedness materials were provided to each participant upon completion of the questionnaire. No monetary incentives were provided to the participants.(Reininger et al., 2008 ; Reininger et al., 2012)

Outcome Variable

The self-reported level of preparedness was measured by one item asking “Overall, how prepared are you if a major hurricane were to strike your community during hurricane season?” The four-point Likert-scale response options ranged from very prepared to not at all prepared. For analysis, response categories were collapsed to indicate those who viewed themselves as prepared and those who viewed themselves as not prepared.

Demographic and Socioeconomic Variables

General demographic information was obtained from participants based on the Hurricane Preparedness in High Risk Areas Survey.(Blendon et al., 2007) Age was measured by an open-ended question (What is your age?) and for analysis approximately 10 year categories were created. Participants were asked to identify their race/ethnicity. Due to minimal representation of Asians, blacks and other races, only white and Mexican American were included in the analysis. Gross annual income was measured by asking what is your total annual household income from all sources before taxes with the following response categories (<10,000, 10,000 – 14,999, 15,000 – 24,999, 25,000 – 34,999, 35,000 – 49,999, 50,000 – 74,999, 75,000 – 99,999, 100,000). Education was measured by three levels: elementary/middle, high school and technical/college level. People married or living with partner were considered married and all other sub-categories (never married, separated, divorced or widowed) were still treated as unmarried. Special needs person (SNP) in a household was assessed based on questions related to dependence for routine care, physical or developmental disabilities, requiring assistance with medical care administration, monitoring by nurse, dependent on equipment, assistance with medications, and mental health disorders. Self-reported health was measured on five-point Likert scale from excellent to poor. Acculturation was measured by creating a mean scale score across four items using a standard acculturation scale(Marín & Gamba, 1996) examining language used for reading and speaking, language spoken at home, language used for thinking, and language spoken with friends. Response categories for all the acculturation items were only Spanish, Spanish

better than English, both equally, English better than Spanish, only English. This scale allows for measurement of cultural adherence to each cultural domain, as well as biculturalism.

Measurement of Social Capital

Measures of social capital were drawn from the General Social Survey and have been used by Putnam (Putnam & Leonardi, 1993 ; Putnam, 1993; Putnam, 1995) and Kawachi et al (1997) to examine population level social capital. The social capital constructs measured include perceived fairness, perceived civic trust, perceived reciprocity and group membership. Perceived fairness was measured by “Do you think most people would try to take advantage of you if they got a chance or do you think they would try to be fair?” The responses indicating fairness most of the time or all of the time were considered perceived fairness. To measure perceived civic trust the item stated “Generally speaking, would you say that most people can be trusted or that you can’t be too careful in dealing with people?” The responses indicating always or usually trust were considered civic trust. To measure perceived reciprocity participants were asked “Would you say that most of the time people try to be helpful or are they looking out for themselves?” The responses indicating always and usually helpful were considered perceived reciprocity. As a measure of civic engagement, we asked about group membership. Participants were asked to identify voluntary organizations (service, veterans, fraternal, sports, school service, church, farm organizations, and other groups) to which they belong from 16 different options. The responses for group membership were dichotomized to present / absent.

Census-Tract Level Variables

Recent preparedness studies have included location or distance variables to model distribution centers in disaster situations(Rawls & Turnquist, 2011); simulate public transport pick up locations (Bish, 2011) and examine hurricane preparedness by region of state.(Baker, 2011) We also included a measure of distance from coastal area to control for the potential confounding effect it might have on an individual’s decision to evacuate. We retrieved year 2000 census-tract level from 171 tracts and county level variables from the three counties of interest from American FactFinder® (<http://factfinder.census.gov>). We calculated distance from shore to census-tract midpoint to assess its role as a potential confounding factor in our assessment of association between social capital measures and preparedness for a hurricane.(Rawls & Turnquist, 2011; Bish, 2011; Baker, 2011) We measured the distance from shore to the epicenter of each census tract based on a mathematical algorithm by identifying the geo-position (latitude and longitude) for the census tract as well as the geo-equation of coastal path such that a shortest distance from tangential line on costal path to the epicenter do exist. Since distance from shore was the same for all households in the same census tract, in the analysis we considered this as a census-level continuous variable. Mean distance from shore to census tracts was 36.1 miles (ranging from .05 to 70.3 miles).

Statistical Analysis

After excluding participants with missing data on predictors and outcomes and from ethnic/ racial groups other than white and Mexican American, the analysis was conducted on 3030

participants. Once the survey data set was merged with multilevel census-data, crude associations of socio-demographic and social capital variables with the level of disaster preparedness as dichotomous outcome variable were run. Response and explanatory variables were tabulated and projected over the entire population under the ‘weighted population’ based on the specific study design and weights by probability of selection to account for over sampling of females, those with lower education, and participants of certain ages. Weighted Log-binomial regression model was performed to estimate the unadjusted prevalence ratios for the main independent variable and covariates.

For the multilevel analysis, outcome and independent variables from door to door survey are considered level 1 variables that are nested within the census-tract variables, distance to shore and social capital variables are considered level 2 variables using random coefficient model. Effects of main independent variables (of ‘Social Capital’) were assessed using multivariable logistic regression models with the binary outcome of preparedness as the dependent variable. We adjusted these effects for all potential confounders like age, gender and ethnicity. We adjusted for other covariates to account for potential confounding. These included marital status, household size, disability or dependency in the household, employment status, and self-reported health status. We also maintained the level 2 variables in all models when analyzing our data. The possibility of multi-collinearity among the four social capital variables was also examined. Statistical analyses were performed in SAS 9.3. Statistical significance was assessed by two-tailed tests with α level of 0.05.

RESULTS

Descriptive analysis of demographic variables (Table 1) revealed that 52% of survey respondents were female, the majority were Mexican American (93%) with a mean age for the survey sample being 47.04 years. Sixty-two percent of the population has a gross annual household income less than \$15,000, which places them among the most impoverished areas in the United States. Across the three counties, the average number of people living in a household was 4.0. Overall, 57% of the population reported being prepared for a hurricane.

We also examined the prevalence of reporting preparedness for a hurricane by individual and census tract level variables (Table 2). Several variables were significant indicating increased prevalence of preparedness including older age [PR=1.66; 95% CI: (1.41, 1.95)], being white [PR =1.21; 95% CI: (1.08,1.36)], higher education [PR =1.16; 95% CI: (1.06, 1.27)], increased income [PR =1.35; 95% CI: (1.17, 1.57)], greater affiliation with English language [PR=1.15; 95% CI: (1.02, 1.29)], excellent self-reported health [PR =1.32; 95% CI: (1.04, 1.67)]. Other variables were significant indicating decreased prevalence of preparedness including being female [PR =.95; 95% CI: (.90, 1.00)], having special needs person in the household [PR =.70; 95% CI: (.65, .77)], and increased number of people in the household [PR =.66; 95% CI: (.60, .74)]. For the social capital variables in the model there were increased prevalence of preparedness for those individuals reporting highest perception of fairness [PR =1.40; 95% CI: (1.20, 1.63)] and greatest perception of civic trust [PR =1.13; 95% CI: (1.01, 1.26)], however the perception of usually not trusted resulted in decreased prevalence of preparedness [PR =.84; 95% CI: (.77, .91)]. Additionally, there was decreased prevalence of preparedness for those individuals reporting moderate views of reciprocity [PR

=.87; 95% CI: (.80, .95)] and [PR =.90; 95% CI: (.81, .99)]. Finally, there was decreased prevalence of preparedness found among persons reporting any group membership [PR =.83; 95% CI: (.75, .91)]. Figure 1 graphically shows the relationships between the estimated probability of preparedness (from weighted unadjusted logistic regression model) and each of the social capital variables by different categories (positive vs. negative) and age groups.

We examined possible confounders by identifying variables that were significantly associated with the social capital variables as well as the level preparedness for evacuations. We accounted for potential confounding variables in the final multivariable logistic regression model (Table 3).

Multivariable Analysis

We considered that preparedness for a major hurricane strike is partly dependent on community-level characteristics including distance to the shore and the four social capital variables. We conducted multivariable logistic regression analyses to control for the potential confounding effects that distance from the shore might have (Table 4) and that age, gender, marital status, ethnicity, education, employment, household income, acculturation, self-reported health, special needs persons in household and household size. The correlation between all four social capital variables and the possibility of multi-collinearity among these variables was also examined. We found that the four variables are very significantly associated with each other but the overall results are not significantly changed by having all 4 variables in the model. To account for the clustered data where Level 1 units (3088 participants) are aggregated into data on level 2 units (100 census-tracts), different multilevel logistic regression techniques were applied. We conducted random coefficient models with a census-tract variable as a random factor and distance to shore and four social capital variables as random covariates. To select the best model, we compared the models where four social capital variables were added as random covariates in different ways and perceived civic trust was finally selected as random covariate in addition to distance to shore. The comparisons between models were made using Akaike's Information Criterion (AIC), Hurvich and Tsai's Criterion (AICC), Bozdogan's Criterion (CAIC) or Schwarz's Bayesian Criterion (BIC). The variance of perceived civic trust was 0.21 but the variation between different distances was very small. Laplace's method was used to determine parameter estimates.

In our final multivariable model we found that two social capital variables were significantly associated with disaster preparedness. We found that among individuals who reported increasing perceptions of fairness the odds of preparedness also increased. For example, among individuals who reported highest perceptions of fairness the odds of preparedness was high [AOR=3.12, 95% CI: (1.86, 5.21)] compared to those individuals who reported lowest perception of fairness. When examining perception of civic trust, we found that among individuals who report "always trusting others" the odds of preparedness was higher [AOR= 2.06; 95% CI: (1.15, 3.68)] than for individuals who reported "always not trusting others". The two other social capital variables, reciprocity and group membership were not significant in the final model.

DISCUSSION

This paper provides previously uncharacterized associations between disaster preparedness and social capital among a low income population living in disaster prone counties along the U.S. Gulf Coast using multivariable modeling techniques. In this study we were able to examine four factors of social capital accounting for individual's perceptions and the influence of social capital in their particular community. After controlling for age, gender, marital status, ethnicity, education, employment, household income, acculturation, self-reported health, special needs persons in household, household size, and distance to the shore we found significant associations between two social capital variables and disaster preparedness: perceived civic trust and perceived fairness.

While causality of these associations cannot be established based on our study design, significant associations are reported. This present study found that even after accounting for the clustering of social capital at the community level, individual perceptions of social capital are significantly associated with greater preparedness. Those respondents who report greater perceptions of civic trust and perceive society as more fair are also more likely to report preparedness. Conversely we can conclude that those who are more prepared also report greater perceptions of civic trust and fairness. Trust and fairness are two social capital factors imbedded in relationships between individuals and society and the outcome expectations associated with social interactions. These factors influence the bonding among network members (Putnam, 1995) and are particularly important in light of data collected from this sample and reported elsewhere that show 46% of respondents indicate that their household would rely on other people from another household to evacuate them (Reininger et al., 2008; Reininger et al., 2012). Trust and fairness foster collaboration and have been shown to overcome the hardships faced in disasters. (Aldrich, 2012a; Putnam & Leonardi, 1993; Putnam et al., 1994)

Our results indicate that the exchange of trust during social interactions fosters preparedness for a disaster. It may also be that individuals who are more trusting are likely to implement the necessary planning steps for a hurricane so that they too can be trusted to share needed resources with others post disaster. Previous studies have shown that trust among community members influences greater sharing of information about facts, procedures or threats to the community. (Aldrich, 2011c) Trust has been discussed in light of social capital (Putnam, et al., 1994; Putnam, 2001; Putnam, 1995) and shown that if trust increases there are greater benefits to community members in the forms of economic, health or political benefits. (Dasgupta P, 1988; Hardin, 2002; Kawachi et al., 1997; Knack & Keefer, 1997; Rothstein & Stolle, 2001) Trust among network members creates the ability to accomplish more compared to groups without trust (Coleman, 1988).

We also found that as perceptions of fairness increased, self-reported preparedness also increased. This suggests that individuals who feel their interactions with society result in balanced exchanges engage in such interactions and prepare for a disaster. This also suggests that individuals who perceive greater fairness in their interactions may recognize their deep social reserves upon which they are able to draw during a disaster resulting in feelings of greater preparedness.

Our results focus on self-reported preparedness (not confirmed preparedness such as documenting supplies purchased, or action plans known by members of the household). Therefore, it is possible that those who report high levels of trust feel that their network will care for them and treat them fairly in interactions during and post disaster. If so, these individuals have high levels of perceived preparedness in part because they have resilient social reserves for a disaster but not because they have gathered actual resources and committed to action plans for a disaster.

This study also documents that as age increases across social capital factors, preparedness increases so that older persons are more prepared. In the graphical representations of preparedness, age and social capital (Figure 1) three of the four social capital variables are significantly different by most age categories (based on the unadjusted (crude) models). In this impoverished community, where household sizes are larger than national average and multigenerational homes are common, it could be that those who are the elders are relied upon for their experience, resources, information and connections to decision makers about disasters. These elders are expected to contribute more to preparation for disasters and based on our results indicate that they comply with those expectations.

We also found that perceived reciprocity was not associated with preparedness among this population in our multilevel model. This suggests that perceptions of what people expect from interactions, whether individuals will be honest and benevolent, are not associated with preparedness among our population. Putnam (2000) discussed reciprocity in terms of generalized reciprocity or an understanding that the interaction occurring between two individuals may not be immediately repaid but rather sometime in the future could be expected. It is possible that with disaster preparedness and response, the promise of future reciprocity from network members becomes irrelevant for it is the immediate assurance of response that is most important when disaster strikes.

While other researchers have noted that social exchanges occurring in groups provide individuals with access to resources, (Brunie, 2009; Portes, 2000) our study shows that group membership was insignificant in the final model. In this study, the connections to organizations in the community and the resources they could provide was not associated with preparation for a hurricane. However, self-reported group membership in our population was very low and therefore is not generalizable to other communities where group membership is more prevalent.

We found approximately 59% of this low income population reported preparedness for a hurricane in an area where hurricane strikes are common. Future studies among similar communities where civic engagement levels are low could examine whether well-planned interventions to increase social capital factors also result in increased preparedness. One recent evaluation of a community currency intervention program implemented by a government entity and specifically designed to increase trust through rewards for volunteerism demonstrated positive increases in levels of trust among community members. (Richey, 2007) Another study has shown that an intervention focused on leadership development and management in communities affected by war post crisis was able to increase social capital compared to a non-treatment comparison community. (Brune &

Bossert, 2009) Extending such approaches and measuring the impact on preparedness may well be considered by disaster management professionals.

Koh and Cadigan, (2008, p. 280) eloquently stated that “all disasters expose disparities.” Planning for populations where disparities exist requires innovative strategies. Our findings, derived from a primarily Mexican American population laden with health, economic and educational disparities suggest the importance of enhancing the social resources available among family and friends as an important disaster preparedness action. Koh and Cadigan (2008) noted the shift in preparedness training focusing beyond professional responders to include local responders and vulnerable populations. Other studies have noted that first responders are often neighbors, family and friends (Shaw & Goda, 2004; Perrow, 2011). As such, building preparedness activities around these natural social resources provides a leverage point for disaster management professionals. Intervention models using neighborhood block leaders or community gatekeepers who connect families and neighbors to information and resources and are seen as trusted point-people for information and advice should be considered. These well-connected individuals in communities can serve as important nodes in their networks to disseminate preparedness information, foster greater perceptions of trust and fairness among the network, and build capacity to effectively prepare for a disaster. Future efforts could consider capitalizing on the bonds that exist among families and neighbors, particularly since our results indicated that formal group membership was exceedingly low in this sample but that trust and fairness were significant indicators of preparedness.

LIMITATIONS

Limitations to the study are related to generalizability and causality. Namely we sampled from three hurricane prone counties where extreme poverty exists. We only sampled from residential households and excluded work/business places, schools, homeless/foster-homes, prisons, and religious institutions from our study. Our sample consisted primarily of Mexican Americans, which closely resembles the demographics for the area. Our sample was mainly women despite sampling during day and early evening hours. To address this imbalance we weighted our data for analysis towards our target three (3) county population. Also, respondents mainly consisted of persons with a high school education or less, and thus, reflective of the three county rates of education. This sample with some of its uniqueness however, may have limited generalizability to other populations. Therefore there is evidence to suggest that the predominantly Mexican-American, coastal-community area in which this study was conducted may differ from other coastal areas in the US. Despite the limitations on generalizability beyond the study sample, we believe this study provides unique insight into perceptions of preparedness and social capital amongst the most disadvantaged of populations.

In addition, respondents’ were interviewed during hurricane season after a level two hurricane had hit the three county areas. And as with most behaviors, preparedness is subject to change under varying circumstances particularly with unfolding disasters. Therefore given the cross-sectional nature of the study we offer a snapshot of preparedness. Additional

longitudinal research is needed to understand the relative importance of social capital and its relationship with preparedness.

This study did not assess the common facet of social capital regarding the strength and types of networks individuals possess, often discussed as bridging and bonding social capital. (Briggs, 2004; Warren, Thompson, & Saegert, 2001; Woolcock & Narayan, 2000) Instead our study, because of the low self-reported group membership, was only able to examine the presence and absence of civic engagement. Our examination did not assess strong ties and weak ties and the access to resources and support that these different types of relationships may offer in the face of preparedness. Future research should consider this facet of social capital further, particularly among populations such as Mexican Americans who have documented strong family ties (Miranda, Estrada, & Firpo-Jimenez, 2000; Sabogal, Marín, Otero-Sabogal, Marín, & Perez-Stable, 1987) where they derive social support (Mendoza & Fuentes-Afflick, 1999; Timmins, 2002; Wallace, Mendez-Luck, & Castañeda, 2009) and from whom they may be accessing resources for preparedness rather than through group memberships outside the family.

Another limitation of our study also found with most studies administering surveys is the need for participant anonymity. In order for the person responding to feel comfortable reporting sensitive information anonymous self-reported data are collected. The resulting limitation is the inability to clarify missing or confusing response patterns with the individuals after the survey is completed. Also, as with most community survey samples, individuals who agree to participate may not be representative of those who did not agree to participate. This survey was designed to be representative of populations at the regional level but not at the state or national level. We attempted to overcome this limitation by using post-stratification design weights to adjust for oversampling/under-sampling of certain demographic groups.

Among our study's corresponding strengths was the use of a stratified, two-stage cluster sampling methodology that did not require reliance on narrowly defined lists and thereby minimized the likelihood of selection bias associated therewith. We also used sensitive, indirect handling of potentially off-putting questions on immigration status and highly trained and culturally-attuned community health workers to perform interviews. The measures of social capital were obtained from a community survey that was designed specifically to assess these and related neighborhood characteristics.(Lochner, Kawachi, Brennan, & Buka, 2003)

Conclusions

Exploration of disaster preparedness and social capital in an impoverished, minority-majority section of the country has been the driving force behind this study. We found higher prevalence of preparedness among individuals who reported the highest perceptions of fairness and trust. This study further substantiates the importance of attending to social resources, and not just gaps in infrastructure, education and economic resources that are often lacking in impoverished areas, as an approach to effective disaster preparedness.

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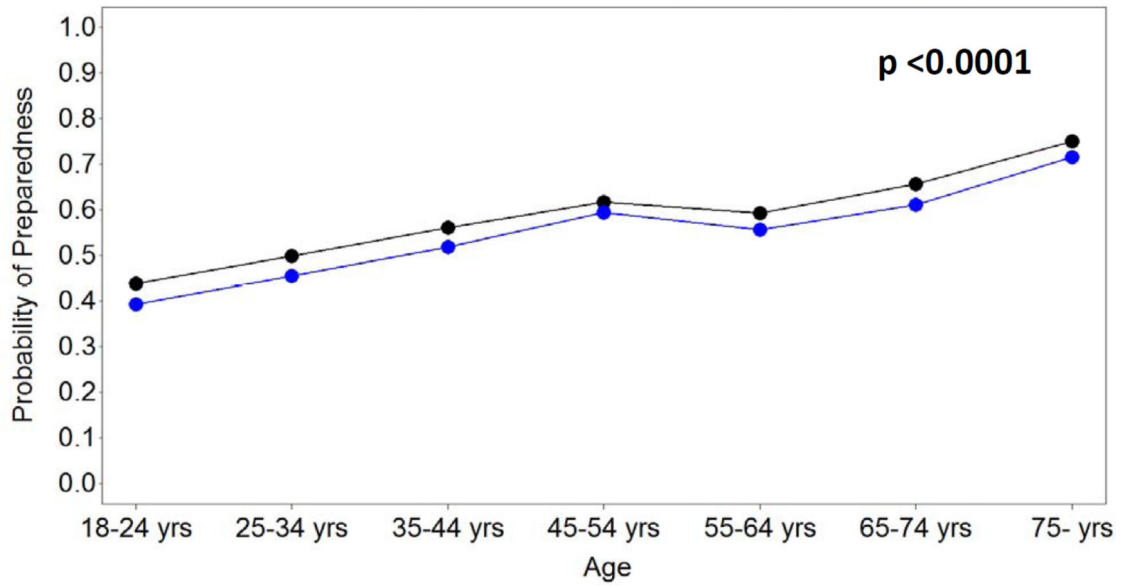
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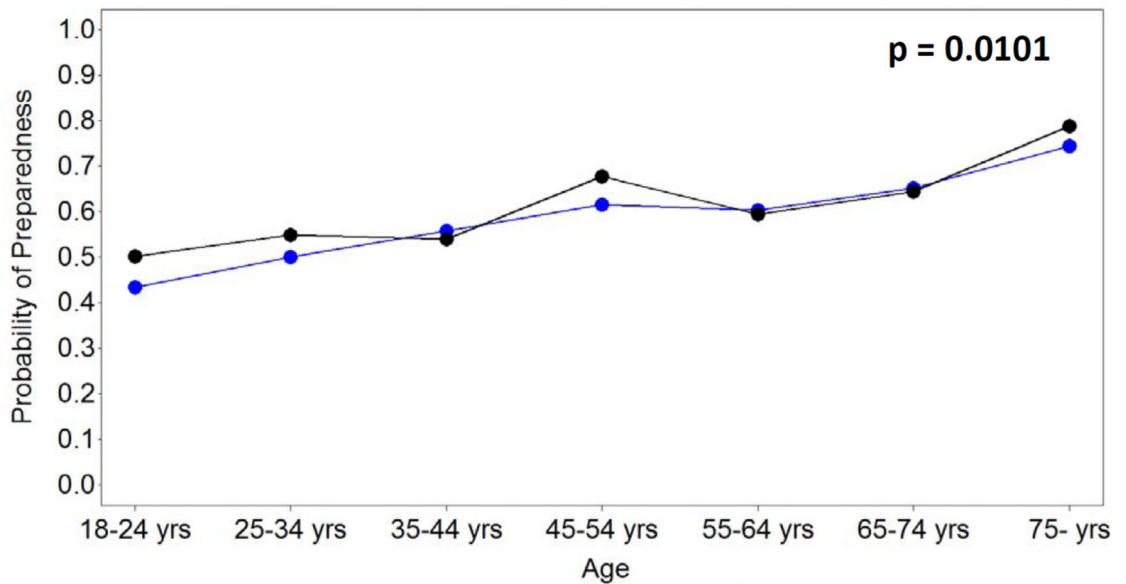
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Perceived Fairness: Probability of Preparedness by Age Group



category \blacktriangle All/Most of the time Fair \blacktriangle All/Most of the time take advantage

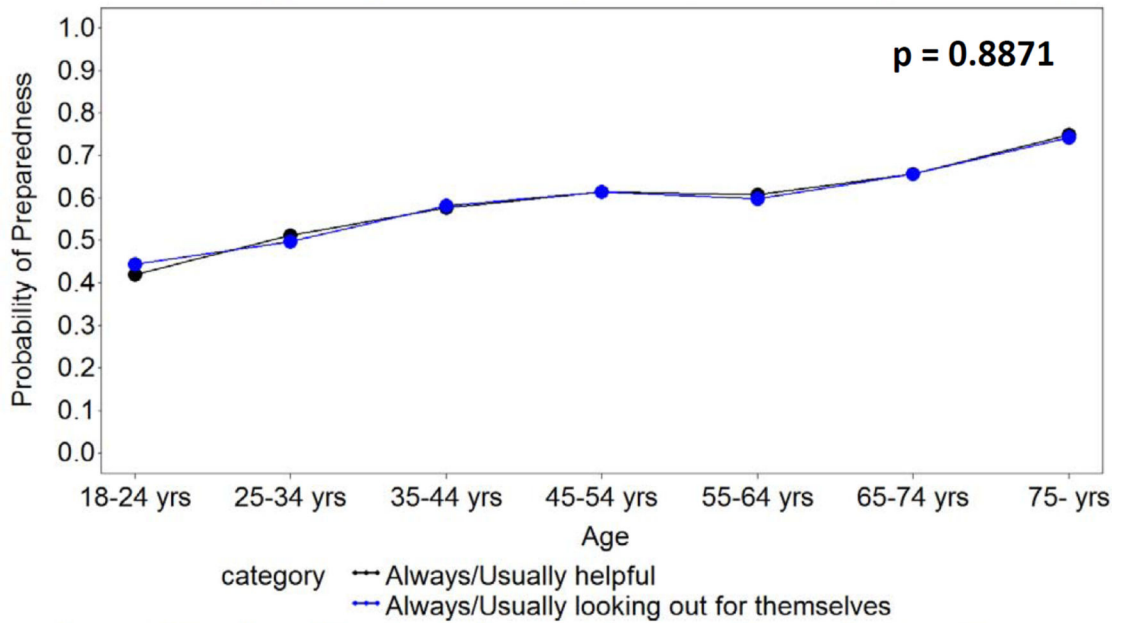
Perceived Civic Trust: Probability of Preparedness by Age Group



category \blacktriangle Always/Usually trusted \blacktriangle Always/Usually Not trusted

Figure 1a

Perceived Reciprocity: Probability of Preparedness by Age Group



Group Membership: Probability of Preparedness by Age Group

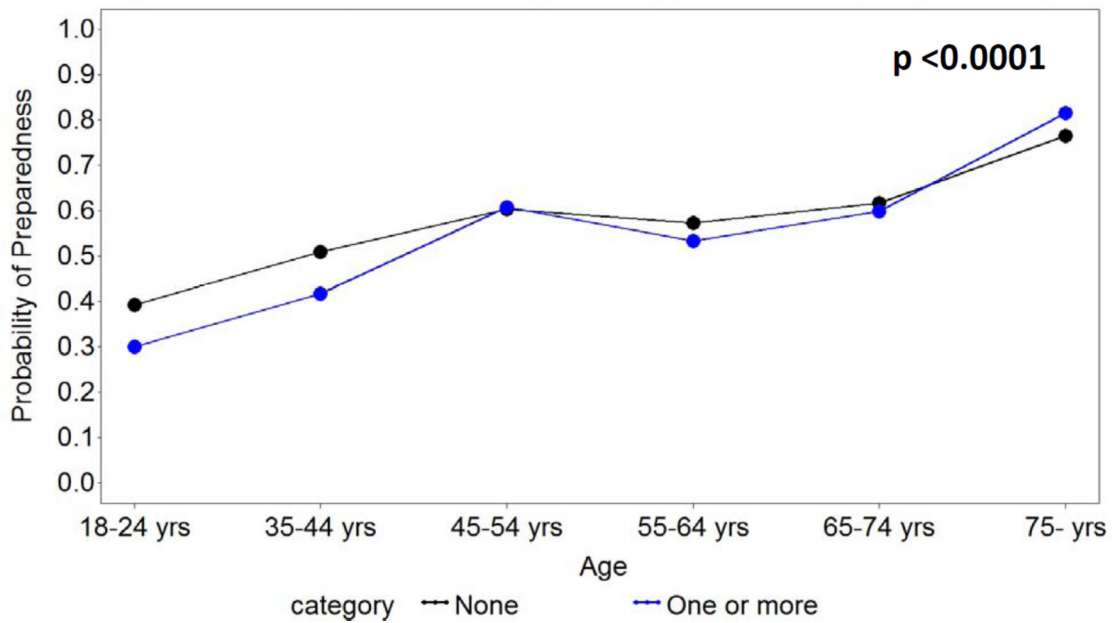


Figure 1b

Figure 1.

Association Between Social Capital Variables and Self-Reported Preparedness By Age Group Among Adults for Hurricane Evacuation in Three Coastal Counties, in South Texas, 2008

p-values represent the difference between two groups of each social capital variable.

Table 1

Comparison of Demographic Characteristics of Adults Surveyed by Their Evacuation Preparedness Status based on Weighted Univariate Analysis using Chi-square test (n=3030)

Dependent Variable:	Prepared N (weighted %) 1,805 (57.05)	Not Prepared N (weighted %) 1,225 (42.95)
Explanatory Variable:		
Age Group	P<.0001	
18–24 Yrs	116 (5.93)	123 (10.11)
25–34 Yrs	311 (16.69)	281 (22.26)
35–44 Yrs	389 (21.42)	267 (21.42)
45–54 Yrs	319 (18.60)	195 (18.60)
55–64 Yrs	284 (16.44)	172 (16.45)
65–74 Yrs	229 (12.51)	114 (9.81)
75+ Yrs	160 (8.40)	73 (4.22)
Gender	p=.0438	
Male	491 (50.06)	284 (46.89)
Female	1314 (49.95)	941 (53.11)
Ethnicity	p=.0084	
Mexican American	1580 (91.39)	1101 (94.70)
White	168 (8.61)	74 (8.61)
Marital Status	p=.3510	
Not Married	543 (27.11)	378 (25.80)
Married	1262 (72.89)	847 (74.21)
Education	p=.0057	
Elementary	693 (38.50)	505 (41.07)
High School	721 (41.02)	525 (43.78)
Tech/College Grad	354 (20.48)	180 (15.15)
Employment	p=.7440	
Not Employed	938 (46.65)	653 (46.07)
Employed	772 (53.35)	514 (53.93)
Annual Household Income	P=.0003	

Dependent Variable:	Prepared N (weighted %) 1,805 (57.05)	Not Prepared N (weighted %) 1,225 (42.95)
<\$10,000	666 (34.08)	507 (36.41)
\$10,000-<\$15,000	424 (24.35)	332 (29.63)
\$15,000-<\$25,000	270 (16.81)	168 (15.57)
\$25,000-<\$35,000	150 (8.74)	91 (9.29)
\$35,000-<\$55,000	95 (7.24)	60 (5.48)
\$50,000-<\$75,000	66 (4.27)	21 (1.82)
\$75,000-<\$100,000	31 (2.07)	4 (0.72)
\$100,000 and up	55 (2.44)	20 (1.08)
Acculturation	p=.0013	
High affiliation with Spanish	849 (42.60)	655 (49.41)
Biculturalism	745 (45.97)	474 (10.96)
High affiliation with English	211 (11.43)	96 (9.63)
Self Reported Health (SRH)	p=.0008	
Poor	28 (1.55)	33 (2.15)
Fair	302 (13.98)	243 (17.03)
Good	1005 (56.15)	697 (59.21)
Very Good	337 (22.26)	188 (17.15)
Excellent	117 (6.07)	51 (4.46)
Special Needs Persons (SNP)	P<.0001	
No	1334 (75.93)	725 (59.67)
Yes	457 (24.07)	485 (40.33)
Household Size	P<0.0001	
1-2 people	470 (27.41)	247 (18.99)
3-5 people	1062 (59.29)	708 (58.29)
>5 people	267 (13.30)	268 (22.75)
Perceived Fairness	P<0.0001	
All the time take advantage	71 (5.18)	61 (5.79)
Most of Time Take Advantage	530 (34.88)	409 (41.50)
Most of Time Fair	725 (43.48)	476 (45.99)
All the time Fair	254 (16.47)	81 (6.71)

Dependent Variable:	Prepared N (weighted %) 1,805 (57.05)	Not Prepared N (weighted %) 1,225 (42.95)
Perceived Civic Trust	P<.0001	
Always Not Trusted	298 (18.50)	179 (15.45)
Usually Not Trusted	556 (31.84)	440 (39.91)
Usually Trusted	701 (43.12)	435 (40.78)
Always Trusted	102 (6.54)	47 (3.86)
Perceived Reciprocity	P=.0032	
Always looking out for	229 (14.51)	114 (11.37)
Usually looking out for	457 (29.31)	343 (32.14)
Usually helpful	826 (48.14)	537 (49.89)
Always helpful	112 (8.04)	69 (6.61)
Group Membership	P=.0003	
None	1462 (80.70)	943 (73.47)
One or more	343 (19.30)	282 (26.53)
Distance from Shore	P<.0001	
Miles from coast mean (SD)	33.46 (17.60)	40.66 (17.73)

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Table 2

Factors Associated with Self-Reported Preparedness for Evacuation during Hurricane Among Adults Living in Three Coastal Counties in South Texas, 2008 based on Weighted Univariate Log-binomial Regression Model

Explanatory Variables	<i>a</i> PR	95% CI	p-value
Age Group			
18–24 Yrs (Ref)	1.00		
25–34 Yrs	1.14	(0.98,1.32)	.0658
35–44 Yrs	1.27	(1.09,1.47)	.0005
45–54 Yrs	1.37	(1.17,1.61)	<.0001
55–64 Yrs	1.37	(1.18,1.59)	<.0001
65–74 Yrs	1.44	(1.21,1.70)	<.0001
75+ Yrs	1.66	(1.41,1.95)	<.0001
Gender			
Male (Ref)	1.00		
Female	0.95	(0.90,1.00)	.0438
Ethnicity			
Mexican American (Ref)	1.00		
White	1.21	(1.08,1.36)	.0084
Marital Status			
Not Married (Ref)		1.00	
Married	0.97	(0.91,1.03)	.3510
Education			
Elementary (Ref)	1.00		
High School	1.00	(0.94,1.06)	.9935
Tech/College Grad	1.16	(1.06,1.27)	.0023
Employment			
Not Employed (Ref)	1.00		
Employed	0.99	(0.93,1.05)	.7440
Annual Household Income			
<\$10,000 (Ref)	1.00		
\$10,000–<\$15,000	0.94	(0.87,1.01)	.1320
\$15,000–<\$25,000	1.06	(0.98,1.15)	.1320
\$25,000–<\$35,000	1.00	(0.89,1.13)	.9712
\$35,000–<\$50,000	1.15	(1.03,1.28)	.0133
\$50,000–<\$75,000	1.37	(1.15,1.62)	.0026
\$75,000–<\$100,000	1.43	(1.26,1.62)	<.0001
\$100,000 and up	1.35	(1.17,1.57)	.0049
Acculturation			
High affiliation with Spanish (Ref)	1.00		
Biculturalism	1.12	(0.05,1.19)	.0004
High affiliation with English	1.15	(1.02,1.29)	.0390
Self Reported Health			

Explanatory Variables	^aPR	95% CI	p-value
Poor (Ref)	1.00		
Fair	1.07	(0.86,1.32)	.5339
Good	1.14	(0.93,1.40)	.1826
Very Good	1.29	(1.04,1.61)	.0095
Excellent	1.32	(1.04,1.67)	.0159
Special Needs Persons			
None (Ref)	1.00		
Yes	0.70	(0.65,0.77)	<.0001
Household Size			
1–2 people (Ref)	1.00		
3–5 people	0.87	(0.82,0.93)	<.0001
>5 people	0.66	(0.60,0.74)	<.0001
Perceived Fairness			
All the time take advantage (Ref)	1.00		
Most of time take advantage	0.97	(0.84,1.13)	0.7097
Most of time fair	1.03	(0.89,1.18)	0.7260
All the time Fair	1.40	(1.20,1.63)	<.0001
Perceived Civic Trust			
Always Not Trusted (Ref)	1.00		
Usually Not Trusted	0.84	(0.77,0.91)	<.0001
Usually Trusted	0.95	(0.87,1.04)	.2634
Always Trusted	1.13	(1.01,1.26)	.0443
Perceived Reciprocity			
Always looking out for themselves	1.00		
Usually looking out for themselves	0.87	(0.80,0.95)	.0015
Usually helpful	0.90	(0.81,0.99)	.0371
Always helpful	0.98	(0.88,1.10)	.7518
Group Membership			
None (Ref)	1.00		
One or more	0.83	(0.75,0.91)	.0003

^aPR: Prevalence Ratio

Ref: Referent Category

Table 3

Associations Between Potential Confounding Variables and Social Capital Response Variables Using Logistic Model

Explanatory Variables	Response Variables			
	Perceived Fairness	Perceived Civic Trust	Perceived Reciprocity	Group Membership
Age Group	.27	.13	.30	.00024
Gender	.038	.47	.79	.44
Ethnicity	.59	.056	.022	.007
Marital Status	.41	.12	.74	.067
Education	.11	.43	.010	.0082
Employment	.089	.041	.25	.00019
Annual Household Income	.013	.81	.028	<.0001
Acculturation	.0041	.086	.051	<.0001
Self Reported Health	.012	.69	.025	.4
Special Needs Persons	.0040	<.0001	.39	<.0001
Household Size	.18	.14	.066	.04

Table 4

Association Between Social Capital Variables and Self-Reported Preparedness Among Adults for Hurricane Evacuation in Three Coastal Counties, in South Texas, 2008

Explanatory Variables	^a Crude Odds Ratio (95% CI)	P value	^b Adjusted Odds Ratio (95% CI)	P value
Age	1.02 (1.01,1.02)	<.0001	1.02 (1.01,1.03)	<.0001
Gender		.0438		.9535
Male (Ref)				
Female	0.88(0.79,1.00)		1.01 (0.80,1.28)	
Ethnicity		.0084		.7651
Mexican American (Ref)				
White	0.59 (0.42,0.84)		1.07 (0.68,1.69)	
Marital Status		.3510		.0298
Not Married (Ref) Married				
Married	0.93 (0.81,1.28)		1.29 (1.03,1.63)	
Education		.0057		.7597
Elementary (Ref)				
High School	1.00 (0.87,1.15)		1.06 (0.82,1.37)	
Tech/College Grad	1.4 (1.15,1.81)		1.14 (0.80,1.64)	
Employment		.7440		.1353
Not Employed (Ref)				
Employed	0.98 (0.85,1.13)		1.19 (0.95,1.49)	
Annual Household Income		.0003		.2370
<\$10,000 (Ref)				
\$10,000-<\$15,000	0.88 (0.75,1.03)		0.98 (0.76,1.28)	
\$15,000-<\$25,000	1.15 (0.95,1.40)		1.23 (0.88,1.71)	
\$25,000-<\$35,000	1.00 (0.77,1.31)		0.92 (0.61,1.39)	
\$35,000-<\$50,000	1.41 (1.08,1.85)		1.00 (0.61,1.64)	
\$50,000-<\$75,000	2.50 (1.31,4.78)		1.90 (0.94,3.86)	
\$75,000-<\$100,000	3.06 (1.79,5.22)		3.79 (0.94,15.25)	
\$100,000 and up	2.42 (1.40,4.17)		1.37 (0.51,3.71)	
Acculturation		.0013		.4487
Biculturalism (Ref)				
High affiliation with Spanish	1.30 (1.13,1.50)		0.88 (0.69,1.11)	
High affiliation with English	1.38 (1.03,1.85)		1.07 (0.73,1.55)	
Self-Reported Health		.0008		<.0001
Poor (Ref)				
Fair	1.14 (0.75,1.74)		1.58 (0.81,3.10)	

Explanatory Variables	^a Crude Odds Ratio (95% CI)	P value	^b Adjusted Odds Ratio (95% CI)	P value
Good	1.32 (0.88,1.99)		2.55 (1.32,4.93)	
Very Good	1.80 (1.16,2.81)		3.37 (1.66,6.83)	
Excellent	1.89 (1.13,3.18)		4.12 (1.88,9.04)	
Special Needs Persons		<.0001		<.0001
None (Ref)				
Yes	0.47 (0.39,0.56)		0.62 (0.49,0.78)	
Household Size		<.0001		.0138
1–2 people (Ref)				
3–5 people	0.71 (0.60,0.83)		1.03 (0.77,1.37)	
>5 people	0.40 (0.33,0.50)		0.70 (0.49,0.99)	
Perceived Fairness		<.0001		<.0001
All the time take advantage (Ref)				
Most of Time Take Advantage	0.94 (0.68,1.30)		1.50 (0.96,2.36)	
Most of Time Fair	1.06 (0.77,1.45)		1.63 (1.04,2.56)	
All the time Fair	2.75 (1.80,4.19)		3.12 (1.86,5.21)	
Perceived Civic Trust		<.0001		.0135
Always Not Trusted (Ref)				
Usually Not Trusted	0.67 (0.50,0.88)		0.89 (0.63,1.25)	
Usually Trusted	0.88 (0.67,1.16)		1.20 (0.84,1.71)	
Always Trusted	1.41 (0.88,2.27)		2.06 (1.15,3.68)	
Perceived Reciprocity		.0032		.0856
Always Looking out for Themselves (Ref)				
Usually Looking out for Themselves	0.71 (0.57,0.89)		0.65 (0.46,0.91)	
Usually Helpful	0.76 (0.58,0.99)		0.76 (0.53,1.08)	
Always Helpful	0.95 (0.70,1.29)		0.66 (0.39,1.11)	
Group Membership		.0003		.6853
None (Ref)				
1 or more			0.95 (0.74,1.22)	
Distance from Shore	0.97 (0.97,0.98)	<.0001	0.97 (0.97,0.98)	<.0001

Ref: Referent Category

^aCrude Odds Ratio and 95% CI from univariate weighted logistic regression model

^bAdjusted Odds Ratio (AOR) and 95% CI from multivariable multilevel logistic regression model with random coefficient model (distance and perceived Civic were used as level 2 variables)