

Differences in Individual-Level Terrorism Preparedness in Los Angeles County

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Background: Increasing individual preparedness for disasters, including large-scale terrorist attacks, is a significant concern of public health planners. As with natural disasters, individuals can help protect their health and safety by preparing for the emergency situation that may follow a terrorist event. Our study describes variations in preparedness among the population of Los Angeles County after the September 11, 2001 and subsequent anthrax attacks.

Methods: In 2004, the data were analyzed from the Los Angeles County Health Survey, a random-digit-dialed telephone survey of the non-institutionalized population in Los Angeles County fielded October 2002 through February 2003.

Results: Overall, 28.0% of respondents had emergency supplies, and 17.1% developed an emergency plan in the past year in response to the possibility of terrorism. Factors associated with having emergency supplies included African American (adjusted odds ratio [AOR] 1.8, 95% confidence interval [CI]=1.1–3.1) and Latino (AOR=1.5, 95% CI=1.0–2.4) race/ethnicity; having a household dependent aged ≤ 18 years (AOR=1.4, 95% CI=1.0–2.0); being born outside the United States (AOR=1.9, 95% CI=1.3–2.9); some college or trade school education (AOR=1.9, 95% CI=1.3–2.9); and higher perceived likelihood of a bioterrorist attack (AOR=2.2, 95% CI=1.6–3.0). Factors associated with having an emergency plan included African American (AOR=2.6, 95% CI=1.5–4.6) race/ethnicity; having a household dependent aged ≤ 18 years (AOR=2.4, 95% CI=1.6–3.5); and physical disability (AOR=1.7, 95% CI=1.1–2.7).

Conclusions: Some groups were more likely to adopt some, but not all, recommended preparedness activities. Identifying subpopulation differences in preparedness is important since different public health messages, programs, and distribution channels are required for different subgroups.

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Introduction

Increasing the nation's level of individual preparedness for disasters, including large-scale terrorist attacks, is a significant concern of public health planners and government and voluntary agencies.^{1–5} The existence of terrorism calls for prudent levels of preparedness alongside the preparedness already recommended for natural catastrophes. As with natural disasters, individuals can help protect their health and safety by preparing for the emergency situation that may follow an event. Preparedness may also contribute

to an individual's resilience to trauma.^{6–8} Individual preparedness might even help avert a terrorist attack if terrorists believe that the attack may be less successful due to high levels of preparedness.⁹ For these reasons, Los Angeles County, a region that will have natural disasters and is a likely terrorist target, is working to improve individual preparedness levels. In Los Angeles, as with many cities and communities in the United States, it is not a matter of if, but rather when a disaster—natural (earthquake, fire) or man-made (catastrophic terrorism, chemical spill)—will happen.

Identifying subpopulation differences in preparedness is important since different public health messages, programs, and distribution channels may be required for improving preparedness among different subgroups. Still, little is known about demographic differences in terrorism preparedness, especially among traditionally vulnerable populations. A national survey reported that people least prepared for a natural disaster or terrorist attack were those who reported an annual income $< \$15,000$ per year, were aged ≤ 35

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years, and lacked Internet access.³ Studies regarding natural disasters report that nonwhite subgroups are less likely to receive disaster education, make structural home improvements to mitigate damage, stockpile emergency supplies, or develop an emergency plan.¹⁰ Both natural and manmade disasters have a disproportionate impact on physical and psychological morbidity and mortality among minority communities.^{11–17} Identifying and correcting these disparities in preparedness is a public health priority.

Personal preparedness can be characterized within the Gelberg and Andersen behavioral model for vulnerable populations as a health behavior (personal health practice). This revision of the behavioral model of health services utilization includes the original predisposing variables, enabling variables, and need variables.¹⁸ It also includes new factors within each category that public health officials, researchers, and policymakers understand to have influence on the health behavior of vulnerable populations.¹⁹ Factors thought to influence personal preparedness can be grouped into the model's domains. Predisposing factors such as age, gender, education, and household dependents have been associated with individual preparedness for natural disasters.²⁰ Enabling factors such as income and Internet access may facilitate preparedness by providing the resources to obtain supplies and information about preparedness.²¹ Need factors, and specifically perceived need factors such as perceived risk of and vulnerability to a disaster, may lead people to prepare for a disaster.

This study describes variations in preparedness after September 11, 2001 among the large metropolitan population of Los Angeles County. It identifies the factors that differentiate households that are prepared from households that are not prepared, investigating all three categories of factors that may influence health behaviors. Identifying such variations could lead to targeted interventions to improve household preparedness for catastrophic terrorism.

Methods

Study Design and Population

Data derived from a subsample of the Los Angeles County Health Survey, a periodic, random-digit-dialed telephone survey of the non-institutionalized population in Los Angeles County.²² Adults aged ≥ 18 years were surveyed in the October 2002–February 2003 period in a two-stage approach. One adult from each randomly selected household was eligible for inclusion in the survey. Of 15,262 households contacted, 8167 interviews were completed for a cooperation rate of 58% based on Council of American Survey Research Organizations standards. This cooperation rate is comparable to that of other telephone health surveys, including the California-wide response rate (50.8%) in the 2001 Behavioral Risk Factor Surveillance System survey.²³ All respondents answered 120 core questions. A random subsample of 1041 participants

answered 12 additional items regarding terrorism. Trained staff conducted telephone interviews using a standardized questionnaire in English, Spanish, or one of four Asian languages (Mandarin, Cantonese, Korean, Vietnamese).

Study Variables

The theoretical framework for predicting personal preparedness was adapted from the behavioral model for vulnerable populations. Using this model, preparedness can be characterized as a health behavior, keeping in mind that there is significant variation within the population.

The outcome variables were responses to the following: "In the past year, has anyone in your household done any of the following things in response to the possibility of terrorism? (1) Purchased or maintained additional emergency supplies of food, water or clothing? (2) Developed an emergency plan for you and your family?" Allowed responses were "yes," "no," "don't know," and "refused." Predisposing variables included self-reported race/ethnicity, age, education level, dependents aged ≤ 18 years in the home, and country of birth (U.S.-born vs non-U.S.-born). Race/ethnicity was defined as non-Latino white (white), non-Latino African American (African American), Latino, Asian/Pacific Islander, and American Indian/other. Enabling variables included income level, and Internet access. Income is reported based on 2002 federal poverty levels (which take into account both income and household size) and collapsed into four categories: poor ($\leq 99\%$ poverty level), near poor (100% to 199% poverty level), middle income (200% to 299% poverty level), and higher income ($\geq 300\%$ poverty level). Finally, need variables included physical disability status and perceived likelihood of a terrorist attack. Disability was defined as a positive response to any of the following three items: "Are you limited in any way in any activities because of a physical, mental, or emotional problem?" "Do you now have any health problem that requires you to use special equipment such as a cane, wheelchair, a special bed, or a special telephone?" "Do you consider yourself a person with a disability?" Perceived likelihood of a terrorist attack was defined as a positive response to the following item: "How likely do you think a terrorist attack is in Los Angeles County during the next 12 months?" Allowed responses were "very likely," "somewhat likely," "somewhat unlikely," and "very unlikely." Positive perceived likelihood was defined by the responses "very likely" or "somewhat likely." All predisposing, enabling, and need variables were selected because they were predictors of preparedness in previous studies or of health behaviors according to the behavioral model for vulnerable populations.

Study Sample and Data Analysis

Participants whose response to both of the dependent variables was coded as "don't know" or "refused" ($n=3$) were excluded from analyses. Univariate analysis was performed to characterize the sample, followed by bivariate analyses to determine the relationship between the dependent variables and the predisposing, enabling, and need variables. Finally, multiple variable logistic regression analyses were performed with preparedness as the dependent variable. All regression models generated adjusted odds ratios (AORs) and 95% confidence intervals (CIs) that measured the independent

Table 1. Characteristics of study participants (*n* = 1038)

Variable	Percent of sample
White	35.4
African American	9.6
Latino	40.9
Asian	14.0
American Indian/other	0.2
Male	48.7
Female	51.3
High school graduate or less	47.4
Some college/trade school	24.2
College/graduate degree	28.5
Aged 18–29 years	24.6
Age ≥30 years	75.4
U.S.-born	58.5
Non-U.S.-born	41.5
Household dependents aged ≤18 years	42.7
No dependents aged ≤18 years	57.3
Person with disability	18.0
Person not with disability	82.0
Perceives attack likely in Los Angeles	59.0
Perceives attack not likely in Los Angeles	41.0
Internet access	52.5
No Internet access	47.5
Income (as % of federal poverty level)	
0–99%	22.5
100–199%	24.5
200–299%	19.2
≥300%	33.8

relationship of each covariate to the outcome variables, adjusting for confounding by the other covariates. Each model contained all covariates. An analytical weight was applied to each participant, comprised of a two-component weight field—a sampling weight and a population-level adjustment. Details have been described previously. Weighted data are presented here as a reasonable approximation of the results of adult residents of Los Angeles County. The analysis was conducted in 2004.

Results

Sociodemographic characteristics of the sample are shown in Table 1. Of the total sample (*n* = 1038), most were aged ≥30 years (75.4%) and U.S.-born (58.5%), reported no household dependents aged ≤18 years (57.3%), and thought an attack was very or somewhat likely in the next year (59.0%). Just under half of the sample had a high school degree or less (47.4%) and reported no Internet access (47.5%).

Overall, 17.1% of respondents responded “yes” to whether they “developed an emergency plan for you and your family”; 28.0% of respondents responded “yes” to whether they purchased or maintained additional emergency supplies of food, water, or clothing; and 35.0% responded “yes” to either developing an emergency plan or maintaining emergency supplies. There were notable demographic differences in groups reporting supplies or emergency plans (Table 2). A

total of 37.1% of Latinos and 31.0% of African Americans reported purchasing or maintaining additional emergency supplies, compared to 21.3% of whites and 19.1% of Asian/Pacific Islanders (*p* < 0.001). More African Americans reported an emergency plan (28.3%) than any other racial/ethnic group (Latino 15.6%, white 14.4%, Asian/Pacific Islander 17.0%, other 13.0%, *p* < 0.05). People with household dependents aged ≤18 years compared to people without dependents were more likely to report supplies (35.3% vs 23.5%, *p* < 0.001) and having a plan (21.7% vs 12.9%, *p* < 0.001). People who were not born in the United States compared to those who were born in the United States were more likely to report supplies (35.3% vs 23.4%, *p* < 0.001), but there was no difference in hav-

Table 2. Proportion of Los Angeles County population reporting terrorism preparedness activities, by sample characteristic

Characteristics	Percent reporting emergency supplies	Percent reporting emergency plan
Race/ethnicity		
Latino	37.1****	15.6**
White	21.3	14.4
African American	31.0	28.3
Asian/Pacific Islander	19.1	17.0
American Indian/other	19.2	13.0
Age (years)		
18–29	22.9***	9.5****
≥30	30.6	18.8
Gender		
Male	25.0**	14.5*
Female	31.6	18.6
Household dependents ≤18 years		
Yes	35.3****	21.7****
No	23.5	12.9
U.S. born		
Yes	23.4****	15.9
No	35.3	17.1
Education		
≤High school	31.8****	16.1
Some college/trade school	33.5	19.9
≥College	18.5	14.5
Perceives attack likely in Los Angeles		
Yes	34.2****	18.7**
No	19.4	13.8
Person with disability		
Yes	29.9	22.3**
No	28.1	15.6
Income (as % of federal poverty level)		
0–99	38.2****	16.9
100–199	31.7	15.0
200–299	26.4	17.7
≥300	20.5	16.9
Internet access		
Yes	22.6***	17.1
No	34.9	16.1

p* < 0.1, *p* < 0.05, ****p* < 0.01, *****p* < 0.001 for chi-square test for group differences (all bolded).

ing an emergency plan between the two groups (15.9% vs 17.1%, $p=0.62$). Physically disabled people were no more likely than nondisabled people to report supplies (29.9% vs 28.1% $p=0.64$), and were more likely to report having an emergency plan (22.3% vs 15.6%, $p<0.05$).

Table 3 provides results of the regression models predicting preparedness. Factors associated with increased odds of having emergency supplies include African American (AOR=1.8, 95% CI=1.1–3.1) or Latino (AOR=1.5, 95% CI=1.0–2.4) race/ethnicity; having a household dependent aged ≤ 18 (AOR=1.4, 95% CI=1.0–2.0); non-U.S.-born (AOR=1.9, 95% CI=1.3–2.9); some college or trade school education (AOR=1.9, 95% CI=1.3–2.9); and higher perceived likelihood of a bioterrorist attack (AOR=2.2, 95% CI=1.6–3.0). Factors associated with having an emergency plan included African American (AOR=2.6, 95%

CI=1.5–4.6) race/ethnicity; having a household dependent aged ≤ 18 years (AOR=2.4, 95% CI=1.6–3.5); and physical disability (AOR=1.7, 95% CI=1.1–2.7). On the other hand, people aged 18 to 29 years were less likely than people aged ≥ 30 years to report emergency supplies (AOR=0.7, 0.5–1.0) and an emergency plan (AOR=0.4, 95% CI=0.3–0.7).

Discussion

A year after September 11, 2001, and the subsequent anthrax attacks, almost 60% of Los Angeles County residents believed that a terrorist attack in Los Angeles was likely in the next 12 months, but only 37% reported having emergency supplies or a plan. There is no concurrent national-level data on preparedness to compare with these results, although national data from 2004 shows lower perceived likelihood of an attack and equally low preparedness.²⁴ Even in Los Angeles, where natural disasters occur, and the real and perceived likelihood of a terrorist attack are high, a low proportion of residents have adopted preparedness activities, regardless of their sociodemographic characteristics.

These results are consistent with recent data showing that young people and single people were less likely to prepare for a disaster, and those who felt at risk were more likely to prepare.²⁴ In Los Angeles, over 35% of non-U.S.-born people compared with 23% of U.S.-born people reported emergency supplies, and this difference remained after controlling for all covariates. Non-U.S.-born people in Los Angeles, many of whom come from developing countries in Latin America and Asia, may have direct or indirect experience with disasters, either natural (hurricanes, earthquakes) or manmade (wars). Personal experience of disasters and enhanced perception of vulnerability are associated with increased adoption of protection behaviors.^{25,26}

The finding that African Americans and Latinos were more likely than whites to have adopted preparedness actions is consistent with one study showing that African Americans were more likely than whites to report gathering emergency supplies as a consequence of the September 11 attacks.²⁷ Interestingly, previous studies regarding natural disasters reported that African Americans and Latinos were less likely to have households prepared for a natural disaster.^{28,29} Results of this study are not inconsistent with these previous studies since they focused on prevalence of preparedness for natural disasters, and these previous studies focused on past-year incidence in response to the possibility of terrorism. Results may differ in Los Angeles if an enhanced perception of vulnerability and self-reliance borne out of a history of natural disasters and other emergencies contribute to adopting preparedness behaviors. Historically, in the recovery and reconstruction phases of disasters, these communities have received fewer emergency and relief services than white communities, and

Table 3. Results of full multivariate logistic models of reporting preparedness activities in Los Angeles County population

Characteristic ^a	Adjusted odds ratio (95% CI) for reporting emergency supplies	Adjusted odds ratio (95% CI) for reporting emergency plan
Race/ethnicity		
Latino	1.5 (1.0–2.4)	1.3 (0.7–2.2)
African American	1.8 (1.1–3.1)	2.6 (1.5–4.6)
Asian	0.5 (0.3–1.0)	1.3 (0.7–2.6)
Age		
18–29 years	0.7 (0.5–1.0)	0.4 (0.3–0.7)
Gender		
Male	0.9 (0.6–1.2)	0.8 (0.6–1.2)
Household dependents ≤ 18 years		
Yes	1.4 (1.0–2.0)	2.4 (1.6–3.5)
U.S.-born		
Non-U.S.-born	1.9 (1.3–2.9)	1.0 (0.6–1.6)
Education		
Some college/trade school	1.9 (1.3–2.9)	1.2 (0.7–1.9)
College/graduate degree	1.0 (0.6–1.5)	0.7 (0.4–1.3)
Perceives attack likely in Los Angeles		
Attack likely	2.2 (1.6–3.0)	1.2 (0.9–1.8)
Person with disability		
Yes	1.2 (0.8–1.8)	1.7 (1.1–2.7)
Income (as % of federal poverty level)		
100–199	0.8 (0.5–1.3)	0.9 (0.5–1.6)
200–299	0.9 (0.5–1.5)	1.3 (0.7–2.5)
≥ 300	0.6 (0.4–1.1)	1.4 (0.8–2.6)
Internet access		
Yes	1.0 (0.7–1.4)	0.8 (0.5–1.3)

^aReference groups are white, aged ≥ 30 , female, no dependents, U.S.-born, less than high school graduate, perceives attack unlikely, not person with disability, income $< 99\%$ of federal poverty level, and no Internet access.
CI, confidence interval.

after greater effort to obtain them.¹⁰ Still, most Latinos and African Americans were not prepared. In spite of important improvements by responsible agencies in incorporating culturally sensitive approaches to diverse populations, these groups continue to face obstacles to preparedness resources. For instance, Latino focus groups performed as part of a national study of bioterrorism preparedness reported the following: (1) there were no locally available preparedness resources in Spanish, (2) they did not know where to get what Spanish language materials may be available, and (3) they were concerned that their particular needs would not be addressed in the event of a bioterrorist attack.³⁰

The low level of preparedness among Asian and Pacific Islander groups and younger adults is particularly striking. Further research is needed to understand this phenomenon among Asians and Pacific Islanders, including investigating which specific ethnic groups account for this finding. Further efforts are needed to target both Asians and Pacific Islanders and younger adults with tailored preparedness programs. Our results show that levels of education and income do not explain the low levels of preparedness in these groups. Also important is the absence of an emergency plan, even among people who are more likely to report emergency supplies. Public health efforts to improve preparedness must particularly address the need for a plan.

People with disabilities were more likely than people without disabilities to have an emergency plan. This difference may reflect a greater perceived vulnerability among people with disabilities who are aware of the regional risk for disasters. The best comparison to these findings comes from a Harris Poll that asked, "In the case of a terrorist attack, natural disaster, or other crisis at the place where you live, have you made plans to evacuate quickly and safely from your home?" In that national survey, 39% of disabled people responded positively, compared to 42% of those without disabilities.³¹ However, differences in the rates of reporting an emergency plan could reflect differences in survey methods, including the 3-month gap in time between the September 11 attacks and the Harris Poll, item construction of the outcome measure, and differences in measurement of disability.

Consistent with the study model, predisposing and perceived need variables were associated with this health promotion behavior. The associated predisposing variables were race/ethnicity (African American, Latino), age (18 to 29 years), education (some college or trade school), dependents aged ≤ 18 years, and born outside the United States. The perceived need variables of disability and perceived likelihood of a terrorist attack were strongly associated with preparedness activities. Enabling variables such as income and Internet access were not associated with preparedness. This may be because the combined enormity of the September

11, 2001 and anthrax attacks amplified the relative effects of predisposing and perceived need factors, as suggested in other studies.³² Other enabling variables may have been more related but were not measured by the survey, including competing needs and self-help skills.

This study has several limitations. First and foremost, the single-item self-assessments of emergency supply and emergency plan may not have fully captured the intended constructs. For instance, having "purchased or maintained additional emergency supplies of food, water, or clothing" does not include the full range of supplies that prepared individuals may have. Nor did these items address the quality of supplies and plans. Also, the outcome items asked about emergency supplies and plans "in response to the possibility of terrorism," potentially excluding people who adopt preparedness primarily for natural disasters. Future research should include the development of validated terrorism preparedness checklists or scales. Second, the sampling frame in this survey excluded the estimated 3% of County residents who live in households without telephones, thus potentially excluding people also most likely to be unprepared. Respondents were asked if they had been without telephone service in the previous 12 months and the data were weighted accordingly to reduce this potential source of bias.³³ Third, the 58% cooperation rate is a potential source of nonresponse bias, although it is comparable to that of other studies.²³ However, people unwilling or unable to participate in a telephone survey may also be less able to adopt preparedness activities.

Public health planners can use these results to guide preparedness interventions and future research. Since rates and predictors of emergency supplies and plans differed (almost all groups were less likely to have a plan than supplies), interventions must distinguish between increasing adoption of supplies and plans. Since perceived likelihood of an event was related to preparedness, rolling out interventions when the perceived likelihood of a terrorist attack is high may be effective. The higher levels of preparedness among non-U.S.-born people, African Americans, disabled people, and people with school-aged dependents in this study should be further investigated to understand the motivators and facilitators of preparedness in these groups. Lessons learned could be used to improve preparedness among these groups. Finally, other municipalities and jurisdictions should investigate their own populations, and subpopulation data should be analyzed to determine if these characteristics are generalizable. For instance, rural and smaller urban communities may contain populations with different levels of perceived risk of terrorism than the large urban population of Los Angeles. Research in rural and small urban populations would therefore be helpful.

What This Study Adds . . .

Hurricane Katrina demonstrated the dreadful consequences that occur when traditionally vulnerable populations are less prepared for and able to mitigate the effects of a disaster, natural or manmade.

As the nation works to increase the level of individual preparedness for catastrophic terrorism, little is known about demographic differences in terrorism preparedness.

This study of variations in preparedness within a large urban population underscores the importance of targeted programs and further research on this topic.

Conclusion

This study demonstrates the low frequency of individual-level preparedness for terrorism in Los Angeles County. Vulnerable populations are of greatest concern since they may be most affected by an event, and may have to be self-reliant in the face of local, state, and federal government efforts that could be overwhelmed by massive population needs. Interventions need to target those who perceive themselves at lowest risk, including young adults, and should be tailored to the subpopulations living in metropolitan regions. Intervention efforts may be furthered by terrorism preparedness analysis in other municipalities and jurisdictions.

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