

RESEARCH

Prevalence of Unmet Health Care Needs and Description of Health Care-seeking Behavior Among Displaced People After the 2007 California Wildfires

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ABSTRACT

Objectives: The southern California wildfires in autumn 2007 resulted in widespread disruption and one of the largest evacuations in the state's history. This study aims to identify unmet medical needs and health care-seeking patterns as well as prevalence of acute and chronic disease among displaced people following the southern California wildfires. These data can be used to increase the accuracy, and therefore capacity, of the medical response.

Methods: A team of emergency physicians, nurses, and epidemiologists conducted surveys of heads of households at shelters and local assistance centers in San Diego and Riverside counties for 3 days beginning 10 days postdisaster. All households present in shelters on the day of the survey were interviewed, and at the local assistance centers, a 2-stage sampling method was used that included selecting a sample size proportionate to the number of registered visits to that site compared with all sites followed by a convenience sampling of people who were not actively being aided by local assistance center personnel. The survey covered demographics; needs following the wildfires (shelter, food, water, and health care); acute health symptoms; chronic health conditions; access to health care; and access to prescription medications.

Results: Among the 175 households eligible, 161 (92.0%) households participated. Within the 47 households that reported a health care need since evacuation, 13 (27.7%) did not receive care that met their perceived need. Need for prescription medication was reported by 47 (29.2%) households, and 20 (42.6%) of those households did not feel that their need for prescription medication had been met. Mental health needs were reported by 14 (8.7%) households with 7 of these (50.0%) reporting unmet needs. At least 1 family member per household left prescription medication behind during evacuation in 46 households (28.6%), and 1 family member in 48 households (29.8%) saw a health care provider since their evacuation. Most people sought care at a clinic (24, 50.0%) or private doctor (11, 22.9%) as opposed to an emergency department (6, 12.5%).

Conclusions: A significant portion of the households reported unmet health care needs during the evacuations of the southern California wildfires. The provision of prescription medication and mental health services were the most common unmet need. In addition, postdisaster disease surveillance should include outpatient and community clinics, given that these were the most common treatment centers for the displaced population. (*Disaster Med Public Health Preparedness*. 2009;3(Suppl 1):S24–S28)

Key Words: wildfires, displaced people, health care-seeking behavior, unmet health care needs

The southern California wildfires that burned from October 20 to November 9, 2007, resulted in widespread disruption and a large statewide evacuation. More than 350,000 people evacuated their homes in less than 1 week due to the rapid advance of multiple fires.¹ State and federal disaster declarations quickly ensued given the resources required to control the fires, the massive evacuation, and the extent of property damage. This massive surge in health and public health needs severely taxed the response system. Before the wildfires had been

fully contained, more than 510,000 acres and more than 3000 structures, including 2233 homes and businesses, burned in San Diego County.^{2,3} Ten people were directly killed by the fires, including 3 who died while evacuating. In addition, more than 100 firefighters were injured while fighting the fire.¹

As the wildfires continued to burn, many shelters rapidly opened and a number of designated local assistance centers (LACs) were established throughout the disaster-affected areas. LACs (later called disaster assistance centers) were designed to provide

ready access to federal, state, and county representatives as well as to disaster industry–related businesses such as insurance companies and organizations such as the American Red Cross. They served as a 1-stop source for disaster relief services and recovery information. This included aid in filing insurance claims and applying for assistance, low interest loans, and temporary housing. Although joint assistance centers had been used following Hurricane Katrina and other subsequent smaller scale events, this was a first for California.⁴

Prior studies have explored the public health and medical needs of evacuees and sheltered displaced people following domestic disasters,^{5–7} but information regarding unmet medical, psychiatric, and pharmaceutical needs has not been addressed. This study explores the topic of unmet medical needs and health care–seeking patterns as well as the prevalence of acute and chronic disease among displaced people following the southern California wildfires. These data can be used to more accurately predict needs and improve the capacity of health systems to respond.

METHODS

Study Design

A team of emergency physicians, nurses, and epidemiologists conducted surveys at shelters and LACs in San Diego and Riverside counties from October 30 to November 1. Survey participants included individuals who were identified as head of household at all open shelters and LACs in San Diego County and southern Riverside County, identified by daily lists from American Red Cross headquarters. A household was defined using the US Census Bureau's definition to include "all the persons who occupy a housing unit such as a house, an apartment, a mobile home, a group of rooms, or a single room that is occupied as separate living quarters." Each team included at least 1 member fluent in Spanish to act as an interpreter. For non–English-speaking survey participants, English-speaking family members were encouraged to assist with translation if needed. Survey participants were able to terminate the survey at any time. The study was exempted by the Johns Hopkins University institutional review board.

Selection of Participants

At the shelters, due to the small numbers, all of the households that were present on the day of the survey were interviewed. At the LACs, a 2-stage sampling method was used. The first stage consisted of selecting a sample size proportionate to the number of registered visits to that site compared with all other sites. The second stage consisted of convenience sampling of people present on the day of the survey. As with the shelters, heads of households were interviewed. Individuals were approached as they waited for assistance. Because the management and layout of each LAC was different, this varied by site and was left to the discretion of the interviewer. Only individuals who were not actively involved with LAC personnel were approached, so as to not interfere with the assistance process. People actively being

assisted, people who had a household member already participating in the survey, and people who declined to participate or who terminated the survey early were excluded.

Survey Design and Data Collection

The survey was developed by 1 of the authors (T.D.K.) based on prior disaster-response experience and a review of the disaster-assessment literature. An expert panel of disaster responders—including physicians, nurses, researchers, and American Red Cross staff—provided feedback and corrections to the instrument. The survey covered demographics; predisaster living conditions; structural damage caused by the wildfires; needs following the wildfires (including shelter, food, water, health care, and other services); shelter use; acute health symptoms; chronic health conditions; access to health care; and access to prescription medications. Data collected were either dichotomous or categorical, except responses related to time and age, which were continuous. The survey was piloted and teams trained on site before deploying to the field to initiating interviews. Three teams of physicians, nurses, and epidemiologists administered the survey. Data were entered into a Microsoft Excel database and analyzed using SAS statistical software version 9.1 (SAS Institute, Cary, NC). Statistical calculations included descriptive statistics of demographics, housing conditions, unmet medical needs, and health care–seeking behavior. Bivariate analysis was used to identify the risk factors of acute and chronic disease burden by chi-square test.

RESULTS

Demographics and Housing Conditions

The research team selected 175 head-of-household respondents at 3 shelters and 7 LACs in San Diego County for inclusion in this study. Among these, 161 (92.0%) people agreed to participate. Demographic comparisons of shelter population and LAC population demonstrated no significant difference in sex ($P = .23$), race ($P = .08$), marital status ($P = .31$), and home ownership ($P = .16$), so the groups were combined for analysis.

These heads of households represent a total of 573 household members with an average household size of 3.3 people. Medical information was supplied by the head of household and was available for 520 of 573 individuals (90.8%). The mean age of individuals was 30.7 ± 21.1 y (range 1–81 y). Sex was equally distributed, males accounting for 256 (49.2%) people and females for 264 (50.8%). Older adults (≥ 65 years old) accounted for 34 people (6.5%). Children under 5 years accounted for 47 people (9.0%). People ages 18 to 34 numbered 120 (23.1%) and people 35 to 64 numbered 183 (35.2%). Racial groups included 83 (51.6%) white heads of households and 68 (42.2%) Hispanic heads of households. The remaining 10 (6.2%) heads of households reported to be African American, Native American, Pacific Islander, or Asian American.

The most common type of dwelling before the fire for households included single-family structures either owned (67,

41.6%) or rented (44, 27.3%), followed by trailers (26, 16.2%), apartments in buildings (21, 13.0%), and other (3, 1.9%). Respondents reported damage to their home as completely destroyed (53, 32.9%), major damage (10, 6.2%), minor damage (51, 31.7%), or no damage (42, 26.1%). Of the households, 66 reported being separated for more than 1 day (41.0%).

Unmet Health Care Needs and Health Care-seeking Behavior

Of the 161 households, 47 (29.2%) reported needing health care at some point during their evacuation (Fig. 1). Within these 47 households, 13 (8.1%) did not receive care that met their perceived need. Need for prescription medication was reported by 47 (29.2%) households, and 20 (12.4%) of those households did not believe that their need for prescription medication had been met at some point during the evacuation. Mental health needs were reported by 14 (8.7%) households, with half of these households reporting that their needs were not met.

A small proportion of respondents (15, 9.3%) believed that their access to health care had worsened after the wildfires, whereas the majority (74, 46.0%) were unaware of any change in access to health care, or stated that access to health care was not applicable to their family. The remaining respondents believed that their access to health care was the same (58, 36.0%) or better (11, 6.8%).

Of the 161 households, 48 (29.8%) reported that at least 1 family member saw a health care provider (physician, nurse practitioner, or physician’s assistant) since their evacuation. Most sought care at a clinic (includes government, volunteer, and hospital clinics; 24, 50.0%) or private doctor (11, 22.9%) as opposed to the emergency department (ED; 6, 12.5%). Of those households in which 1 member was seen by a health care provider, physicians were the primary source of care (34, 70.8%), followed by nurses (10, 20.8%). Only 1 household reported being seen by a midlevel provider such as a physi-

cian’s assistant or nurse practitioner. Heads of households who reported that at least 1 family member left prescription medication behind during evacuation numbered 46 (28.6%). By day 10 after the evacuation, 30 of the 46 households (65.2%) who had lost medications had replaced them, whereas 16 households (34.8%) had yet to do so.

Burden of Acute and Chronic Disease

Heads of households (n = 161) reported on the presence of acute and chronic medical conditions among members of their families representing 520 individuals (Fig. 2). Most common were acute respiratory symptoms, including shortness of breath, cough, and wheezing reported in 182 (35.0%) of individuals. This was followed by acute depressed mood or anxiety (171, 32.9%) and acute gastrointestinal symptoms such as abdominal pain, diarrhea, and nausea/vomiting (71, 13.7%). Less frequently reported acute symptoms included acute chest tightness or pain (44, 8.5%) and injuries (7, 1.3%). Heads of households reported the prevalence of chronic cardiac diseases such as coronary artery disease, angina, or hypertension most frequently (64, 12.3%) among their family members. Chronic respiratory diseases such as chronic obstructive pulmonary disease or asthma were reported in 53 people (10.2%), followed by chronic psychiatric illnesses including depression and schizophrenia in 27 people (5.2%). Less reported chronic illnesses included other (liver failure, cancer, stroke, or seizure disorder) in 20 people (3.9%), human immunodeficiency virus in 1 person (0.2%), and tuberculosis in 1 person (0.2%).

Risk Factors for Acute Symptoms and Chronic Diseases

Bivariate analysis demonstrated no significant differences in age or sex for those individuals reporting acute respiratory symptoms (Table 1). Women were more likely than men to

FIGURE 1

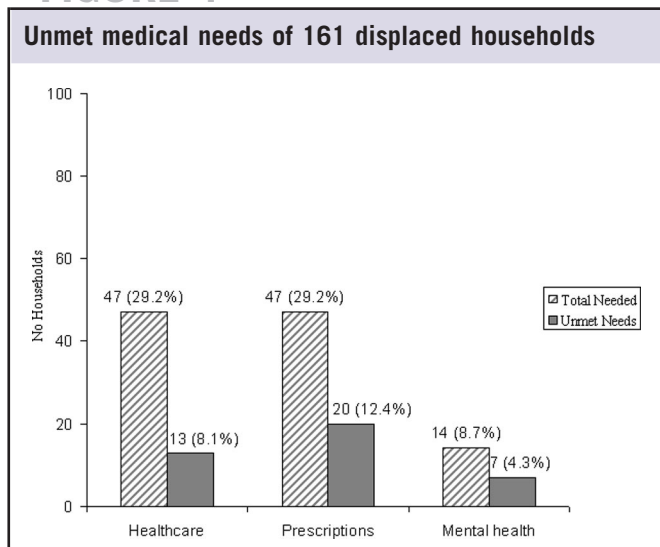


FIGURE 2

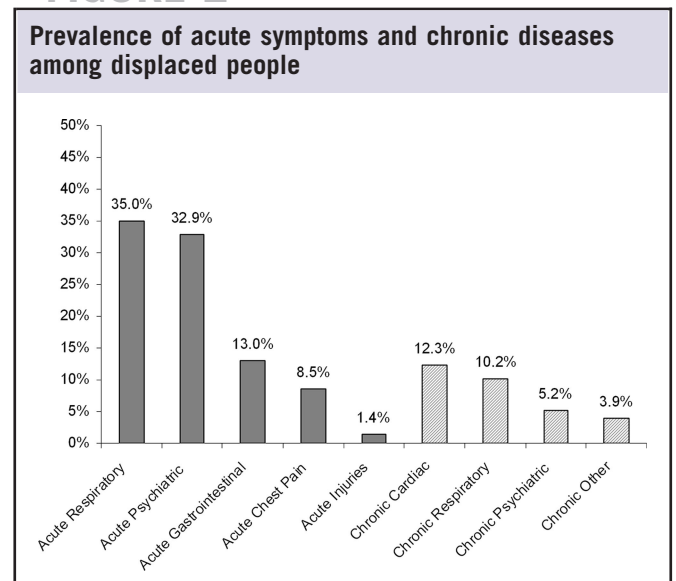


TABLE 1

Bivariate Analysis of Age and Sex as Risk Factors for Acute Symptoms and Chronic Diseases

	Age, y			<i>P</i> *	Sex		<i>P</i> *
	<18 (n = 183) n (%)	18–64 (n = 303) n (%)	>64 (n = 34) n (%)		M (n = 256) n (%)	F (n = 264) n (%)	
Acute respiratory	59 (32.2%)	110 (36.3%)	13 (38.2%)	.61	80 (31.3%)	102 (38.6%)	.08
Acute psychiatric	35 (19.1%)	120 (39.6%)	16 (47.1%)	<.05	72 (28.1%)	99 (37.5%)	<.05
Acute gastrointestinal	18 (9.8%)	48 (15.8%)	5 (14.7%)	.17	25 (9.8%)	46 (17.4%)	<.05
Acute chest pain	5 (2.7%)	32 (10.6%)	7 (20.6%)	<.05	18 (7.0%)	26 (9.8%)	.25
Chronic cardiac	0 (0%)	44 (14.5%)	20 (58.8%)	<.05	29 (11.3%)	35 (13.3%)	.5
Chronic respiratory	22 (12.0%)	26 (8.6%)	5 (14.7%)	.32	22 (8.6%)	31 (11.7%)	.24
Chronic psychiatric	0 (0%)	27 (8.9%)	0 (0%)	<.05	8 (3.1%)	19 (7.2%)	<.05
Chronic other	1 (0.5%)	12 (4.0%)	7 (20.6%)	<.05	8 (3.1%)	12 (4.5%)	.4

* Chi-square; boldface indicates significance.

report acute gastrointestinal symptoms and acute psychiatric symptoms ($P < .05$). Complaints of psychiatric symptoms increased with each age group, with the oldest group (>64 years) being most likely to have symptoms ($P < .05$) and a total of 171 people (32.9%) reporting symptoms. Likewise, complaints of acute chest pain rose with increasing age with the oldest group (>64 years) being most likely to experience symptoms ($P < .05$), and a total of 44 people (8.5%) reporting symptoms. Bivariate analysis for the risk factors for acute injuries was unable to be performed due to the small number of individuals reporting injuries.

The prevalence of chronic cardiac diseases increased with each age group, with the oldest age group being the most likely to have cardiac diseases such as coronary artery disease, angina, or hypertension ($P < .05$). No age group was found to be more likely to report chronic respiratory diseases such as asthma or chronic obstructive pulmonary disease. The only age group to report chronic psychiatric illness such as depression and schizophrenia was the 18 to 64 years group, with 8.9% of the group reporting a condition. Women were more likely than men to have chronic psychiatric illnesses such as depression ($P < .05$). Neither sex was more likely to report having other chronic diseases such as cardiac or respiratory disorders.

DISCUSSION

This survey of displaced people documented unmet health care needs, health care-seeking patterns, and prevalence of disease during the first 10 days after evacuation from the 2007 southern California wildfires. Almost one-third (29.2%) of displaced households reported needing health care at some point during their evacuation, and almost one-third of those households (8.1% of the total) stated that they had unmet health care needs. A similar percentage (29.8%) of households also received care by a health care provider during this time period. More than 40% of the need for prescriptions was unmet (12.4% of total displaced), and almost half of those households that stated they had mental health needs had unmet needs (4.3% of the total displaced).

The need for prescriptions was similar to the percentage of households (29.2%) for which the head stated that at least 1 family member left behind prescription medication during evacuation. By 10 days after evacuation, almost 20% of these still did not have their prescription medications. It is common that these minor medical and chronic disease problems overwhelm the already taxed emergency medical system after a disaster and decrease the system's ability to respond to the surge of needs.^{8,9} This may be improved upon by education efforts aimed at personal disaster preparedness. Prescription medications should be included in family disaster kits in the event that emergent evacuation is required. For some families, keeping additional supplies of medications on hand may be cost prohibitive, given that insurance companies often have restrictions on dispensing more than 30 days of medication at a time. It may also be addressed by the rapid delivery of common medications for distribution following disasters. Recently, a consortium of health care providers and industries have created RxResponse to ensure the supply of critical medicines and supplies during emergency relief.¹⁰

Displaced people were more likely to present for care at a private doctor's office or clinic (72.9%) rather than an ED (12.5%). This would suggest that a method for outreach to individuals may include strengthening or augmenting community clinics in addition to ED resources. In addition, postdisaster surveillance activities should focus not only on EDs but also on outpatient clinics at which the majority of our sample reported seeking care. Physicians were also the main source of care given (70.8%), which presents a significant opportunity for the increased involvement of midlevel providers such as physician's assistants and nurse practitioners. In our survey, only 1 household reported seeing a midlevel provider for health care.

Acute respiratory and psychiatric symptoms were among the most commonly reported in this population. The rate of respiratory symptoms found in this study (35.0%) was at least triple that found in studies of displaced people from Hurricane Katrina (7.5%–11.5%).^{6,7} The most obvious reason for

increased respiratory symptoms may have been due to smoke exposure or decreased air quality as a result of the wildfires. It is interesting to note that another study by the Centers for Disease Control and Prevention reports that the number of ED visits associated with respiratory complaints increased by 20% in San Diego County in the period immediately following the wildfires.¹¹

Psychiatric complaints were much higher in our study when reported as prevalence (32.9%) instead of the chief complaint as in another postdisaster study (3.7%).⁷ This may suggest that displaced people are less likely to seek care for mental health issues. Health care providers should keep in mind that even though people may seek care for medical issues, a more active screening approach may be needed for psychiatric illnesses. The lack of chronic psychiatric disorders in our sample in the <18 and >64 years age groups may be due to reporting bias given that heads of households were the main source for health information regarding family members.

The analysis of age and sex as risk factors for acute symptoms and chronic conditions demonstrated that women were more likely than men to have acute gastrointestinal and psychiatric symptoms. Women were also more likely than men to report having a chronic psychiatric condition. This may be consistent with a previous study that demonstrated that the female gender is associated with greater severity of self-reported psychiatric illness.¹² Also, as expected, individuals above the age of 64 years were more likely than younger age groups to have chronic cardiovascular diseases such as coronary artery disease, angina, or hypertension.

The major limitation in this study is the use of convenience sampling in the LACs. All of the available households in the shelters were interviewed and an internal analysis of the 2 populations demonstrated that they were comparable. In addition, because the surveys were conducted 10 to 12 days after the onset of the fires, fewer shelters remained open and those that were open housed smaller numbers than in the immediate aftermath of the wildfires. This delay was necessitated by the fluid nature of the fires, the fact that the LACs opened on different days 3 to 5 days after the first evacuations, and the need to assess the evolution of needs over time. This may have lead to a sampling bias that overestimates prevalence because people less severely affected may have resolved their aid needs at an earlier time.

Conclusions

The medical response to disasters has been described by services delivered and needs met, but never by the unmet needs of the affected population. This study demonstrated significant unmet needs, especially for the provision of medications and mental health services. Using this information for planning can improve the surge capacity of the health care system. By using a similar rapid survey tool during a disaster response, the already limited health care resources can be used more efficiently to meet the needs of the popu-

lation. Increased availability of prescriptions and improved disaster education efforts to encourage families to maintain extra supplies of medications for disasters when financially feasible may be 1 potential solution. Finally, postdisaster disease surveillance should include outpatient and community clinics because of the frequency of visits by the displaced population in this study.

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Authors' Disclosures

The authors report no conflicts of interest.

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REFERENCES

- Berlant D. 2007 Fire Siege Overview. http://www.fire.ca.gov/communications/downloads/communique/2008_spring/Overview.pdf. Accessed November 27, 2008.
- California Fire Wildland 2007 Fire Summary. http://www.fire.ca.gov/communications/downloads/fact_sheets/2007Summary.pdf. Accessed November 29, 2008.
- Steinhauer J. California fires out of control as more than 500,000 flee. *New York Times*. October 24, 2007. http://www.nytimes.com/2007/10/24/us/24calif.html?_r=1&scp=1&sq=California%20fires%20out%20of%20control%20as%20more%20than%20500,000%20flee&st=cse. Accessed March 17, 2009.
- Southern California Recovers From Massive Wildfires (DR-1731-CA). http://www.fema.gov/about/regions/regionix/ca_fires.shtm. Accessed June 27, 2008.
- Brodie M, Weltzien E, Altman D, et al. Experiences of Hurricane Katrina evacuees in Houston shelters: implications for future planning. *Am J Public Health*. 2006;96:1402–1408.
- Greenough PG, Lappi MD, Hsu EB, et al. Burden of disease and health status among Hurricane Katrina—displaced persons in shelters: a population-based cluster sample. *Ann Emerg Med*. 2008;51:426–432.
- Millin MG, Jenkins JL, Kirsch T. A comparative analysis of two external health care disaster responses following Hurricane Katrina. *Prehosp Emerg Care*. 2006;10:451–456.
- Irvin CG, Atlas JG. Management of evacuee surge from a disaster area: solutions to avoid non-emergent, emergency department visits. *Prehosp Disast Med*. 2007;22:220–223.
- Eastman AL, Rinnert KJ, Nemeth IR, et al. Alternate site surge capacity in times of public health disaster maintains trauma center and emergency department integrity: Hurricane Katrina. *J Trauma*. 2007;63:253–257.
- RxResponse: Getting Medications to Patients Who Need Them During a Crisis. <http://www.rxresponse.org/web/guest/home2>. Accessed December 12, 2008.
- Centers for Disease Control and Prevention. Monitoring health effects of wildfires using the biosense system—San Diego County, California, October 2007. *MMWR Morb Mortal Wkly Rep*. 2008;57:741–744.
- Kornstein SG, Schatzberg AF, Yonkers KA, et al. Gender differences in presentation of chronic major depression. *Psychopharmacol Bull*. 1995; 31:711–718.