Physical and Mental Health Symptom Assessment in New Orleans Police Department Personnel 15 Months After Hurricane Katrina

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The employer shall post a copy of this report for a period of 30 calendar days at or near the workplace(s) of affected employees. The employer shall take steps to insure that the posted determinations are not altered, defaced, or covered by other material during such period. [37 FR 23640, November 7, 1972, as amended at 45 FR 2653, January 14, 1980].

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Acknowledgments

Abbreviations

NIOSH	National Institute for Occupational Safety and Health
NOPD	New Orleans Police Department
PTSD	Posttraumatic Stress Disorder

Highlights of the NIOSH Health Hazard Evaluation

The National Institute for Occupational Safety and Health (NIOSH) received a request from the New Orleans Police Department (NOPD) management concerning continuing respiratory, gastrointestinal, and mental health symptoms among NOPD personnel who responded to Hurricane Katrina. NIOSH did a previous survey looking at similar symptoms in October 2005, 2 months after Hurricane Katrina. As a result of this request, a second survey was conducted in December 2006, 15 months after the hurricane.

What NIOSH Did

- We conducted a survey of physical and mental health symptoms.
- We compared the responses of participants from the first survey to responses of participants in the second survey who also took the first survey.

What NIOSH Found

- Almost half of those who took the second survey reported upper respiratory symptoms; a third reported cough symptoms.
- Almost a fourth of those who took the second survey reported depressive symptoms and a little less than that reported symptoms of posttraumatic stress disorder (PTSD).
- Most who took the second survey were satisfied with their work schedules, ability to make independent decisions, quality of supervision, communication with supervisors, and communication with coworkers. Most were dissatisfied with their work-related equipment.
- The prevalences of upper respiratory symptoms, cough, PTSD, and depressive symptoms were similar at the first and second surveys for those who took both surveys.
- Among those who took both surveys, more gastrointestinal symptoms and lower respiratory symptoms were reported in the second survey.
- Among those who took both surveys, a fifth of respondents reported seeing a healthcare provider for upper respiratory symptoms during the second survey.
- In those who took both surveys, reporting respiratory and gastrointestinal symptoms was significantly associated with reporting symptoms of depression and PTSD.
- Most who took the second survey reported they exercised less, had less social interaction, and slept less than they did prior to Hurricane Katina. They reported “no change” in drinking alcohol and smoking.
- Less than half of those who took the second survey reported living in the same home that they lived in before Hurricane Katrina.

- Among those who took both surveys, there was no significant difference in their use of group meetings, individual counseling, and counseling referral. Use of family counseling increased from the first to the second survey.

What Managers Can Do

- Continue to encourage NOPD personnel with ongoing physical or mental health symptoms to seek follow-up with a healthcare provider.
- Implement an employee assistance program for NOPD personnel in need of ongoing psychological support.
- Form a joint employee-management committee that can address health and safety issues of NOPD personnel.
- Ensure that the existing disaster preparedness program addresses health and safety needs of NOPD personnel responding to a disaster event.
- Obtain preexposure and postexposure medical screening for NOPD personnel involved in disaster response.

What Employees Can Do

- Seek care for ongoing physical and mental health problems from a healthcare provider.
- Report work-related health concerns to NOPD management.
- Participate in the workplace health and safety committee once it is created.

Summary

Symptom prevalences for upper respiratory symptoms, cough, PTSD, and depression were similar in October 2005 and December 2006. The prevalences of gastrointestinal and lower respiratory symptoms were higher in December 2006 than in October 2005. NOPD management should continue to encourage NOPD personnel who have ongoing physical or mental health symptoms to seek follow-up with a healthcare provider.

In December 2006, NIOSH received a health hazard evaluation request from NOPD management asking for assistance in evaluating the persistence of physical and mental health symptoms one year after Hurricane Katrina. NOPD management requested NIOSH assistance based on the findings from a previous NIOSH evaluation conducted in October 2005.

On December 11-16, 2006, we distributed questionnaires to NOPD personnel. We received 808 questionnaires (a 68% response rate). Overall, upper respiratory symptoms were the most common symptoms reported (n=388, 48%). Of the mental health symptoms, 20% (n=158) of NOPD personnel reported symptoms of PTSD and 23% (n=176) reported symptoms of depression. The majority of NOPD personnel were satisfied with the following aspects of their work: work schedules, ability to make independent decisions, quality of supervision, communication with supervisor, and communication with coworkers. Only 24% (n=189), however, were satisfied with their work-related equipment.

For the purpose of analysis and ease of identification for this report, three groups are defined. We define the group of NOPD personnel who completed the initial questionnaire in October 2005, 2 months after Hurricane Katrina as the "first survey group." All of the NOPD personnel who completed the questionnaire in December 2006, 15 months after Hurricane Katrina are defined as the "second survey group." Because we did not have personal identifiers on either questionnaire, we could not identify the specific participants who completed both questionnaires. Instead, we used a positive response to the question, "Did you complete the previous CDC / NIOSH survey administered in October 2005?" to define the third group, the "second survey subset." These participants completed both the first and second survey and allowed us to determine whether symptoms persisted in the NOPD personnel over the 15-month period.

Comparing those who completed both surveys, there were no changes in upper respiratory symptoms (first survey group: 28% vs. second survey subset: 28%), but there was a slight increase in cough (21% vs. 25%), an increase in lower respiratory symptoms (9% vs. 19%), and an increase in gastrointestinal symptoms (7% vs. 14%). A slight increase in PTSD symptoms (19% vs. 21%) but slight reduction of depressive symptoms (26% vs. 23%), was documented in the second survey subset compared to the first survey group. The use of group meetings, individual counseling,

and counseling referral changed little from the first survey group to the second survey subset. The use of family counseling increased from 2% to 6% from the first survey group to the second survey subset. None of these differences were tested for statistical significance.

Among those who completed both surveys, 17% of the second survey subset reported seeing a healthcare provider for persistent upper respiratory symptoms. We found that upper respiratory, cough, lower respiratory, gastrointestinal, and skin rash symptoms were statistically significantly ($p<0.01$) related to symptoms of PTSD and depression. Comparing their activities prior to Hurricane Katrina to the time of the second survey, 15 months after the hurricane, most participants in the second survey subset reported they exercised less (55%), had less social interaction (51%), and slept less (53%), but reported "no change" in level of alcohol consumption (61%) and smoking (86%). Sixty-one percent of the second survey subset reported living with the same people they lived with prior to Hurricane Katrina and 41% of participants reported living in the same home that they lived in before Hurricane Katrina.

We recommend that NOPD management continue to encourage personnel with physical or mental health symptoms to obtain care from a healthcare provider and expand services to include an employee assistance program. NOPD management should establish a joint employee-management committee to address both ongoing health and safety issues of the department and those specific to disaster response. In addition to the existing disaster preparedness plan, we recommend that additional health and safety issues be addressed as part of this plan. Lastly, NOPD management should consider providing preexposure and postexposure medical screening for NOPD personnel involved in disaster response as part of the disaster preparedness plan.

Keywords: NAICS 922120 (Police Protection), disaster protection, PTSD, depression, respiratory, gastrointestinal, occupational health, hurricane recovery efforts, persistent symptoms

INTRODUCTION

The management of the NOPD requested that NIOSH conduct a health hazard evaluation in response to their concern about the persistent physical and mental health symptoms among NOPD personnel 15 months after Hurricane Katrina. NIOSH had initially conducted a survey of NOPD personnel 2 months after Hurricane Katrina. In December 2006, NIOSH conducted a second survey. The purpose of this second survey was to document the prevalence of physical and mental health symptoms, as well as certain organizational factors, and to report any differences in symptoms, social factors, and health service utilization among NOPD personnel since the initial survey.

The initial survey was conducted 2 months after Hurricane Katrina (October 17-28, 2005) to document the extent of physical and mental health problems reported by NOPD personnel. Head/sinus congestion (45%) and nose/throat irritation (43%) were the most common Katrina-related physical symptoms reported. In addition, 19% of NOPD personnel reported symptoms consistent with PTSD, and 26% reported depressive symptoms. A report for the initial survey was published and sent to NOPD, New Orleans city officials, and federal agencies [NIOSH 2006]. A complete copy of the initial survey report can be found at www.cdc.gov/niosh/hhe/reports/pdfs/2006-0027-3001.pdf.

ASSESSMENT

In August 2006, we held meetings with the superintendent, administrators, and police officers to discuss current health and work organizational issues in the police force. Information from these meetings was used to develop the questionnaire. In December 2006, we met with management and police officers to discuss the plan for the second survey and answer questions and address their concerns. Police affiliate groups, such as the Police Association of New Orleans, Fraternal Order of Police, Black Order of Police, and Police Officer Women of Every Rank were informed about the survey. (The NOPD does not have a recognized bargaining unit for police officers.)

From December 11 through 16, 2006, we distributed questionnaires to police personnel at NOPD Headquarters, during roll call hours at each of the eight district stations and supporting units, at the police academy, at the communications and records building, and at the monthly Police Association of New Orleans meeting. All NOPD personnel present during these meetings were

asked to complete the anonymous, self-administered questionnaire. Prior to distributing questionnaires, we explained the purpose, confidentiality, and voluntary nature of the survey. During the administration and collection of the questionnaires, we were available to answer questions. Participants were also provided a resource packet that contained contact information regarding available local and national health services (Appendix A).

Questionnaire

The questionnaire included questions about work history and locations, family circumstances, level of damage to residence, use of sick leave, personal activities, and job satisfaction. Participants were asked about the presence of daily physical symptoms and about past medical history. We also asked about symptoms of PTSD and depression and whether police officers sought mental healthcare related to Hurricane Katrina events.

Participants were considered to have a physical symptom if they responded positively to the question, "Have you had any of the following symptoms every day or almost every day in the last 4 weeks?" In addition, we looked at symptoms combined in groups for upper respiratory, lower respiratory, cough, and gastrointestinal symptoms. Participants were considered to have upper respiratory symptoms if they reported symptoms of head/sinus congestion or nose/throat irritation. Lower respiratory symptoms were defined as shortness of breath with minimal activity, wheezing/whistling in the chest, or chest tightness. We defined cough as reports of dry cough or cough with phlegm. Lastly, we defined gastrointestinal symptoms as nausea/vomiting, diarrhea, or abdominal pain.

We defined upper and lower respiratory, gastrointestinal, and skin rash symptoms using the above symptom criteria as well as a negative response to, "Did you have this symptom prior to Hurricane Katrina?" If yes, then we assume that this would not relate to the events of Hurricane Katrina.

We also described the prevalence of participants who were seen by a healthcare provider for physical symptoms. This was defined by a positive response to a physical symptom as well as to the question "Have you seen a healthcare provider for this since Hurricane Katrina?"

Questions related to PTSD included 19 items derived from the Veterans Administration PTSD Checklist [Weathers et al. 1993].

The Veterans Administration PTSD Checklist was scored using criteria from the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition for PTSD [APA 2000a]. Participants were asked to rate the severity of each of the items in the last 4 weeks on a five-point scale ("not at all", "a little bit", "moderately", "quite a bit", and "extremely"). Participants who chose moderately through extremely were considered positive. As a screening instrument, the Veterans Administration PTSD Checklist has demonstrated high sensitivity and specificity when compared to findings from structured clinical interviews [Blanchard et al. 1996; Forbes et al. 2001].

We used an abbreviated Center for Epidemiological Studies Depression Scale consisting of 10 questions [Anderson et al. 1994]. This scale has been shown to be reliable and valid to detect symptoms of depressed mood for a wide range of study populations [Weissman et al. 1977; Eaton and Kellser 1981; Wada et al. 2007]. We used a cut-off score of 11 (out of a total possible score of 30) to define persons exhibiting symptoms that may be consistent with major depression.

Statistical Analysis

For the purpose of analysis and ease of identification for this report, three groups are defined. We defined the group of NOPD personnel who completed the initial questionnaire in October 2005, 2 months after Hurricane Katrina, as the "first survey group." All of the NOPD personnel who completed the questionnaire in December 2006, 15 months after Hurricane Katrina, are defined as the "second survey group." Because we did not have personal identifiers on either questionnaire, we could not identify the specific participants who completed both surveys and could not compare an individual's responses on the two questionnaires. We used a positive response to the question, "Did you complete the previous CDC / NIOSH survey administered in October 2005?" to define the third group, the "second survey subset." These participants completed both the first and second survey and allowed us to compare prevalences of symptoms of the NOPD participants at two different points in time. Defining the three groups allowed us to document symptom prevalences of the NOPD personnel at 15 months, and to compare symptom prevalences between those who were surveyed at both 2 months and 15 months. The results from those taking both surveys told us how things changed with time.

ASSESSMENT (CONTINUED)

We reported prevalences of physical and mental health symptoms, characteristics, and organizational factors of the entire surveyed population. We examined prevalences of those who had reported seeing a healthcare provider for upper respiratory, lower respiratory, cough, and gastrointestinal symptoms, changes in lifestyle activities, and changes in family/social contacts. In addition, we performed Chi-square tests to examine the relationships between physical symptoms, currently living with same people prior to Hurricane Katrina, and mental health symptoms.

The statistical software used for the analyses was SAS version 9.1, SAS Institute, Cary, NC.

RESULTS

Second Survey Group

Demographics

We received questionnaires from 808 NOPD personnel, a 68% response rate based upon NOPD reports of 1184 personnel. The mean age of participants was 40 years (range: 21–73) and the majority of participants were male (72%). Mean duration of NOPD employment was 13 years (range: 0.3–50) and mean number of hours worked per week was 41 hours (range: 3–90). Most participants reported they never smoked cigarettes (69%); 18% were current smokers and 13% were former smokers. Most participants reported they were commissioned police officers (85%) and 61% of participants worked in a field/patrol capacity. Twenty-eight percent of participants reported working in an administrative capacity. Twelve percent of participants reported working in both a field/patrol and administrative capacity. Slightly more than half of participants reported working in a district station (52%).

Physical and Mental Health Symptoms

Table 1 lists the prevalences of physical and mental health symptoms in the second survey group. The most frequently reported symptoms were upper respiratory symptoms (48%). As for the mental health symptoms, 23% met the criterion for symptoms of depression and 20% reported PTSD symptoms.

Table 1. Prevalence of Symptoms for the Second Survey Group

Symptoms	n (%)[†]
Upper respiratory symptoms[*]	388 (48)
Cough[*]	250 (31)
Lower respiratory symptoms[*]	182 (23)
Gastrointestinal symptoms[*]	144 (18)
Skin rash[*]	116 (14)
PTSD symptoms	158 (20)
Depressive symptoms[‡]	176 (23)

[*]Symptoms occurring every day or almost every day in the last 4 weeks
[†]Denominators ranged from 775 to 808.
[‡]Center for Epidemiological Studies Depression Scale

Workplace Satisfaction

Table 2 lists the prevalences of satisfaction with certain workplace elements in the second survey group. Participants were asked if they were satisfied with work-related equipment, work schedules, ability to make independent decisions, quality of supervision, communication with supervisor, and communication with coworkers. The majority of participants were satisfied with most of these aspects of their work. Equipment received the lowest rating with only 24% reporting they were satisfied with work-related equipment.

Table 2. Satisfaction[*] with Workplace Elements in the Second Survey Group

Elements	n (%)[†] Satisfied
Equipment	189 (24)
Work schedules	496 (63)
Ability to make independent decisions	526 (67)
Quality of supervision	555 (71)
Communication with supervisor	597 (76)
Communication with coworkers	685 (86)

[*]Responses were split into two groups: dissatisfied (slightly, moderately, or very dissatisfied) and satisfied (slightly, moderately, or very satisfied).
[†]Denominators ranged from 786 to 794.

Comparison of the First Survey Group and Second Survey Subset

Demographics

Table 3 presents characteristics of the first survey group and second survey subset. A total of 912 NOPD participants were in the first survey group and 430 NOPD participants were in the second survey subset. The demographics of participants who completed both surveys were similar.

Table 3. Demographics of the First Survey Group and Second Survey Subset[*]

	First Survey Group[†]	Second Survey Subset[‡]
Male	724 (80%)	320 (75%)
Mean age	38 Years (range: 19–78)	38 Years (range: 22–63)
Mean years worked for/with NOPD	11 Years (range: 0–41)	12 Years (range: 1–41)

[*] Participants who completed both surveys, based on a positive response to the question, "Did you complete the previous CDC / NIOSH survey administered in October 2005?"
[†] Denominators ranged from 887 to 909.
[‡] Denominators ranged from 420 to 427.

Prevalences of Health Symptoms in the First Survey Group and Second Survey Subset

Table 4 lists the prevalences of health symptoms of the first survey group and second survey subset. There was no change in the prevalences of upper respiratory symptoms (28%) and slight increases in the prevalences of cough (21% vs. 25%) and PTSD symptoms (19% vs. 21%) over time. A slight reduction in prevalences of depressive symptoms (26% vs. 23%) and an increase in the prevalences of lower respiratory symptoms (9% vs. 19%) and gastrointestinal symptoms (7% vs. 14%) were documented over time.

Table 4. Prevalences of Symptoms Among the First Survey Group and Second Survey Subset[*]

Symptoms	First Survey Group n (%)[†]	Second Survey Subset n (%)[‡]
Upper respiratory symptoms[§]	236 (28)	120 (28)
Cough[§]	176 (21)	107 (25)
Lower respiratory symptoms[§]	81 (9)	82 (19)
Gastrointestinal symptoms[§]	60 (7)	60 (14)
PTSD symptoms	170 (19)	90 (21)
Depressive symptoms[¶]	227 (26)	96 (23)

[*]Participants who completed both the first and second survey, based on a positive response to the question, "Did you complete the previous CDC / NIOSH survey administered in October 2005?"

[†]Denominators ranged from 845 to 895.

[‡]Denominators ranged from 413 to 428.

[§]Symptoms occurring every day, or almost every day in the last 4 weeks, and not prior to Hurricane Katrina

[¶]Center for Epidemiological Studies Depression Scale

Group Meetings and Counseling Services

Table 5 lists the prevalences of participation in group meetings and use of counseling services related to Hurricane Katrina from the first survey group and second survey subset. Use of these services changed little although use of family counseling increased from 2% to 6%.

Twenty-eight percent of participants in the second survey subset reported taking sick days due to health problems thought to be related to Hurricane Katrina compared to 8% of participants in the first survey group. In the second survey subset, 6% reported they changed jobs or had limited job duties because of health problems related to Hurricane Katrina compared to 2% in the first survey group.

Table 5. Use of Mental Health Services Among the First Survey Group and Second Survey Subset*

Service	First Survey Group n (%)†	Second Survey Subset n (%)‡
Individual counseling	126 (14)	58 (13)
Group meeting (held at shift change or when left site)	105 (12)	62 (14)
Family counseling	21 (2)	27 (6)
Counseling follow-up referral for individual and/or family	14 (2)	15 (3)

*Participants who completed both the first and second survey, based on a positive response to the question, "Did you complete the previous CDC / NIOSH survey administered in October 2005?"
†Denominators ranged from 854 to 890.
‡Denominator = 430

Second Survey Subset

Relationship Between Physical and Mental Health Symptoms

We found a statistically significant relationship between physical symptoms (upper respiratory, cough, lower respiratory, and gastrointestinal) and mental health symptoms (depression and PTSD) among participants in the second survey subset ($p<0.01$). Among NOPD participants who did not report symptoms of PTSD or depression, a lower prevalence of physical symptoms was found compared to those personnel reporting mental health symptoms.

Severity of Symptoms

We considered symptoms to be more severe if participants sought care from a healthcare provider. Table 6 lists the prevalences of physical symptoms that involved a healthcare provider consultation.

Lifestyle Activities

Table 7 lists results for changes in lifestyle activities in the second survey subset. We asked participants to compare activities prior to Hurricane Katrina to the time of the second survey, 15 months after Hurricane Katrina. The majority of participants reported they exercised less (55%), had less social interaction (51%), and slept less (53%) than prior to Hurricane Katrina. The majority reported "no change" in the amount of alcohol consumption (61%), and smoking (86%).

Table 6. Prevalence of Symptoms Involving a Health Care Provider Consultation Among the Second Survey Subset*

Symptoms†	n (%)‡
Upper respiratory symptoms	71 (17)
Cough	64 (15)
Lower respiratory symptoms	44 (10)
Gastrointestinal symptoms	31(7)

*Participants who completed both the first and second survey, based on a positive response to the question, "Did you complete the previous CDC / NIOSH survey administered in October 2005?"
†Symptoms occurring every day or almost every day in the last 4 weeks, not prior to Hurricane Katrina, and involving a health care consultation since Hurricane Katrina
‡Denominators ranged from 418 to 425.

Table 7. Lifestyle Changes Following Hurricane Katrina in the Second Survey Subset *

Lifestyle Changes	More n (%)†	Less n (%)†	No Change n (%)†
Exercise	65 (15)	232 (55)	128 (30)
Social interaction	42 (10)	218 (51)	164 (39)
Sleeping	62 (15)	226 (53)	138 (32)
Eating	159 (38)	84 (20)	179 (42)
Alcohol consumption	118 (29)	38 (9)	247 (61)
Smoking	42 (10)	15 (4)	345 (86)

*Participants who completed both the first and second survey, based on a positive response to the question, "Did you complete the previous CDC / NIOSH survey administered in October 2005?"
†Denominators ranged from 402 to 426.

Changes to Family / Social Contacts

Twelve percent of participants in the second survey subset reported the death of an immediate family member and 9% reported a family member was seriously injured as result of Hurricane Katrina. Sixty-one percent of the second survey subset reported living with the same people they lived with prior to Hurricane Katrina and 14% reported they were "single, lived alone." Participants in the second survey subset who reported they lived with the same people (excluding those who reported being "single, lived alone") were about half as likely to report depressive symptoms than those who reported not living with the same people they lived with prior to Hurricane Katrina ($p<0.01$).

Home Damage

Fifty percent of participants in the second survey subset reported damage from Hurricane Katrina resulted in a complete loss of their home. Nine percent of those experiencing a complete loss of home reported their home was completely rebuilt after damage from Hurricane Katrina. Forty-one percent of participants in the second survey subset reported living in the same home that they lived in before Hurricane Katrina.

DISCUSSION & CONCLUSION

The second survey allowed us to compare physical and mental health symptoms in NOPD personnel at two points in time after Hurricane Katrina, at 2 months and 15 months. Our results show that symptom prevalences for upper respiratory, cough, PTSD, and depression were similar in October 2005 and December 2006. The prevalences of gastrointestinal and lower respiratory symptoms were higher in December 2006 than in October 2005.

We documented an increase in lower respiratory symptoms, but prevalences of cough and upper respiratory symptoms were similar over time. About 15% the second survey subset reported seeing a healthcare provider for upper respiratory, lower respiratory, and cough symptoms, which may indicate that respiratory symptoms experienced by NOPD personnel were severe. Exposure to mold during the prolonged clean-up phase after Hurricane Katrina may have contributed to their respiratory symptoms. In another study, NIOSH researchers found that respiratory symptoms were associated with exposure to water-damaged homes, including exposure limited to being inside without participating in clean-up activities 6 months after Hurricane Katrina [Cummings et al. 2008]. In addition, a 2004 Institute of Medicine report concluded that sufficient evidence exists for the association between the presence of mold or other dampness-related agents in damp buildings and nasal and throat symptoms, cough, and wheeze, as well as exacerbation of asthma symptoms in sensitized asthmatics [IOM 2004]. Additional evidence suggests asthma can develop in individuals exposed to dampness or mold in an occupational setting [Cox-Gasner et al. 2005].

Exposure to severe stressful events can affect the reporting of gastrointestinal and respiratory symptoms. Our study found an association between physical symptoms (upper respiratory, cough, lower respiratory, and gastrointestinal) and mental health

symptoms (PTSD and depression). Among NOPD participants who did not report symptoms of PTSD or depression, a lower prevalence of physical symptoms was found compared to those personnel reporting mental health symptoms. Although we are unable to demonstrate a causal relationship between the presence of mental health symptoms and subsequent physical symptoms, some evidence in the literature suggests such a relationship. Researchers [Wolfe et al. 1994; Vedantham et al. 2001; Huag et al. 2002] have shown that stress, anxiety, and depression are associated with gastrointestinal symptoms such as nausea and diarrhea. It has been estimated that in about half of people with digestive disorders, psychological factors (such as stress) may play an important role in their symptoms [Herschbach et al. 1999]. This association is believed to occur through the release of certain hormones and chemicals in response to stress, through a complex pathway that involves certain areas of the brain, the endocrine system, and the digestive system. Stress and adverse psychological factors cause the brain to release certain chemicals that affect many functions of the digestive system.

The reason for the association between mental health symptoms and respiratory symptoms is less clear. In a similar study conducted by NIOSH of depressive symptoms in New Orleans Fire Department personnel after Hurricane Katrina, NIOSH found that persons with new onset respiratory symptoms had a significantly higher risk of reporting depressive symptoms [Tak et al. 2007]. Another study found an increased incidence of respiratory symptoms in Australian firefighters with PTSD [McFarlane et al. 1994]. Experiencing adverse psychological factors may influence the reporting of physical symptoms.

In our study, the prevalence of symptoms consistent with PTSD increased slightly over time (21% at 15 months vs. 19% at 2 months). Previous studies show that PTSD symptoms persist after natural disasters from several months to years. PTSD among first responders involved in fires and earthquakes has been reported as high as 30% 15 months after the disaster [McFarlane 1988; Carr et al. 1997]. Our results are similar to findings in other studies conducted months after Hurricane Katrina. A PTSD symptom prevalence of 19% was reported among Tulane University employees 6 months after Hurricane Katrina [DeSalvo et al. 2007]. Study participants interviewed between 5 and 8 months after Hurricane Katrina and one year after showed little change in PTSD prevalence between the two study periods (25.9% to 24.1%) in New Orleans residents [Kessler et al. 2008].

Although the immediate consequences of Hurricane Katrina have passed, PTSD symptoms may persist or be reactivated in response to reminders of its occurrence [APA 2000a]. NOPD personnel continue to be exposed to stressors related to Hurricane Katrina as they conduct their work and are continually reminded of the hurricane's destruction when patrolling New Orleans neighborhoods. Many of the NOPD personnel were involved in or witnessed traumatic events or experienced illness, injury, or loss of family members, friends, and coworkers. A study in a New Orleans workforce documented high perceived stress scores in those who had feared losing their life or knew of someone who died because of Hurricane Katrina [Leon et al. 2007]. Another study documented that being physically injured or having an illness caused or exacerbated by Hurricane Katrina were significantly related to PTSD symptoms in a group of adults in the New Orleans metro area [Galea et al. 2007]. Since Hurricane Katrina, the NOPD has lost several members of its workforce and has had difficulty recruiting new officers. These factors can place additional workload strain on available NOPD personnel to manage the crime and law enforcement issues in the city [RAND 2007]. Added to increased workloads, more than half of the NOPD participants reported they sleep less and exercise less since Hurricane Katrina. A lack of sleep and sleep disturbances have been associated with anxiety and high stress levels in the workplace [NIOSH 1999]. In addition, studies have found that routine aerobic exercise can help to counteract stress and mental health issues such as anxiety and depression [Fox 1999; Paluska 2000].

The prevalence of symptoms of depression has decreased slightly over time (23% at 15 months vs. 26% at 2 months). However, the prevalence we found in the NOPD is higher than 13% of a sample of New Orleans residents reported with depression 15 months after Hurricane Katrina [Kim et al. 2008] and compared to rates of depression in rescue workers months after responding to other disasters [CDC 2004; Fullerton et al. 2004; Aker 2006].

As with PTSD, personal loss and decreases in social support have been found to be important predictors of postdisaster psychological distress and depression [Freedy et al. 1992; Kaniasty and Norris 1997; Ginexi et al. 2000; APA 2000b; Armenian 2002; Reacher et al. 2004]. NOPD personnel have experienced personal loss, disruption and strain on social support networks, and readjustment difficulties related to Hurricane Katrina. Participants reported death of family members, and many have reported a change in their social networks as evidenced by the quarter of NOPD participants not living with the same people they lived

with prior to Hurricane Katrina. Half of those who participated in the second survey subset reported that they have less social interaction than prior to Hurricane Katrina. Over time, social support becomes more important as a resource to help disaster victims recover and resume daily activities [Gist and Lubin 1999]. Our analysis demonstrated that those who reported they lived with the same people prior to Hurricane Katrina were less likely to report depressive symptoms. Regarding their living situations, 50% of participants in the second survey subset reported that Hurricane Katrina resulted in a complete loss of their home; many NOPD personnel may have had to live in temporary residences or trailers. Other studies have found poor mental health outcomes in adult populations who have had to live in temporary trailers, with friends or relatives, or who experienced multiple moves since Hurricane Katrina [Leon et al. 2007; Abramson et al. 2008].

Among participants in the second survey subset, 25% reported taking sick days due to health problems related to Hurricane Katrina. Sick leave use in emergency personnel has been found to increase after a disaster [Morren et al. 2007]. Rescue workers responding to an explosion had persistent psychological and physical symptoms requiring sick days for up to 3 years [Morren et al. 2007].

About 14% of participants in the second survey subset reported having individual mental health counseling, but more sought help at group meetings and family counseling. Overall, the prevalence of counseling use was low compared to the 29% of Tulane University employees seeking counseling 6 months after Hurricane Katrina [DeSalvo 2007]. Other studies have reported higher usage of counseling services months after disasters [Carr et al. 1992; Boscarino 2004]. NOPD personnel may not recognize they could benefit from it, may not be aware of the mental health treatment options available, or may not feel they have time to seek care due to competing priorities. In addition, the NOPD may not have a culture in which mental healthcare is comfortably sought. Other studies have demonstrated that police officers often avoid acknowledging emotional difficulties and a perceived stigma associated with seeking mental health treatment [Carlier et al. 1997; Hodgins et al. 2001].This perceived stigma may have prevented NOPD personnel from accessing care, despite healthcare provider guarantees of anonymity and confidentiality. Another factor that could have affected accessing treatment is a lack of availability of services and fewer mental health professionals present in the New Orleans area after Hurricane Katrina [Weisler 2006; DeSalvo 2007].

Study Limitations

Due to the lack of personal identifiers on the questionnaires, we could not properly test possible differences in symptom prevalences for the first survey group and the second survey subset. Therefore, the results from the first survey group and second survey subset were compared descriptively. The results from the second survey subset may not be representative of NOPD personnel who participated in the first survey or NOPD personnel involved in the initial response to Hurricane Katrina. We were unable to survey NOPD personnel who were on sick leave during the second survey period, which may have led to an underestimation of health symptom prevalence. Although our results include physical symptoms reported only after Hurricane Katrina, we cannot solely attribute symptoms to the hurricane event. Participants may be experiencing symptoms related to the initial response to Hurricane Katrina, ongoing recovery efforts, or current exposures in their workplace unrelated to Hurricane Katrina. Participants may have been reticent to admit to existing mental health symptoms, which may have led to an underestimation of PTSD and depressive symptom prevalences.

Although this report contains descriptions of physical and mental health symptoms, this information should not be interpreted as definitive diagnoses of individual mental health or physical problems. These would need to be confirmed on an individual basis with a physician or other licensed health professional.

RECOMMENDATIONS

In the first NIOSH report addressing the effects of Hurricane Katrina in May 2006, we recommended that NOPD management put into place mechanisms that made it easy for personnel with physical or mental health symptoms to obtain care from a healthcare provider. Since that time, the NOPD has provided a plan for both medical and psychological treatment that includes accessing services from Tulane University for physical injuries/ illnesses and Louisiana State University for counseling services. We applaud these changes and encourage the NOPD management to continue them and expand services to include an employee assistance program. The employee assistance program should be confidential and the services provided by mental health professionals. Additional recommendations are given below based on our findings from this evaluation.

NOPD management should establish a joint employee-management committee to address both ongoing health and

RECOMMENDATIONS (CONTINUED)

safety issues of the department and those specific to disaster response. The health and safety committee concept emphasizes the importance of management and employees working together to identify work hazards and propose solutions. The committee should have representation from all units, sections, districts, and divisions; should be convened regularly; and should be appropriately supported with resources. The health and safety committee could also prepare additional resource needs for both small and large-scale disasters.

We acknowledge and commend the NOPD management for implementing a disaster preparedness plan. In addition to the existing plan, we recommend adddressing additional health and safety issues as part of this plan by obtaining input from management, NOPD personnel, and the above-mentioned health and safety committee. As a guide, the NIOSH document *Protecting Emergency Responders, Volume 3: Safety Management in Disaster and Terrorism Response* may be helpful. It is available at www.cdc.gov/niosh/docs/2004-144/.

NOPD management should consider providing preexposure and postexposure medical screening for NOPD personnel involved in disaster response as part of the disaster preparedness plan. Both preexposure and postexposure screening can be helpful to evaluate personnel's fitness to perform potentially hazardous or stressful work safety and to help recognize adverse health effects in a timely manner. The level or extent of screening appropriate for a given work activity will depend on multiple factors, in particular the type of work activity anticipated and the extent to which hazardous conditions can be predicted. Additional guidance is available for those who may be involved in disaster response at www.cdc.gov/niosh/topics/flood/preexposure.html and www.cdc.gov/niosh/topics/flood/MedScreenWork.html.

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Appendix A: List of Local & National Health Resources Distributed During the Survey Period

General Resources

Hotlines
CDC INFO- 1-800-232-4636

Community Resource Line 1-800-749-2673

Cope Line 1-800-749-2673

FEMA-1-800-621-3362

HIV Hotline-504-894-7609

Red Cross- 1-877-975-7585

Salvation Army-1-888-363-2769

Mental Health Clinics
East Jefferson Mental Health
504-838-5257

Southeast La Hospital
985-626-6300

Jefferson Parish Health Unit
504-838-5100
Has info on getting birth certificates, food stamps, Medicaid, mental health services and medication

Health Clinics
Algiers Community Health Clinic
4422 General Meyer
New Orleans, La. 70131

Carrollton Clinic-Mobile only
3900 S. Carrolton Ave.
New Orleans, La. 70118

Common Ground-Free standing clinic
1401 Teche St.
New Orleans, La. 70114
504-671-9659

Covenant House
611 Ramport St.
New Orleans, La
Open seven days a week
504-584-1111

Earl K. Long Medical Center
1401 N. Foster Dr.
Baton Rouge, La. 70806
225-987-9155

East Jefferson General Hospital
504-889-7200

Edna Pillsbury Health Clinic
2222 Simon Bolivar Ave.
New Orleans, La. 70113
Mobile van only, well children clinic

Elmwood Medical Center Campus
1221 S. Clearview Pkwy.
Elmwood, La. 70121
504-736-4860

Health Care for the Homeless Clinic-mobile van
2025 Canal Street
New Orleans, La. 70112

Ida Hymel Health Clinic
1111 Newton St.
New Orleans, La. 70053
504-364-5643

Medical Center of LA at New Orleans
136 S. Roman St.
New Orleans, La. 70112
504-903-7041

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Appendix A: List of Local & National Health Resources Distributed During the Survey Period (continued)

Metairie Clinic
4770 S I 10 Service Rd W
Metairie, La 70001
504-887-2222

Ochsner Foundation Hospital
1514 Jefferson Hwy.
Jefferson, La. 70121
504-842-4000

St. Charles Hospital
3700 St. Charles Ave.
New Orleans, La. 70115
504-899-7441

The Women's Medical Centers
515 Westbank Expressway
Gretna, La. 70053
504-366-7233

Touro Infirmary Hospital
1404 Foucher Street
New Orleans, La. 70115
504-897-7011

Tulane-Lakeside Hospital Clinic
4700 S I 10 Service Rd. W
Metairie, La. 70001
504-780-8282

Uptown Square Clinic
200 Broadway
New Orleans, LA 70118

West Jefferson Medical center
1101 Ave D
Marrero, La. 70058
504-347-5511

Domestic Violence Resources

Chez Hope
Franklin, La
1-800-331-5303

Faith House Lafayette
318-232-8954

Louisiana Domestic Violence Hotline
1-888-411-1333

Metropolitan Battered Women's Program
504-837-5400

Other Resources of Interest

Celebration Church
2701 Transcontinental Dr.
Metairie, LA 70006
504-831-9673

Find Family Call Center
1-866-326-9393

Food Stamp Distribution
900 Stumpf Blvd
Gretna, La. 70053

Mardi Gras World
932 Teche St.
New Orleans, LA 70114

Mold Information
Contact CDC
1-800-584-8814

Register for Housing Assistance
Contact FEMA
1-800-745-0243

Social Security
1-800-772-1213

Vector Control Hotline
504-658-2400
Mosquitoes,flies & rodents complaints

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HEALTH RESOURCES FOR NOPD

Medical Treatment

Tulane University Hospital and Clinic
1415 Tulane Ave
New Orleans, LA 70112
504-988-5800

Dr. Norman McSwain, NOPD Physician, Tulane University
Phone number: 504-232-4681 and 615-478-5018
Email: Norman.mcswain@comcast.net

Mental Health Services
Dr. Armond Devezin: NOPD Psychiatrist: 504-606-8317

Howard J. Osofsky, M.D., Ph.D.,
Kathleen and John Bricker Chair of Psychiatry LSU Health Sciences Center New Orleans
504-296-7110; hosofs@lsuhsc.edu

Dr. James Arey, Psychiatrist: 504-542-6259

Dr. Jeff Rouse, Psychiatrist: Substance Abuse and Mental Health Services Administration (SAMHSA)
Coordinator: 504-236-4533

Catholic Charities Archdiocese of New Orleans
1000 Howard Avenue
New Orleans, LA 70113
504-523-3755

NOPD Department Chaplains:
Connie Daniels: 504-799-5273
Joe Cull: 504-458-5633
Lynn Hyder: 843-838-7148

Other Important Phone Numbers

- Crisis Counseling for Non-First Responders: 800-273-8255
- Family Assistance Center: 866-326-9396
- Emergency Operations Center main Number: 504-658-2210
- FEMA: 800-621-FEMA
- To Report a water line break: 585-2400 9AM - 5PM
- To Restore service with Entergy: 1-800-ENTERGY
- American Red Cross: 800-HELP NOW
- American Red Cross: 866-GET INFO
- American Red Cross Financial Assistance: 800-975-7585
- American Red Cross Find Loved Ones: 877-LOVED-1S
- Department of Education: 877-453-2721
- Department of Social Services: 888-524-3578
- Disaster Legal Services: 800-310-7029

Acknowledgments and Availability of Report

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