

Barriers to At-Home-Preparedness in Public Health Employees: Implications for Disaster Preparedness Training

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Objectives: To assess "at-home" preparedness and barriers to preparedness in a cohort of public health employees. **Method:** Conducted a cross-sectional survey involving 100 employees attending emergency preparedness training that emphasized incident command training and included a segment on "at-home" preparedness. **Results:** Fifteen percent of participants were rated as "better prepared," and only 8% of participants would be considered "most prepared." There was no relationship between the concern for bioterrorism and other disasters and preparedness. The principal barrier involved challenges in getting the task done versus lack of desire or knowledge. **Conclusions:** There is great potential for distraction of public health workers during an emergent event if they are not prepared at home and have concern for family members. At-home preparedness training efforts that emphasize what should be done and why are likely to have limited impact on changing behavior. Strategies that ensure that small steps are taken are likely to be more successful. (J Occup Environ Med. 2007;49:318-326)

Since the 9/11 attack, there has been great interest in emergency preparedness with significant resources being poured into this endeavor. For example, federal funding for public health preparedness increased from \$67 million in 2001 to \$1 billion in 2002.¹ There has also been a dramatic increase in writings on this subject, with an explosion of PubMed citations for disaster planning since 2001 (Fig. 1). These writings range from an ever-expanding list of who needs to be prepared,²⁻⁹ to what needs to be done and how, emphasizing partnerships, strategies, competencies, and curriculum.¹⁰⁻¹⁵ Clearly, the goal of this activity is to reduce the morbidity and mortality associated with any large-scale disaster, the cost of which can reach into the billions. It should also be appreciated that the burden in the aftermath of a major disaster is influenced by the dance between the capacities of the responders on one end and the collective needs of the "respondee" on the other. As an example, in New York City, the emergency management service (EMS) reported a 58% increase in calls during the black-out of 2003. Many of the calls were due to respiratory device failure, with the recognition that a widespread prolonged outage could have easily overwhelmed EMS's ability to respond.¹⁶ Clearly, there will be far less impact when the capabilities of the response team far exceed the needs of those most affected.

Despite the efforts of many, including the Federal Emergency Man-

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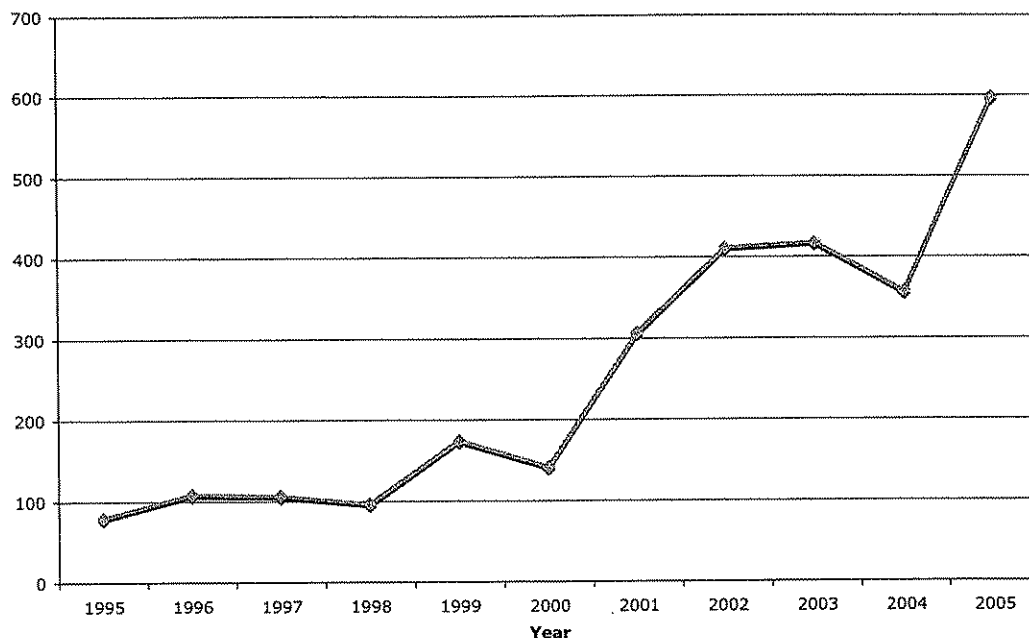


Fig. 1. Disaster planning PubMed hits.

agement Agency (FEMA), American Red Cross, Centers for Disease Control, Salvation Army, and others, concerns remain regarding the readiness of communities as well as those individuals who would be considered emergency responders. For example, a study done in Los Angeles noted that only 17% of responders had an emergency plan, and 35% stated that they had emergency supplies such as food, water, or clothing.¹⁷ Similar findings were noted in a national telephone survey conducted by the National Center for Disaster Preparedness.¹⁸ They estimate that only 31% have a basic family emergency plan, and overall, 66% feel unprepared. Their findings have been without change since 2002. This is in the face of a growing belief among those surveyed that there would be a terrorist attack in the future.

There is also concern for the capabilities of the responders. The most glaring example was the response to Hurricane Katrina.^{19,20} More than 250 New Orleans police officers did not report to work during the initial response to Hurricane Katrina. Many of these officers reported that they had been involved in assuring their

family's safety during this time period.²¹ Added to this observation is growing literature suggesting that other workers may not show up for work in the face of disaster. Qureshi et al.²² surveyed 6428 health care workers and found that the likelihood of reporting to work varied based on the type of disaster. Their willingness to report to work ranged from a low of 48% during a severe acute respiratory syndrome (SARS) outbreak to a high of 81% during a mass casualty event.²² Several barriers to performance were mentioned, and as in the Katrina incident, a concern for family members surfaced. Clearly, issues that would serve to distract workers must be addressed, because even the best training would be ineffective if those needed in an emergency do not show up or are not focused on the task at hand.

Aiming toward lessening worker distraction created by concerns for family members, we undertook an investigation involving a municipality's public health employees. Although typically not thought of as first responders, they are included in the broader definition of emergency responders, particularly given the

role they would play in response to bioterrorism or a pandemic flu. The assurance that their families are not in harm's way is critical, as these public health workers could be away from their families for extended periods. Their ability to function may be impaired by their concerns for their own families' safety.

In addition to assessing the level of preparedness in those individuals who might be first responders, this study seeks to understand some of the barriers preventing these workers from being prepared to react at their maximum capacity. Understanding these barriers will help to develop better training programs, which will lessen the chance for having distracted workers and facilitate an optimal response to disaster.

This information is vital in targeting at-home preparedness educational programs more effectively, not only for municipal workers, but also for the community at large so as to optimize readiness. The ultimate goal is a well-trained workforce, undistracted and able to serve a community that is similarly well prepared.

Materials and Methods

Design

The design involves a cross-sectional study employing the use of a self-completed survey. The survey included no personal identifiers and was approved by the human investigations committee.

Study Population

Members of a local health department were asked to complete the survey prior to attending an at-home preparedness seminar. These classes were part of the ongoing emergency preparedness training occurring in the health department emphasizing the incident command structure. Sessions were held monthly, with 25 members attending each class. Data was gathered from the participants of four classes prior to the commencement of at-home preparedness training.

Instrument

The survey instrument was designed to collect information in five areas: demographics, event likelihood beliefs, preparedness, barriers to preparedness, and preferred learning methods. General demographic information was collected on age, gender, type of residence, household income, and educational level. With the exception of age and number in household, all other variables were categorical.

The survey (see Appendix) was a modified checklist developed by FEMA and the American Red Cross.²³ The participants were asked about 21 preparedness items with "Yes" or "No" responses. When members answered "No," they were to indicate one of four choices of why they had not completed that particular item. The choices were as follows: 1) feel no need to accomplish the task, 2) feel the need to accomplish the task but was not clear on what to do, 3) is clear on what to do but is having trouble getting it done due to time or resource constraints, or 4) has accomplished the

task in the past but has not maintained it. These four levels were chosen to reflect the nodes between the five stages of change (precontemplation, contemplation, preparation, action, and maintenance) as described in the Transtheoretical Model of Behavior Change.²⁴

The participants were then asked to rate the likelihood of a disaster occurring using a 5-point Likert scale. The events of concern were Bioterrorism, Power Outage, and Natural Disaster. The instrument concluded with an assessment of the participant's preferred method of receiving additional information. Five choices were given with the option of choosing "yes," "no," or "maybe."

Data Handling/Analysis

Summary statistics were used to describe the demographics of the population. The Preparedness Level was described using two methods. The first method was to divide the 21 preparedness question items into 4 groups: Not Prepared (0–5 items), Minimally Prepared (6–10 items), Better Prepared (11–15 items), and Most Prepared (16–21 items).

The second method was to arrange the 21 preparedness questions into 3 categories with 7 items in each group, reflecting the importance and level of organization needed to accomplish these tasks. These groups were labeled as Basic, Intermediate, and Advanced. The Basic group (Items 7–11, 13, and 16) included common household items such as candles that are helpful in a minor emergency. The Intermediate group (Items 14, 15, and 17–21) repre-

sented tasks that suggested extra effort was needed to prepare but without formal planning, such as having a radio that does not require batteries. The group labeled Advanced (Items 1–6 and 12), represented tasks that involved formal preparedness planning such as having a written disaster plan.

We used odds ratios to assess a relationship between a participant's level of concern of a disaster and the completion of each of the 21 tasks. To accomplish this, we divided the responses regarding concern into "Low Level of Concern" (responses 1, 2, and 3,) and "High Level of Concern" (responses 4 and 5).

Results

The study population was composed of 70 females and 29 males. The mean age of responders was 37.3 years. More than 88% had at least a college-level education. Most of the participants lived in houses (82%), and most qualified as head of household (78%). Most of the responders lived within the municipality (68%). Seventy-six percent listed more than one member in the household, 15% listed one member, and 8% did not give a response. The range of income for responders was between \$30,000 and \$70,000 per year. Forty-eight percent of the responders listed themselves as health professionals versus 43% as non-health professionals.

Rates of preparedness are listed in Table 1. Only 2 respondents had completed all 21 of the items. Overall, 8% of the respondents were classified as "Most Pre-

TABLE 1

Percentage Prepared by Group

	Not Prepared (0–5 Items)	Minimally Prepared (6–10 Items)	Better Prepared (11–15 Items)	Most Prepared (16–21 Items)
All 21 items	32 (0 or 1 item)	43 (2 or 3 items)	17 (4 or 5 items)	8 (6 or 7 items)
Basic	14	26	35	25
Intermediate	35	47	16	2
Advanced	51	30	15	4

TABLE 2
Preparedness by Stratified Demographics n (%)

Variable	Level of Preparedness for an Emergency		
	Better Prepared Group (≥ 11 Q)*	Less Prepared Group (≥ 10 Q)†	Total‡
Age (years)			
<40	3 (10)	28 (90)	31
40–50	10 (29)	25 (71)	35
≥ 51	7 (32)	15 (68)	22
Total	20 (23)	68 (77)	88
$P > 0.05$			
Number of individuals in the household			
1–2	12 (30)	28 (70)	40
3–4	6 (17)	29 (83)	35
≥ 5	4 (25)	12 (75)	16
Total	22 (24)	69 (76)	91
$P > 0.05$			
Type of residence			
Apartment	3 (21)	11 (79)	14
House	21 (25)	62 (75)	83
Total	24 (25)	73 (75)	97
$P > 0.05$			
Job title			
Health profession	16 (34)	31 (66)	47
Non-health profession	6 (13)	39 (87)	45
Total	22 (24)	70 (76)	92
$P < 0.05$			
Annual income			
Less than \$50,000	8 (20)	32 (80)	40
$\geq \$50,000$	16 (31)	36 (69)	52
Total	24 (26)	68 (74)	92
$P > 0.05$			
Level of education			
High school	1 (10)	11 (90)	12
College	15 (25)	44 (75)	59
Postgraduate	9 (33)	18 (67)	27
Total	25 (26)	73 (74)	98
$P > 0.05$			
City of residence			
Detroit	17 (25)	51 (75)	68
Metro Detroit	7 (26)	20 (74)	27
Total	24 (25)	71 (75)	95
$P > 0.05$			

*Those who completed ≥ 11 question items from the 21 questions in Section B of the questionnaires.

†Those who completed < 10 items from the 21 questions in Section B of the questionnaires; those who did not respond were counted as 0 responses.

‡Total study population was 100, but there were no responses to some questions.

pared”; they completed more than 15 of the 21 items. Seventeen percent were classified as “Better Prepared”; they completed more than 10 items. Forty-three percent were classified as “Minimally Prepared” and 32% as “Not Prepared”. When the 21 items were broken down into groups representing Advanced, Intermediate, and Basic, the percentages representing those “Most Prepared” were 4%, 2%, and 25%, respectfully.

Table 2 notes the relationship between selected stratified demographic variables and preparedness, dividing groups into More Prepared (Better Prepared plus Most Prepared) and Less Prepared (Minimally Prepared plus Not Prepared). Only the demographic variable that demonstrated a greater level of preparedness was being listed as a health professional, with 35% of the health-care professionals being rated as

TABLE 3
Percentage of Employees With Concern for Disaster

Type of Event	Percentage With High Concern (Rated 4 or 5)
Bioterrorism	41
Power outage	63
Other natural disaster	49

“More Prepared” versus 13% of the non-healthcare professionals.

Perceptions regarding the likelihood of various disasters are noted in Table 3, where those indicating 4 or 5 on the survey were combined to represent “High Concern.” The next concern was for power outage at 63%. This was followed by Other Natural Disasters (49%) and bioterrorism (41%). Odds ratios were performed to look at the relationship between the concern for an event and completing any of the 21 items in the survey (63 relationships in total, not shown). Only three demonstrated a statistically significant association and, of these, only one with a positive association. Item 21 (possessing a waterproof, fireproof container for important papers) was noted to have a positive association with power outage, with an odds ratio of 2.7 (1–7.47).

The reasons why participants did not complete the tasks (barriers to preparedness) are listed in Fig. 2. In the total group, for 17% of the responses the reason given was a feeling that there was no need to complete the task. For 24% of the uncompleted items, the reason cited was lack of clarity concerning what to do. For 43% of the items, the reason cited was lack of time or resources. Finally, for 16% of the items, the reason cited was lack of maintenance of a previously completed task. When the 21 items were grouped by those representing advanced, intermediate, and basic, a similar distribution was noted with greater than 50% of the uncompleted items relat-

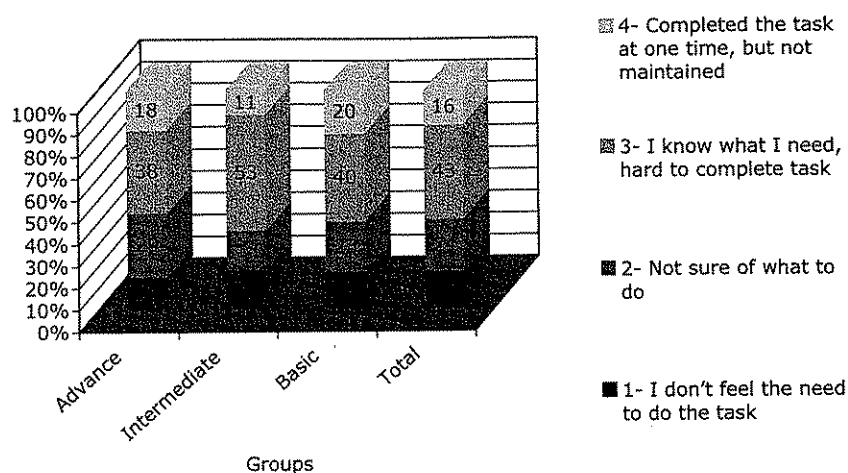


Fig. 2. Percent of barriers by group.

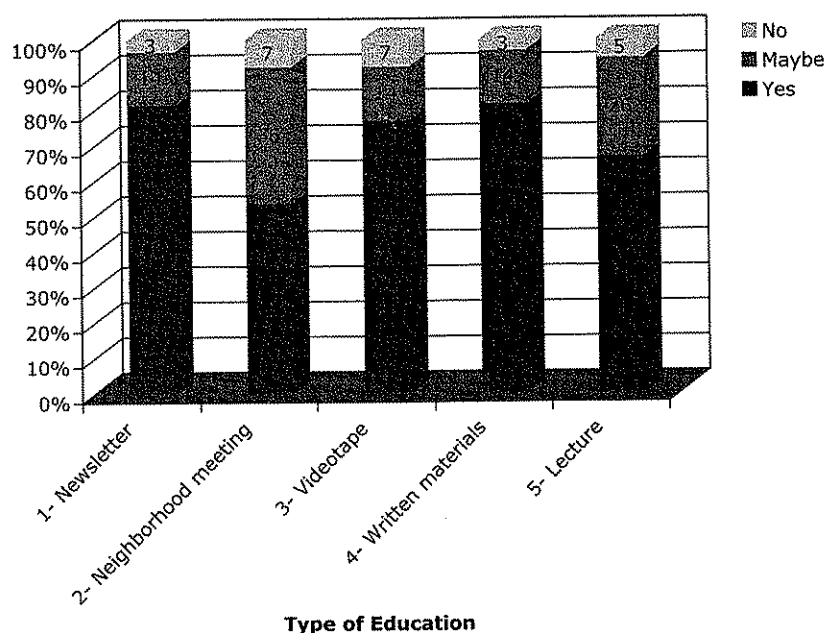


Fig. 3. Preference for additional learning.

ing to time, financial resources, or maintenance.

The majority of the respondents were open to learning more about at-home preparedness (Fig. 3). The most desirable ways were by newsletter or flyer (76%), and watching a videotape (72%). The least desirable methods were attending a neighborhood meeting (50%), followed by attending a lecture (62%).

Discussion

Consistent with other studies, this investigation found a low level of "at-home" emergency preparedness.

This finding is a bit more concerning, as this was not the general population but a group of workers whose skills would likely be necessary in a large-scale disaster. The concern comes from the observation that, in the time of need, workers distracted by the need to care for their family members may not show up to perform their duties. This distraction could potentially affect as much as 85% of the workforce in this cohort, as that was the number of workers who reported having family members at home. It is therefore imperative that emergency response preparation ef-

forts seek out and mitigate factors such as at-home preparedness that may serve as a barrier to optimal worker performance. The best-trained workers add no value if they do not show up when needed most.

What does it take to help people achieve high levels of at-home preparedness? The findings in this study suggest that convincing people that an event is likely will not do it. Only 3 of 61 odds ratios noted a statistically significant relationship between concern and preparedness, and in 2 of these the correlation was negative. Although the odds ratios were statistically significant, it is more likely that these 3 relationships represented a chance occurrence. Similar findings were noted in the report from the National Center for Disaster Preparedness, which has noted an increase in the concern of a terrorist attack (from 78% in 2005 to 84% in 2006), without a similar rise in the level of preparedness.¹⁸ Some studies suggest that concern is associated with preparedness, but in these cases the concern came from living through an actual disaster.²⁵ Although these findings tell us that increased preparedness can be associated with increasing concern, it is unlikely that this can come from traditional teaching methods such as a lecture or printed material. Having the message delivered by those who have experienced personal tragedy may help. Factors leading to behavioral change are quite complex, and it has been suggested that reasoning that leads to preparedness is a process separate from the reasoning that leads one not to prepare.²⁶

The most revealing part of the investigation concerns the barriers to preparedness. Although lack of concern and lack of knowledge play a role in preparedness, these two items were in the minority. Across all preparedness groupings (Advanced, Intermediate, and Basic), the greatest barrier prevalence was not having the time or financial resource to accomplish the task, which averaged 43%. This percentage increased to

53% with the Intermediate grouping of tasks containing the more costly items, suggesting that financial resources could be a significant barrier. Financial barriers to preparedness have been recognized in other investigations.²⁷ Adding challenges with maintenance increases the barrier prevalence to nearly 60%. This data suggests that educational efforts that emphasize what we should do and why are not likely to have a great lasting impact. Fortunately, the majority of respondents were willing to review additional information, which indicates an opportunity for change. However, consistent with the concern for time management, they favored methods that would allow them to control their time. There may also be value in emphasizing low-cost elements in preparedness, such as written plans and better organization of basic elements, that can offer great returns.

In thinking about these issues it is likely that the most effective method to overcome barriers to preparedness is to have a working effort that is broken down into small steps. These steps can then be tracked over time. An example would be having the group focus on one task per week over a 21-week period, with a process that tracks one's progress in achieving the goal with immediate feedback. For those who are unsuccessful at follow-up, there should be opportunity to identify barriers to accomplish the task with group support in brainstorming. It would also help to prioritize those tasks that would give the greatest return on investment.

Conclusion

Similar to the general public, emergency responders may demonstrate a low level of at-home preparedness. This deficiency must be corrected, as the best emergency training can be rendered useless if the employee who is distracted by concerns for family members at home does not show up for work. The solution to this challenge will

not likely come by convincing people of the need, or telling them what to do, but breaking the effort down into smaller tasks that can be worked into a hectic schedule. Finally, as we prepare both responder and community, we would do well to expand our understanding of factors that would lessen performance (eg, stress and fatigue) and do all we can to mitigate them, for only then can we be assured that our efforts at emergency preparedness will be effective if and when needed.

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Appendix

At-Home Emergency Preparedness Survey

If a disaster occurs, it is important first to know what happened and how it can affect you and your family, but it is more important to be prepared for an unexpected event.

This survey will help us in evaluating how much you and your families are prepared at home for such events.

This survey will assist the city in determining the amount of educational need regarding at-home emergency preparedness and how an intervention might be best targeted given the assessment of at-home preparedness.

The survey is strictly voluntary and anonymous. It should take less than 15 minutes to complete. We thank you in advance for your support.

Check the appropriate box [Number] or fill in the blank [] for the requested question.

TABLE 4
At-Home Emergency Preparedness Survey

Age in years	[]				
Gender	[1] Male		[2] Female		
Head of household	[1] Yes		[2] No		
Number of persons in household	[]				
Living quarters	[1] Apartment building		[2] House		[3] Other
Job title	[1] Physician		[2] Nurse		
	[3] Other health care provider		[4] Non-health care provider		
Total household annual income	[1] Less than \$30,000		[2] \$30,000-\$49,999		
	[3] \$50,000-\$69,999		[4] \$70,000-\$89,999		
	[5] \$90,000 or more				
Highest level of education	[1] Less than high school		[2] High school		
	[3] College		[4] Postgraduate		
	[5] Other				
Residence	[1] Detroit		[2] Metro Detroit		[3] Others
A. Your concerns about Disasters					
Please indicate the likelihood of each of the following events occurring over the next 2 years in Southeast Michigan.					
	Extremely Unlikely	Not Likely	Somewhat Likely	More Likely Than Not	Very Likely
Terrorism and/or Bioterrorism	[1]	[2]	[3]	[4]	[5]
Power Outage	[1]	[2]	[3]	[4]	[5]
Outbreak of Communicable Diseases	[1]	[2]	[3]	[4]	[5]
B. Your preparedness for Emergency					
For the following set of questions, please indicate "Yes" if you have completed the following tasks at your home. If your answer is no, then please indicate the reason for the "No" response by circling the number of one of the following statements in the last column:					
Explanation for the "No" response					
1. I do not feel the need to complete this task.					
2. I would like to complete this task but not sure of exactly what I need to do.					
3. I know what I need to do; I am just finding it hard to complete the task (work this into my schedule, no time, no money).					
4. I have completed the task at one time, but I have not maintained/updated this task.					

(Continued)

TABLE 4
Continued

	Yes	No	Explanation for No Response			
1. I have a written Family Emergency Communication Plan that has been reviewed for accuracy/changes over the past year.	☐	☐	1	2	3	4
2. My family has a designated meeting place outside our home.	☐	☐	1	2	3	4
3. My family has a designated place to meet outside of our immediate neighborhood.	☐	☐	1	2	3	4
4. My family has an Emergency Supply Kit that can sustain us for 72 hours. [Please look for the attached (Your Family Disaster Supply Kit) by the American Red Cross].	☐	☐	1	2	3	4
5. We have a fire escape plan for our home.	☐	☐	1	2	3	4
6. My family keeps emergency supplies in each of our vehicles (flashlight, blankets).	☐	☐	1	2	3	4
7. We have stored 3 gallons of water per person in our household (3-day supply).	☐	☐	1	2	3	4
8. We have stored enough food that does not need refrigeration or preparation that can sustain our family for 3 days (eg, peanut butter, canned fruit, bread, tuna, crackers, energy bars, bottled V8 or other juices, canned meat, dry cereal, and dry or evaporated milk). [If your answer is "No" please go to question 10].	☐	☐	1	2	3	4
9. Is the stored food separated from your regular food supply?	☐	☐	1	2	3	4
10. We have a working flashlight with an extra set of batteries in our home.	☐	☐	1	2	3	4
11. We have a battery-operated radio with working batteries in our home.	☐	☐	1	2	3	4
12. We have a packed set of clothing in our home that may be used for evacuation.	☐	☐	1	2	3	4
13. We have a packaged first-aid kit in our home.	☐	☐	1	2	3	4
14. I/we have a flashlight that does not require electricity or batteries in our home.	☐	☐	1	2	3	4
15. I/We have a radio that does not require electricity or batteries in our home.	☐	☐	1	2	3	4
16. We have stored candles and matches in our home.	☐	☐	1	2	3	4
17. We have an alternate source of power to operate our home (eg, generator).	☐	☐	1	2	3	4
18. We have battery-powered, two-way radios in our home.	☐	☐	1	2	3	4
19. We have a fire extinguisher in our residence.	☐	☐	1	2	3	4
20. Every member in our household (age 14 and older) knows how to shut off the gas, water, and electricity coming into the house.	☐	☐	1	2	3	4
21. We have a container that is both fireproof and waterproof for storing important papers.	☐	☐	1	2	3	4

(Continued)

TABLE 4
Continued

C. Your Interest in Learning More

In order to prepare for a community education program, it is important to have input from you to show how we can all become better prepared at home for disasters and emergencies. Please check one box per question below to let us know how involved you might become in this effort.

	Yes	Maybe	No
Would you read newsletters and other materials mailed to your residence concerning "At-home Emergency Preparedness"?	☐	☐	☐
Would you attend a neighborhood meeting on "At-home Emergency Preparedness"?	☐	☐	☐
Would you watch "At-home Emergency Preparedness" programs on videotape?	☐	☐	☐
Would you read written materials/flyers concerning "At-home Emergency Preparedness"?	☐	☐	☐
Would you attend a meeting or lecture concerning "At-home Emergency Preparedness"?	☐	☐	☐