Assessing Functional Needs Sheltering in Pike County, Kentucky: Using a Community Assessment for Public Health Emergency Response

Amy R. Kolwaite, ARNP, MS, MPH, W. Gary Hlady, MD, MS, Matthew C. Simon, MA, GISP, Betsy L. Cadwell, W. Randolph Daley, DVM, MPH, Dipl ACVPM, Aaron T. Fleischauer, MSPH, PhD, Zora May, and Doug Thoroughman, PhD, MS

ABSTRACT

Objective: During 2009-2011, Pike County, Kentucky, experienced a series of severe weather events that resulted in property damage, insufficient potable water, and need for temporary shelters. A Community Assessment for Public Health Emergency Response (CASPER) survey was implemented for future planning. CASPER assesses household health status, preparedness level, and anticipated demand for shelters.

Methods: We used a 2-stage cluster sampling design to randomly select 210 representative households for in-person interviews. We estimated the proportion of households with children aged 2 years or younger; adults aged 65 years or older; and residents with chronic health conditions, visual impairments, physical limitations, and supplemental oxygen requirements.

Results: Of all households surveyed, 8% included children aged 2 years or younger, and 27% included adults aged 65 years or older. The most common chronic health conditions were heart disease (51%), diabetes (28%), lung disease (23%), and asthma (21%). Visual impairments were reported in 29% of households, physical limitations in 24%, and supplemental oxygen use in 12%.

Conclusions: Pike County residents should be encouraged to maintain an adequate supply of medications and copies of their prescriptions. Emergency response plans should include transportation for persons with physical limitations; and shelter plans should include sufficient medically trained staff and adequate supplies of infant formula, pharmaceuticals, and supplemental oxygen. (*Disaster Med Public Health Preparedness*. 2013;7:597-602)

Key Words: needs assessment, disaster planning, emergency preparedness

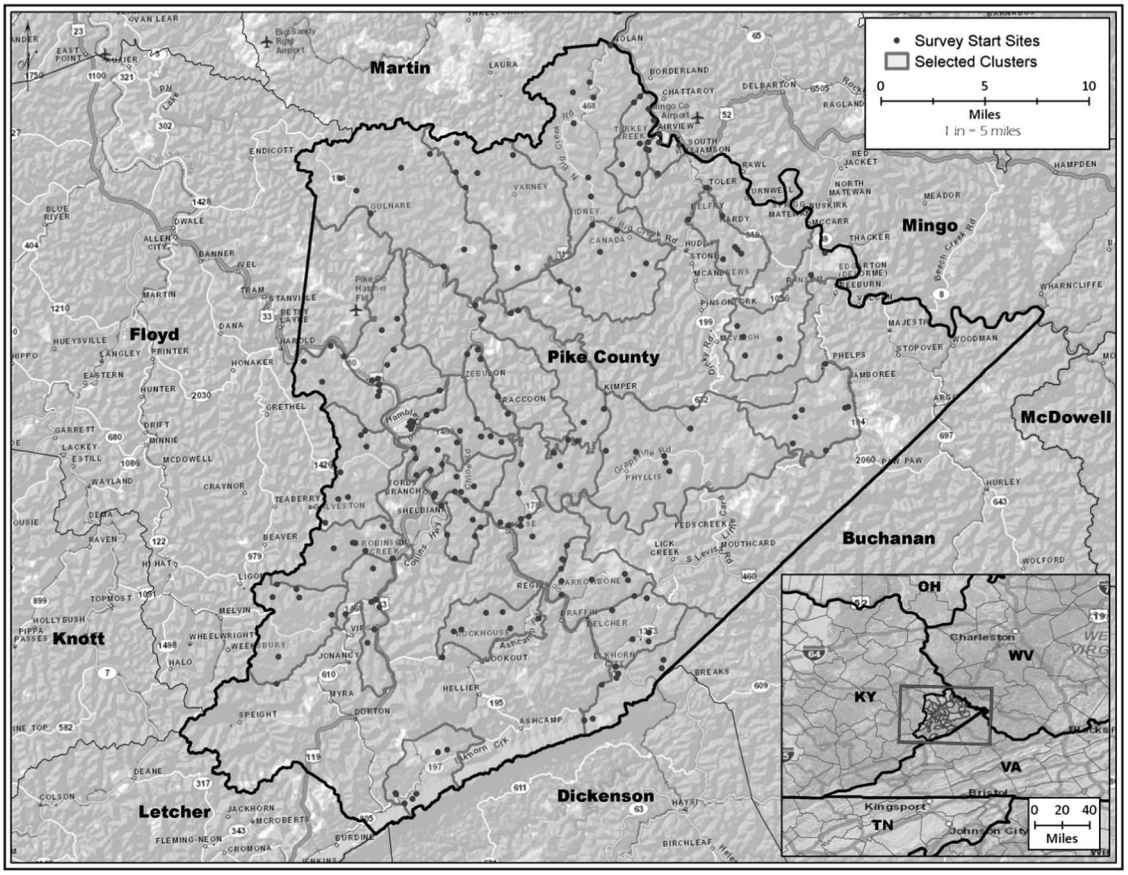
Recent federal legislation has focused on improving access to shelters for persons with functional needs. A functional need implies that a person can function independently or with limited support systems under usual circumstances, but during a disaster, the person's ability to function independently is challenged.[1] Persons likely to have functional needs include those living in institutional settings or with physical or mental disabilities, women in late stages of pregnancy, older persons, children, persons with limited English proficiency, and persons with limited access to transportation.[1]

The Stafford Act[2] and Post-Katrina Emergency Management Reform Act,[3] along with federal civil rights laws, mandate the integration of persons with disabilities in general population shelters.[4] The Americans with Disabilities Act[5] was amended in 2008 to state that general population shelters should offer persons with disabilities the same benefits provided to those without disabilities,[4] including safety, comfort, food, medical care, and the support of family and friends. Therefore, this legislation requires that all general population shelters be modified to be capable of caring for persons with functional needs.

The Federal Emergency Management Agency (FEMA) has provided guidelines on planning for and integrating functional needs support services (FNSS) into general population shelters during emergencies and disasters.[4] These guidelines include reasonable modification of policies, practices, and procedures; provision in shelters of durable medical equipment, consumable medical supplies, and personal assistance services; and other goods and services, as needed.[4] Kentucky is a midsized state, ranking 36th in the United States for land area and 26th in population; however, it ranks 9th for the number of federally declared disasters since 1960,

FIGURE

Selected Clusters for CASPER, Pike County, Kentucky. Map created by Matthew C. Simon, MA, GISP.



Map created by: Matthew C. Simon, MA, GISP

including floods, tornadoes, landslides, and ice storms.[6] During these disasters, ensuring adequate sheltering for functional needs populations has been identified as a consistent gap. Likewise, functional needs populations are more likely to require medical assistance during a disaster,[7,8] and Kentucky ranks in the top 10 states for diabetes, asthma, and obesity burden, smoking prevalence, and prescriptions filled per capita. These findings underscore the importance of planning for a high burden of functional, health-related needs among the affected population during disasters.[9,10]

To plan for efficient FNSS integration into general population shelters, the Kentucky Department for Public Health (KDPH) conducted a series of community needs assessments. The objectives of these assessments were to describe the burden of functional needs within the community and obtain a baseline assessment of the community's preparedness status. Certain counties severely affected by recent natural disasters (eg, ice storms, flooding, and landslides) were selected for the initial assessments. This report describes the assessment conducted in Pike County, a rural Appalachian county, with a population of 65 024 residents (2010 census data),[11] located in the eastern part of the state (Figure). Pike County has a history of destructive natural disasters and high social vulnerability.

For our assessment, we used the Community Assessment for Public Health Emergency Response (CASPER) methodology. CASPER is a community survey method developed to provide quick and low cost, household-based public health information for disaster and nondisaster purposes.[12] The CASPER methodology originated in the 1960s as a tool used by local health departments to conduct rapid assessments of immunization coverage.[13] The methodology was later adopted by the World Health Organization Expanded Program on Immunization and then by the Centers for Disease Control and Prevention (CDC) for use in natural disaster response.[14,15] This sampling scheme has been validated and used effectively for rapid assessment and estimation of different population-level public health needs.[15,16] Conducting a CASPER survey is useful when performing a complete census of the defined region is not feasible. However, CASPER methodology can also be

https://doi.org/10.1017/dmp.2013.110 Published online by Cambridge University Press

used in nondisaster settings when a community-level sample is desired to estimate population parameters.[12,17]

METHODS

CASPER employs a 2-stage, 30 by 7 cluster sampling design.[12,14] For this assessment, we designated a census block group as a cluster. In the first stage, 30 US census block groups were selected on the basis of probability proportionate to the number of occupied households. Within each selected block group, 7 interview locations were randomly chosen by using a geographic information system-based survey site selection toolkit developed by the North Carolina Division of Public Health in Esri ArcMap 9.3 (Figure) for a goal of 210 interviews.

KDPH developed a 1-page questionnaire that included housing type, number and age of household residents, level of current preparedness (eg, supplies of adequate drinking water, nonperishable food, and prescription medications, future disaster management plans), sources of heat and power, resident health conditions, and use of assistive devices and services. Questions were derived from questionnaires used in previous CASPER surveys in Kentucky and North Carolina and available from the CDC CASPER toolkit.[18] Before conducting the survey, interviewers were provided with 4 hours of training on safety hazards, interview techniques, local culture, use of questionnaire tools, and methods to select additional households when needed.

The survey was conducted on Tuesday, June 07, 2011, by 17 teams comprising 36 public health staff, volunteers, and US Public Health Service officers conducting a training exercise in Kentucky. Teams proceeded to assigned interview locations by using geographic positioning systems and approached the nearest housing unit; a household spokesperson provided verbal consent for participation. One eligible household member (aged ≥18 years) was asked to provide information on all household members. Any adult, regardless of sex, race/ethnicity, or religion, was able to participate in the assessment. If more than 1 adult was present in the house, then either could serve as the spokesperson; the participating adult was self-selected. Participation was voluntary, and the spokesperson could stop the interview at any time. Interviewers recorded survey responses both on a paper form and into a handheld field computer. If no household spokesperson was available for interview or agreed to participate, the team continued to the next closest housing unit until an interview could be completed or daylight hours ended and the teams had to return to headquarters. Housing units that appeared unoccupied or where no one answered the door were not revisited. The survey protocol was reviewed for human subjects protection by CDC and KDPH and deemed to be nonresearch.

After completion of the survey, interviewers provided each participating household with an information sheet containing a brief description of the survey and contact information for any questions after the interview process. Household participants were provided with informational preparedness brochures, as well as other materials (eg, magnets, educational coloring books, a pocket emergency preparedness guide, or a keychain with an integrated flashlight, whistle, and compass). When immediate needs pertaining to public health and safety (eg, replacement of a damaged fire hydrant, tree removal, pack of feral dogs, or smoking cessation help) were identified, assessment teams completed referral forms that were then forwarded to local public health or emergency management officials for further action.

Data from the handheld computers were uploaded into a central database and cross-checked against responses captured on paper forms. Analysis was conducted in SAS (version 9.2, SAS Institute, Inc). Generalized estimating equations were used to calculate standard errors adjusting for the multistage sampling design. Data were weighted to account for incomplete responses in certain clusters and to provide generalizable estimates of countywide household totals for each variable.

RESULTS

Of 375 households approached, assessment teams made contact with a resident in 252 (67%) households; of these, 204 (81%) completed the survey, yielding a 97% overall target completion rate (204/210). This sample was representative of the 26 728 occupied households in Pike County. Consequently, the following reported percentages were weighted household estimates. An estimated 75% of households resided in single-family dwellings, 23% in mobile homes, and 2% in multiunit complexes (Table). An estimated 8% of households included 1 or more persons aged 2 years or younger, and 27% included 1 or more persons aged 65 years or older. The median household size was 2 persons (range, 1-10).

The most frequently reported chronic health condition was cardiovascular disease, present in 51% of households. Other chronic health conditions included visual impairment (29%), diabetes (28%), physical impairment (24%), chronic lung disease (23%), asthma (21%), and neurologic disorders (12%). The majority of households (76%) reported having a 2-week supply of medications for household members who needed them. However, anecdotally, many further explained that, depending on when a disaster occurs relative to the 30-day prescription period, they might not have an adequate supply. Multiple households included a person needing an assistive device or service: use of cane or walker (15%), use of wheelchair (8%), required supplemental oxygen (12%), or required home health services, or were home- or bedbound (9%).

In 83% of the households surveyed, respondents reported that they had lived in Pike County during a previous natural disaster (eg, a flood, land or mudslide, tornado, or ice storm).

https://doi.org/10.1017/dmp.2013.110 Published online by Cambridge University Press

TABLE

Weighted Percentages and Number of Projected Households Reporting Selected Characteristics During CASPER Survey in Pike County, Kentucky, June 7, 2011

Status	Households, %	95% CI	No. Projected Households	95% CI
Household structure type				
Single-family home	75	68–82	20 046	18 175–21 917
Mobile home	23	16–30	7217	4276–8018
Multiple unit	2	0–5	535	0–1336
Household occupant age, y				
≤2	8	4–13	2138	1069–3475
≥65	27	19–35	7243	5078–9355
Chronic health condition				
Cardiovascular disease, including high blood pressure	51	42–60	13 631	11 226–16 037
Visual impairment	29	19–39	7751	5078–10 424
Diabetes	28	22–34	7484	5880–9088
Physical impairment	24	18–29	6415	4811–7751
Chronic lung disease	23	17–29	6147	4544–7751
Asthma	21	15–26	5613	4009–6949
Neurologic disorder, including strokes and seizures	12	8–17	3207	2138–4544
Assistive devices or services				
Cane or walker	15	11–20	4009	2940–5346
Supplemental oxygen	12	7–16	3207	1871–4276
Wheelchair	8	4–12	2138	1069–3207
Home health services	6	3–10	1604	802–2673
Homebound or bedbound	6	1–10	1604	267–2673
Plan on living in Pike county for next 5 y	93	89–98	24 857	23 788–26 193
Lived in Pike County during previous natural disaster	83	76–90	22 184	20 313–24 055
Chose to shelter-in-place during previous disaster	80	70–89	21 382	18 710–23 788
Level of disaster preparedness				
3-d supply of drinking water	65	57–73	17 373	15 235–19 511
3-d supply of nonperishable food	94	90–98	25 124	24 055–26 193
2-week supply of prescription medications	77	71–82	20 441	18 977–21 917
Types of animals				
Pets	67	60–74	17 908	16 037–19 779
Livestock	6	3–10	1604	802–2673
Future disaster management plans in place				
Pets/livestock	82	74–90	14 684	13 252–16 117
Family	68	61–75	18 175	16 304–20 046
Heat source				
Electricity	80	73–88	21 382	19 511–23 521
Propane or gas	35	10–25	9355	2673–6682
Wood	1	0–3	267	0–802
Coal or charcoal	1	0–3	267	0–802
Water source				
Public municipal tap	69	60–77	18 442	16 037–20 581
Bottled	17	11–24	4544	2940–6415
Private well	14	9–19	3742	2406–5078
Equipment				
Charcoal or gas grill	79	73–84	21 115	19 511–22 452
Kerosene heater	46	37–55	12 295	9889–14 700
Generator	36	29–43	9622	7751–11 493
Functioning carbon monoxide detector	40	33–49	10 958	8820–13 097
Home communication connectivity				
Landline home telephone	92	88–97	24 590	23 521–25 926
Cellular phone	81	74–88	21 650	19 779–23 521
Internet	68	60–77	18 175	16 037–20 581

Abbreviations: CASPER, Community Assessment for Public Health Emergency Response; CI, confidence interval.

Of those households, 80% reported that they had chosen to shelter-in-place at least once. An estimated 94% of households had a 3-day supply of nonperishable food for each person; 65% had at least 1 gallon of stored water per person per day for 3 days. An estimated 79% of households had access to a charcoal or gas grill, 46% to a kerosene heater, and

https://doi.org/10.1017/dmp.2013.110 Published online by Cambridge University Press

36% to a generator. However, only 39% of households had a functioning carbon monoxide detector in their home. In 68% of the households surveyed, the respondents reported that they had a disaster management plan in place for their family.

DISCUSSION

Collecting community information about the public's health needs allows agencies and emergency managers to effectively plan for and distribute resources during a disaster. Households in Pike County commonly included persons with chronic medical conditions, most notably cardiovascular disease, diabetes, chronic lung disease, and asthma. Those more severely ill might require additional services to address their needs during a natural disaster; however, this assessment did not ascertain the severity of these conditions. An additional need that was identified was access to medications for persons with chronic medical conditions, a need identified during past disaster events and of concern to KDPH due to its potential for giving rise to additional medical crises secondary to a disaster.[19]

The high prevalence of chronic diseases and impaired functional mobility among residents in Pike County highlights the need for communities to plan for adequate supplies of medications and equipment used during disaster settings. This plan should include refrigeration for medications, glucometers with supplies, bedside commodes, lifts for bedbound patients, and portable oxygen generators. Shelters should also incorporate structural modifications to accommodate persons with visual or physical impairments.

Given that a high number of households had sheltered-in-place during a previous disaster, we recommend educating residents regarding FEMA guidelines[20] for having a 3-day supply of food and water per person and a supply of all necessary prescription medications.[20] In addition, safe use of alternative power and heating sources, including generators and kerosene heaters, should be emphasized. This plan also includes education regarding the necessity of owning and safely using battery-operated carbon monoxide detectors, because carbon monoxide poisoning has been reported after past Kentucky disasters.[21] Moreover, all households, including those planning to shelter-in-place, should have an emergency plan to transport home- or bedbound household members to shelters, if needed. Last, mobile home residents should preidentify an emergency shelter in the event of a tornado as part of their disaster planning and preparedness.

Limitations

The CASPER methodology was a useful tool for assessing functional needs in Kentucky. Although resource intensive, it was completed within a short time and provided statistically valid results for the Pike County population. However, one limitation of this study is the potential for information bias if the members on each team did not ask the questions exactly as they were worded on the questionnaire. Training was provided on how to ask the questions correctly, but any deviations in the field might have biased the results. Also, if the person being surveyed did not understand the question completely or did not answer the question on the basis of household knowledge, information bias might have been introduced.

The possibility of a selection bias must also be considered because the survey was conducted on a weekday during work hours when older persons who stay at home might be more highly represented. However, this timing provided data regarding functional needs populations because we may have been more likely to capture a population that typically has more chronic health needs. The 27% of households reporting a resident aged 65 years or older was similar to published census 2010 data for Pike County, indicating that 29% of households report a resident aged 65 years or older.[22] The similarity of our findings with other published data sources provided assurance that our findings were representative in spite of these limitations.

CONCLUSIONS

Our study demonstrates that using CASPER in a nondisaster setting is a beneficial and highly effective method for obtaining a baseline assessment of the community's health and preparedness status. This exercise in Pike County, Kentucky, afforded KDPH the ability to gather important information in a short amount of time (1 day) using limited resources. The CASPER was used in a limited setting in this application but could be expanded to more geographic venues to make it a more robust predictor of overall preparedness for larger geographic areas. Using CASPER in a nondisaster setting can gather valuable information for preparedness planning, allowing an opportunity for agencies and emergency planners to understand and plan for the potential burden of functional needs in the population following a disaster.

About the Authors

Epidemic Intelligence Service (Dr Daley and Ms Kolwaite), Centers for Disease Control and Prevention (Drs Fleischauer and Thoroughman and Ms Cadwell), Atlanta, Georgia; Health Resources and Services Administration, Bureau of Clinician Recruitment and Service, San Francisco, California (Dr Hlady); University of North Carolina Center for Public Health Preparedness, North Carolina Institute for Public Health, University of North Carolina Gillings School of Global Public Health, Chapel Hill, North Carolina (Mr Simon); Kentucky Department for Public Health, Frankfort (Dr Thoroughman and Ms Kolwaite), and Pike County Health Department (Ms May), Pikeville, Kentucky; and North Carolina Division of Public Health, Raleigh, North Carolina (Dr Fleischauer).

Address correspondence and reprint requests to Amy R. Kolwaite, ARNP, MS, MPH, Kentucky Department for Public Health, 275 E Main St HS 2GW-C, Frankfort, KY 40621 (e-mail: izj9@cdc.gov).

Acknowledgments

The US Public Health Service Applied Public Health-2 Team assisted with data collection and analysis; the University of North Carolina Center for

https://doi.org/10.1017/dmp.2013.110 Published online by Cambridge University Press

Public Health Preparedness and the North Carolina Division of Public Health conducted the sampling and provided technical assistance in planning and conducting the Community Assessment for Public Health Emergency Response. Edward C. Weiss, MD, MPH, and Margaret Riggs, PhD, MPH, MS, Centers for Disease Control and Prevention; Jeffery W. Brock, PhD, Brad Learn, T.J. Sugg, MPH, and Kraig Humbaugh, MD, MPH, Kentucky Department for Public Health; and the community of Pike County participated in this survey.

Disclaimer

The findings and conclusions in this report are those of the author(s) and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

REFERENCES

1. Federal Emergency Management Agency. National response framework. Washington, DC: Federal Emergency Management Agency; August 2, 2012. *http://www.fema.gov/national-response-framework*. Accessed February 21, 2013.
2. Federal Emergency Management Agency. Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended, and related authorities. Washington, DC: Federal Emergency Management Agency; June 2007. *http://www.fema/gov/pdf/about/stafford_act.pdf*. Accessed March 4, 2013.
3. S 3595—109th Congress: United States Emergency Management Authority Act of 2006. *http://www.gpo.gov/fdsys/pkg/PLAW-109publ295/pdf/PLAW-109publ295.pdf*. Accessed March 4, 2013.
4. Federal Emergency Management Agency. Guidance on planning for integration of functional needs support services in general population shelters. Washington, DC: Federal Emergency Management Agency; November 2010. *http://www.fema.gov/pdf/about/odic/fnss_guidance.pdf*. Accessed February 21, 2013.
5. Americans with Disabilities Act of 1990, as amended. January 2009. *http://www.ada.gov/pubs/adastatute08.pdf*. Accessed March 4, 2013.
6. Federal Emergency Management Agency. Disaster declarations. Washington, DC: Federal Emergency Management Agency. *http://www.fema.gov/disasters*. Accessed February 21, 2013.
7. Aldrich N, Benson WF. Disaster preparedness and the chronic disease needs of vulnerable older adults. *Prev Chronic Dis*. 2008;5(1):A27.
8. Flanagan BE, Gregory EW, Hallisey EJ, Heitgerd JL, Lewis B. A social vulnerability index for disaster management. *J Homeland Secur Emergency Manage*. 2011;8:e1-5.
9. Kaiser Family Foundation. State health facts. Menlo Park, CA: Kaiser Family Foundation. *http://www.statehealthfacts.org*. Accessed February 21, 2013.
10. United Health Foundation. America's health rankings. Minnetonka, MN: United Health Foundation. *http://www.americashealthrankings.org*. Accessed February 21, 2013.
11. US Census Bureau. State and County QuickFacts: Pike County, Kentucky. Washington, DC: US Census Bureau. *http://quickfacts.census.gov/qfd/states/21/21195.html*. Accessed February 21, 2013.
12. Centers for Disease Control and Prevention. *Community Assessment for Public Health Emergency Response (CASPER) Toolkit*. Atlanta, GA: US Department of Health and Human Services, Centers for Disease Control and Prevention; 2009. *http://emergency.cdc.gov/disasters/surveillance/pdf/CASPER_toolkit_508%20COMPLIANT.pdf*. Accessed February 21, 2013.
13. Serfling RE, Sherman IL. *Attribute Sampling Methods for Local Health Departments With Special Reference to Immunization Surveys*. Atlanta, GA: US Department of Health, Education, and Welfare, Public Health Service, Communicable Disease Center; 1965, HEW Publication No. 1230.
14. Malilay J, Flanders WD, Brogan D. A modified cluster-sampling method for post-disaster rapid assessment of needs. *Bull World Health Organ*. 1996;74:399-405.
15. Henderson RH, Sundaresan T. Cluster sampling to assess immunization coverage: a review of experience with a simplified sampling method. *Bull World Health Organ*. 1982;60:253-260.
16. Frerichs RR, Shaheen MA. Small community based surveys. *Annu Rev Public Health*. 2001;22:231-247.
17. Centers for Disease Control and Prevention. Assessment of household preparedness through training exercises—two metropolitan counties, Tennessee, 2011. *MMWR Morb Mortal Wkly Rep*. 2012;61(36):720-722.
18. Centers for Disease Control and Prevention. *Community Assessment for Public Health Emergency Response (CASPER) Toolkit*, ed 2. Atlanta, GA: Centers for Disease Control and Prevention; 2012.
19. 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.
20. Federal Emergency Management Agency. Are you ready? Guide: An in-depth guide to citizen preparedness. Washington, DC: Federal Emergency Management Agency. *http://www.ready.gov/are-you-ready-guide*. Accessed February 21, 2013.
21. Lutterloh EC, Iqbal S, Clower JH, et al. Carbon monoxide poisoning after an ice storm in Kentucky, 2009. *Public Health Rep*. 2011;126(suppl 1):108-115.
22. United States Census Bureau. American FactFinder. Washington, DC: United States Census Bureau. *http://factfinder2.census.gov/*. Accessed March 20, 2013.

https://doi.org/10.1017/dmp.2013.110 Published online by Cambridge University Press