

# An Assessment of Disaster Preparedness Among Rural Residents Along a Major Fault Line

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## Abstract

*This study assessed the level of knowledge that residents in a southern Illinois county possess regarding the county's effort to coordinate relief efforts when compared to the beliefs of disaster preparedness professionals in the region. The residents were significantly more likely to rely on oneself, neighbors, and family for assistance for medical care. The experts were significantly more likely to seek such medical care from the American Red Cross. Professionals were more likely to depend upon government and emergency services to provide assistance. The residents ranked government as the least important group to depend upon in case of an emergency. Education, planning, and preparedness are value means to lessen earthquake losses, injuries, and deaths. Communities in the New Madrid Fault area need to provide the residents with appropriate information, training, and help to make the residents ready for an eventful earthquake.*

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## Introduction

One of the largest earthquake faults in the United States is the New Madrid Fault. This fault runs generally in a line from Memphis to St. Louis. Six states, 51 counties, and over 4.2 million people border this fault. In early 1991, special attention to the size of this fault was heightened by a prediction that this region would suffer a major earthquake during the first week of December. Although the prediction was based on faulty research, it nonetheless gained the media's attention. Such attention caused many communities to assess their status on earthquake preparedness. More recently, this area experienced disastrous flooding, and heightened awareness of this area's ability to deal with emergencies.

Whereas this area dealt with the 1993 flooding well, the New Madrid region is not totally prepared to deal with an earthquake. Unlike California, there are few, if any, building codes to ensure the withstanding of a major earthquake. Many buildings, bridges, and homes were built before the public's knowledge on how to build earthquake resistant facilities.

Public health and governmental officials are concerned about the possible ramifications for this region after an earthquake hits the region. In addition, because the bulk of the population along the New Madrid Fault resides in the Memphis and St. Louis metropolitan area, it is felt the rural areas between these two cities will receive less immediate attention. Therefore, some officials have been claiming that residents must be prepared to survive at least 72 hours before any assistance is rendered. Other officials

feel that 72 hours is too optimistic of a period and refer to the 1989 San Francisco quake in which rural areas were without assistance for up to two weeks. Because of this concern, many plans were developed to deal with this pending catastrophe.

To increase earthquake preparedness among community members, attention must be given to the various aspects of program planning. From a public health perspective, Digman and Carr (1987) outlined the several phases of program planning at the community level that include (1) community analysis, (2) community diagnosis, (3) focus of the program, (4) analysis of behavioral, educational and group process, (5) program development, (6) implementation, and (7) evaluation.

The first two phases of the Digman and Carr model are commonly called needs assessment and are the most crucial steps in planning. Bracht (1991) also supports this notion and describes the needs assessment as the "process of assessing and defining needs, opportunities, and resources involved in initiating community health action programs." (p. 91).

The Federal Emergency Management Agency (FEMA) (1985) has developed a program similar to the planning model of Digman and Carr (1987). According to FEMA, this marketing approach for community earthquake preparedness is necessary primarily because "most people resist preparing for events of low probability and high potential loss" thus requiring the experts to conduct preparedness campaigns as a means of motivation (p. 2). The FEMA marketing approach for increasing earthquake preparedness includes (1) a situation audit to assess the status of the community or "market", (2) the generation of strategies specific to the characteristics of the population, (3) the program design, (4) implementation,

and (5) post campaign audit or evaluation. FEMA concludes that an effective community earthquake preparedness program needs to (1) prepare resource materials, (2) establish delivery mechanisms and centers, (3) identify and train campaign members, (4) use the mass media, and (5) develop special events and programs (FEMA-112, 1985).

Kartez and Lindell (1987) report that local governments are surprised when they find that "detailed plans are irrelevant in real events." There are several reasons why a community may be less than fully prepared to face a disaster situation. One reason is community disaster plans often are neglected by community officials because these usually are lengthy and dry procedural documents. This is because many of these plans have strict government guidelines that have descended from military command models (Kartez & Lindell, 1987). Problems arise during disaster situations when a community service agencies, like a police or fire department, see problems only in terms of its own capabilities. Local governments could reduce this problem if multi-departmental emergency exercises were conducted. Many such exercises are state and federally funded and experience has shown that the few people who attend them give only minimal effort (Kartez & Lindell, 1987).

Another concern related to effective planning for disasters is that planning should have both technical and social dimensions. Funding requirements emphasize the technical by requiring the development of written procedures. However, the development of effective organizations is often over-looked. Lack of experience with disasters can also prevent a community from effectively planning for a disaster. However, it also appears that "direct personal experience with disaster demands does not change expectations about the demands of future events because the experience often contradicts prior (but erroneous) beliefs" (Kartez & Lindell, 1987, p.489). In short, lack of community preparedness for a disaster includes a lack of experience with disasters, failure to learn from one's own disaster experiences as well as those experienced by others, insufficient planning and the wrong kind of planning (Kartez & Lindell, 1987).

Of the issues that need to be addressed during an earthquake, four particular areas are of greatest concern: the need for medical care, the need for fresh water, the need for shelter, and the need for food. It is the hypothesis of these researchers that residents of this county are not informed of the role that various agencies will play in providing these four main concerns. Thus, the purpose of this study was to determine whether residents in a southern Illinois county know what type of relief help is available and where to obtain information.

## **Procedure**

A survey was designed to address the residents' perception regarding the role of various organizations in helping the residents in obtaining fresh water, shelter, medical care, and food under emergency conditions. A Cronbach Alpha was completed to determine internal reliability of the instrument. The four sub-components of the survey (water, shelter, medical care, food) were found to have a Cronbach Alpha of .86, .87, .85, and .84 respectively. When combined, the Cronbach Alpha was reported at .96. According to Sarvela and McDermott (1993) the least accepted reliability score is .60, with .80 preferred for applied research.

Two hundred twenty-five registered voters were selected through a stratified process (by precincts) during the first week of September 1993. The survey asked that the recipient complete the survey and to return within two weeks. Eighty-nine returned the survey, representing a 39% return rate. According to Isaac and Michaels, the return rate number is sufficient to predict with 95% confidence among the registered voters in this county. Of those responding, 50.9% were female (49.1%, male), 75.5% had their primary residence being a house, and the average age was 40.6 years. Considering these figures, the sample was compatible with the overall population demographics.

In addition, 22 disaster preparedness experts were assessed on their professional opinion on where residents should expect to receive fresh water, shelter, medical care and food via the same instrument used by the registered voters. These experts included an Emergency Services and Disaster Agency (ESDA) representative, a representative from the county health department, the hospital administrators from the two hospitals in the county, police and fire chiefs from the two major cities in the county, the chair of the county board of commissioners, two emergency preparedness and planning representatives from the nearby university, the director of a county chapter of the American Red Cross, representatives from the water, gas, and electrical companies, and the county sheriff. The results of the residents were compared to the experts.

## **Results**

Generally, the residents felt that they were well prepared to respond to a potential disaster situation. Table 1 reveals the results of the various sections of the survey. The higher the score, the more likely the group felt that the service/organization would provide assistance. Table 1 shows that the residents were significantly more likely to rely on oneself, neighbors, and family for assistance for medical care. The experts were significantly more likely to seek such medical care from the American Red Cross. There was also a

significant difference noted with the role of local government, but both residents and experts rated such service as low.

Table 1 also shows that residents were more likely to rely on oneself and one's family to provide fresh water. Although there were additional significant differences in the perception of the role of the fire department, police department, the local health department, and the local hospital in providing fresh water, both residents and experts rated such service as in the middle of expectations.

Further Table 1 shows that experts relied on the American Red Cross significantly higher than the residents in providing food after an earthquake. For assistance in housing, results in Table 1 show that the residents were more likely to depend upon oneself. The experts were more likely to rely upon family and the local health department.

Table 2 shows a rank ordering of the combined results of the survey. Among the experts, oneself, the American Red Cross, and family were reported as the highest

groups. Residents were similar, with them switching the role of the American Red Cross and family. Table 3 shows a rank ordering of use of community services by social groupings (social, health, government, and emergency). Experts were more likely to depend upon government and emergency services to provide assistance. The residents ranked government as the least important group to depend upon in case of emergency.

Finally, Table 4 shows a listing of the residents' reported items available in their house and/or in an emergency kit. Less than 25% of the respondents showed that they had bottled water, radios and batteries, fire extinguisher, gloves, money, alternate source for cooking, and a wrench to turn off various utilities available in an emergency kit.

**Discussion**

The residents of this study felt that during the first 72 hours after an earthquake they must rely upon themselves, family members, and the American Red Cross for medical care, water, and food. The public feels that most

**Table 1. Perception of Residents and Experts of Medical Care, Fresh Water, Food, and Housing Availability From Various Services**

Category	Experts	Residents	Chi-Square Value	Probability
	Low=1 High=7	Low=1 High=7		
<b>Police</b>				
Medical Care	2.61	3.41	4.907	0.671
Fresh Water	1.82	2.61	21.044	0.004
Food	1.78	2.37	7.675	0.362
Housing	1.78	2.38	10.098	0.183
<b>Fire Department</b>				
Medical Care	3.08	3.85	10.147	0.180
Fresh Water	2.22	3.61	16.121	0.024
Food	1.78	2.56	6.437	0.490
Housing	1/78	2.29	11.227	0.129
<b>Yourself</b>				
Medical Care	5.04	6.20	11.811	0.000
Fresh Water	4.83	5.74	18.004	0.012
Food	5.52	5.74	4.293	0.746
Housing	5.55	5.75	11.397	0.077
<b>Neighbors</b>				
Medical Care	3.65	4.44	15.225	0.033
Fresh Water	3.26	4.06	9.250	0.235
Food	3.78	4.15	4.241	0.752

Housing	3.95	3.81	4.642	0.704
<b>Family</b>				
Medical Care	4.39	4.80	8.972	0.255
Fresh Water	4.40	4.32	14.172	0.048
Food	4.95	4.68	9.505	0.218
Housing	5.93	4.67	18.247	0.011
<b>American Red Cross</b>				
Medical Care	4.48	4.09	12.467	0.086
Fresh Water	4.22	4.07	5.702	0.575
Food	5.17	4.68	14.228	0.047
Housing	5.26	4.39	11.282	0.127
<b>Local Health Department</b>				
Medical Care	3.70	3.46	8.893	0.260
Fresh Water	2.35	3.41	12.149	0.096
Food	2.17	2.78	7.195	0.409
Housing	2.34	2.30	15.909	0.026
<b>Local University</b>				
Medical Care	2.61	2.39	8.333	0.304
Fresh Water	1.83	2.19	6.799	0.450
Food	1.83	2.29	5.757	0.568
Housing	2.39	2.229	9.250	0.235
<b>Local Government</b>				
Medical Care	2.61	3.20	12.155	0.096
Fresh Water	3.83	3.20	24.818	0.001
Food	3.17	3.24	8.617	0.281
Housing	3.91	3.39	9.182	0.240
<b>State Government</b>				
Medical Care	2.78	3.54	6.354	0.500
Fresh Water	3.70	3.39	15.156	0.034
Food	3.52	3.48	6.047	0.534
Housing	3.87	3.43	8.329	0.304
<b>Federal Government</b>				
Medical Care	3.13	3.43	3.950	0.785
Fresh Water	3.89	3.19	11.765	0.109
Food	3.78	3.48	7.723	0.385
Housing	4.21	3.35	9.039	0.250
<b>Local Hospital</b>				
Food	1.83	2.31	5.005	0.659
Housing	1.73	1.78	8.063	0.153
<b>National Guard</b>				
Medical Care	4.09	3.93	7.851	0.346

Fresh Water	4.13	3.65	10.594	0.157
Food	3.82	3.83	11.971	0.102
Housing	3.47	3.50	9.584	0.213
<b>Home Insurance</b>				
Housing	4.00	4.70	10.760	0.149

local and state agencies and local emergency agencies (police, fire, and hospitals) will not provide much assistance in the early aftermath after an earthquake. Although the residents should be applauded for recognizing the importance of self-help during the aftermath of a crisis, the study also reveals that the residents have an inadequate supply of water, food, and emergency supplies to deal effectively with an earthquake.

The disaster preparedness experts realize, like the public, which people helping people, neighbor helping neighbor, and family member helping family member are keys to reducing problems of medical care, food, and water after an earthquake. For most victims of an earthquake, the experts realize that government agencies will have larger issues to address the first 72 hours after an earthquake.

Table 2. Rank Ordering of Importance of Community Resources in Earthquake Disaster by Residents and Experts

Resource	Experts		Residents		Prob. T
	Score <sup>a</sup>	Rank	Score <sup>a</sup>	Rank	
Yourself	5.22	1	5.86	1	0.6563
American Red	4.78	2	4.31	3	0.3154
Family	4.68	3	4.62	2	0.9062
National Guard	3.88	4	3.73	5	0.7606
Federal	3.75	5	3.35	7	0.4398
Neighbor	3.66	6	4.12	4	0.2857
State Government	3.47	7	3.46	6	0.9855
Local	3.38	8	3.26	8	0.7987
Health	2.64	9	2.99	10	0.3897
Fire Department	2.22	10	3.08	9	0.0270 <sup>b</sup>
Local University	2.16	11	2.29	12	0.7153
Police	2.00	12	2.69	11	0.0756 <sup>c</sup>
Hospital	1.71	13	2.29	12	0.1128

<sup>a</sup> Low=1, High=7

<sup>b</sup> p<.05

<sup>c</sup> p<.10

Table 3. Rank Ordering of Importance of Community Resources in Earthquake Disaster by Experts And Residents Within Social Groupings

Resource	Experts		Residents		Prob. T
	Score <sup>a</sup>	Rank	Score <sup>a</sup>	Rank	
Social <sup>b</sup>	4.51	1	4.86	1	0.3063
Health <sup>c</sup>	3.87	2	4.01	2	0.7419
Government <sup>d</sup>	3.53	3	3.36	4	0.7034
Emergency <sup>e</sup>	2.70	4	3.40	3	0.0880*

<sup>a</sup> Low=1, High=7

\*p<.10

<sup>b</sup>Social - family, self, & neighbor

<sup>c</sup>Health - ARC, health dept., hospital

<sup>d</sup>Government - local, state, federal

<sup>e</sup>Emergency - Police, fire, and national guard

The American Red Cross was recognized by both the public and the disaster preparedness experts as a primary response component after an earthquake occurs. As a part of its Congress' approved charter, the American Red Cross will disaster management personnel and establish a field headquarters as described in the national catastrophic plan (American Red Cross, 1993). However, the local American Red Cross chapter does not have any plans in dealing with the disaster and will rely only on the national division to assist in aid. To avoid any negative publicity among the residents, this local American Red Cross chapter needs to inform the public and emergency response personnel as to their minimized role and capabilities in time of a disaster.

Similarly, local, county, regional, state and federal emergency response agencies must provide information to the public as to each's responsibilities and functions in an emergency. This information will provide local citizens with each's role and what they can do when a major disaster occurs. Besides depending upon themselves, a clear delineated strategy of where help can be received in relation to food, water, shelter, and medical help must be developed and conveyed to the public.

The residents of any area where earthquakes are a major threat should have their own supply of a portable radio equipped with fresh batteries, an adequate supply of bottled (plastic) water, first aid supplies, and canned food products. It would be appropriate to keep a set of these supplies in area near an entrance/exit of the home and in the trunk of a motor vehicle. Although many of the residents reported having emergency products available in their

residence, very few were specifically put in a disaster kit. Although one's resident may contain such items, the residence may be destroyed for the person to enter and retrieve such items. Local emergency response groups should carry out a mass-media campaign emphasizing the importance to having a stock of these products and replacing them when appropriate.

Education, planning, and preparedness are proven means to lessen earthquake losses, injuries, and deaths. Communities in the New Madrid Fault area need to provide the residents with appropriate information, training, and help to make the residents ready for an eventful earthquake.

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Table 4. Percentage of Respondents Who Indicated That Items Were Available in a Specific Earthquake Kit

Item	In the House	In a Disaster Kit
bottled water	62.3	22.6
fire extinguisher	73.6	15.1
money	58.5	9.4
non-electric can opener	81.1	28.3
flashlight	83.0	26.4
first aid kit	66.0	28.3
work gloves	71.7	17.0
alternate source for cooking	69.8	18.9
batteries	73.6	20.8
portable radio	75.5	20.8
cooking utensils	n/a	34.0
clothing	n/a	30.2
canned foods	n/a	45.3
peanut butter	n/a	26.4
toilet paper	n/a	37.7
plastic bags	n/a	41.5
eating utensils	n/a	35.8
blankets	n/a	43.4
crackers	n/a	45.3
wrench	n/a	22.6
matches	n/a	30.2