

# Emergency Preparedness of Persons Over 50 Years Old: Further Results From the Health and Retirement Study

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## ABSTRACT

**Objective:** This article conceptualized emergency preparedness as a complex, multidimensional construct and empirically examined an array of sociodemographic, motivation, and barrier variables as predictors of levels of emergency preparedness.

**Methods:** The authors used the 2010 wave of the Health and Retirement Study's emergency preparedness module to focus on persons 50 years old and older in the United States by use of logistic regression models and reconsidered a previous analysis.

**Results:** The models demonstrated 3 key findings: (1) a lack of preparedness is widespread across virtually all sociodemographic variables and regions of the country; (2) an authoritative voice, in the role of health care personnel, was a strong predictor of preparedness; and (3) previous experience in helping others in a disaster predisposes individuals to be better prepared. Analyses also suggest the need for caution in creating simple summative indexes and the need for further research into appropriate measures of preparedness.

**Conclusion:** This population of older persons was generally not well prepared for emergencies, and this lack of preparedness was widespread across social, demographic, and economic groups in the United States. Findings with implications for policy and outreach include the importance of health care providers discussing preparedness and the use of experienced peers for outreach. (*Disaster Med Public Health Preparedness*. 2017;11:80-89)

**Key Words:** emergency preparedness, older persons, Health and Retirement Study

A leading policy concern in the United States is maintaining and enhancing resilience during times of disasters. Consequently, emergency preparedness of older persons is becoming a focal point for families, health care professionals, and policy-makers. This research adds to the relatively sparse literature in this arena by reanalyzing a nationally representative dataset, identifying potential avenues to enhance emergency preparedness in older persons, and laying out an agenda for future research.

Evidence demonstrates that older persons are particularly vulnerable to negative outcomes in disasters. In Hurricane Katrina, nearly three-quarters of the bodies found immediately after the storm were people over the age of 60 years; 40% were older than 70. High mortality rates were attributed to a variety of factors, including infirmities complicating or preventing effective evacuation.<sup>1</sup> Older populations continued to be at higher risk, with excess mortality reported, in the year following the hurricane.<sup>2</sup> According to a recent publication on post-disaster outcomes among older persons, researchers found higher morbidity varied with the type of disaster as

well as with comorbidities, low social support, need for prescription medications, hearing and visual impairments, impaired mobility, and cognitive deficits.<sup>3,4</sup> Age-related vulnerabilities represent a matrix of challenges for persons negotiating the given disaster, as well as for the agencies bearing legal and moral responsibility for individuals' well-being.

The federal government recognizes the importance of emergency preparedness for the whole nation. The National Health Security Strategy is based on the idea that healthy individuals, families, and communities forge the foundations of community and national resilience.<sup>5</sup> In 2011, the Federal Emergency Management Agency (FEMA) awarded \$2.9 billion in grants to assist states, urban areas, tribal governments, and other agencies to install measures to prevent, protect, respond to, and recover from disasters and emergencies.<sup>6</sup> Faith-based and other nonprofit organizations are playing an essential role in emergency preparedness, filling gaps where government efforts are lacking.<sup>7</sup> These efforts underscore the importance of obtaining dependable measurements of emergency preparedness levels among different populations.

These efforts have taken on greater urgency as the impacts of climate change become more apparent, particularly more frequent and more extreme weather events.<sup>8,9</sup> All people, including older persons, are facing potentially more risk in the future, not less.<sup>10</sup>

The aging population structure of the United States is well understood and it is recognized that concentrations of older persons are not evenly distributed geographically.<sup>11,12</sup> Evidence suggests that older persons are more likely to live in areas more prone to experiencing natural disasters.<sup>13</sup> Given the increased vulnerability of older persons in emergency and disaster situations, a clear rationale exists for focusing on the preparedness of older persons.

Only a few studies have addressed the critical issue of preparedness levels among older populations. One such recent work examined emergency preparedness by using the nationally representative Health and Retirement Study (HRS).<sup>14</sup> These researchers identified significant deficits for emergency preparedness among persons aged 50 years old and older. They reported that about two-thirds of the sample had not participated in any planning program or did not have knowledge of available resources. They generally found that the participants in their study had an overall low level of preparation.

However, these researchers operationalized emergency preparedness by a single, summative score that combined disparate variables. Their study oversimplified the conceptualization of emergency preparedness, combining variables that directly measured preparedness levels with variables measuring motivations and barriers. The motivation and barrier variables may enhance or diminish capacity to prepare or respond but do not directly measure preparedness levels. A different analytical approach and discussion of the resulting insights are provided here.

Preparedness measurement instruments have typically been based on recommendations from the Centers for Disease Control and Prevention, FEMA, and the American Red Cross. The need to measure emergency preparedness levels, and improve those levels if necessary, is driven by the widely held belief that higher emergency preparedness levels result in improved post-emergency outcomes.<sup>15</sup> Given this belief, measuring preparedness among different groups and identifying motivations for and barriers to preparedness takes on urgency.

The literature is mixed with respect to predicting levels of readiness among demographic groups. Some studies have found being male, older, and white and having higher incomes to be highly predictive variables for being prepared.<sup>16-18</sup> Other studies found a lack of significant correlation between demographic characteristics (age, race, income, education, prior experience) and the possession of recommended emergency supplies.<sup>19</sup>

Prior exposure to emergencies was found to significantly increase current preparedness levels.<sup>18,20,21</sup> Preparedness levels were also positively correlated with older adults' perceived trust in the emergency preparedness of their local health care system.<sup>17,18</sup> Not surprisingly, the greater the perceived threat of disaster, the more likely respondents were to have preparedness supplies.<sup>17</sup>

Some barriers to preparedness have been identified. In one study, willingness to comply with protective measures was related to the familiarity of the activity.<sup>17</sup> For example, respondents were willing to comply with more familiar measures such as vaccinations, sheltering in place at home, quarantine, and prophylactic medications. On the other hand, barriers to emergency preparedness included inability to evacuate owing to both physical disability and structural impediments. Emergency preparedness levels were also impacted by the type of dwelling and location in which the respondents lived.<sup>22</sup> Households in multiple-unit dwellings were less likely to have copies of important documents and knowledge of multiple evacuation routes.<sup>23</sup> Rural older adults were disproportionately the most vulnerable group.<sup>24</sup> Finally, situational challenges such as lack of time, knowledge, access, and funds can impede preparedness activities.<sup>25,26</sup>

Conflicting evidence exists as to the preparedness levels among older adults with chronic diseases. In one study, the authors found evidence of a lack of overall preparedness among older adults and the medically vulnerable.<sup>27,28</sup> Still other researchers found those respondents with poorer health and multiple chronic diseases tended to possess more recommended emergency preparedness supplies and prescribed medications but were less likely to have an evacuation plan.<sup>16,28</sup> Yet another study found results that contradicted the presence of supplies: respondents with fair or poor perceived health and 3 or more chronic diseases were more likely to have a 3-day supply of prescription medications but were less likely to have a 3-day supply of food and water, a radio, or a flashlight with extra batteries.<sup>27</sup>

Given these mixed results, this article reevaluates the analytical approach used in an earlier study by Al-rousan et al.<sup>14</sup> In the current study, steps were taken to clarify the conceptualization of the emergency preparedness of older adults. This was done by disentangling direct measures of preparedness levels from motivation and barrier variables that enhance or impede preparedness levels and response capacity.

## METHODS

Data for this study originated from the 2010 wave of the nationally representative HRS.<sup>29</sup> To our knowledge, the 2010 HRS data are the only nationally representative data of older persons containing information, however limited, on emergency preparedness.<sup>29,30</sup> As a nationally representative dataset, results are more generalizable than other, more limited datasets.

The HRS has been conducted biennially since 1992 with a focus on the health and financial resources of the aging population. In addition to the core survey items, each wave of the survey includes special modules that are distributed to approximately 10% of the wave's survey participants. In the 2010 HRS wave, the focus of one of the modules was on emergency preparedness, and it is this module that was analyzed here.

Eligible participants in the study lived in the United States, were aged 50 years and older, and did not live in long-term care. The complete study had a pool of 22,034; from that pool, 1892 participants were randomly selected for the emergency preparedness module. Records with data missing on any of the key variables were excluded, resulting in a final dataset of 1784.

This study conceptualized emergency preparedness as complex behavior consisting of (1) specific knowledge acquisition, (2) acquisition and storage of items needed for sustaining life and health in the short term, (3) planning steps, and (4) motivations and barriers that enhance or

impede an individual's capacity for and ability to complete emergency preparedness activities. Emergency preparedness levels were captured by the first 3 dimensions listed; the fourth (motivations and barriers) influences or conditions the level of the participant's preparedness and capacity to respond. Seven items in the module directly measured emergency preparedness levels (Table 1). The other questions in the module measured motivations and barriers, including situational constraints. These items modulated an individual's capacity to complete preparedness activities and may expose barriers in the ability to respond in the case of an emergency (Table 2). For both sets of measures, responses were dichotomous responses and all items were scored so that 1 was equivalent to "yes" and 0 was equivalent to "no."

Key demographic characteristics of the participants are found in Table 3. The typical respondent in this analysis was a 72-year-old, white, married, middle-class female with a high school diploma, living in her own home in an urban area in the South. The sociodemographic variables from the HRS control for variations in emergency preparedness across social dimensions and included age, race, ethnicity, marital status,

TABLE 1

**Emergency Preparedness Level Variables**

Variable	Percentage, %
Do you have a smoke or fire detector in your residence?	94.6
In the past few years, have you or other members of your household participated in any educational program such as a lecture or discussion or read materials on how to prepare for disasters?	38.2
Has anyone either in your household or someone close to you prepared a specific plan written or otherwise on what to do in case of a disaster, such as a fire, flood, tornado, or earthquake?	26.1
Do you know the specific location of a shelter in your community in case you have to leave your residence in a disaster?	43.2
Suppose a disaster occurred, and water, electricity, heat, and air conditioning were not available. Do you have a set of supplies or a kit in your residence that could supply food, water, and medical treatments so you could live in your home for at least 3 days?	60.5
Are you or other members of your household registered with any community program or medical or other organization that would offer help to you in the event of a disaster?	14.3
If there were no power or telephones, would you have a way to receive communications about disasters in your residence, such as with a battery-operated radio?	72.2

TABLE 2

**Motivation and Barrier Variables of Emergency Preparedness**

Variable	Percentage, %
Do you or anyone in your household have any medical devices in your home that are important to health and that require electrical power to operate?	14.8
In the event of a disaster, if the main entrance door to your building were blocked, is there another way for you to exit your residence immediately?	95.9
Are there persons whom you know who live within 50 miles of your residence who would help you and provide transportation and shelter in the event of a disaster that prevented you from living in your house?	92
Has a doctor or other health professional talked to you about what to do in the event of a natural disaster?	8.4
Have you helped or offered to help other persons in the event of a disaster?	39.6
Does a hearing impairment make it difficult for you to hear warning sirens while you are in your house?	6.4
Does anyone in your household have a car they are able to drive?	91.4

TABLE 3

**Sociodemographic and Health Characteristics of Participants (N = 1803)**

Characteristic	Percentage or Mean (SD)
<b>Female</b>	77.8
<b>Age, y</b>	71.7 (5.7)
<b>Race/ethnicity</b>	
White	78.2
Black	17.5
Hispanic	6.9
Other minority	4.3
<b>Marital status</b>	
Married	46.2
Widowed	31.3
Separated /divorced	18.6
Unmarried	3.7
<b>Educational attainment</b>	
Less than high school	22.4
High school graduate	36.6
Some college	22.0
College graduate	9.8
<b>Economic status</b>	
Annual household income, \$	64,586.2 (89,219.3)
Household wealth including housing, \$	410,417.0 (967,250.3)
<b>Self-reported health</b>	
Excellent	11.0
Very good	29.7
Good	30.7
Fair	21.0
Poor	7.6
<b>Number of activities of daily living</b>	2.4 (2.7)
<b>Housing</b>	
Single family home	71.6
Duplex/apartment/condo	22.2
Mobile home	6.2
<b>Geographical region</b>	
South	41.7
Midwest	22.7
West	20.9
Northeast	14.5
<b>Urbanity</b>	
Urban	50.8
Suburban	40.5
Exurban	27.7

educational attainment, economic status, health, type of housing, and geographic region of residence. Age was included as a continuous variable. Race and ethnicity were included as categorical predictor variables, as were marital status and educational attainment. Economic status was accessed by using participant reports of annual household income and an HRS-derived variable of household net worth. Both were included as continuous variables.

Health was measured in 2 ways. An HRS-derived variable of the count of participant limitations in activities of daily living (ADLs) was included as a count variable. Self-reported health was measured on a scale ranging from 1 = excellent to 5 = poor and was included as a continuous variable.

Two variables were used as indicators of respondents' geographic residence. Respondents were grouped by US Census Bureau region of the country: North, South, Midwest, and West. Participants were also categorized in the HRS data into living in urban, suburban, or exurban areas, based on designations from the US Department of Agriculture (USDA) Economic Research Service. In the HRS data, the geographic descriptors are defined by using the 2003 Beale Rural-Urban Continuum (RUC) codes developed by the USDA's Economic Research Service. These RUC codes use population and adjacency to metropolitan areas to measure the degree of urbanization. In the HRS data, rural is represented by the exurban code which is defined as RUC codes 3–9 or all places with less than 250,000 population, both adjacent and nonadjacent to a larger metropolitan area. While this conflates one category (3) generally assigned to metropolitan status, it does capture all of the rural population available in the sample.

Initially, the study's analytical strategy attempted to create internally consistent measures of disaster emergency preparedness by using items from the disaster emergency preparedness module. Emergency preparedness is a complex construct with multiple internal dimensions. Careful assessment of these internal dimensions is an important research agenda for emergency preparedness planners and educators in order to identify more effective targeted interventions. To that end, factor analyses were conducted to evaluate whether the items in the HRS could be used to construct these internal dimensions. The results were suggestive but not persuasive and, as a result, the analytical approach was changed.

Following unsuccessful attempts to create internally consistent measures, a series of logistic multiple regressions was prepared to evaluate predictive models for the direct measures of emergency preparedness. This approach provided insight into differentiating participants who completed emergency preparedness activities that directly measure levels of preparedness. The predictive models included the variables identified as barriers or motivations, along with the socio-demographic characteristics of the participants.

## RESULTS

As seen in the descriptive measures presented in Table 1, the preparedness of older persons varied widely across the specific measures. Whereas nearly 95% had a smoke or fire detector in their homes, about 38% had attended a disaster educational program. Slightly more than 26% had a disaster household plan, whereas slightly more than 43% knew the location of a community emergency shelter. Only about 61% had supplies (eg, food, water, and medical treatments) for 3 days. Just over 14% had registered with an organization to help them during a disaster event and about 72% were able to receive emergency communications. These results mirrored earlier studies.

To further evaluate whether subgroups within the population differed from one another and the influence of barriers and motivations on completion of separate preparedness activities, a logistic regression was performed for each of the 7 direct measures. A logistic regression model was used because the dependent variable was binary in each case: whether or not the participant answered “yes” to the question. In general, the equation had the following form:

$$\log\left(\frac{p_i}{1-p_i}\right) = \alpha + \beta_1 X_{i1} + \beta_2 X_{i2} + \dots + \beta_p X_{ip}$$

where  $p$  was the probability that the dependent variable was 1 or “yes,” and the independent variables were as listed above, including the demographic characteristics and the barrier and motivation measures. For each of the 7 direct emergency preparedness activities in Table 1, a logistic regression analysis was completed and the results, reported in terms of odds ratios (ORs), are discussed in order (Tables 4 and 5).

Having a smoke or fire detector in the home may seem like a relatively low-barrier emergency preparedness activity but appeared to be problematic for those with fewer resources. The presence of a detector was less likely for respondents who had not graduated from high school (OR = 0.52,  $P < 0.05$ ) and who resided in the South (OR = 0.44,  $P < 0.05$ ). Household income increased the likelihood of having a detector (OR = 1.16,  $P < 0.001$ ), as did living in a mobile home (OR = 1.17,  $P < 0.001$ ). Having a car and being able to drive doubled the odds ratio of having a smoke or fire detector in the home (OR = 2.05,  $P < 0.05$ ). However, this model explained very little of the variation, as the R-square was only 0.05.

Participating in disaster or emergency preparation planning was positively, but only slightly, related to household income (OR = 1.03,  $P < 0.001$ ). Lower self-reported health decreased the likelihood of participating in disaster planning (OR = 0.85,  $P < 0.01$ ). Living in the West increased the odds ratio of participation in disaster planning (OR = 1.58,  $P < 0.01$ ). Two factors nearly tripled the likelihood of the respondent having participated in preparation planning. The first was having a health care provider discuss emergency preparedness (OR = 2.78,  $P < 0.0001$ ). The second was whether participants had previously helped others in a disaster (OR = 2.70,  $P < 0.0001$ ). The R-square for this model was the highest of the 7 models, but still relatively low at R-square = 0.12.

Actually developing a disaster plan for the household was less likely for African American respondents (OR = 0.71,  $P < 0.05$ ). This was the only dependent variable with a racial or ethnic group difference. Medical conditions requiring electric medical devices also increased the likelihood of actually having a disaster plan (OR = 1.52,  $P < 0.01$ ). Having one's health care provider discuss emergency preparedness prior to an emergency greatly increased the odds ratio of having a disaster plan (OR = 4.66,  $P < 0.0001$ ). Experience in helping others with disasters more than doubled the

likelihood of having a disaster plan (OR = 2.43,  $P < 0.0001$ ). The R-square for this model was 0.11, slightly less than participation in planning.

Those living in the South were more likely to know the locations of local shelters (OR = 1.72,  $P < 0.0001$ ). Those residing in suburban areas were also more likely to be aware of a shelter's location (OR = 1.35,  $P < 0.05$ ). Once again, medical personnel discussing preparedness (OR = 2.52,  $P < 0.0001$ ) and experience in helping others (OR = 2.19,  $P < 0.0001$ ) were the most influential predictive factors, both factors more than doubling the odds of knowing the location of a local shelter. This model had an R-square of 0.10.

It might be anticipated that having sufficient supplies for a 3-day emergency would be more difficult for those of limited financial means. Household wealth slightly increased the likelihood of having these supplies (OR = 1.04,  $P < 0.0001$ ), although household income was not significantly related to having emergency supplies. Residing in the West also increased the likelihood of having emergency supplies (OR = 1.43,  $P < 0.05$ ), as did residing in exurban areas (OR = 1.35,  $P < 0.05$ ). Participants who knew others who could provide help during a disaster were more likely to have emergency supplies (OR = 1.57,  $P < 0.05$ ). Although significant and important, the influence of medical personnel discussing preparedness (OR = 1.80,  $P < 0.01$ ) and helping others in disasters (OR = 1.98,  $P < 0.0001$ ) were weaker predictors than in the models discussed above. The R-square was also slightly lower at 0.08.

The only model showing differential preparation between men and women was the model predicting registering for disaster help, with women being more likely to register for help than men (OR = 1.60,  $P < 0.05$ ). Those with higher counts of ADLs were also slightly more likely to register for help (OR = 1.09,  $P < 0.05$ ). As previously, one's health care provider discussing emergency preparedness strongly predicted participants' registering for disaster help (OR = 4.51,  $P < 0.0001$ ). Likewise, helping others in a disaster was almost as influential in predicting participants' registering for disaster help (OR = 3.01,  $P < 0.0001$ ). The model had an R-square of 0.10.

The last model predicted the ability to receive emergency communications. Living in an exurban area reduced the likelihood that one was able to receive these communications (OR = 0.72,  $P < 0.05$ ). As had been true with all but the first model presented, the strongest predictors were discussing emergency preparedness with one's health care provider (OR = 1.86,  $P < 0.05$ ) and experience helping others in a disaster (OR = 1.85,  $P < 0.0001$ ). The likelihood of having the ability to receive communications, similar to the model for having a smoke or fire detector, was higher for those who had a car and drove (OR = 1.64,  $P < 0.05$ ). As with the model for having a smoke or fire detector, this model explained little variation with an R-square of 0.05.



TABLE 4

Logistic Regression Predicting Emergency Preparedness Variables<sup>a</sup>

Predictor Variable	Odds Ratio			
	Smoke/Fire Detector	Disaster Preparedness Participation	Disaster Plan	Knows Shelter Location
<b>Female</b>	1.17	1.09	0.97	0.93
<b>Age</b>	1.04	1.01	1.00	1.00
<b>Race/Ethnicity</b>				
White (omitted comparison)				
Black	0.93	0.94	0.71 <sup>b</sup>	1.04
Other minority	1.50	0.89	0.97	1.06
Hispanic	0.88	1.06	0.89	1.05
<b>Marital status</b>				
Married (omitted comparison)				
Separated/divorced	1.08	1.00	1.16	1.06
Widowed	0.84	0.98	1.10	1.26
Unmarried	0.81	1.07	0.82	0.72
<b>Educational attainment</b>				
Less than high school	0.52 <sup>b</sup>	0.92	1.11	1.04
High school graduate (omitted comparison)				
Some college	0.65	1.18	0.95	0.92
College graduate	0.49	1.03	1.13	1.40
<b>Economic status</b>				
Annual household income/10,000	1.16 <sup>d</sup>	1.03 <sup>d</sup>	1.01	1.01
Household wealth/100,000	1.02	1.00	1.00	1.00
<b>Health status</b>				
Count of ADLs	1.07	0.99	1.02	1.02
Self-reported health	0.88	0.85 <sup>c</sup>	0.89	0.98
<b>Housing</b>				
Single family home (omitted comparison)				
Mobile home	1.17 <sup>d</sup>	0.98	0.84	1.13
Duplex/apt/condo	3.36	1.20	1.22	1.04
<b>Geographic region</b>				
Midwest (omitted comparison)				
South	0.44 <sup>b</sup>	1.05	1.18	1.72 <sup>e</sup>
Northeast	0.76	0.80	0.82	1.28
West	0.77	1.58 <sup>c</sup>	1.16	0.83
<b>Urbanicity</b>				
Urban (omitted comparison)				
Suburban	0.54	0.97	0.92	1.35 <sup>b</sup>
Exurban	0.81	0.89	0.99	1.22
<b>Situation variables</b>				
Medical devices needing electricity	1.43	1.33	1.52 <sup>c</sup>	1.20
More than one exit to residence	1.63	1.06	1.51	1.35
Know persons to help in disaster	1.77	1.31	1.14	1.63 <sup>b</sup>
Doctor discussed emergency plans	1.18	2.78 <sup>e</sup>	4.66 <sup>e</sup>	2.52 <sup>e</sup>
Helped others in disaster	1.26	2.70 <sup>e</sup>	2.43 <sup>e</sup>	2.19 <sup>e</sup>
Hearing loss prevents hearing warning	0.65	0.69	0.89	0.88
Has car and drives	2.05 <sup>b</sup>	1.22	1.27	1.23
<b>R-square</b>	0.05	0.12	0.11	0.10

<sup>a</sup>Abbreviation: ADL, activity of daily living.<sup>b</sup> $P < 0.05$ . <sup>c</sup> $P < 0.01$ . <sup>d</sup> $P < 0.001$ . <sup>e</sup> $P < 0.0001$ .

## DISCUSSION

Overall, the findings of this study suggested that the emergency preparedness of persons aged 50 years and older is inadequate, a finding consistent with previous research.<sup>14,26,27,31</sup> However, this study does reveal important understandings missed in the earlier study by Al-rousan et al.<sup>14</sup>

The results of the univariate analysis showed that although most older persons had smoke or fire detectors in their homes, were able to receive emergency communication, and had supplies for 3-day emergencies, considerably fewer than half had taken additional measures to prepare for emergencies. It is of concern that nearly 75% had no household emergency plan and over

TABLE 5

Logistic Regression Predicting Emergency Preparedness Variables<sup>a</sup>

Predictor Variable	Odds Ratio		
	Supplied for 3-day Emergency	Registered for Disaster Help	Ability to Receive Communications
<b>Female</b>	0.83	1.60 <sup>b</sup>	0.91
<b>Age</b>	1.00	1.01	1.01
<b>Race/ethnicity</b>			
White (omitted comparison)			
Black	1.12	1.14	0.98
Other minority	1.00	1.09	0.84
Hispanic	0.82	1.09	0.94
<b>Marital status</b>			
Married (omitted comparison)			
Separated/divorced	0.90	1.03	0.94
Widowed	1.01	0.96	0.97
Unmarried	1.26	0.81	0.85
<b>Educational attainment</b>			
Less than high school	1.18	0.75	1.07
High school graduate (omitted comparison)			
Some college	1.15	0.70	1.05
College graduate	1.03	1.27	1.05
<b>Economic status</b>			
Annual household income/10,000	1.01	1.00	1.01
Household wealth/100,000	1.04 <sup>e</sup>	0.98	1.00
<b>Health status</b>			
Count of ADLs	1.00	1.09 <sup>c</sup>	0.98
Self-reported health	0.90	0.93	1.02
<b>Housing</b>			
Single family home (omitted comparison)			
Mobile home	0.80	0.67	0.89
Duplex/apartment/condo	0.89	1.21	0.89
<b>Geographic region</b>			
Midwest (omitted comparison)			
South	1.05	1.23	0.96
Northeast	1.05	1.16	0.80
West	1.43 <sup>b</sup>	1.29	0.87
<b>Urbanicity</b>			
Urban (omitted comparison)			
Suburban	0.92	1.25	0.94
Exurban	1.35 <sup>b</sup>	0.77	0.72 <sup>b</sup>
<b>Context variables</b>			
Medical devices needing electricity	1.18	1.23	1.16
More than one exit to residence	1.67	1.13	1.46
Know persons to help in disaster	1.57 <sup>b</sup>	0.87	1.25
Doctor discussed emergency plans	1.80 <sup>c</sup>	4.51 <sup>e</sup>	1.86 <sup>b</sup>
Helped others in disaster	1.98 <sup>e</sup>	3.01 <sup>e</sup>	1.85 <sup>e</sup>
Hearing loss prevents hearing warning	0.93	0.84	0.88
Has car and drives	1.44	0.87	1.64 <sup>b</sup>
<b>R-square</b>	0.08	0.10	0.05

<sup>a</sup>Abbreviation: ADL, activity of daily living.<sup>b</sup> $P < 0.05$ . <sup>c</sup> $P < 0.01$ . <sup>d</sup> $P < 0.001$ . <sup>e</sup> $P < 0.0001$ .

60% had not participated in an emergency preparation program. Less than 45% knew the location of an emergency shelter.

The question for those charged with future emergency preparedness and response is how to improve overall preparedness levels. Understanding emergency preparedness

as a more complex construct and reanalyzing the data uncovered 3 critical findings.

First is that the lack of preparedness extended across virtually all sociodemographic variables and regions of the country. Based on extant research, approaches of planners and outreach programs

may have assumed that certain vulnerable populations, measured along racial, ethnic, and income axes, are less likely to be prepared than more dominant social groups.<sup>26,27,31,32</sup> That was clearly not the case in regard to these data.

Second, the motivating influence of an authority, in the role of health care personnel, is undeniable. With little exception, those older persons whose health care professional spoke to them about emergency preparedness were far more likely to complete direct emergency preparedness activities. This is a critical and important finding, suggesting a powerful and direct avenue of intervention.

Third, another avenue for motivating older persons to complete emergency preparedness activities would be to utilize peer-to-peer intervention led by older adults who have previously helped others in a disaster. Next to the influence of the authoritative voice of health care personnel, this factor had the most impact across all activities measured. Other public health outreach programs have demonstrated the efficacy of peer outreach, suggesting that older persons with previous experience helping in disasters are an underutilized resource.<sup>33-35</sup>

That said, it is also important to note that only 4.9% of respondents actually reported having had a discussion with their health care professional about preparedness. It should be noted that fewer than 40% of respondents had helped others in a disaster. These avenues are not yet fully exploited.

Further, the current study has methodological implications for how emergency preparedness is measured. The approach of evaluating emergency preparedness by summing or otherwise combining individual items without distinction into a single measure of preparedness, as done in Al-rousan et al's study, is called into question.<sup>14</sup> We were unable to use these items to create an internally consistent and persuasive summary measure of emergency preparedness. There are 2 possible reasons for this. It may be these are the wrong items to be used to create a summary variable of emergency preparedness. It may also be the approach is itself untenable because a more valid approach conceptualizes emergency preparedness as a multi-dimensional construct with complex internal dimensions. As was evident, the second approach was taken in this study to the extent allowed by the specific measures in the HRS data.

A strength of this study is that the data came from the nationally representative HRS. This suggests that the results are more generalizable than those of other studies based on convenience samples. While the use of nationally representative secondary data affords the strength of generalizability, it also imposes limitations.

One limitation was the inability to expand or modify questions assessing emergency preparation. Emergency preparation is significantly more complicated than can be assessed with the limited items included in the HRS module. Additional

research is needed to identify what those missing measurements are and how they might be used to gain a more sophisticated perspective on the emergency preparation of older persons.

The age range of the participants in this study raises an important caution about the generalization of findings to younger adults. Older and younger persons are likely to have differing levels of preparedness. They are also likely to have differing motivations for how they prepare for disasters. These findings should only be generalized to persons who are 50 years old and older.

Also, it was not possible to conduct follow-up interviews to gain a deeper understanding of the participants' responses. Qualitative interviews may be more effective at revealing how people think about emergencies and how they prepare or fail to prepare for them.

## CONCLUSIONS

This study presumed an increased probability that older persons will be impacted by emergencies in greater numbers over time owing to population aging, migration patterns of older persons, and increased disasters resulting from climate change. It also presumed that the negative financial and social consequences of disasters and emergencies can be partially mitigated through increased preparation. Given these presumptions, important implications can be drawn from these results.

Researchers should be cautioned about combining various components of preparedness into a single index. These data included only 7 items addressing emergency preparation directly and 7 more addressing barriers and motivations with no theoretical thread tying the individual items together. More research is needed on how to measure emergency preparedness by using additional items theoretically derived and accessing common latent emergency preparedness internal dimensions to elucidate a more complex multi-dimensional construct.

The results of this study suggest that emergency preparation programs should be widespread across all sociodemographic dimensions of people 50 years old and older. No particularly vulnerable subpopulation could be identified that should be targeted for increased preparation programming.

One clear outcome is that accessing health care providers to discuss emergency preparedness with older persons is likely to have a positive impact on emergency preparation across all sociodemographic groups. Notably, few participants reported discussing emergency preparation with their health care professional. Programs emphasizing the role health care professionals play in emergency preparation are likely to contribute positively to increased preparation of older persons and should be encouraged.



Finally, while not surprising, the results of this study suggest that the experience of helping others in an emergency greatly contributes to whether older persons are themselves prepared. These persons can be positively involved in programming and sharing of experiences and stories, and using peer outreach models can encourage those with little emergency experience to make advance preparations.

Despite these limitations, this study contributes to a relatively sparse literature on emergency preparation of persons aged 50 years and older. Given projections of significant increases in the numbers of older people in the United States and the increasing number of emergencies in the coming decades, more attention in regard to this population is vital.<sup>8,11</sup> If the presumption that preparation will mitigate the negative consequences of emergencies is accurate, a great deal of research and evidence-based outreach needs to be done to increase the preparedness of older persons for upcoming disasters.<sup>36</sup> Including these items in future modules of the HRS will significantly contribute to an evolving understanding of how older persons are prepared or underprepared for disasters.

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