Preparedness for Natural Disasters Among Older US Adults: A Nationwide Survey

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Objectives. We sought to determine natural disaster preparedness levels among older US adults and assess factors that may adversely affect health and safety during such incidents.

Methods. We sampled adults aged 50 years or older (n = 1304) from the 2010 interview survey of the Health and Retirement Study. The survey gathered data on general demographic characteristics, disability status or functional limitations, and preparedness-related factors and behaviors. We calculated a general disaster preparedness score by using individual indicators to assess overall preparedness.

Results. Participant (n = 1304) mean age was 70 years (SD = 9.3). Only 34.3% reported participating in an educational program or reading materials about disaster preparation. Nearly 15% reported using electrically powered medical devices that might be at risk in a power outage. The preparedness score indicated that increasing age, physical disability, and lower educational attainment and income were independently and significantly associated with worse overall preparedness.

Conclusions. Despite both greater vulnerability to disasters and continuous growth in the number of older US adults, many of the substantial problems discovered are remediable and require attention in the clinical, public health, and emergency management sectors of society. (*Am J Public Health.* 2014;104:506–511. doi:10.2105/AJPH.2013.301559)

Each of the past few years has witnessed more natural disasters than any year on record, costing billions of dollars, according to the US National Climatic Data Center.[1] President Obama declared a record number of federally designated natural disasters in 2011, more in the first 3 years of his presidency than almost any other presidents in their full 4-year terms.[2] In 2012, insured economic losses from severe weather-related catastrophes in the United States totaled $57.9 billion.[2] We continue to experience aberrant climatic and geologic phenomena that can jeopardize older adults and disproportionately affect them.[3] Three quarters of those who perished in Hurricane Katrina in 2005 were aged older than 60 years.[4] Natural disasters, such as the earthquake and tsunami in Japan in 2011 and Hurricane Sandy in 2012, continue to occur and impose serious aftermaths on older persons.[5,6]

Having the highest prevalence rates for multiple chronic conditions, limitations in activities of daily living (ADLs) and instrumental activities of daily living (IADLs), physical and cognitive disabilities, and sensory impairments makes older adults particularly vulnerable to physiological stresses during natural disasters.[7] However, most fatalities, injuries, and damage caused by natural disasters, such as floods, tornadoes, hurricanes, and earthquakes, are preventable.[8] Preparing older adults for disasters by following certain precautionary measures and designing comprehensive disaster management plans can alleviate some proportion of the physical, social, and emotional damage that occurs in these situations. But an important public health question is, How prepared are older US adults for natural disasters? We report the results of a survey of older Americans, part of the Health and Retirement Study (HRS), an ongoing nationwide panel study of the health, social, and economic status among persons, conducted by the University of Michigan.[9]

METHODS

The HRS is a nationally representative cohort study that surveys the social, economic, and health characteristics of Americans aged 50 years and older.[9] Supported by the National Institute on Aging and the Social Security Administration, it explores issues related to work characteristics and the retirement process, changes in labor force participation, the evolving social and economic status of US families, and their health transitions over time. Biennial surveys have been conducted since 1992. In addition to the core survey items administered to all respondents, each survey wave contains a set of "modules." These modules are administered to randomly chosen subsamples of the survey population, each module comprising approximately 10% of the respondents in that wave. A detailed description of HRS methods and questionnaires is contained on its Web site (http://hrsonline.isr.umich.edu). In the 2010 survey, one of the modules, with 21 questions (with a 97.0% response rate), was administered concerning disaster preparedness. Nursing home and other institutional residents and persons aged younger than 50 years (generally younger spouses of the target respondents) were excluded from the analysis, yielding a final sample size of 1304. The rate of item-specific missing data was less than 1.5% for all questions used in this analysis.

Preparedness module questions were assembled from previous local surveys, previously published relevant articles, disaster preparedness technical reports,[10–14] and discussions with geriatricians and others familiar with emergency situations. We derived health and demographic variables used in this analysis from core HRS questionnaires.[15]

Demographic variables included race/ethnicity, gender, date of birth, and educational attainment. Economic status was represented by annual household income. Individuals were designated as living alone if no other person resided in the household and if the respondent

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reported that he or she was married but not residing with his or her spouse. Body mass index (BMI) was calculated with the formula weight in kilograms divided by the square of height in meters. Type of housing was classified into 1-family house, apartment, or townhouse; multifamily unit; mobile home; or "other." Overall self-rated health status was classified as excellent or very good, good, or fair or poor. Functional status was assessed with ADLs and IADLs[10,16]—ADL dysfunction was assessed by self-reported difficulties on 5 tasks: bathing, eating, dressing, toileting, and transferring; IADL dysfunction included difficulties with managing money, managing medications, preparing meals, going shopping, and using a telephone.

We assessed 18 disaster-preparedness indicators in this study. Some questions assessed residential preventive measures, such as having a smoke or fire detector and whether it was tested in the past year, if natural gas supply is used and knowing how to turn it off, and if multiple exits existed in place of residence in case of blockage in an event of emergency. Other items assessed household member disaster preparation activities and individual efforts exerted by the respondent or his or her household's members in disaster preparation. These activities included having a specific disaster plan, written or otherwise, on what to do in case of disaster; being able to receive emergency information by having a battery-operated radio; and having assembled a 3-day supply of food, water, medications, and other necessities.

We calculated an 18-point summary score by summing up the yes-or-no answers for all the disaster preparedness indicators asked in the module. We gave each "yes" answer 1 point and each "no" a 0 for the first 16 questions. We scored related (follow-on) questions 18 and 19, and 20 and 21 each as 1 question (18 and 19: 0 for yes and no, or 1 for yes and yes or no and not applicable; 20 and 21: 0 for no and no, and 1 for either answered as yes). We reverse-scored 2 items (6 and 14) so that a "yes" answer was in a positive direction and a "no" answer was in the negative direction. Lower scores indicated worse preparedness, higher scores better preparedness. We assessed reliability for the preparedness summary score by using Cronbach α (0.61).

We queried respondents on being aware of programs or organizations that work to help prepare people for the possibility of disasters and whether they were registered in any community program or in any medical or other organization that would offer help in the event of a disaster. Also, we asked them if they had participated in an educational program offering a lecture or discussion and had read any materials that familiarized them with signs of disasters and preparation for disasters before the events occurred. Items on respondents' readiness for evacuation included availability of friends or relatives within 50 miles who could offer emergency shelter, having means of transportation or being able to secure one if needed, and whether individuals were able to quickly evacuate their residences without the help of others. We further assessed the reasons for slow exit. We queried about hearing impairment that precluded hearing warning sirens, as well as the use of medical devices requiring electricity. Finally, we queried participants about previous experience with a natural disaster.

Analytic files of HRS data prepared by the RAND Center for the Study of Aging provided processed data items and sampling weights. We compared derived variables with raw questionnaire data before use in analysis. Outcomes included the individual disaster preparedness questions and the preparedness summary score (continuous and classified by 0–9, 10–12, or 13–18). Covariates of interest included age (continuous and grouped by 50–64, 65–69, 70–79, or 80–98 years), gender, race/ethnicity (Black, White, or other), education in years (0–9, 10–11, 12–13, or >13), marital status (married, partnered, or single), BMI (<25, 25–29, or ≥ 30), self-perceived health status (excellent or very good, good, or fair or poor) living alone (yes or no), type of residence (house, mobile home, multiunit dwelling, or other), ADL limitations (none, 1–2, 3–4, or ≥ 5) and IADL limitations (none, 1, or ≥ 2).

Frequencies and percentages in Table 1 were unweighted and included 1304 respondents. We used weighted analyses for population estimates in Tables 2 and 3 and included 1225 respondents, who had HRS-provided sampling weights. We generated unadjusted frequencies and percentages by using categorical data procedures that produced estimates of population proportions, population proportions, and their standard errors. We generated unadjusted and adjusted population P values, least squares

TABLE 1—Characteristics of Respondents (n = 1304): Health and Retirement Study Disaster Preparation Module, United States, 2010

Characteristic	No. (%)
Age, y	
50–64	403 (30.9)
65–79	691 (53.0)
≥ 80	211 (16.1)
Gender	
Male	544 (41.7)
Female	760 (58.3)
Self-reported race/ethnicity	
White, non-Hispanic	1063 (81.5)
Black non-Hispanic	193 (14.8)
Other	48 (3.7)
Education	
< high school	148 (11.4)
High school or equivalent	124 (9.6)
Some college	533 (41.2)
College graduate	490 (37.8)
Household income, US $	
< 17 000	277 (21.2)
17 000–33 175	298 (22.9)
33 176–63 079	370 (28.4)
≥ 63 080	359 (27.5)
Household number	
Living alone	335 (25.7)
Living with partner	969 (74.3)
BMI, kg/m^2	
< 25.0	417 (32)
25.0–29.9	459 (35.2)
≥30.0	428 (32.8)
Type of housing	
House or apartment	1121 (86.6)
Mobile home	83 (6.4)
Multidwelling unit	50 (3.9)
Other	40 (3.1)
Perceived health status	
Excellent or very good	527 (40.4)
Good	405 (31.1)
Fair or poor	372 (28.5)
ADL limitation	
None	813 (62.4)
≥ 1 impairment	491 (37.6)
IADL limitation	
None	1118 (85.7)
≥ 1 impairment	186 (14.3)

Note. ADL = activities of daily living; BMI = body mass index; IADL = instrumental activities of daily living.

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TABLE 2—Population Estimates (n = 1304) for Disaster Preparedness Indicators: Health and Retirement Study, United States, 2010

Disaster Preparedness Indicator	Total No. (%)	Age Group, %			Gender, %		Race/Ethnicity, %		
		50–64 Years	65–79 Years	≥80 Years	Female	Male	White	Black	Other
1. Has a smoke detector at home	1155 (94.6)	95.6	93.7	93.8	94.3	94.9	94.7	93.6	95.1
2. Has a smoke or fire detector that has been tested in the past year	1005 (87.3)	88.0	86.6	86.6	87.8	86.6	87.1	90.3	84.2
3. Participated or registered in disaster preparation program	405 (34.3)	39.2*	31.3*	26.3*	37.1	31.2	34.4	33.6	34.1
4. Has an emergency evacuation plan	281 (23.6)	24.2	24.4	18.6	24.6	22.3	22.5	28.9	33.7
5. Knows specific location of a shelter in community	517 (43.2)	46.5*	42.6*	32.9*	41.5	45.2	42.4	49.6	45.7
6. Uses medical devices that need electricity	181 (14.2)	14.6	14.3	12.3	13.8	14.6	14.0	14.6	18.1
7. Has a 3-d supply emergency kit	771 (62.7)	61.3	64.6	61.8	59.2**	66.8**	64.3***	51.9***	55.2***
8. Registered for disaster help	142 (10.1)	8.4	11.8	10.3	11.0	9.0	8.7***	19.9***	14.7***
9. Aware of programs or organizations that prepare for possibility of disasters	277 (27.2)	30.0	26.0	20.1	28.1	26.2	26.5	36.2	20.1
10. Able to receive communications (e.g., battery-operated radio)	871 (71.0)	71.9*	72.8*	61.7*	69.2	73.1	71.2	70.8	66.0
11. Can perform immediate exit in case of emergency without help from another person	1108 (91.5)	92.8	91.0	88.4	91.1	92.0	91.9	88.0	92.0
12. Reason for slow exit is health or mobility limitation	58 (49.9)	25.1*	63.5*	76.0*	53.6	45.3	46.9	69.8	47.7
13. Has multiple exits in case of blockage	1177 (96.5)	97.3	96.3	94.3	96.1	97.0	96.5	96.3	96.9
14. Knows people who live within 50 miles who could provide shelter and transportation in case of disaster	1126 (92.4)	93.3	91.5	91.5	92.4	92.3	93.1	89.7	81.8
15. A doctor or health professional discussed what to do in case of natural disaster	72 (4.9)	4.1	6.4	3.1	6.0	3.6	4.5	7.3	10.1
16. Has experience in helping others in the event of disasters	424 (34.9)	38.8*	33.0*	27.0*	36.5	33.2	34.0	35.7	54.3
17. Hearing impairment prevents hearing warning sirens	83 (6.7)	5.1	6.7	12.7	3.2	3.5	6.8	4.8	10.3
18. Has natural gas used in place of residence	696(57.5)	58.8	56.8	54.8	57.0	58.0	56.6***	57.7***	76.6***
19. Has natural gas supply and knows how to turn it off	454 (66.3)	66.5*	69.9*	52.3*	46.2**	88.8**	65.8	70.3	65.8
20. Household member(s) has a car and drives	1124 (93.0)	94.7*	93.9*	83.9*	91.6	94.5	94.5***	83.2***	83.4***
21. Household member(s) doesn't have a car but can secure transportation to evacuate in case of disaster	74 (75.2)	78.2	70.2	77.7	78.5	69.6	79.0	67.9	66.6

*$P \le .05$: deficit significantly increases as age increases; **$P \le .05$: deficit significantly different by gender; ***$P \le .05$: difference or deficit significantly different for the following items and ethnicity: item 7, Black vs White; item 8: Black vs White; item 18: Black vs other and White vs other; item 20: Black vs White and other vs White.

means, and standard errors by using regression analysis methods for weighted sample survey data. We generated global P values with the F-test statistic and we assessed comparisons between categories with the t test. Adjustment variables included categorical age, gender, race, categorical education, and categorical income. We also assessed all 2-way interactions among covariates. We performed analyses with SAS version 9.2 (SAS Institute Inc, Cary, NC). We assessed reliability for the preparedness summary score by using Cronbach α (0.60; 95% confidence interval [CI] = 0.56, 0.63).

RESULTS

Table 1 shows the characteristics of the analytical study population. The average age was 70.2 (SD = 9.3) years and the majority (81.5%) were White. Most had an educational attainment beyond a high-school diploma (79.0%), and 25.7% lived alone. The median annual household income was \$37 608 and 21.2% of the respondents reported an annual income less than \$17 600. Approximately one third of the respondents had a BMI of 30 or greater (32.8%), indicating obesity. About 6.4% were living in mobile homes, 86.6% in a 1-family house or apartment, and 3.9% in multiunit dwellings. Most reported good or excellent health status, but 28.5% reported their health to be fair or poor. About 37.6% reported 1 or more ADL limitations and 14.3% reported 1 or more IADL limitations.

Table 2 exhibits the disaster preparedness items used in this study, along with the percentage endorsing these items, by age, gender, and ethnic group. There was substantial variation among the items in terms of level of preparedness. Of note, 14.2% of the cohort reported using medical devices that require electricity. Nearly 7% reported hearing impairment to a level that prevented them from hearing warning sirens, especially among those aged 65 years or older. One third of respondents (34.3%) reported that they had participated or were registered in an educational disaster preparation program such as those offering a lecture or discussion, or had read materials on how to prepare for disasters. An additional 27.2% were aware that such preparatory educational programs existed.

Only a modest percentage (23.6%) of respondents reported having any specific plan,

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TABLE 3—Population Means for Overall Disaster Preparedness by Respondent Characteristics: Health and Retirement Study, United States, 2010

Characteristic	Unadjusted Mean (SE)	Unadjusted P[a]		Adjusted Mean (SE)[a]	Adjusted P[a]	
		Class[b]	Global[c]		Class[b]	Global[c]
Live alone			.04			.73
No (Ref)	11.3 (0.1)			11.1 (0.2)		
Yes	10.9 (0.2)	.04		11.0 (0.2)	ND	
Gender			.15			.91
Female (Ref)	11.1 (0.1)			11.0 (0.2)		
Male	11.3 (0.1)	.15		11.0 (0.2)	.91	
Age group, y			< .001			.031
50–64	11.4 (0.1)	< .001		11.2 (0.2)	.01	
65–79	11.2 (0.1)	.002		11.1 (0.2)	.022	
80–98 (Ref)	10.5 (0.2)			10.6 (0.3)		
Race			.87			.32
White (Ref)	11.2 (0.1)			10.9 (0.1)		
Black	11.3 (0.2)	ND		11.3(0.2)	ND	
Other	11.1 (0.5)	ND		10.8 (0.5)	ND	
Education, y			< .001			.002
0–9 (Ref)	10.0 (0.3)			10.3 (0.3)		
10–11	11.3 (0.3)	< .001		11.5 (0.3)	.002	
12–13	11.1 (0.1)	< .001		10.9 (0.2)	.028	
> 13	11.6 (0.1)	< .001		11.3 (0.2)	.001	
Income, US$			< .001			.003
< 17 600 (Ref)	10.3 (0.2)			10.3 (0.3)		
17 600–33 175	11.0 (0.2)	.007		11.0 (0.3)	.015	
33 176–63 079	11.4 (0.1)	< .001		11.3 (0.2)	.004	
> 63 079	11.7 (0.1)	< .001		11.3 (0.3)	.001	
Marital status			.03			.97
Married (Ref)	11.4 (0.1)			11.0 (0.2)		
Partner	11.4 (0.4)	.82		11.1 (0.4)	.9	
Single	10.9 (0.1)	.01		11.1 (0.2)	.82	
Type of residence			.08			.46
One-family house (Ref)	11.3 (0.4)			11.1 (0.2)		
Mobile home	11.0 (0.3)	.26		11.0 (0.4)	.84	
Two-family unit	11.3 (0.5)	.96		11.3 (0.4)	.69	
Apartment or townhouse	10.6 (0.3)	.007		10.7 (0.3)	.072	
Other	11.0 (0.5)	.56		11.0 (0.5)	.82	
BMI			.27			.038
< 25	11.1 (0.2)	.53		11.0 (0.2)	.15	
25-29.9	11.4 (0.1)	.107		11.2 (0.2)	.011	
≥ 30 (Ref)	11.1 (0.1)			10.7 (0.2)		
Self-reported health			< .001			.012
Excellent or very good	11.6 (0.1)	< .001		11.4 (0.2)	.003	
Good	11.2 (0.1)	.028		11.1 (0.2)	.09	
Fair or poor (Ref)	10.7 (0.2)			10.7 (0.2)		

Continued

written or otherwise, on what to do in case of an emergency or disaster. Only 10.1% reported members of their household being registered for disaster help should it be needed, and 43.2% knew of a specific shelter location in their community, in case they had to abandon their homes. About a quarter (24.8%) of the respondents did not have access to a car and stated that they could not secure private transportation in case of an emergency. Being able to receive communications through a battery-operated radio was reported by 71.6%. Although 94.6% of the respondents reported having a smoke or fire detector at home, many had not been tested during the year before the survey. Although 57.5% of the residences used natural gas, only about two thirds (66.3%) reported knowing how to shut it off. Nearly all (96.5%) reported having dwellings with multiple exits, and more than 91% reported being able to immediately exit their residences without the help of others. About half of those with difficulty exiting reported that the reason was health or mobility limitation. Only a small percentage of respondents reported that their doctors or other health care providers discussed disaster preparedness with them (4.9%).

We examined the independent effects of respondent characteristics on overall preparedness, with adjustment for demographic factors (Table 3). Raw scores ranged from 4 to 17, out of a total of 18 possible positive preparedness responses. Among the demographic variables, gender, race/ethnicity, marital status, and living alone were not associated with the score levels, but scores were significantly lower (i.e., less prepared) with increasing age and decreasing educational attainment and annual income. Among the health variables, reporting a fair or poor self-reported health status was significantly associated with a lower score as was having greater levels of ADL and IADL limitations. The BMI was not linearly or significantly associated with the score.

DISCUSSION

To our knowledge, this is the first national survey to evaluate preparedness for emergent natural disasters among US older persons. This population-based sample highlights many important deficits in natural disaster preparedness—an important public health issue

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TABLE 3—*Continued*

ADL limitations		< .001			< .001
None (Ref)	11.5 (0.1)		11.4 (0.2)		
1–2	10.9 (0.2)	.001	10.9 (0.2)	.024	
3–4	10.6 (0.3)	< .001	10.6 (0.3)	.007	
≥ 5	8.9 (0.6)	< .001	9.0 (0.5)	< .001	
IADL limitations		<.001			.001
None (Ref)	11.4 (0.1)		11.3 (0.2)		
1	10.3 (0.3)	.001	10.4 (0.3)	.006	
≥ 2	9.7 (0.4)	< .001	10.0 (0.4)	.002	

Note. ADL = activities of daily living; BMI = body mass index; IADL = instrumental activities of daily living; ND = not significantly different from reference.
[a]Adjusted for gender, categorical age, race, categorical education, and categorical income.
[b]Class *P* values were generated with the *t* test that compared each category to the reference category for the characteristic.
[c]The global *P* value was generated by using an *F* test for the alternative hypothesis that the characteristic is associated with the disaster preparedness score. There are no reference groups for the global *P* value.

that will require more attention and remediation. The Centers for Disease Control and Prevention, in developing its 2012 guide for older adults' all-hazard preparedness, faced important limitations in its ability to plan and create preparedness guidelines to protect older adults, including an absence of consensus on the best way to identify and protect older adults.[12] To date, there have been few studies that assessed elders' levels of preparedness for natural disasters[13,14] or have evaluated instruments for disaster mitigation.[17] Assessments of older adults' health preparedness characteristics and behaviors have not always included age-specific analyses.[18] Surveys such as ours should assist in such planning, but available studies, including our own, seldom evaluate measures of independent, objective outcomes.

About two thirds of the study population had no emergency plan, had never participated in any disaster preparedness educational program, and were not aware of the availability of relevant resources. More than one third of the respondents did not have a basic supply of food, water, or medical supplies in case an emergency situation arises. Such deficits could result in further decline in health status,[19] especially in the presence of mobility and functional limitations.[20] About 15% of our sample used medical devices requiring externally supplied electricity. Thus, power interruptions could pose important adverse health effects, but we were unable to determine whether the absence of electrical power would cause life-threatening situations.

However, this situation suggests the need for a comprehensive emergency preparedness plan through cross-sector collaboration to identify and meet the specific needs of vulnerable older adults during each phase of an emergency. For example, those who use medical devices such as home oxygen, positive airway pressure machines, cardiac assistive devices, and electrical devices assisting bed transfer should be on a utility priority list to restore power in the event of a prolonged outage.

Older persons are more susceptible to the adverse effects of psychological and physical stresses such as disasters, in part of because of higher rates of chronic illnesses.[18] Acute disasters may impose overwhelming stress on older adults that needs to be fully understood and anticipated.[17] Families caring for persons with chronic illnesses, whether mental or physical, should be encouraged to have individualized emergency plans, including contingencies that do not rely solely on informal caregivers, who may also be incapacitated during emergencies and unable to adequately assist the dependent older adult.[21] Despite existing and useful disaster preparedness guidelines and resources for older adults, persons with mobility impairments continue to have difficulties during and after a disaster,[19] and the oldest of the respondents had the lowest levels of disaster preparedness. However, social isolation, even in the midst of a large community, prevents many older people from receiving warning signals or asking for help, rendering them invisible to rescue teams.[22]

Many older adults live in poverty or have limited financial reserves, which may add to the challenges during a disaster. This study affirmed that low income and similar measures of socioeconomic status are associated with lower disaster preparedness scores. Both lack of personal financial resources, including lack of transportation and communication equipment, and low educational attainment may identify those in special need for disaster planning. This is another reason why targeted, effective disaster plans are essential.

Emergency preparedness is no longer restricted to residents of certain areas. Any geographic area can sustain a disaster at any time, including floods, hurricanes, earthquakes, and fires. Older Americans may also travel to areas with disaster risks higher than those at their usual residence. Adopting tailored disaster preparedness plans that address both the general and emergency health needs for individual older adults is a worldwide problem, the enormity of which has been declared a pressing global need by the World Health Organization.[23]

This study has potential limitations that should be recognized. All of the items in this analysis were self-reported; although some have been validated, many are in need of further scrutiny. A corollary to this, as noted previously, is that some survey items are hypothetical, not experienced by respondents in disaster or other emergency situations. However, it is possible that some of the findings may be of value for situations other than acute disasters, such as thermal extremes or unplanned power interruptions. Also, some communities may have effective preparedness programs in place, even if respondents are unaware of them, which could provide capable emergency assistance. Finally, the data were cross-sectional and may not fully reflect future individual and household preparedness capacities.

In conclusion, older adults are important assets to the nation, and enhance society in many ways. Growing proportions of older adults, coupled with today's increasing climatic and other disaster risks, will require serious public health and prevention planning and programs for effective community preparedness. Understanding factors that interfere with older adults' proper disaster preparedness and the health needs of this age group are essential parts of retooling for an aging US population. ■

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Contributors

T. M. Al-rousan drafted the article and led the writing. L. M. Rubenstein conducted the statistical analyses. Both T. M. Al-rousan and R. B. Wallace were involved in the conceptualization of the research and interpretation of the data. R. B. Wallace supervised the study and is a co–principal investigator for the Health and Retirement Study, has ongoing involvement in the design and maintenance of the cohort, and was responsible for devising the survey questions used in this article. All authors read and approved the final article.

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Human Participant Protection

The Health and Retirement Study was approved by the University of Michigan institutional review board. All participants gave informed consent. This analysis was performed on an anonymous data set provided by the Health and Retirement Study, and required no further institutional review board approval.

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