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Rural Older Adults in Disasters

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Rural Older Adults in Disasters: A Study of Recovery from Hurricane Michael

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Abstract

To better understand the importance of effective disaster preparedness for community-dwelling older adults in rural America, it is important to recognize that challenges associated with an aging society, shaped by geographic location, work in tandem to influence individuals' vulnerability during disasters and emergencies. Consequently, there is a critical need to assess the disaster preparedness needs of rural older adults in order to implement feasible survival and tailored preparedness strategies. With interdisciplinary experts from the United States, Canada, Ireland, Scotland, Sweden, and Brazil representing disciplines including gerontology, disaster preparedness, social work, psychology, nursing, mental health, public health, community health, and public policy, this study addresses this challenge. The intent was to create a committee of investigators who were experts from multidisciplinary fields. In this exploratory study, we examined the hypothesis that individuals 65 and older are poorly prepared for and disproportionately affected by a national disaster. A cross-sectional survey method was employed, whereby interviews surveyed older adults (65+) in Jackson County, Florida, following the 2018 Hurricane Michael. Results indicated (n=139) rural older adults' mean age was 73 years (SD=6.72). They rely on social support, community organizations, and trusted relief agencies for national disasters to prepare and recover from disaster-related emergencies. Such findings can be used to inform the development of new interventions, programs, policies, practices, and tools for federal emergency management and social services to improve disaster preparedness and resiliency among the older populations in rural communities.

Keywords: older adults, disaster preparedness, public health, aging in place, rural population, emergency preparedness

Background

The U.S. Census Bureau, based on national population projections using the 2010 census data, asserts that there will be a demographic transformation in the American population between 2017-2060 (2017). In the next two decades, the United States will experience a population growth with an increase of 78 million people from 325 million to 404 million individuals. As a part of that demographic shift, the number of people who are 65 years and older is projected to double in size, from 49 million to 95 million by 2060. By 2030, one in five Americans will be older than 65 (Vespa, Armstrong, & Medina, 2018).

Location can impact the experience of growing older (Smith & Trevelyan, 2018; Ervin & Reid, 2015; Innes, Morgan, & Kostineuk, 2011). In the United States, where the current study was based, it is important to carefully define "rural" in order to understand the specialized needs of older adults residing in these areas. The U.S. Census Bureau has defined a rural area as one of low population and infrastructure density at some distance from urban areas (Ratcliffe, Burd, Holder & Fields, 2016). There are three categories for measuring degrees of rurality: completely rural (100% of the population in a rural area), mostly rural (50 to 99.9% of the population in a rural area), and mostly urban (less than 50% rural) (Ratcliffe et al., 2016). Women make up approximately 52% of the older adult rural population in the US. Reportedly, 63.3% of rural older adults are married, and typically live in the homes that they own— either with others or alone. In terms of socioeconomic status, over one-third of older rural adults have at least a high school diploma (38.2%) with Social Security as the primary source of income. At present approximately 8% of older rural adults live in poverty (Smith & Trevelyan, 2018). Over a third (36.1%) of older rural adults live with at least one disability, and rural mortality rates are higher than their urban counterparts (Smith & Trevelyan, 2018).

Older Adults and Disasters

Natural disasters are varied and are generally defined as an event that has rapid and profound effects on the natural and social environment, causing significant financial loss, trauma, or death. Their frequency is expected to increase in the coming years as it has in the previous few decades (United Nations Office for Disaster Risk Reduction, 2019). Those affected by natural disasters experience these events unequally. Wealthier nations, including those with better-developed institutions, generally experience lower mortality, environmental degradation, and economic damage (Padli, Habibullah, & Baharom, 2010). However, there are exceptions; lethality and long-term consequences of natural disasters are worse for women, minorities, impoverished individuals, older adults, and other marginalized and vulnerable groups even in wealthier societies, depending on how disaster management occurs (Morrow, 1999; Reid, 2013; Walters & Gaillard, 2014).

Older adults are disproportionally affected by disasters. Scholars point to numerous sources of vulnerability for older adults in disaster situations. Although older adult populations are heterogeneous and require consideration of many factors, one common issue of importance is that older adults at large are more likely to be socially isolated. Experiences of social isolation can be a result of chronic conditions, limitations in daily activities, changing physical and cognitive conditions, decreased sensory awareness, or disconnection from support systems and resources (Aldrich & Benson, 2008; Acierno, Ruggiero, & Kilpatric, 2006; Kim & Zakour, 2017; Levac, Toal-Sullivan, & O'Sullivan, 2012; O'Donnell & Forbes, 2016; Malik et al., 2017). For older adults, chronic disease, as well as stress and anxiety from extreme weather events and disaster, can affect mental and cognitive health (McDermott-Levy, Kolanowski, Fick, & Mann, 2019). Health problems that are usually managed may become exacerbated under the physical

and psychological stresses of a disaster situation, with negative health effects not being immediately apparent (Baker & Cormier, 2015). Older adults in disasters are at greater risk for developing mental health issues due to loss of family, friends, reduced income and a decline in health or physical abilities. They may also experience the onset of conditions such as post-traumatic stress disorder, dementia, and other psychiatric symptoms, depending on individual and collective coping mechanisms, exposure factors and available resources (Baker & Cormier, 2015; Rafiey et al., 2016).

Each year, older adults all over the world suffer from various types of natural disasters. According to the World Health Organization (2008), 90% of deaths and related illnesses after the 2003 earthquake in Kobe, Japan were among individuals sixty-five and older. Rurality can also make individuals more vulnerable during a disaster (Baernholdt, Yan, Hinton, Rose, & Mattos, 2012). This is especially concerning because in the United States, approximately 17.5% of residents in rural communities are 65 years and older, compared with 14.9% of older U.S. adults generally (U.S. Census Bureau, 2016). Although older adults are often well supported by family and friends in some rural areas of the world, disasters can result in social isolation due to destroyed roadways, disruptions in service systems, changes in family structure, and forced relocation into cities for employment opportunities (WHO 2008; Baernholdt et al., 2012; Ashida, Robinson, Gay & Ramirez, 2016). Among rural older adults, everyday challenges are amplified and compounded by hostile environments during and after the disaster. The potential impact of a natural disaster on older adults living in a rural area was demonstrated in the United States after Hurricane Katrina, whereby older individuals represented 74% of reported deaths (Simerman, Ott, & Mellnik, 2005).

Aging-in-Place and Disasters

Researchers have found that older rural Americans are typically longtime time residents in their homes and have the desire to age-in-place (Anarde, 2019). Aging in place is a well-known concept and policy driver in urban studies and environmental gerontology, understood as the "ability to live in one's own home and community safely, independently, and comfortably regardless of age, income, or ability level" (Centers for Disease Control and Prevention, 2013, p. 1). Researchers argue that because older people have reported a preference to remain in their homes as long as possible, promoting aging in place policies will inevitably create optimal social and health outcomes for older individuals, their families and communities at large. Aging in place is often assumed to be a positive experience; however, this does not hold true in the context of disaster where there is a lack of congruence between needs, supplies and environment (Sixsmith & Sixsmith, 2008). For example, an experience of forced relocation is inextricably one of the most stressful events that can occur in a person's life, and many people may be willing to endure significant hardship in order to remain in their homes (Spurgeon, Jackson & Beach 2001; Makowsky, Cook, Berger, & Powell1, 1988), because most people would prefer not to move and continue to live in their homes, even if circumstances are sub-optimal and unsafe. This is reinforced by data from the AARP 2018 Home and Community Preferences Survey, which indicates that three out of four adults aged 50 and older hope to remain in their current residence in later life (Binette & Vasold 2018). While this may be the preference, older individuals who live in their own home often require the support of another individual. A national survey indicated that 12% of the U.S. population aged 80 and older are unable to evacuate in times of emergency without help from another person (Al-Rousan, Rubenstein, & Wallace, 2014).

A significant proportion of older adults have experienced some form of forced relocation in their life (Cherry et al. 2009; Tuohy & Stephens 2012). An older person may perceive such an event as a hostile environmental transition, which can contribute to vulnerability in older age (Cherry et al. 2009; Tuohy & Stephens 2012). This kind of experience is commonly reported during natural disasters (Cherry et al. 2009; Tuohy & Stephens 2012) as well as transitions to (Kao, Travis, & Acton, 2004; Bekhet, Zauszniewski, & Nakhla, 2009) or between (Falk, Wijk, & Persson, 2011; Holder & Jolley, 2012) institutions and across different levels of care (Shippee 2009; Canham et al., 2018a). A forced relocation, which often requires substantial uprooting, can lead to the loss of social networks and supports and significant challenges during the readjustment period, resulting in overwhelming impacts on one's physical and mental health (Bradley & Van Willigen, 2010; Canham et al. 2018b). As weather-related disaster events increase in number, communities need to explore and identify new programs and strategies to strengthen and improve disaster preparedness and resilience for older adults. What happens to an older adult when their home is damaged or destroyed during a disaster it can be a critical element in their ability to recover successfully. It has become increasingly crucial for strengthening informal connections and building secure networks (Acosta, et al., 2018).

As the number of older persons living in rural regions continues to grow (Hirsch, 2019) and 75.9% are likely to remain in their homes (Smith & Trevelyan, 2019), communities must begin planning for their needs in anticipation of disasters (Anarde, 2019). Rural communities and governments must implement feasible survival and preparedness strategies that engage members of the interdisciplinary teams. Participative and integrated strategies can benefit from a whole community approach to support long-term recovery of older adults after a disaster.

Hurricane Michael

In 2019, the United States Census Bureau estimated that there were 9,424 (19.5%) people 65 or older in Jackson County, Florida. This is consistent with the 2010 decennial census, which listed 8,018 (15.7%) persons 65 or older, indicating an increase of 3.8%. According to the United States Census Bureau, Jackson County was 75.4% rural in 2010 (2017). Rural populations tend to rely on government health issuance and experience poverty more than their urban counterparts (MacKinney, Dudley, & Schoephoerster 2019). The household income, employment status, poverty status, and health insurance status of individuals 65 and older in Jackson County reflects what is typical of reaching that milestone (Smith & Trevelyan, 2018).

The National Oceanic and Atmospheric Administration (NOAA) reports that 2018 was the first time since 2008 that four storms – Florence, Helene, Isaac, and Joyce – were all active at the same time (National Oceanic and Atmospheric Administration, 2019a; National Oceanic and Atmospheric Administration, 2019b). Later that year, in October 2018, Hurricane Michael was the strongest hurricane recorded to strike the Florida panhandle, reaching a Category 5 strength. Hurricane Michael become the fourth-strongest storm in the continental U.S. since Hurricane Andrew in 1992, with maximum sustained winds of 160 mph (National Oceanic and Atmospheric Administration, 2018a; National Oceanic and Atmospheric Administration, 2018b). Local news in Marianna, a small town in Jackson County, reported that Hurricane Michael was like a bomb going off—severely impacting green spaces, powerlines and the local 911 system. There was unprecedented disruption at the Jackson Hospital due to the malfunctioning of the water pump as well as lack of fuel to operate generators necessary to maintain equipment for critical care patients. Stores and buildings around the courthouse square also sustained devastating damage (Burlew, 2018).

Florida is known as the sunshine state because of its subtropical weather, but it also experiences more Atlantic storms than other states (Oliver-Smith, 2019). Florida's coastal communities are at increased risk due to rising sea levels and coastal flooding, which tends to modify existing shorelines (NOAA, 2019). Hurricane Michael's destructive winds and storm surge inflicted tremendous damage. It was responsible for 16 deaths and approximate $25 billion in damages in the United States (Beve, Berg, & Hagen, 2019; NOAA, 2019).

After a significant storm, the Federal Emergency Management Agency (FEMA) is deployed to the affected state. According to the Federal Notification Registry, after Hurricane Michael, the President of the United States issued a major disaster declaration -4399DR-FL, under the authority of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. 5121 *et seq*. (the "Stafford Act"), authorizing FEMA to provide direct temporary housing assistance for several counties, including Jackson (Figure 1). FEMA Information Data and Analysis (FIDA, FEMA Confidential Communication) reports that after Hurricane Michael, there were 3,309 survivors in Jackson County 65 and older who registered for financial assistance. Of that number, 928 (30.5%) received assistance because they were uninsured or underinsured with expenses that were severe and necessary in nature. Of those who registered for FEMA assistance, 91.6% (2,785) were homeowners, and 7.2% (220) were renters. There were 1748 individuals (57.5%) who had homeowners' insurance, while 1291 (42.5%) were uninsured. Only 48 individuals (1.6%) had flood insurance, while 2991 (98.4%) did not (as reported in FIDA_34250 _FSA_ 4399 FEMA Confidential Communication).

Emergency managers are responsible for creating frameworks that help reduce the risk of a hazard, or a natural disaster, understand the specific needs of the communities they serve, and are of vital importance when developing a community's emergency plans. Unfortunately, some

plans are written by consultants who may not take into consideration the needs of the community or recognize areas requiring additional attention. A consultant may rely on his or her perception of the community's needs, or simply follow guidelines to comply with basic requirements. In order to align emergency management plans with the reality of the specific community and area being serviced and in order to build a culture of preparedness, one must survey the population, assess the real needs of its residents, and identify groups that historically have been underserved. As emphasized, older adults are among one of the most vulnerable groups in any community (Bodstein, et al., 2014). They are considered to be at higher risk of poor social and health outcomes due to mobility issues, chronical health conditions, fixed incomes, etc. According to Hirsch (2019), declining health and economic constraints can place older adults at increased risk of injury, death, and physical and psychological loss during and after disasters. However, there are additional factors that must be taken into consideration when developing emergency management plans for communities for which the majority of the population are older. Social networks, communications preferences, ties to the community, and other factors could be critical in understanding strengths and weakness in their preparedness efforts, as well as areas of unmet need.

Study Purpose

After Hurricane Michael, researchers endeavored to understand how adults 65 and older in Jackson County, Florida, prepared for and coped with the disaster. Hence, this study explored rural older adults' preparedness tactics for natural disasters and identified key challenges that were experienced by those living in the affected area. Specifically, the study sought to answer the following questions:

1. What resources are available to individuals aged 65 and older in rural communities to prepare for a disaster?

2. What challenges do individuals aged 65 and older in rural communities face when experiencing a disaster?

3. What are the physical, social, emotional, and financial needs of individuals 65 and older in rural communities when a disaster strikes?

The study findings revealed that individuals aged 65 and older lack disaster preparedness and are disproportionately affected when a national disaster strikes. Acosta et al. (2018) suggest that public health departments and community organizations, age-friendly communities, and villages that connect programs, services and individuals, should collaborate to focus on improving disaster resilience and aging in place for the older population. Al-Rousan, Rubenstein, & Wallace (2014) argue that disaster preparedness planning can help prevent older adults from becoming susceptible to physiological stressors, which are often experienced under these circumstances. Importantly, there is a significant gap between knowledge and pro-active disaster planning when it comes to meeting the needs of older adults residing at home in rural communities.

Methods

Scholarship on the question of rural older adults and disaster preparedness is limited. We searched various databases for relevant scholarship using keywords ("older adults," "aging," "aging-in-place," "seniors) combined with ("disaster preparedness," "resilience," "emergency preparedness," and "rural," "rural population"). Researchers applied quantitative research techniques to generate useful data for FEMA, and the health department to inform strategic planning, organizing, and administering, Emergency Preparedness activities for individuals 65

and older in communities after a disaster. A cross-sectional survey was employed to accomplish these objectives.

Research Design

Our research team consisted of interdisciplinary disaster research experts from the United States, Canada, Ireland, Scotland, Sweden, and Brazil representing disciplines including gerontology, disaster preparedness, social work, psychology, nursing, mental health, public health, community health, and public policy. The team collectively developed measures to administer face-to-face cross-sectional interviews for this exploratory study that were probing in nature in order to capture a descriptive profile of the residents, identify critical trends regarding disaster planning, and capture attitudes regarding disaster planning and concerns.

Study Recruitment

Members from the Department of Health at Jackson County acquired permission from 15 local organizations to conduct the survey with local study participants. Upon receiving consent from 12 organizations, a team of ten trained individuals was paired to administer the survey to residents 65 and older in Jackson County. Interviews were conducted over three weeks and lasted approximately 10 minutes for each participant. Study participants came from one of twelve locations in the county, including senior housing residences, senior centers, the Jackson Health Department, local grocery stores, church and ministries, and a regional community event. Interviewers requested verbal consent from each participant before administering the questions. We initially collected data on 153 older adults to understand their disaster preparedness level, health conditions, and social-demographic information. A total of 139 interviews were included for analysis. A total of 14 surveys that were removed and deemed unqualified where a

respondent was found to be underage, as well as in cases of incomplete questionnaires and where a respondent did not provide consent.

Measures

We constructed our survey to include 20 questions designed to gauge the following: demographic characteristics, living arrangement, types of informal and formal supports, assistance devices, access to medication, chronic condition needs during a disaster, perceived mood post-disaster, perceived knowledge of disaster preparedness, and communication access during a disaster. Our goal was to collect useful information for guiding the development of new interventions, programs, policies, practices, and tools for emergency managers and aging services to improve disaster preparedness and improve disaster resilience (one's ability to recover) amongst older populations in rural communities.

Statistical Analysis

Due to the exploratory nature of this study, we performed descriptive analysis of the quantitative data, including frequencies, cross-tabulation, and correlations. Followed by multivariable logistic and linear regressions examining the relationship between demographic information (age, gender, race, educational level, living & housing situation) and needs, concerns, and consequences of disaster. Due to small sample sizes these models should be interpreted with caution. SPSS 25.0 and SAS 9.4 software were used to generate descriptive statistics and frequencies to help illustrate the preparedness of older survivors for a natural disaster. SPSS and SAS were utilized to compare several statistical tests (e.g., correlations) between quantitative variables. We examined quantitative data obtained from open-ended questions for thematic content and used it in an auxiliary, illustrative manner when discussing the quantitative findings.

Results

We initially conducted the survey with 153 individuals to understand their disaster preparedness level, health conditions, and social-demographic information. However, a total of 139 survey data were used for analysis because 14 surveys were removed as those participants were found to be underage, did not complete the survey, or did not give consent. The sample characteristics of 139 participants are provided in Table 1. The mean age of the sample was 73.2 years (SD 7.3; range 61-92). Participants were predominantly female (73.4%), Black/African American (54.7%) or White (43.9%) and living alone (41%). Participants had diverse income levels, living, and marital situations (Table 1). For example, one quarter of respondents lived in a mobile home. Compared to the older population in the Jackson country at large, our sample had a higher proportion of females and did not include any Hispanic individuals.

Insert Table 1.

The descriptive findings regarding resources, needs, barriers, concerns, and consequences of disaster situations for older adults who responded to the face-to-face survey interviews are summarized in Table 2. Our results indicate a strong reliance on ones' social networks when it comes to locating resources. Family, friends, and neighbors were the most likely first points of contact for assistance after a disaster. For the majority of respondents (n=117, 84%), family, friends, and neighbors were also the most likely to help participants prepare for disasters. Most participants (54.7%) relied on only one source of support. There was substantial variation within this figure, however, with 10% of respondents reporting being unsure on whether they could secure aid in preparing, and 35.3% reporting that they could secure aid get help from two or more sources.

Despite its importance as a source of assistance, social networks played a comparatively minor role as a source of information during disasters. Respondents were most likely to learn about emergencies from radio and television (88.5%). Finally, there was substantial variation in respondents' financial resources in case of evacuation. Nearly one-fifth of respondents were unsure or could not pay for food and housing for even a single day in the event of an evacuation. Many (n=51, 36.7%) could only sustain costs only for 1-3 days.

Insert Table 2.

Several respondents (n=61, 43.9%) reported requiring some form of assistance during the evacuation. The most common needs identified were associated with mobility, for example help with transportation (23%) or having a walker or cane (17.3%). Respondents were most likely to report arthritis, diabetes, and mobility issues as the health conditions most likely to affect their ability to evacuate (see Table 2). The number of initial concerns respondents reported when a disaster watch or warning was issued varied substantially. The mean number of selected concerns was 2.8 (SD 2.0), with a range from 0 to 9. The most common concerns involved basic needs, including safety (60.4%), medicine (56.1%), shelter (36.0%), and food (33.1%). About half of the participants reported a decrease in mood (n=70, 51.1%) as a result of the hurricane.

Our exploratory multivariable analyses showed that those older individuals were less likely to rely on formal help when preparing and recovering from a disaster. Predictably, older individuals, as well those living alone, reported greater need for assistance. African Americans/Blacks tended to report lower knowledge about emergency kits, lower ability to cover costs in case of evacuation and had a higher number of concerns when a warning was issued (Figure 2). Thus, they are an essential group to focus on. Another vulnerable group seemed to be those living in mobile homes. They reported having access to less help after a disaster and

had a smaller total number of resources (Figure 2) they could draw on in disaster situations. Two examples of differences observed in the multivariable models included a) the total number of resources after a disaster according to a housing type, and b) the total number of concerns, as tabulated by race, when a disaster watch/warning is issued.

Discussion

As the proportion of older adult populations are projected to increase worldwide in the coming decades, global leaders have urged much-needed discussions on how to adequately house and care for older people (United Nations 2017; World Health Organization and Centre for Health Development, 2010). The findings we have presented in this report indicate that older individuals rely mainly on family and friends, and less on social services and institutional help for disaster preparedness and recovery. This is consistent with studies previously reported by Kim & Zakour (2017) and is a significant predictor for how rural older adults prepare for disaster-related emergencies. In the broader context, our results shed new light on cohesion and social integration. We recommend that social services, community organizations, and trusted relief agencies devise enhanced mechanisms for attaining a better understanding of how supportive social environments, i.e. individuals' support for one another, can help improve emergency preparedness of communities in anticipation of a disaster.

Similarly, we have found that rural older adults required specific needs post disaster and are at greater risk for encountering situational challenges and barriers. Our analysis revealed that the lack of transportation is a key challenge for older adults during an emergency evacuation situation because the majority of older people no longer drive and must rely on others for transport. The use of a walker or cane can hinder an older adult's ability to move quickly and effectively without assistance.

When an emergency watch or warning is issued, older individuals' first concerns are typically surrounding their health and safety. Reportedly, most participants indicated concerns regarding attaining their medicines or the challenges of finding food. Emergency shelters are critical during a disaster because they provide a variety of services, including a safe place to sleep, as well as food, and water for survivors of the storm. Shelters require appropriate planning, preferably involving community, vulnerable populations, local organizations and public services, to prevent potential problems in during disaster management and coping.

Of equal importance for consideration are older adults' wide range of physical, social, emotional, and financial needs when a disaster strikes. Income is an important factor to successfully recover from a disaster; but so too is literacy. Worldwide, experts consider mental health support an integral element in disaster response. Disasters often have serious impacts on individuals' wellbeing and mental health. These impacts can occur during acute periods (hours to days or several weeks after the disaster) or post-acute periods (weeks to months or years later) (Katz, 2017). Although not all disaster survivors will go on to develop a mental illness, disasters may exacerbate symptoms where people are already living with a psychiatric condition. Mental illness may also be worsened by limited availability of medication. Amongst adults over 60, approximately 15% experience some form of mental illness (WHO, 2016). The mental health of older adults in Jackson County after the hurricane appears to have worsened, with nearly half (46.8%) of participants stating a decline in mood. Only 38% of study participants indicated no change in their state of mind. A small minority (3.6%) of participants reported having engaged in self-harm behavior since the disaster. These rates are consistent with studies showing self-harm rates at their lowest amongst older adults, despite higher suicide rates in this age group (Troya et al., 2019). Findings indicate that resilience, or one's ability to emotionally recover

from a crisis, and other protective factors such as reliance on social support networks and positive coping skills (e.g. attending community social support groups, feeling confident in one's ability to recover from future disaster events) seem to have stopped older adult participants from engaging in self-harm behavior as a response to disaster-related stress.

In this study, we found that nearly half of our participants had an income of less than $1041 monthly, equivalent to the federal poverty level. We used this level as a mechanism to examine older adults' ability to recover from disaster. The Federal property threshold is considered the national measure of economic hardship, developed in 1994 by Mollie Orshansky of the Social Security Administration to support Lyndon Johnson's war on poverty (Marchand & Smeeding, 2016). While the ideas presented in this paper do not focus on the social-economic status of older adults, it still bears direct connection with older adults' ability to recover from a natural disaster. Mollie Orshansky argued in the 1960s that the poverty threshold is flawed because it is an arbitrary collection of reference points. She argues that instead, measurement of hardship in older age should include household expenditure patterns and the ability to cope with hardship (Marchand & Smeeding, 2016).

There is a direct link between poverty and literacy. We found that some of our study respondents had literacy deficiencies, making it challenging for them to access disaster preparedness materials. These findings align with previous studies that suggest a gap between population literacy and the level of education required to read most disaster preparedness materials (So, Franks, Cree, & Leeb, 2019). Furthermore, many community organizations and relief agencies are understaffed during a disaster. They are not able to provide personalized attention that describes the program and services of the agency to each survivor impacted by the disaster; consequently, many older survivors who qualify for a loan or services are unable to

complete the application. Franks, Cree, & Leeb (2019) suggest that the emergency preparedness materials made widely available to general public must be written at a level which can be easily understand.

The impact of a disaster can be disruptive in many ways, amongst which is the destruction of an individual's home. The older individuals of this study all either lived independently or with a family member or friend. During Hurricane Michael, 60.9% of older adults lived in a free-standing single-family dwelling, while 20.9% lived in a mobile home. Studies have shown that mobile homes are often unsafe during natural disasters (Chakraborty, Tobin & Montz, 2005; Kusenbach, Simms & Tobin, 2010). Mobile homes can also suffer from other issues, for example their value may depreciate more rapidly than a conventional home, and mobile homeowners may not own the land on which their home sits. The challenge is multiplied when considering that rural older adults prefer to age-in-place. While recent studies emphasize the importance of helping older people remain living in their homes for as long as possible (United Nations 2015; Fang et al. 2016), this is often not possible, as demonstrated in the case in Jackson County, Florida after Hurricane Michael.

Not all older people are the same. Service and support for this demographic must be designed in an inclusive way that considers heterogeneity. We must work to create more suitable post-disaster services that will ultimately enable older people to 'age well in the right place' even under trying circumstances (Golant, 2015). This is an opportunity for community organizations and trusted relief agencies for disasters to develop practical communication skills, disaster preparedness print materials, and websites that will offer appropriate solutions for individuals improve the experiences of survivors.

Limitations

There are several limitations in applying the findings from this pilot study. While faith-based institutions have been at the core of many rural communities (Dudley, 2019) and were instrumental for finding participants for this study, only those organizations which are already engaged in disaster relief work were likely to respond to our request for assistance in recruiting respondents. This may have resulted in a degree of bias from some participants and the service providers representatives. Our sample size was also relatively small and homogeneous in terms of geographic location and race, which limited our ability to generalize our findings to more diverse populations. In the future, researchers should consider more elaborate measures to build on the findings of the present study.

Conclusion

Our study shows that many older adults face obstacles in preparing and responding to disasters. As these disasters increase in frequency, communities must develop comprehensive preparedness and recovery programs that will address the obstacles that older adults face in preparing and responding to natural disasters. Natural disasters are by no means indicative to the United States and policy implementation based on recommendations can be employed internationally in the event of similar disasters. Further research is needed to find solutions to current gaps in care during emergency crises situation of this kind and in long-term recovery among older rural population. Further research is also needed to determine ways to facilitate effective disaster preparedness and response among older adults. Recommendations and areas of focus include (1) a communication mechanism for informing religious institutions about disaster programs and available assistance; (2) education and training for civic and social organizations need to become more knowledgeable with an identified point of contact; (3) "at the level of

county government, health departments should devise strategies to enhance coordinated efforts with federal institutions regarding regular updates during disaster events; (4) better communication resources for senior centers such as the provision of NOAA radios in the same manner that fans are distributed, and (5) empowering faith-based communities to develop and implement an effective communication including a phone-tree.

Last, we suggest that governments consider the development of programs to ensure that homes are safe for older residents who may choose not to leave during a storm. The size and composition of the older population will play a fundamental role in determining adequate housing accommodations. The high percentage of survivors in these counties (Figure 1) who are 65 years and over suggests the county consider preemptively support the construction of housing in preparation for future disasters that are accessible with no-step entrances, main level bathrooms and wide interior doors that can allow the older survivor to navigate their home. It follows then that it is crucial for federal, local, state government, community organizations, and trusted relief agencies for national disasters work together to help older adults prepare and recover from disaster-related emergencies.

Acknowledgments

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Figure 1. Percentage of Population Over 65 Years of Age – Designated Counties for Individual Assistance
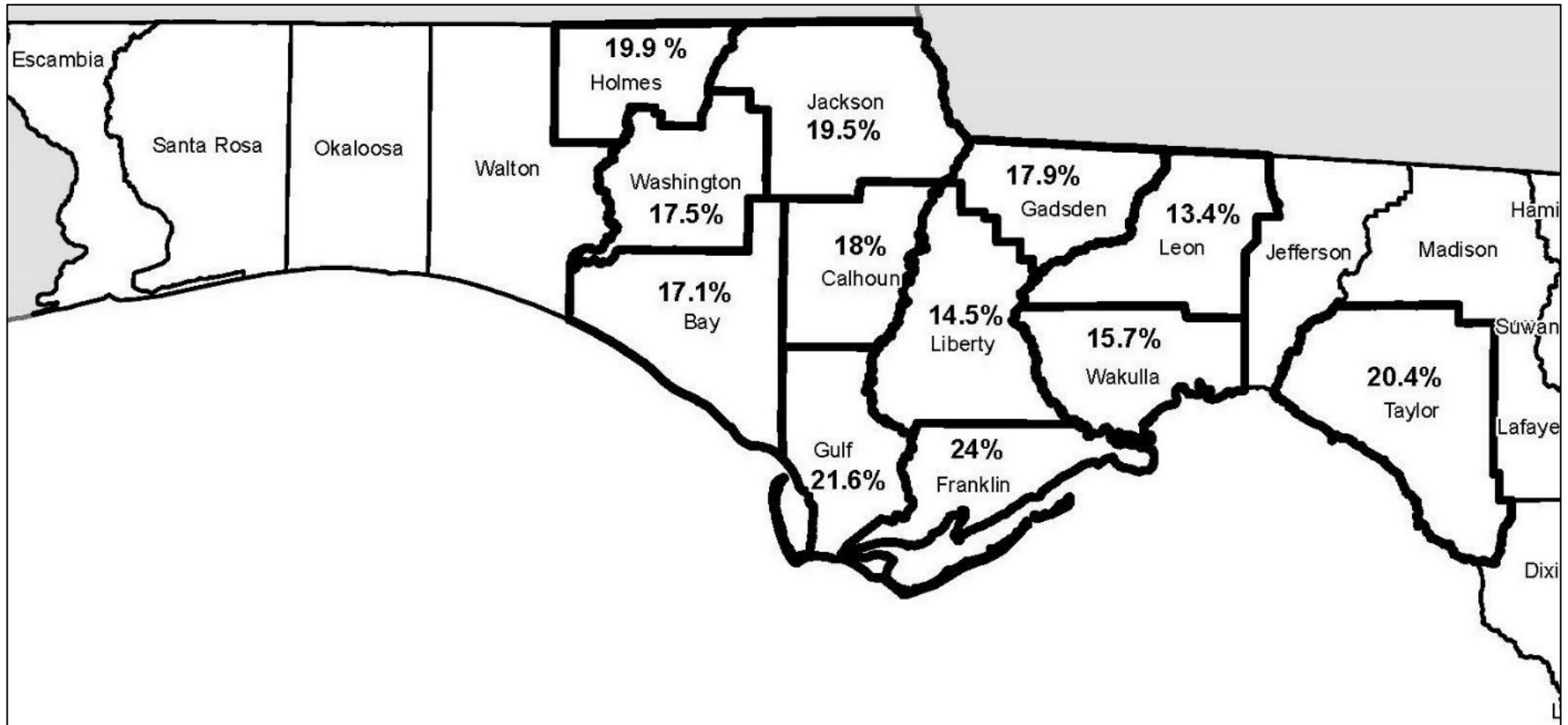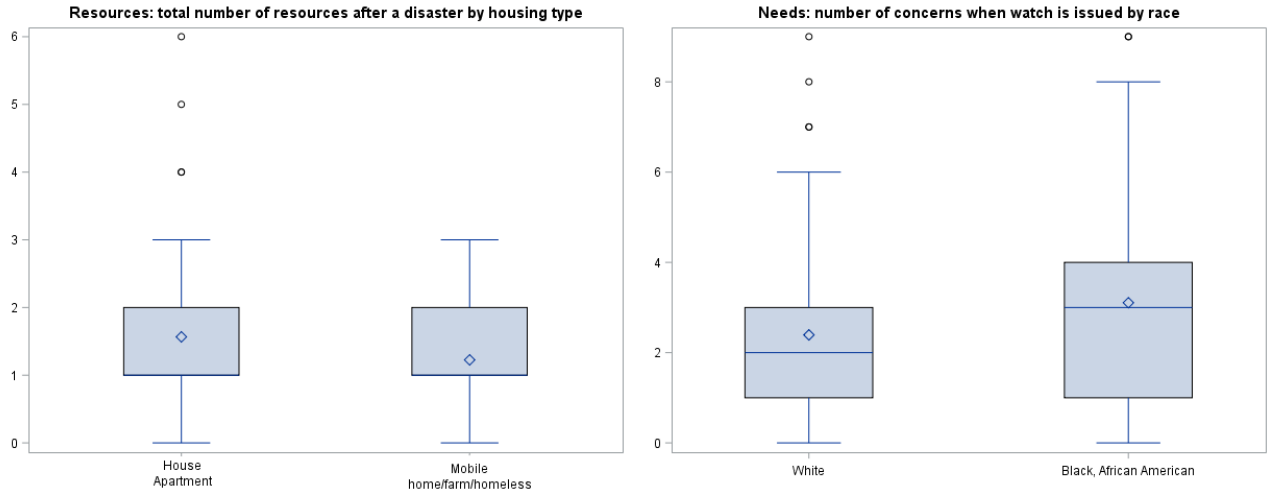
Figure 2. Multivariable analyses

Table 1. Sample characteristics of the study (N = 139)

Variable	N (%)	Variable	N (%)
Gender		**Race**	
- Female	102 (73.4)	- White	61 (43.9)
- Male	37 (26.6)	- Black, African American	76 (54.7)
Age in Years		**Marital Status**	
- Under 64	6 (4.3)	- Divorced/Separated	37 (26.6)
- 65-74	78 (56.1)	- Married	46 (33.1)
-75-85	38 (27.3)	- Never Married	15 (10.8)
-Over 85	17 (12.2)	- Widow/Widower	41 (29.5)
Income		**Lived With**	
- Less than $1,041	55 (39.6)	- Alone	57 (41.0)
- $1,384	20 (14.4)	- Spouse	49 (35.3)
- $1,436 to $2,082	30 (21.6)	- Children	12 (8.60)
- $2,602 & above	34 (24.5)	- Other family/roommate	21 (15.1)
Education Level		**Type of dwelling**	
- Less than High school	14 (10.1)	- Apartment	22 (15.8)
- High School Diploma	62 (44.6)	- House	84 (60.4)
- At least some College	63 (45.3)	- Mobile Home/Farm	30 (21.6)
		- Homeless	3 (2.2)

Note: *one person reported other, ** 4 individuals did not report income, they were included in lowest category+ *** only one person reported living on a farm

Table 2. Descriptive information regarding a) resources, b) needs, barriers &
concerns, and c) consequences of disaster. Unless otherwise reported the values
represent count and percentage.

A. Resources	
Paid help, social services or institutional helping to prepare for a disaster	
- No	123 (88.5)
- Yes	16 (11.5)
Family, friends, neighbors helping to prepare for disaster	
-Yes	117 (84.2)
- No	22 (15.8)
Number of days one could pay for food & housing in case of evacuation	
- unsure	21 (15.1)
- zero	8 (5.8)
- 1 day	22 (15.8)
- 3 days	29 (20.9)
- 7 days	46 (33.1)
- $\geq$ 14 days	13 (9.3)
Who spreads information about disaster	
- Radio	46 (33.1)
- Television	77 (55.4)
- Other (senior center, health department, friend/neighbors, church)	16 (11.5)
First contact for assistance after disaster	
- Family	108 (77.7)
- Friends/neighbors	12 (8.6)
- Formal resources (FEMA/Red Cross, Social Service, Paid help, 911)	12 (8.6)
- Unsure if anyone available to contact	7 (5.0)
Knowledge of what should be in emergency kit	
- Yes	102 (73.4)
- No	11 (7.9)
- Unsure	26 (18.7)
B. Needs, Barriers and Concerns	
Some need of assistance in evacuation	61 (43.9)
Top forms of assistance needed in evacuation	
- Transportation	32 (23.0)
- Walker cane	24 (17.3)
Mean number (SD) of concerns when watch/warning is issued	2.8 (2.0)
Top concerns when watch/warning is issued	
- Safety	84 (60.4)
- Medicines	78 (56.1)
- Shelter	50 (36.0)
- Food	46 (33.1)
Top conditions thought to prevent one's evacuation	
- Arthritis	33 (23.7)
- Diabetes	22 (15.8)
- Mobility issues	20 (14.4)

C. Consequences	
Decrease in mood after hurricane	
- Yes*	71 (51.1)
- No	53 (38.1)
- Unsure	15 (10.8)
Self-harmful ideation after the hurricane	5 (3.6)

*includes those reporting decrease in mood more than a year ago (n=6)