

**How Else Can We Weather the Storm? An Exploration of Mental Health Effects of
Hurricanes in Northeastern North Carolina**

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Abstract

As scientists and researchers find new ways to help create more infrastructurally resilient communities affected by natural disasters, there needs to be a focus on building mental health resiliency. In many communities, there is a stigma against those with mental illnesses and often the issue is ignored. Many individuals suffering from mental issues are not treated or even not identified as mentally ill. Our main aim at this research was to examine the prevalent mental health issues such as anxiety, depression, alcoholism/substance abuse in a hurricane affected population. We also studied social support and access to mental health services in that population. We used a mixed-methods approach using surveys and short-answer questions. The quantitative survey data were analyzed with Kendall's Tau using IBM SPSS version 26.0. The results showed instances of substance abuse, depression, and anxiety in the selected sample of 203 adults. It is a preliminary study, with limitations of random participant selection and sample size that necessitates further research on this topic.

Keywords: resiliency, coastal North Carolina, mental health, hurricane, survey

How Else Can We Weather the Storm? An Exploration of Mental Health Effects of Hurricanes in Northeastern North Carolina

Recent scientific research has found that we only have a few more years before we really start to experience the effects of climate change (Climate NASA, 2019); with coastal cities and islands being the first to experience these changes. NASA reports that 18 of the 19 warmest summers have occurred since 2001 and sea levels are rising 3.3 millimeters yearly over the past century. The changes are evident in such areas as they have been experiencing natural disasters, such as hurricanes, earthquakes, floods, and tsunamis more frequently than in the last two decades (Climate NASA, 2019). These calamities can cause destruction of someone's environment which can lead to "ecological grief"; where a person has a connection with their environment, whether it is because they have fond memories of their area or because they were born and raised there (Cunsolo & Ellis, 2018). This especially applies to those who are displaced. It is expected that residents experiencing the effects of natural disasters directly or indirectly suffer from mental health issues that are ignored for many reasons.

Previous studies have demonstrated that people, especially the minority populations, rarely come forward to receive assistance even though there are efforts to treat mental health issues (Dobalin & Rivers, 2008; Cook, McGuire, & Miranda, 2007; Jimenez, Cook, Bartels, & Alegría, 2013). For the most part, many minorities look to their families and religious beliefs for support (Aten, Topping, Denney, & Bayne, 2010). Secondly, there is a stigma of being diagnosed with a mental illness in these communities, so often those who need assistance do not get it for fear of what their peers might think of them (Masudam Anderson, & Edmonds, 2012). Also, many minorities experience mistrust towards mental health professionals (Wilkins, Whiting, Watson, Russon, & Moncrief, 2013).

The literature in many areas of science failed to look at how minorities are affected by certain issues. This comes from the archaic, “one-size-fits-all” approach to mental and physical health in the scientific community (Knifton, Gervais, Newbigging, et. al, 2010). Furthermore, few assessments explore how climate change and the resulting health vulnerability (psychological and physiological) can take a toll on a person (Hayes & Poland, 2018). Mental health resilience is challenging, especially as the infrastructural resilience is achievable in a shorter amount of time than mental health resilience.

Areas of Interest

Physical Health. How a person recovers physically after a hurricane is determined on the person, health care/insurance coverage, and availability of resources. We find that here, and in many other areas of interest, socioeconomic status plays a key role. Some groups that are most likely to be affected physically in the event of a hurricane or other natural disaster are young children, the elderly, the disabled, the impoverished, and the homeless. An older study by Aguirre (1988) found that during a tornado in Saragosa, Texas, the poor and other minority groups suffered more injuries and a higher death rate due to warning systems not being aimed towards them. Aguirre stated that many of the Saragosa residents were of Latino descent and mainly watched Univision, so they missed the tornado warning that was listed on other channels. As Fothergill and Peek (2004) cite, the low-cost, affordable housing leaves residents at a greater risk of injury due to the low-quality construction of the home. There is also the risk of indoor molds and mildews occurring due to water damage (Barbeau, Grimsley, White, El-Dahr, & Lichtveld, 2010) that may leave a person’s immune and respiratory systems exposed.

Additionally, when researchers examine physiological changes in a person following a hurricane or natural disaster, it may also be noted that Post-Traumatic Stress Disorder (PTSD)

can also be developed. PTSD pertains to physical health as it is an anxiety disorder that brings with it many issues such as high blood pressure, heart disease, and depression. The vulnerable populations generationally experience stress due to trauma that can lead to PTSD being encoded into their DNA, otherwise known as epigenetics (Wilkins et. al., 2013).

Traumatic Events. As cited by Bistricky, Long, Lai, et. al. (2019), prior traumatic experiences have been linked to an increase of Post-Traumatic Stress Disorder (PTSD) symptoms in a future disastrous event. These experiences include other natural disasters and abuse (sexual and physical). Also included are life-threatening accidents such as war or death of a family member (Bistricky et. al., 2019). An additional consequence of PTSD is a perceived sense of hopelessness (Scher & Resick, 2005), that is when repeated exposure to uncontrollable environmental stimuli leads to the belief that these situations are inescapable so a person stops trying to get out of them (Abramson, Metalsky, & Alloy, 1989; Liu, Kleiman, Nestor, & Cheek, 2015).

Mental Health. Mental health is still a taboo topic in modern society, though it is becoming more apparent that everyone from large corporations to family units are taking it more seriously. However, it should be noted that while the mental health of citizens following a natural disaster has started to become a topic of conversation, the mental health consequences of disasters (natural and man-made) for first responders, military health care workers, public health workers, and volunteer responders has yet to make it into major discussions (Benedek, Fullerton, & Ursano, 2007; Pennington, Carpenter, Synett, et. al, 2018). This is important to discuss because these individuals have to assist others and have the training to do so, but they may not have the institutional support needed to address any mental health issues that may occur as it is

as traumatic to see people hurt, dying, or dead and not being able to help them. They may even feel that if they had done something different there may have been a different outcome.

There are just as few articles that discuss the effects of disasters on adolescents. Children view these situations and even though they are not able to explain it, these instances have an effect of them. As the children are cared for by adults and if the caring adult is experiencing psychological and physical health issues, or economic issues that can directly affect the child. Adams, Sumner, Danielson, et. al (2014) report that 6.7% of adolescents met the diagnostic criteria for PTSD, girls were more likely than boys to meet the diagnostic criteria for having major depressive episode. Injured family members and loss of services were also correlated with PTSD and major depressive episode in both younger and older children, although there was an increase in older children. Moreover, continuous stress can alter an adolescent in terms of cognitive developments, understanding of social roles, sexuality, and individuation (Berton & Stabb, 1996).

Alcohol and Substance Abuse. Without a proper social support system or coping mechanism, some turn to illicit substances to deal with their pain. It has even been found that first responders (Benedek et. al., 2007) use these substances to deal with what they have seen; in female firefighters there is a reported higher binge drinking rate than male firefighters. (Gulliver, Zimering, Dobani, et. al., 2019), The post disaster alcohol use disorder (North, Ringwalt, Downs, Derzon, & Galvin, 2011) has been seen in those who had experienced drinking problems before the disaster, that becomes worst after a disaster.

Social Support. The concept of social support comes up in resiliency because humans, like most social animals, fare better in groups. When we consider the other previous themes in the area of resiliency after a hurricane many of them can be alleviated with a strong support

group. It is found that in many minority communities, specifically African American and Latino communities, communalism/ familism, decreases depression and anxiety (Schwartz, 2007; Almeida, Subramanian, Kawachi, & Molnar, 2011). This is a specific type of social support that emphasizes the importance of interdependent relationships. In fact, throughout reviews of hurricane resiliency literature it is found that social support, a psychosocial resource, diminishes many of the aftershocks experienced after a natural disaster (Lowe, Bonumwezi, Valdespino-Hayden, & Galea, 2019; Bokszczanin, 2012). Additionally, avoidant coping, or not dealing with what is perturbing is associated with post-traumatic stress symptoms, which can lead to PTSD (Bistricky et. al., 2019). On the contrary, positive coping, or utilizing your support group is experienced by those with a strong support group prior to the natural disaster. This can be chalked up to the reality that humans are social animals and need social connections for their well-being.

From literature review, it is apparent that the research on the ways to increase resiliency (other than infrastructural) following a hurricane, especially in mental health, is still relatively new to research. We see that after Hurricanes Katrina and Sandy there is a rise in research related to natural disasters but there is still a high need to examine the personal and community disruptions that occurs, especially in rural areas that are not as prepared as urban areas tend to have better disaster preparedness and relief (Morrissey & Reser, 2007).

Currently, the problem is to figure out the services needed to help those affected by hurricanes and how these services can reach those who really need them. Furthermore, it is important to know that what is preventing these people from accessing the needed services. The purpose of this research was to investigate the mental health services available in the area, the services residents were aware of, and the hurdles preventing members of the community from

utilizing the available services. Based on the findings of previous research, the study hypotheses are: (1) that factors such as stigma, lack of knowledge, and lack of transportation will be hurdles in receiving treatment and (2) those with stronger social support will report less substance abuse.

Community Resilience Theory

The community resilience theory examines “the existence, development, and engagement of community resources by community members to thrive in an environment characterized by change, uncertainty, unpredictability, and surprise” (Magis, 2010). The first concept of this theory is that a system should be able to absorb a disturbance and reorganize in the aftermath. Afterwards, the system should easily retain the same function and structures. Another concept is the emphasis on individual mental health and personal development as community resilience is considered a continuous process of having personal development when dealing with adversity through adaptation. While the concept of community-level resilience is mentioned in articles spanning to the early 2000s, community resilience theory was authored by Berkes and Ross (2013). The characteristics that they conclude that play a role in a community developing resilience are social networks/support, community problem-solving, the ability to cope, etc. Community resilience theory is salient to mental resiliency following a natural disaster since these events cause collective trauma.

Methodology

Participants

We used multimethod cross-sectional survey approach collecting quantitative and qualitative data with structured questionnaires from the hurricane affected populations with diverse backgrounds. We chose a county in coastal North Carolina that had been affected

repeatedly by a hurricanes and experienced flooding as a result (see Table 1.1). Participants from the county were recruited from churches, offices, and county events using sample of convenience.

Materials

The Post-Hurricane Health Effect Assessment (PHHEA). This 61-item questionnaire was been adapted from the PSID 2007 Katrina Supplement. It has sections on demographical information/hurricane experiences (items 1-20), physical health (items 21-30), alcohol and drug abuse (items 31-43), traumatic life events (item 44), and mental health (items 45-61).

Descriptive responses allowed for many items clarity and detail.

Procedure

After Institutional Review Board approval, the PHHEA was administered to hurricane effected residents by approaching them in county offices, events, and churches. Data collection ran from June 2019 to July 2019. The participants were instructed to respond to the questionnaires and deposit them anonymously either in a box with a slit during in-person group data collection or mailed in a postage paid in a sealed envelope. The option of collecting survey data via Qualtrics survey link was also used (see table 1.2).

We combined the data from both data collection methods and computed a Kendall's Tau and on the nominal and ordinal responses using IBM SPSS Version 26. For the aforementioned areas of interest, average responses who calculated for each participant for final analysis. All correlations with significance level of 0.05 and 0.01 were included in our discussion. For descriptive responses to some items on the questionnaire, we used theme analysis with three coders. Kendall's Tau indicated significant association of age, gender, injury, or illness

(personal, family, and acquaintances), home damage, and displacement due to hurricane with many mental health and alcohol and substance abuse items. There was also indicated associations of demographic variables with hurricane effects, alcohol and substance abuse, and mental health.

Results

The qualitative data indicated prevalence of mental health issues including alcohol and substance abuse the county affected by repeated hurricanes that included lying to doctors, relying on and misuse of prescription medicines, and symptoms of anxiety and depression (see Table 1.3). The hurdles reported in qualitative data and evident in quantitative analysis include low level of awareness to services, transportation, stigma, lack of providers, lacking diagnosis, insurance/cost, and interpretation of government policy/changes on healthcare. The agencies that provided aid following a hurricane were the Red Cross, FEMA, and Social Services. The main types of aid needed were food, water, and disaster loans (see Table 1.4). The resilience from repeated hurricanes over decades in this community lies in strong family and community support.

Discussion

The findings that the stigma of labeled with mental illnesses, lack of knowledge about mental health issues, and lack of transportation to access the mental health facilities are hurdles in receiving treatment for mental health issues and the relationship between exposure to hurricanes and substance abuse support the first hypothesis. The results of this study do not support the relationship between stronger social support and substance abuse occurrences. The qualitative responses suggest that the people feel strong community bonding and that support is a

crucial factor in resilience of the community from repeated hurricanes. The participants mentioned support from immediate family and faith-based organizations.

We found that the individuals reporting higher annual income believed that there had access to needed disaster relief services. Also, the data indicate that those participants who reported experiencing more hurricane exposures, the more they found little interest and pleasure in things that they used to find pleasure in the past. They also reported to have misused/overused medication prescribed to them by a doctor. The older people tend to perceive a drug abuse problem in their area. This may be because older people could bounce back faster from a recent traumatic event if they had experienced one before (Shrira, Palgi, Hamama-Raz, Goodwin, & Ben-Ezra, 2014). Also, with age we gain maturity and wisdom from experiences, so older people may have better, more positive coping mechanisms so they gained resiliency which lowered their depressive symptoms (Bistricky et. al., 2019). But younger people may not have acquired these coping skills yet and therefore utilize more negative coping mechanisms that lead to their relying on substance abuse.

The data also point to that the participants realized that they could have done more to protect themselves from the hurricanes they had experienced, and that they had lied to medical health professionals about being in pain to receive medication. This indicates how displacement is associated with unresolved mental trauma (Fussell & Lowe, 2014). During the data collection process, a county official recounted how due to a hurricane an entire trailer park was flooded out which led to numerous families being displaced and even having to move to different counties making it hard for their children since they had to leave behind essentially all that they had known causing lasting stress for them (Reich & Wadsworth, 2008).

Though, many of the participants of this study self-described themselves as African American, it would be unforgivable and careless to use this data to assert race-based claims of inequity in experience of psychological issues and access to mental health services.

Nevertheless, when we examine the research done in the area of mental resiliency following a hurricane/ natural disaster minority are seldom the focus. This is especially egregious when we consider that African Americans are more inclined to depressive symptoms because of stigma around mental illness and their physical environment (i.e. prone to crime, impoverished area, other perceived neighborhood problems) (Tamura, Landerman, Orstad, et. al, 2020).

Limitations

Due to limited time and contacts in the study population areas, we could not reach representative sample from the population. The lack of random sample and small sample size of 203 against the expected sample of 500 respondents limits the interpretation of the findings in this preliminary study. Since our data collection was held at public events that may have discouraged some participants from completing the entire questionnaires truthfully as they did not want to miss the events. We noticed that in the online Qualtrics questionnaires there was full engagement with the questions and even complete responses to the hard to answer sections, such as the one asking about previous traumatic events.

Future Research

Most of the research on resiliency after a hurricane is on emergency management issues, but more research and discussion is needed on the psychological vulnerability of the hurricane effected communities.

Recommendations. The efforts towards complete resilience from repeated hurricanes may include training members of the communities in mental health and substance abuse issues so that they can educate and assist the residents to access the appropriate professional services. Due to the changing insurance policies, communities could also have expert sessions that explain the often difficult to understand language of the policies.

Appendix A: List of Tables

Table 1.1 Study Population Demographics

	County 1
Population	19,913
Poverty	22%
Median Age	45
Income	\$31,287
Black	61%
White	16.3%
Female	49.5%
Male	50.5%

Source: www.census.gov/quickfacts

Table 1.2 Paper and Online Survey Respondent Demographics

	Paper Survey	Online Survey
n	190	14
Male	27%	38%
Female	71%	62%
Black	64%	23%
White	31%	77%
Age	85% 35 to 64+	91% 35 to 64+

Table 1.3. Kendall’s Tau b

Variables	τ	p	Interpretation
Age – Home Damage	.245**	0.001	Older people tend to report more damage
Age – Community Use	.173*	0.017	Older people perceive increase use of drugs/alcohol in general and after hurricane
Race – Access to Mental Health Services	-.154*	0.042	African Americans believe that there is access to mental health services in their area.

Income – Single Parent	.256**	0.000	Those who are not single parents have higher income
Marital Status – Physical Health After Hurricane	.244**	0.000	Single/Married people report good or excellent health a year or so after a hurricane
Income – Health After Hurricane	-.267**	0.000	Low income people tend to report fair or poor health in the year after a hurricane they experienced
Social Support Average- Health After Hurricane	.208**	0.001	Those who experience high social support also report good or excellent mental health a year or so after a hurricane
Access to Mental Health Services- Income	-.203**	.005	Those with higher income perceive that there is adequate access to mental health services
Residency-Community Drug Use Problem	-.188*	.014	Those who reside in area for long time perceive that there is a community drug use problem
Physical Health After Hurricane-Mental Health Average	.174**	.005	Those who report good or excellent mental health in the year after a hurricane also report satisfactory mental health

*p<0.05; **p<0.01

Table 1.4 Qualitative Responses

Who did you receive aid from?	What type of aid do you need?	What [health] programs have you heard of?	I believe that the [health] services should include the following:
Red Cross	Food	Trillium	Group therapy
FEMA	Water	Crisis Line	Therapy for those with no insurance
Social Services	Food stamps	Trauma-Based therapy	Programs to help the youth
Friends/Family	Disaster Assistance/Loan		Transportation to services
			Substance abuse counseling

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