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Amandine Ballart Date

Grant proposal for the assessment of mental health service utilization factors following hurricane Florence to inform future response and support programs.

By

Amandine Ballart

Degree to be awarded: Master of Public Health

Prevention Science

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William Michael Caudle, PhD

Committee Chair

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M.B.A, University of Lille (France), 2007

Thesis Committee Chair: William Michael Caudle, PhD

An abstract of

A thesis submitted to the Faculty of the

Rollins School of Public Health of Emory University

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Master of Public Health in Prevention Science

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Abstract:

Grant proposal for the assessment of mental health service utilization factors following hurricane Florence to inform future response and support programs.

By Amandine Ballart

Extreme weather events, such as hurricanes, flooding, droughts and fires are becoming more frequent and intense. These disasters impact physical but also psychological well-being of survivors, as they are exposed to stressors such as profound loss, social disruption, deterioration of social and community resources, and loss of perceived safety. Psychological disorders have been observed among victims of natural disasters with symptoms that can linger for months or even for years. Because of the physical and psychological consequences faced by victims of natural disasters, the increase in intensity and frequency of extreme weather events is a public health concern. Hurricanes have severely impacted the US and new literature demonstrates increasing intensity of hurricanes and tropical cyclones as climate continues to warm: hurricanes will harm more and more people, leading to more severe physical and psychological consequences.

In order to foster resiliency and minimize long-term symptoms of psychological disorders, delivering mental health services (MHS) after hurricanes is required. However, literature shows that despite current supportive programs and substantial financial investments, most survivors of disasters are reluctant to use MHS and/or face barriers to access these services. The factors influencing MHS use remain unclear and this knowledge gap in utilization factors may have an impact on the efficiency and quality of post-disaster MHS. This gap may also lower their capacity to reach the most vulnerable victims and address their mental health disorders.

The main objective of this grant proposal is to conduct a quantitative survey on survivors of Hurricane Florence (September 2018) in order to collect information on the factors that led victims to use/not use mental health programs. An examination of predictors of post-disaster MHS utilization would strengthen future mental health response programs and have significant implications on how to better allocate resources in order to provide essential help to the most vulnerable.

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CHAPTER 1: INTRODUCTION

1. Background

Extreme weather events, such as hurricanes, flooding, droughts and fires are becoming more frequent and intense (Watts et al., 2017). Victims of these disasters face consequences such as injuries, loss of habitation, food insecurity and exposure to infectious diseases (Smith, Burkle, Aitken, & Leggatt, 2018). Disasters impact the physical as well as the psychological well-being of survivors, as they are exposed to stressors such as profound loss, social disruption, deterioration of social and community resources, and loss of perceived safety. Psychological problems such as posttraumatic stress disorder (PTSD), major depression disorder (MDD), generalized anxiety disorder (GAD) and panic disorder (PD) have been observed among victims of natural disasters (Norris, Friedman, Watson, et al., 2002). Victims suffering from mental health disorders have symptoms that can linger for months or even for years (Norris, Friedman, & Watson, 2002).

Because of the physical and psychological consequences faced by victims of natural disasters, the increase in intensity and frequency of extreme weather events is a public health concern. Changes in demographic landscapes and urbanization contribute to the increasing numbers of people being impacted by extreme weather events each year. For example, the rise in coastal populations have led to increasing hurricane-related damage along the US coastline (Klotzbach, Bowen, Jr., & Bell, 2018). Hurricanes have severely impacted the US: between 2017 and 2019, two category 4 and two category 5 hurricanes have killed more than 300 people and resulted in billions of dollars of property damage and economic losses (NOAA, 2019a). Although it is difficult to track past changes in hurricanes due to the heterogeneity of historical data, new literature demonstrates increasing frequency and intensity of hurricanes and tropical cyclones as climate continues to warm (Kossin, Olander, & Knapp, 2013; Lane et al., 2013). Hurricanes will harm more and more people, leading to more severe physical and psychological consequences. More victims will suffer from mental health disorders such as PTSD and MDD but also from interpersonal problems.

In order to foster resiliency and minimize long-term symptoms of emotional problems, delivering high quality and timely mental health services (MHS) after hurricanes is required. Even

though most victims of hurricanes may not exhibit significant symptomatology, individual- and community-level interventions are needed to foster resilience, reduce vulnerability and address psychological disorders (Norris, Friedman, & Watson, 2002). Post-disaster counseling programs can be implemented at the Federal, Tribal, State, and community levels. States receiving a presidential major disaster declaration can seek funding from the Federal Emergency Management Agency (FEMA). FEMA funds crisis counseling assistance and training activities. The mission of FEMA's Crisis Counseling Assistance and Training Program (CCP) is to assist both individuals and communities in recovering from psychological effects of disasters (FEMA, 2015). FEMA offers Immediate Services Programs (ISP) that provide funds for up to 60 days following the presidential declaration of State of Emergency and Regular Services Programs (RSP) that provide funds for up to nine months (FEMA, 2015). Counseling programs are also implemented at the State level, and response varies depending on factors such as the State's existing mental health operations network and the budget allocated to mental health programs.

2. Problem statement

Research has been conducted on hurricanes and their consequences on victims' mental health (Lieberman-Cribbin, Liu, Schneider, Schwartz, & Taioli, 2017; Schwartz et al., 2018). This research shows that the majority of victims cope well in the face of disasters, but a significant proportion will develop mental disorders (Norris, Tracy, & Galea, 2009). People who experience these disasters and do not develop psychopathology are characterized as "resilient", meaning that their coping and adaptation mechanisms allow them to continue functioning and go back to their normal social and professional life. Being resilient does not mean the absence of psychological symptoms following a disaster but illustrates an ability in "bouncing back". Victims may experience distress for a short period of time but quickly go back to their pre-disaster level of functioning (Goldmann & Galea, 2014). Victims who experience psychological impairment are impacted by several types of mental disorders; after Hurricane Sandy (2012), 14.5% of residents in Monmouth County, NJ, screened positive for PTSD and 6% met criteria for depression 6 months after the event (J. A. Boscarino et al., 2013).

While the incidence of mental health disorders following hurricanes has been well studied, a limited amount of literature exists on the availability and utilization of post-disaster mental health programs by those who have experienced a hurricane. Only a few studies have assessed the existing mental health support programs and the MHS use (J. A. Boscarino, Hoffman, Adams, Figley, & Solhkhah, 2014). The literature also shows that despite current supportive programs and substantial financial investments, 56.8% of victims who need MHS, either do not receive help or do not use the existing services (Lowe, Norris, & Galea, 2016). Most survivors of disasters are reluctant to use MHS and/or face barriers to access these services (Rodriguez & Kohn, 2008). The factors influencing service use remain unclear even though Andersen's Behavioral Model of Healthcare Utilization suggests that it can be predicted by predisposing factors, enabling factors and perceived needs (Lowe, Sampson, Gruebner, & Galea, 2016).

This knowledge gap in utilization factors may have an impact on the efficiency and quality of post-disaster MHS. This gap may also lower their capacity to reach the most vulnerable victims and address their mental health disorders. Future response programs could be strengthened by identifying predictors of MHS utilization, and addressing barriers and challenges faced by victims of hurricanes.

3. Purpose Statement

Despite existing programs and substantial investment in mental health programs, survivors who suffer from psychopathology may not receive support the support that they need (Wang et al., 2007). The decision to seek and accept help for psychological disorder is a complex process and involves several factors such as availability of healthcare services, socio-demographic characteristics, and economic and social factors (Fleury, Ngui, Bamvita, Grenier, & Caron, 2014). Utilization of mental health programs is even more challenging in times of disaster since victims have to overcome financial, structural, and other barriers to obtaining care (Wang et al., 2007). Even though research has demonstrated that the majority of victims of disasters do not utilize MHS, the factors behind this non-utilization have not been well explored.

Since little evidence exists, the purpose of the proposed study is to conduct explanatory research; as such, no specific hypothesis is formulated. The overarching goal of this proposal is to examine the factors that predict MHS use among survivors of natural disasters. The research will be framed by Andersen's Behavioral Model of Healthcare Utilization, which will serve to identify factors that facilitate or disrupt utilization of healthcare programs. This framework states that individual use of services can be predicted by (1) predisposing factors such as health beliefs and social structure; by (2) enabling factors such as community/family support and health insurance; by (3) need factors such as how people view their own health and the symptoms of illness (Lowe, Sampson, et al., 2016). These three elements of Andersen's Model will be included in the quantitative survey of this proposal. Through logistic regression, we will examine the data collected to:

- Aim 1: Identify the factors associated with utilization of MHS.
- Aim 2: Identify the factors associated with non-utilization of MHS.

The proposed research seeks to provide evidence of the relationship between predisposing characteristics, enabling resources, perceived needs and barriers to care and utilization/non utilization of MHS. The expected outcome is to illustrate potential disparities between sub-populations in the use of MHS. These disparities could be taken into consideration in MHS planning and could be further studied in future research.

4. Theoretical Framework

The overarching objective of this grant proposal is framed by Andersen's Behavioral Model of Healthcare Utilization. It is a multilevel model that take into consideration both individual and contextual determinants of health services use. Andersen describes three major components (Babitsch, Gohl, & Von Lengerke, 2012):

(1) Predisposing factors include demographic characteristics such as age and sex, social factors such as education, occupation, ethnicity and family status, and mental factors such as health beliefs (values and knowledge on health and health services).

(2) Enabling factors include financing and organizational factors such as income, health insurance, patient's capability to pay for health services, and source of care. They also

include transportation and travel time to seek care, distribution of healthcare facilities, as well as community and family support.

(3) Need factors include individuals' perceived need for healthcare (i.e. how they evaluate their own health and symptoms of illness) and evaluated need (i.e. assessment by healthcare provider).

This behavioral model has been extensively used in research on the utilization of health services and has been applied to a broad range of health services sectors and diseases (Babitsch et al., 2012). Thus, it is appropriate to use this model in the context of post-disaster to conduct research on utilization factors of MHS.

5. Significance Statement

A growing number of people will suffer from post-disaster psychological disorders as the intensity and frequency of natural disaster increase. As literature shows that most survivors of disasters are reluctant to use MHS and/or face barriers to access these services, there is a pressing need to identify factors that foster or prevent service utilization. An examination of predictors of post-disaster MHS utilization would strengthen mental health response programs and have significant implications on how to better allocate resources in order to provide essential help to the most vulnerable.

CHAPTER 2: LITERATURE REVIEW

1. Introduction

A. Outline of the literature review

Extreme weather events are becoming more intense and frequent, affecting people's physical and psychological well-being (Watts et al., 2017). Federal and State organizations provide help to victims of a natural disaster, such as water and food supplies, temporary housing, medical services as well as mental health counseling programs. However, even though mental health counseling is much needed following a natural disaster, literature shows that a large proportion of victims does not use these services (Lowe, Norris, et al., 2016). This literature review will provide an overview of how the landscape of extreme weather events has changed, how they impact victims' mental health, and what remains to be explored in health services utilization following a natural disaster.

B. Literature review methodology

Relevant articles and publications were searched using PubMed and Google scholar. Initial searches were conducted using the following keywords: natural disasters, extreme weather events, hurricanes, tropical cyclones, mental health, MHS, counseling programs, crisis counseling, service use and service utilization. In addition to an online search, resources were obtained from discussion with employees from FEMA, the Georgia Department of Behavioral Health & Developmental Disabilities (GDBHDD), and the North Carolina Department of Health and Human Services (NCDHHS).

2. Body of Literature

A. Extreme weather events

a. Climate change and extreme weather events

As the climate continues to warm, this warming triggers changes to the Earth's weather: natural phenomena such as heatwaves, rising temperatures, and increases in the frequency and intensity of extreme weather events have been reported and studied (Watts et al., 2017).

These extreme weather events (e.g. droughts, floods, cyclones, and wildfires) are the primary way that most people experience climate change. Impacts of such events include alteration of food and water supply, changes in agricultural conditions, damage to infrastructures, injuries, deaths and consequences on mental health and well-being (IPCC, 2014).

Over the last 50 years, many U.S. States have experienced increases in prolonged periods of excessively high temperatures, heavy downpours, and in some regions, severe floods and droughts (NCA, n.d). Across major cities in the United States, heatwaves occur more often than they used to, from an average of 2 heat waves per year during the 1960s to more than 6 per year during the 2010s. Moreover, the average heat wave period across 50 major cities is 47 days longer than it was in the 1960s (Figure 1) (USGCRP, n.d.).

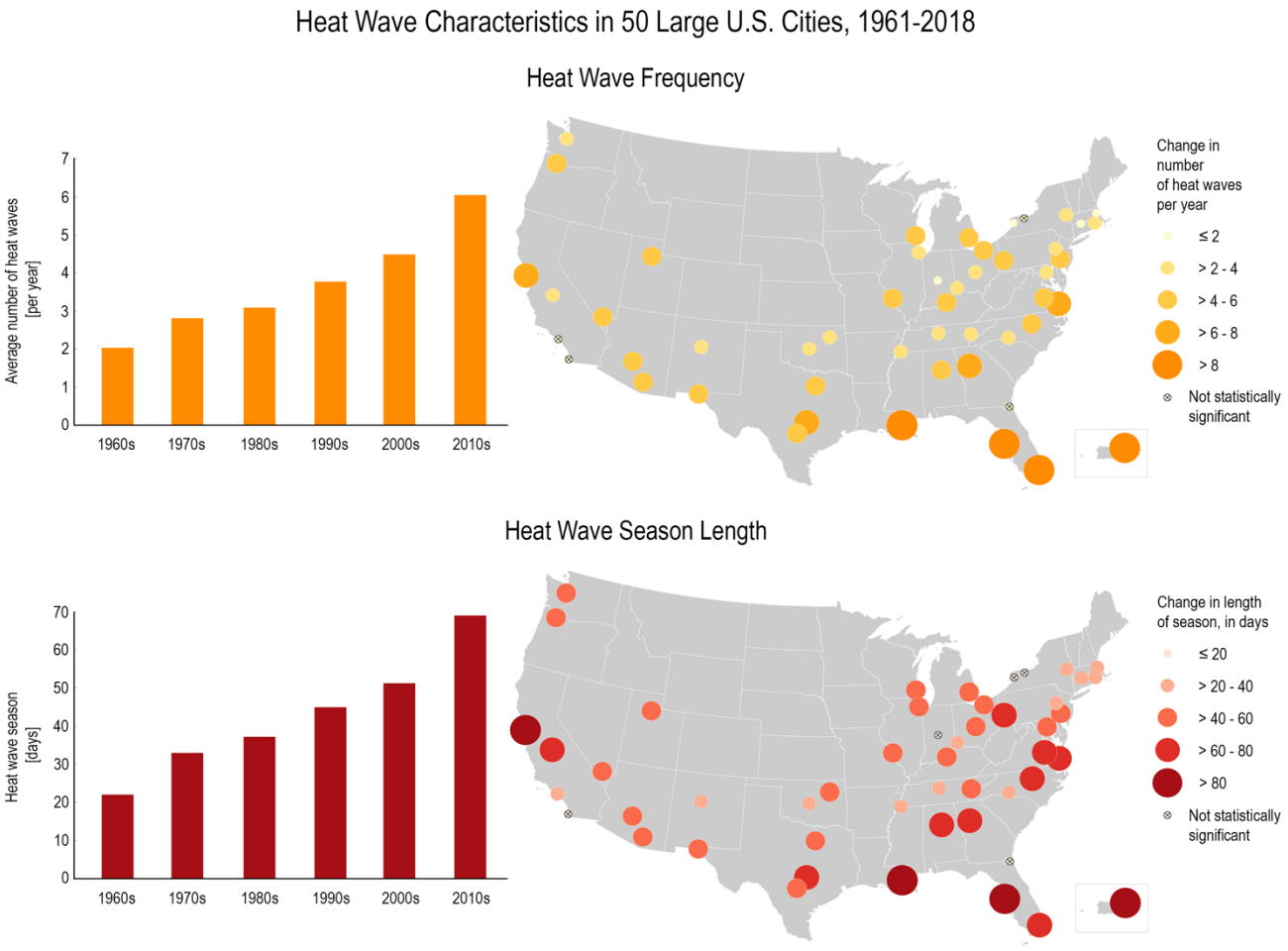


Figure 1: US Global Change Research Program

From 1980 to 2009, floods caused more than 500,000 deaths worldwide and affected more than 2.8 billion people (Doocy, Daniels, Murray, & Kirsch, 2013). In the United States, floods caused 4,586 deaths from 1959 to 2005 and an yearly average damage cost of $7.95 billion between 1984 and 2013 (NOAA, 2015). Climate change intensifies the intensity of heavy rain, leading to more devastating flood (Climate Central, n.d.). Warmer climate will also increase the rainfall rates in hurricanes, with a projected increase of about 20% rainfall near the center of hurricanes by the end of the century (NCA, n.d).

b. Hurricanes

Another type of extreme weather event, hurricanes, is also increasing in intensity. Hurricanes are tropical cyclones reaching sustained winds of 74 miles per hour or higher originating in the North Atlantic, central North Pacific, and eastern North Pacific. Tropical cyclones originating in the Northwest Pacific are called typhoons, while the same type of disturbance is called a tropical cyclone in the South Pacific and Indian Ocean (NOAA, 2020). Research has demonstrated that tropical cyclones respond to climate change and studies have found that hurricanes activities are sensitive to diverse environmental conditions such as sea surface temperature, low level vorticity and humidity in the lower and middle troposphere (Emanuel, 2008). Over the last 30 years, Atlantic tropical cyclones have become more intense and this intensity is correlated with higher sea surface temperatures and increased water vapor in the region that Atlantic hurricanes form in and move through (Elsner, Kossin, & Jagger, 2008). While the theory of tropical cyclone intensity due to climate change has been well-accepted, the question of an increase of frequency is more controversial and there is less confidence in the correlation between hurricane frequency and climate change than in the increase in intensity (Climate, 2016).

Hurricanes have severely impacted the US: for example, during hurricane Katrina, 1,600 people lost their lives, 500,000 people were evacuated and 90,000 squares miles were declared a disaster area (Kessler et al., 2008). In recent years (2017-2019) two category 4 and two category 5 hurricanes have killed more than 300 people and resulted in billions of dollars in property damage and other economic losses (NOAA, 2019a). The intensity of hurricane is

determined by the Saffir-Simpson Hurricane Wind Scale, which is a 1 to 5 rating based on a hurricane's sustained wind speed. Figure 2 summarizes the diverse categories as well as the potential damage (NOAA, n.d.).

Category	Sustained Winds	Types of Damage Due to Hurricane Winds
1	74-95 mph 64-82 kt 119-153 km/h	**Very dangerous winds will produce some damage:** Well-constructed frame homes could have damage to roof, shingles, vinyl siding and gutters. Large branches of trees will snap and shallowly rooted trees may be toppled. Extensive damage to power lines and poles likely will result in power outages that could last a few to several days.
2	96-110 mph 83-95 kt 154-177 km/h	**Extremely dangerous winds will cause extensive damage:** Well-constructed frame homes could sustain major roof and siding damage. Many shallowly rooted trees will be snapped or uprooted and block numerous roads. Near-total power loss is expected with outages that could last from several days to weeks.
3 (major)	111-129 mph 96-112 kt 178-208 km/h	**Devastating damage will occur:** Well-built framed homes may incur major damage or removal of roof decking and gable ends. Many trees will be snapped or uprooted, blocking numerous roads. Electricity and water will be unavailable for several days to weeks after the storm passes.
4 (major)	130-156 mph 113-136 kt 209-251 km/h	**Catastrophic damage will occur:** Well-built framed homes can sustain severe damage with loss of most of the roof structure and/or some exterior walls. Most trees will be snapped or uprooted and power poles downed. Fallen trees and power poles will isolate residential areas. Power outages will last weeks to possibly months. Most of the area will be uninhabitable for weeks or months.
5 (major)	157 mph or higher 137 kt or higher 252 km/h or higher	**Catastrophic damage will occur:** A high percentage of framed homes will be destroyed, with total roof failure and wall collapse. Fallen trees and power poles will isolate residential areas. Power outages will last for weeks to possibly months. Most of the area will be uninhabitable for weeks or months.

Figure 2: Saffir-Simpson Hurricane Wind Scale, National Oceanic and Atmospheric Administration

c. Hurricane Florence

Hurricane Florence was the first major hurricane of the 2018 Atlantic hurricane season. On August 30, 2018, it emerged near Cape Verde as a strong tropical depression. For the next several days, Florence maintained a steady west northwestward motion and became a category 4 hurricane by September 5, 2018 while centered over the central Atlantic about 1200 miles east-southeast of Bermuda (Figure 3). Florence reached its peak intensity on September 11 when the hurricane was located about 725 miles east-southeast of Cape Fear, North Carolina. The weakening hurricane approached the southeastern coast of North Carolina late on September 13 and Florence made landfall as an category 2 hurricane near Wrightsville Beach, North Carolina on September 14 (NOAA, 2019b). With winds of 140 mph, rainfall of 20 to 35 inches (figure 4), and reported record tides (the ocean was 3.74 feet above high tide in Beaufort), Florence produced extensive damage along the South and North Carolina coasts (N. W. S.-. NOAA, 2019). The storm caused nearly $17 billion in damage, affected 304,000 households and resulted in 40 fatalities. Over more than 130,000 people have registered with FEMA for individual assistance and a budget of $108 million was approved for individual assistance for homeowners and renters (NCDHHS, 2018; NCOSBM, 2018).

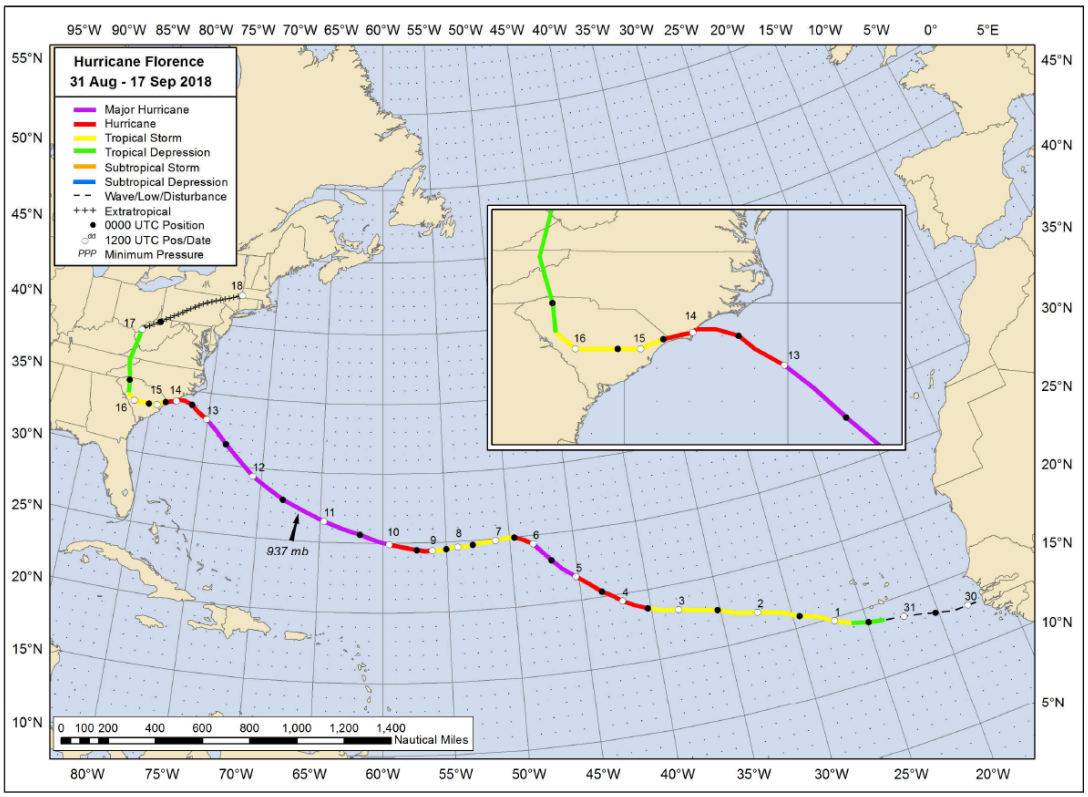


Figure 3: Best track positions for Hurricane Florence, 31 August–17 September 2018.

NOAA Weather Prediction Center

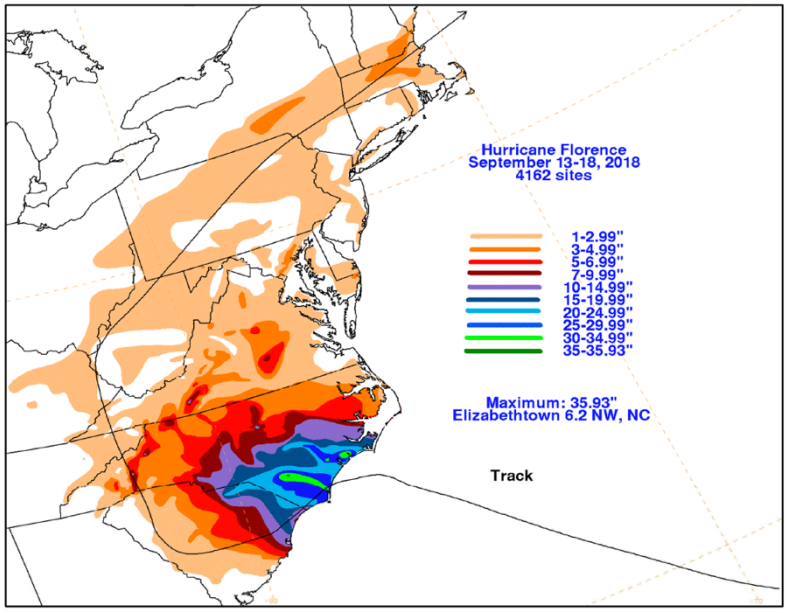


Figure 4: Hurricane Florence U.S. rainfall analysis (inches) during the period 13–18 September 2018.

NOAA Weather Prediction Center.

State of Emergency in both Carolinas was declared on September 11, 2018. Before Hurricane Florence made landfall, FEMA and its federal partners were on the ground assisting state and local governments. FEMA delivered more than 2.7 million meals and 2.6 million liters of water to North Carolina. Disaster Survivor Assistance teams went door to door to 113,069 homes in damaged areas offering options for how to access programs that can help them move forward in their recovery, including mental health support. A Disaster Distress Helpline in English and Spanish was available to victims of Florence (FEMA, 2019).

This grant proposal will target survivors of hurricane Florence. This hurricane has been selected for different reasons: a. It happened in 2018, which is relatively recent. Selecting a hurricane that is recent may limit recall bias; b.As mentioned earlier in this section, Florence had a severe impact on the Carolinas, affecting more than 304,000 households. Given this number, selecting a representative sample of victims seems feasible.

B. Psychological consequences of natural disasters

a. Psychological disorders

Because of their magnitude, all types of natural disasters share a potential to affect victims' physical and mental health. Indeed, they: a. threaten harm or death to the population involved, b. affect individual and communal stability, causing disruption of social networks and c. involve "secondary consequences" (other than infrastructures/home destruction) i.e. physical and mental health outcomes (Goldmann & Galea, 2014). Disasters engender an array of stressors including threat to one's physical integrity, community and social disruption and exposure to death (Norris, Friedman, Watson, et al., 2002). Psychological problems such as posttraumatic stress disorder (PTSD), major depression disorder (MDD), generalized anxiety disorder (GAD) and panic disorder (PD) have been observed among victims of natural disasters (Norris, Friedman, Watson, et al., 2002). PTSD is a psychiatric disorder that affect people who have experienced or witnessed a traumatic event. It is characterized by: "re-experiencing" the traumatic event through nightmares, flashbacks; feelings of sadness or anger; numbing of emotional responses or symptoms of arousal (e.g. being on guard/watchful) (APA, 2013). PTSD is the most common post-disaster psychopathology (Goldmann & Galea, 2014). MDD is a serious

medical illness that negatively affects how patients feel, how they think and how they act. It is characterized by sadness, loss of interest in things once enjoyed and other symptoms such as sleep disorders and irritability (APA, 2017; Goldmann & Galea, 2014). GAD is characterized by excessive and ongoing anxiety that is difficult to control (ADAA, n.d.). PD is a sudden episode of intense fear that can lead to severe physical reactions even though there is no real danger (MayoClinic, 2018).

The consequences of hurricanes on psychological health have been studied and the existing literature provides a good understanding of the types of mental health disorders. Boscarino et al. interviewed victims six month after hurricane Sandy and found that 14.5% of the victims screened positive for PTSD and 6% met criteria for MDD. (J. A. Boscarino et al., 2013). While most studies were conducted shortly after the disaster (a few months to two years), some studies also looked at long term mental health consequences. Raker et al. interviewed victims of hurricane Katrina and found that, 12 years after the disaster, 16.67% of victims still experience post-traumatic stress symptoms and 20.09% still experience psychological distress (Raker et al., 2019). Norris et al. conducted an empirical review of the literature on disasters and mental health and determined that the conditions that are the most often observed in studies are PTSD (observed in 68% of samples), depression (36%), anxiety (20%). Panic disorders and death anxiety have only been occasionally observed in samples (Norris, Friedman, Watson, et al., 2002).

b. Resilience

Resilience is defined as “low levels of symptoms or problems in a given outcome over time, with minimal elevations that are limited to the time period during the disaster and its immediate aftermath” (Lowe, Joshi, Pietrzak, Galea, & Cerda, 2015). People who experience disasters and do not develop psychopathology are characterized as “resilient”, meaning that their coping and adaptation mechanisms allow them to continue functioning. They go back to their normal social and professional life, sustaining a low level of psychological symptoms short- and long-term after the disaster (Lowe, Sampson, Gruebner, & Galea, 2015). However, being resilient does not mean the absence of psychological symptoms following a disaster; rather, it

illustrates an ability in "bouncing back". Victims may experience distress for a short period of time but quickly go back to their pre-disaster level of functioning (Goldmann & Galea, 2014). Research shows that factors such as socioeconomic advantage and no/limited exposure to traumatic events could be predictive of resilience. Individual resilience being linked to community resilience, social support, sense of community and community-level resources can also promote resilience (Lowe, Sampson, et al., 2015). Even though studies have shown that a large proportion of disaster victims exhibit a trajectory of stably low symptoms (e.g. reduced concentration, sleeping disorders), some victims will suffer from short- and long-term psychological disorders (Norris et al., 2009). Disasters impact physical but also psychological well-being of survivors, as they are exposed to stressors such as profound loss, social disruption, deterioration of social and community resources, and loss of perceived safety.

c. Risk factors for post-disaster psychopathology

Psychological consequences following a hurricane are not distributed equally and pre-, peri- and post-disaster factors influence mental health outcomes (Goldmann & Galea, 2014). Research demonstrates that individual-level indicators of socioeconomic disadvantage (persons of color, women, unemployment), previous exposure to traumatic event and pre-disaster mental health conditions are associated with higher risk of post-disaster mental disorders (Norris, Friedman, Watson, et al., 2002; Raker et al., 2019). A study on the mental health consequences of hurricane Katrina targeting low income Black women found that four in five respondents experienced moderate or severe damage to their homes and nearly one in three respondents had a relative or a friend who died during the hurricane. Among this population, 43.8% suffered from post-traumatic stress symptoms (PTSS) after 11 months (Raker et al., 2019).
Peri-disaster risk factors play also a significant role in mental health psychopathologies. The severity of exposure to disaster is the most predictive factor of mental illness and research has illustrated a "dose-response" relationship between disasters and mental disorders. The type of disaster, its magnitude, duration, and the death toll can predict the risk of psychopathology (Goldmann & Galea, 2014). Lastly, post-disaster risk factors are also predictors of the development of mental disorders. Stressors such as property damage, displacement, job loss and

injury can increase the vulnerability to psychopathology. Reduction in social support and community relationship are also associated with post-disaster mental disorders. Moreover, studies have shown that higher levels of social support are associated with resilience (Goldmann & Galea, 2014).

C. Post-disasters mental health programs

a. Federal Level

Post-disaster counseling programs can be implemented at the Federal and State levels. States receiving a presidential major disaster declaration can seek funding from the Federal Emergency Management Agency (FEMA). FEMA funds crisis counseling assistance and training activities. The mission of FEMA's crisis counseling program (CCP) is to assist both individuals and communities in recovering from psychological effects of disasters (FEMA, 2015). FEMA offers "Immediate Services Programs" (ISP) that provide funds for up to 60 days following the presidential declaration of State of Emergency and "Regular Services Programs" (RSP) that provide funds for up to nine months (FEMA, 2015). The CCP is guided by the following principles (FEMA, 2015) :

- Strengths Based: CCP services promote resilience, empowerment, and recovery
- Anonymous: the crisis counselors do not classify, or diagnose people but refer them to healthcare professional. FEMA does not keep records or case.
- Outreach Oriented: FEMA's crisis counselors visit the communities and deliver services, rather than wait for victims to seek assistance
- Counseling is conducted in nontraditional settings: counselors make contact in homes, shelters, and communities but not in clinical settings.
- Designed to Strengthen Existing Community Support Systems: The CCP does not replace state/community systems but it provides additional support.

The Substance Abuse and Mental Health Services Administration (SAMHSA) Center for Mental Health Services (CHMS) works with FEMA, through its Emergency Mental Health and Traumatic Stress Services Branch. They provide technical assistance and training for state and local mental

health personnel. The CMHS is also in charge of the CCP grant administration and program oversight (SAMHSA, 2019b).

The CCP include:

- Individual and group crisis counseling
- Basic supportive or educational contact
- Community networking and support
- Assessments, referrals, and resources
- Development and distribution of educational materials
- Media and public service announcements

b. State level and the example of Hurricane Florence

Counseling programs are also implemented at the State level, and response varies depending on factors such as the State's existing mental health operations network and the budget allocated to mental health programs. During Hurricane Florence, the North Carolina Department of Health and Human Services (NCDHHS) provided mental health counseling programs through The Hope 4 NC program. This program helped people to learn coping skills and strategies to reduce the impact of trauma, loss and stress they experience during the hurricane. They also provided assessment and referrals for services. 200 counselors targeted the most impacted counties and provided door-to-door behavioral health outreach. Hope 4 NC was supported through funding from FEMA and Substance Abuse and Mental Health Services Administration (SAMHSA) ((NCDHHS, 2019). In September 2019, the NCDHHS announced that over 200,000 people impacted by Hurricane Florence were served by the Hope 4 NC behavioral health crisis counseling program. Among these 200,000 people, more than 32,000 were referred for more intensive community services in behavioral health and disability services (RHA, n.d.). The South Carolina Department of Mental Health (SCDMH), through its robust network of mental health clinics, workforce and volunteers established contact with 205,899 people from October 1, 2018 to September 30, 2019 (number provided by an employee of the SCDMH).

D. Utilization of post-disasters mental health programs

Even though research a few studies have shown that the majority of victims of disasters do not utilize MHS, post-disaster service utilization has not been well explored. Despite existing programs and substantial investment in mental health programs, survivors who suffer from psychopathology do not receive support (Wang et al., 2007). The decision to seek and accept help for psychological disorder is a complex process and involves several factors such as availability of healthcare services, socio-demographic characteristics, and economic and social factors (Fleury et al., 2014). Utilization of mental health programs is even more challenging in time of disaster since victims have to overcome financial, structural, and other barriers to obtaining care (Wang et al., 2007).

The few studies that explored post-disaster mental health program utilization are framed with Andersen's Behavioral Model of Healthcare Utilization. This framework is used to understand predictors of service use and identify factors that facilitate or disrupt utilization of healthcare programs. An individual use of services can be predicted by (1) predisposing factors such as health beliefs and social structure; by (2) enabling factors such as community/family support and health insurance; by (3) need factors such as how people view their own health and the symptoms of illness (Lowe, Sampson, et al., 2016). Wang et al. conducted research on MHS use among Hurricane Katrina survivors and interviewed 1043 victims over the phone. The research showed that 14% of the respondents who reported not using help felt that they actually needed care. Among these 14% who did not use help, 64% reported that they did not seek helps because of a lack of enabling factors such as available services, transportation and financial means (Wang et al., 2007).

Better understanding of these utilization factors could have strong public health implication as it would contribute to stronger mental health response programs, help to better meet survivors' needs and foster service utilization for vulnerable populations who need support during difficult times.

3. Current Problems and study relevance

Hurricanes have disastrous consequences on victims mental health, with effects that can linger for months or even for years (Norris, Friedman, & Watson, 2002). Two elements should be considered as we think about the threat of hurricanes on public health: 1. as literature demonstrates, extreme weather events are becoming more intense and 2. changes in demographic landscapes and urbanization contribute to the increasing number of people impacted by extreme weather events (Elsner et al., 2008) (Klotzbach, Bowen, Jr., & Bell, 2018). These two elements illustrate a pressing need to strengthen response programs, as extreme weather events will harm more and more people.

The effects of hurricanes on victims' mental health have been summarized in this literature review. To foster resiliency and minimize long-term symptoms of emotional problems, delivering mental health counseling programs following a hurricane is required. However, even though such programs already exist at the Federal and State level, the literature shows that despite current supportive programs and substantial financial investments, 56.8% of victims who need MHS, either do not receive help or do not use the existing services (Lowe, Norris, et al., 2016). The factors influencing the utilization of MHS remain unexplored and this lack of information may have an impact on the efficiency and quality of post-disaster MHS. Describe predictors of MHS utilization, identify populations who do not have access/do not seek help and address barriers and challenges faced by victims of hurricanes would have significant implications on how to better allocate resources. This would greatly strengthen mental health response programs and provide essential help to the most vulnerable.

CHAPTER 3: METHODOLOGY

Introduction

Chapter 3 includes a non-exhaustive list of funding agencies that typically address mental health related issues and that support programs implemented to provide mental health counseling. This chapter also includes a summary of the grant announcement, a description of the methodology of the grant review process as well as a description of the proposal reviewers and their area of expertise. Lastly, since this grant proposal includes work with human subjects, Chapter 3 will provide a description of guidelines for protection of human subjects.

1. A review of funding agencies

In the United States, mental health research is funded by organizations and departments within the federal government, as well as by charities, foundations, and not-for-profit organizations. The smaller organizations fund research within specific areas (e.g. Archstone Foundation funds research on underserved populations; The Brain and Behavior Research Foundation funds scientific research on mental illness diagnostics tools and therapies). On the website grants.gov, research on mental health disorders and research on mental health programs are predominantly funded by the National Institutes of Health (NIH) and its National Institute of Mental Health (NIMH) and the US Department of Health and Human Services (HHS) through the Substance Abuse and Mental Health Services Administration (SAMHSA).

A. The National Institutes of Health (NIH) and its National Institute of Mental Health (NIMH)

The NIH mission is to enhance health, reduce the burden associated to illness and disability, and extend healthy life. The NIH provides financial support through cooperative agreement, grants and contracts. While most grants are awarded for research, the NIH also supports research-related activities, such as career development, scientific conferences and fellowships and trainings (NIH, 2016). The main types of grant funding offered by the NIH are the following (NIH, 2019):

- Research grants
- Career development awards

- Research training and fellowships
- Program projects
- Resource grants
- Trans NIH programs

The NIH invests more than $32 billion a year to support its mission and is composed of 27 institutes and centers that all have a different and well-defined mission. One of them is the National Institute of Mental Health, the lead federal agency for research on mental health. The mission of the NIMH is to "transform the understanding and treatment of mental illnesses through basic and clinical research, paving the way for prevention, recovery, and cure". The NIMH offers funding opportunities in various fields, including support for clinical trial, research, career opportunities (NIMH, n.d.-a).

The Traumatic Stress Research Program is a division of the NIMH. It coordinates research on psychological, physiological, biological, and behavioral reactions to emergencies, risk factors for developing prolonged mental health sequelae (including post-traumatic stress disorder) resulting from exposure to such emergencies, service delivery and treatment of victims, and effectiveness of programs designed to prevent mental health problems. (NIMH, n.d.-b). It is the focal point for support on research projects on the mental health consequences following events in the external environment. These events can be natural or human-made and range from natural disasters (e.g. floods and hurricanes), human-made emergencies (e.g. toxic waste spill) and violence (e.g. mass shootings) (NIMH, n.d.-b).

B. The US Department of Health and Human Services (HHS) and the Substance Abuse and Mental Health Services Administration (SAMHSA)

The mission of the U.S. Department of Health & Human Services is "to enhance and protect the health and well-being of all Americans". HHS provides resources for effective health and human services and to promote progress in medicine, public health, and social services (HHS, n.d.).The Substance Abuse and Mental Health Services Administration (SAMHSA) agency is part of the HHS. SAMHSA's mission is to lessen the impact of mental illness and substance abuse

on the US population (SAMHSA, n.d.). SAMHSA provides leadership and resources, such as information and data, personnel, and programs to promote prevention, treatment and recovery services for mental and substance use disorders (SAMHSA, 2019c).

To better meet mental illness and substance abuse health care needs, SAMHSA has identified five priority areas (SAMHSA, 2018):

- Combating the opioid crisis through the expansion of prevention, treatment, and recovery support services
- Addressing serious mental illness and serious emotional disturbances
- Advancing prevention, treatment, and recovery support services for substance use
- Improving data collection, analysis, dissemination, and program and policy evaluation
- Strengthening health practitioner training and education

SAMHSA's bases its work on five core principles (SAMHSA, 2018):

- Supporting the adoption of evidence-based practices
- Increasing access to the full continuum of services for mental and substance use disorders
- Engaging in outreach to clinicians, grantees, patients, and the American public.
- Collecting, analyzing, and disseminating data to inform policies, programs, and practices
- Recognizing that the availability of mental health and substance use disorder services are integral to everyone's health

SAMHSA offers grants through its three Centers: The Center for Substance Abuse Prevention, the Center for Substance Abuse Treatment, and the Center for Mental Health Services (CMHS). The mission of the CMHS is to promote the prevention and treatment of mental health disorders through several activities. This grant proposal falls within the scope of work of the CMHS and more particularly the following activities (SAMHSA, 2019a):

- Strengthening the nation's mental health system by helping states improve and increase the quality and range of their treatment, rehabilitation, and support
- Making it easier for people to access mental health programs

- Ensures that scientifically-established findings and practice-based knowledge are applied in preventing and treating mental disorders

2. Grant Summary

The National Institute of Mental Health (NIMH) posted on May 3rd, 2012 a funding opportunity announcement (FOA) entitled "Rapid Assessment Post-Impact of Disaster". This FOA expired on October 4, 2015. The complete grant announcement can be found at PAR-12-181.

The purpose of this FOA is to provide rapid funding for research on post-impact of disaster with the objective of supporting studies on symptoms of traumatic stress reactions, on the management and delivery of mental health counseling programs and approaches to intervention. The Traumatic Stress Disorders Research Program of the NIMH acknowledges that disasters have the potential to cause serious public health burden and that there is a need to learn more about biological but also behavioral consequences of traumatic stress. This need can be addressed by conducting research involving populations that have been exposed to disasters. The NIMH is particularly engaged with topics including (but are not limited to): psychological, biological and behavioral reactions to trauma, risk factors for mental health disorders, and efficient delivery of mental health counseling programs, prevention and treatment. Successful proposals are described as demonstrating the following elements:

- The research subject must be relevant to the NIMH mission
- The disaster under study provides a unique occasion to collect information (i.e. the nature of the event and/or the population are adapted to the proposed study)
- The research results have the potential to advance the field by producing new insights instead of bolstering existing findings

This FOA utilizes the Exploratory/Developmental Research Grant (R21) mechanism. Applications to the funding opportunity have to propose a project that would not exceed two years. Direct costs are limited to $275,000 over a R21 two-year period, allowing no more than $200,000 in direct costs per year. Eligible institutions are: For-profit and non-profit organizations, Public or private institutions, such as universities, colleges, hospitals, and laboratories, Units of State government, Units of Local government, Units of State Tribal government, Units of Local Tribal

government, Eligible agencies of the Federal government, Foreign Institutions, Domestic Institutions and Faith-based or community-based organizations. Grant applications are reviewed against the following criteria: scientific merit of the proposed project, availability of funds and relevance to program priorities. For the purpose of completing a thesis for the Emory EMPH program, the student did not have to submit a complete application with required components of the FOA. She was only required to write the narrative part of the proposal and did not need to complete pieces that included budget, key personnel, or any financial and tax information.

3. NIMH Review criteria

As noted above, the NIMH emphasizes that grant applications should demonstrate that: a) the topic to be studied represents significant scientific needs relevant to the NIMH mission, b) the disaster/event under study provides a unique scientific occasion to acquire needed information, and c) the insight to be gained has the potential to advance the field by producing fundamental new insights as opposed to bolstering existing findings.
Because the Research Plan for a R21 is limited to 6 pages, an exploratory/developmental grant application does not require extensive background material or preliminary information (unlike R01 application). Thus, the reviewers focus their evaluation on the conceptual framework, the level of innovation, and the potential to significantly advance the knowledge or understanding. The following criteria are considered in evaluating applications and assigning overall scores:

- *Significance:* Does the study address an important problem or a critical barrier to progress in the field? In what capacity will the proposed investigation produce responses to ongoing, relevant inquiries? How will successful completion of the aims change the concepts, strategies, advances, treatments, services, or preventative interventions that drive this field?
- *Approach:* Are the methodology, framework and analyzes well-reasoned and tailored to the project's aims? Does the applicant consider potential problems and alternative strategies? If the project is in the early stages of growth, does the plan set viability and does it address risky aspects?

- *Innovation:* Is the project original and pioneering? Does it question current research or clinical practice? Does it examine innovative hypothesis? Does the project propose new application of theoretical concepts, methodology or interventions?
- *Investigators:* Are the investigators properly trained and well-suited for the project? Do the principal investigator and other researchers have the appropriate level of experience for the proposed work? Have they demonstrated record of achievements which have advanced their field(s)? Does the investigation team (if applicable) bring complementary and integrated skills to the project?
- *Environment:* Can the research climate in which the study is being carried out contribute to the probability of success? Is the institutional funding, facilities, and other physical resources available to the researchers sufficient for the proposed project? Is there evidence of institutional support?

Note: since this proposal is written for the purpose of completing a thesis, the criteria "investigators" and "environment" will not be evaluated by the reviewers.

Responsiveness of the grant proposal

Hurricanes, with their high prevalence of injuries, widespread and extreme property damage, disruption of social life, and of access to healthcare, result in severe and lasting psychological consequences. However, despite existing programs and substantial investments in mental health programs, most survivors of disasters are reluctant to use MHS and/or face barriers to access these services. Post-disaster service utilization has not been well explored and utilization factors remain unclear. This grant proposal intends to fill this knowledge gap by examining the factors that underlie the use of MHS. The information collected would contribute to stronger mental health response programs, help to better meet survivor's need and foster service utilization for vulnerable populations who need support during difficult times.

4. Grant review process

The five grant reviewers received the proposal via email on April 26, 2020 and were given 3 weeks to review and provide feedback. Reviewers were asked to base their critique on the

NIMH criteria listed above and on a short questionnaire of multiple choice and open-ended questions. Once responses were received, the student listed the comments and reviewed them with Professor William Michael Caudle, Committee Chair, so they can be utilized as constructive feedback for the final draft of the proposal. Comments were included in chapter four of this thesis and a final review of the proposal was conducted by the Committee Chair and Field Advisor. The final version of the proposal is found in Chapter Five.

The five questions on the EMPH reviewer template include:

1. Please state your level of agreement/disagreement with the following statement: the student makes a compelling case that the proposed research is necessary:
    A. Strongly Agree
    B. Agree
    C. Neither Agree nor Disagree
    D. Disagree
    E. Strongly Disagree

2. The proposal is well-reasoned and tailored to the project's aims:
    A. Strongly Agree
    B. Agree
    C. Neither Agree nor Disagree
    D. Disagree
    E. Strongly Disagree

3. The project is original and pioneering:
    A. Strongly Agree
    B. Agree
    C. Neither Agree nor Disagree
    D. Disagree
    E. Strongly Disagree

4. How could the proposal have been more responsive to the review criteria?

5. What improvements could be made to the theory and structure of the proposal?
6. What would have improved the argument that the grant proposal is original and pioneering?
7. What additional comments and suggestions do you have for the student?

5. Grant reviewers

William Michael Caudle, PhD - Committee Chair

Dr. caudle is a Research Associate Professor in the Department of Environmental Health at Emory University as well as a member of the Graduate Division of Biomedical and Biological Sciences (Neuroscience Program), The Center for Neurodegenerative Disease, and the Neuroscience and Behavioral Biology Program. His focus includes the relationship of environmental toxins with neurological diseases.

Tony Mendes – Field Advisor

Tony Mendes is a Mitigation Specialist with FEMA Region VIII in Denver, Colorado with over 30 years of experience in Emergency Management at the State and Federal levels. A US Army Veteran, Tony has studied at the University of California at Davis, the University of San Francisco, and the University of Denver. His FEMA experience includes program & grant management, operational planning, and risk communications. Innovative problem solving and collaboration are hallmarks of Tony's successes. With over 40 disaster deployments, he led local community, Tribal and State mitigation, recovery and redevelopment operations. He is a Certified Floodplain Manager (CFM), teaches Mitigation curricula, and is an accomplished Project Manager. He has worked with Public Assistance at Joint Field Offices innovating mitigation roles, providing quality customer service, and measuring effectiveness.

Gwen Biggerstaff, ScD, MSPH

Gwen Biggerstaff, ScD, MSPH, is the Associate Director for the Office of Program Support, Coordination, and Implementation in the Division of Foodborne, Waterborne, and Environmental Diseases (DFWED) at the Centers for Disease Control and Prevention. She received her doctorate from Tulane University's School of Public Health and Tropical Medicine and holds a Master's of Science in Public Health degree from the Rollins School of Public Health at Emory University. She has worked in DFWED since 2006, responding to enteric disease outbreaks and

evaluating programs for improving surveillance and response. Dr. Biggerstaff currently leads a team that provides technical, scientific, and logistic support for enteric disease surveillance and outbreak response capacity building activities.

Katy Seib, MSPH

Katy Seib is the Director of Programs of IANPHI U.S. office at Emory University's Global Health Institute in Atlanta. Katy Seib has worked at Emory University since 2010 serving as manager of research projects in Emory University's School of Medicine, Division of Infectious Diseases and Emory University's Rollins School of Public Health, Department of Global Health where she has managed and implemented research projects and technical work in collaboration with the CDC, the Bill and Melinda Gates Foundation, the Association of Immunization Managers, the International Association of Immunization Managers, the Global Polio Eradication Initiative, WHO, UNICEF, the Task Force for Global Health and multiple partners at universities and state health departments. She has also served as special assistant to the Chair of the U.S. National Vaccine Advisory Committee. Her research, policy and technical experience spans vaccine effectiveness and uptake, health and risk communications, emergency preparedness, and reducing global health disparities through improved infrastructures, disease elimination programs and the intersection of those efforts – particularly related to vaccine-preventable diseases. Prior to her work at Emory she was a freelance medical and technical writer for United Healthcare, Kaiser Permanente, and other clients. She earned a Master of Science in Public Health in Epidemiology from Emory's Rollins School of Public Health.

Ellen Whitney, MPH

Ellen Whitney is the Director of IANPHI U.S. office at Emory University's Global Health Institute in Atlanta. In 2015, Ellen Whitney joined IANPHI as the Director of Programs. From 2003-2015 she served as the Director of Research Projects for the Center for Public Health Preparedness and Research at Rollins School of Public Health and the Associate Director of the Emory Preparedness and Emergency Response Research Center. Her research focused on strengthening public health systems as well as epidemiology and surveillance for emerging infectious diseases. As an epidemiologist with the Centers for Disease Control and Prevention, National Center for Infectious Diseases, Bacterial and Mycotic Diseases, Meningitis and Special

Pathogens from 2000-2003, she participated in the 2001 anthrax investigation and the one-year follow-up of the anthrax survivors, as well as the 2003 monkeypox outbreak. Her past experience in BSL3 laboratories at Emory University on Tuberculosis and atypical mycobacteria lead to her work on Buruli ulcer disease. She has served as a consultant for the World Health Organization on Buruli ulcer disease. Her interests include public health systems, surveillance, epidemiology, emerging infectious diseases, zoonotic diseases, atypical mycobacteria, and public health preparedness. She received her Master in Public Health in epidemiology from the Rollins School of Public Health, Emory University.

6. Protection of Human Subjects

If funded, it is expected that this grant proposal will require full IRB committee review, as it involves research with human subject. The research will explore the factors associated with utilization and non-utilization of MHS and consists of a survey of victims of hurricane Florence and a statistical analysis of the results. The survey will be done over the phone by trained professional surveyors. They will carry out the questionnaire after describing the survey and the aims of the study to the participants. They will also explain to the participants that the phone conversation is recorded and ask for verbal consent before starting the interview. All adults (18 year and older) living in Beaufort, Carteret, or Onslow county are potential participants. Because 12.8% of the population of Onslow county is of Hispanic origin and because 10.3% of the residents speak a language other than English at home, the survey will also be available in Spanish.

Participants will be told that they can withdraw from the study, refuse to answer any questions and that they have the right to prevent their information from being used in the study. All participants will be given a phone number that they can call in case they have any questions or concerns. The completed surveys will be kept in password protected electronic files accessible only by research staff. Participants identifiable information will be kept confidential and will not be released in the results of the research project.

CHAPTER 4: INCORPORATION OF REVIEWERS COMMENTS

This chapter examines the comments made by the five reviewers and how they have been integrated into the final grant proposal. The student would like to thank William Michael Caudle, PhD; Tony Mendes; Gwen Biggerstaff, ScD, MSPH; Katy Seib, MSPH, and Ellen Whitney, MPH for taking the time to review this grant proposal. Their suggestions and comments on how to strengthen this grant proposal were extremely valuable.

Note: The reviewers' comments are in blue and the student's responses are in italics.

1. William Michael Caudle - Committee Chair

1. The student makes a compelling case that the proposed research is necessary: Strongly Agree
2. The proposal is well-reasoned and tailored to the project's aims: Strongly Agree
3. The project is original and pioneering: Strongly Agree
4. How could the proposal have been more responsive to the review criteria? None

   Response: no response needed
5. What improvements could be made to the theory and structure of the proposal? None

   Response: no response needed
6. What would have improved the argument that the grant proposal is original and pioneering? None

   Response: no response needed
7. What additional comments and suggestions do you have for the student?

   None. Amandine has been very thoughtful and diligent with the development of her research question and approach to this proposal.

   Response: no response needed

2. Tony Mendes - Field Advisor

1. The student makes a compelling case that the proposed research is necessary: Strongly Agree
2. The proposal is well-reasoned and tailored to the project's aims: Strongly Agree
3. The project is original and pioneering: Agree

4. How could the proposal have been more responsive to the review criteria? The research proposal appears to have a very neutral approach regarding identifying factors influencing accessing MHS, and those factors influencing non-access to MHS. The proposal perhaps could have focused more on mechanisms to enhance actual behavioral change within the affected populations, in terms of modification of stigma associated with accessing MHS. Witness current work with Alzheimer and Depression, the wide variety of drugs on the market to treat those diseases and their symptoms. Perhaps the outcomes of the research will show a path towards creation of new marketing, public relations, advertising, goodwill-building in the topical area of MHS, in order to drive a level of attitudinal and/or behavioral change within the nation. I would have liked to have seen a proposed hypothesis, but I realize the limitations of time and money for this effort. Next steps for the graduate student would be post-graduate studies in the areas of behavior modification; or a study and analysis of all recent (perhaps back thirty years) Individual Assistance Program delivery of the Crisis Counseling funds to states, in terms of identifying negative and positive Lessons Learned, as well as Best Practices/Case Studies and presenting a pathway for successful implementation in future events where MHS are required

Response: Since little evidence exists on MHS utilization factors, the purpose of the proposed study is to conduct explanatory research; as such, no specific hypothesis is formulated. The proposed research seeks to provide evidence of the relationship between predisposing characteristics, enabling resources, perceived needs and barriers to care and utilization/non utilization of MHS. If the results are indeed statistically significant, this would illustrate disparities between sub-populations in the use of MHS. These disparities could be taken into consideration in MHS planning to strengthen current response programs. This study could also serve as ground work for additional research on inequities in access to MHS and, as suggested by Tony Mendes, on behavioral changes in victims of hurricanes. Such research would provide valuable information on how to better allocate resources and foster service utilization for vulnerable populations.

5. What improvements could be made to the theory and structure of the proposal?

See above; also, I'm unsure of the overall selection criteria for the three counties, and whether the emphasis on a wide range of diversity might have a reverse discriminatory bias. This is a minor issue in my mind. However, many coastal residents are citizens who have multiple homes,

the coastal property being a "second" home; implying moderate financial means. I believe the survey will examine those demographic identifiers.

Response: the three counties have been selected based on the following criteria: they were among the most impacted by hurricane Florence and their populations display diverse characteristics and income levels. In order to conduct research in diverse neighborhoods within each county, target areas will be determined using the CDC's social vulnerability index. Demographic identifiers will indeed be examined through the survey.

6. What would have improved the argument that the grant proposal is original and pioneering? Perhaps delving into other areas of previous mental health accessibility research, if such exists, could give the research different angles of information to examine.

Response: Even though research a few studies have shown that the majority of victims of disasters do not utilize MHS, post-disaster service utilization has not been well explored and mental health accessibility research remains limited.

The decision to seek and accept help for psychological disorder is a complex process and involves several factors such as availability of healthcare services, socio-demographic characteristics, and economic and social factors (Fleury et al., 2014). Utilization of mental health programs is even more challenging in time of disaster since victims have to overcome financial, structural, and other barriers to obtaining care (Wang et al., 2007). The objective of this proposal focuses on better understanding these utilization factors could have strong public health implication as it would contribute to stronger mental health response programs, help to better meet survivor's need and foster service utilization for vulnerable populations who need support during difficult times.

7. What additional comments and suggestions do you have for the student? I have included some brief thoughts/comments/editorial endeavors in the proposal highlighted in RED regarding first use of acronyms being spelled out and a few minor other items.

Response: suggestions have been added to the proposal.

3. Gwen Biggerstaff

1. The student makes a compelling case that the proposed research is necessary: Strongly Agree

2. The proposal is well-reasoned and tailored to the project's aims: Strongly Agree

3. The project is original and pioneering: Agree

4. How could the proposal have been more responsive to the review criteria? The proposal sufficiently addresses the significance, approach, and innovation review criteria. The proposal establishes the need for foundational research in this area and provides clear justifications for the selected approach. While this proposal does not include specifically innovative methodologies, the aims of the research are innovative, would contribute significantly to the public health literature, and would establish critical information for planning future research.

Response: no response needed

5. What improvements could be made to the theory and structure of the proposal? The methodology and theoretical framework were clearly described and tailored to the project's aims. The methodology seems feasible and appropriate to the research question. The proposal includes plans for enrolling a sufficient study population with the expected telephone-based response rate and to enroll both English-speaking and Spanish-speaking respondents. The proposal also describes how this methodology could be expanded in future research to limit any sampling bias introduced by using a phone survey.

Response: no response needed

6. What would have improved the argument that the grant proposal is original and pioneering? The proposal established the link between psychopathology and natural disasters, including disparities in populations that are impacted. The proposal would have been strengthened by including some high-level information about current practices for delivering MHS related to natural disasters and describing the gap in existing literature about barriers to accessing MHS. For example, when summarizing the literature about people who suffer from disaster-associated psychopathology, the proposal could also specifically state that those studies do not include evaluation of accessing MHS among the study populations. This would also establish context for if the NC/Hurricane Florence example was typical.

Response: Information on current practices for delivering MHS related to natural disasters and a description of the gap in existing literature about barriers to accessing MHS are explained in the literature review (Chapter 2) of this thesis. Due to the 6-page limit of a R21, the review of

literature could not be extensively developed in the grant proposal. However, to follow Dr. Biggerstaff's advice, the student added a paragraph that emphasizes the literature gap.

If the research statement of the grant proposal were not limited to 6 pages, the following information on MHS delivery would be added:

Post-disaster counseling programs can be implemented at the Federal and State levels. States receiving a presidential major disaster declaration can seek funding from the Federal Emergency Management Agency (FEMA). FEMA funds crisis counseling assistance and training activities. The mission of FEMA's crisis counseling program (CCP) is to assist both individuals and communities in recovering from psychological effects of disasters (FEMA, 2015). FEMA offers "Immediate Services Programs" (ISP) that provide funds for up to 60 days following the presidential declaration of State of Emergency and "Regular Services Programs" (RSP) that provide funds for up to nine months (FEMA, 2015). The Substance Abuse and Mental Health Services Administration (SAMHSA) Center for Mental Health Services (CHMS) works with FEMA, through its Emergency Mental Health and Traumatic Stress Services Branch. They provide technical assistance and training for state and local mental health personnel. The CMHS is also in charge of the CPP grant administration and program oversight (SAMHSA, 2019b).

Counseling programs are also implemented at the State level, and response varies depending on factors such as the State's existing mental health operations network and the budget allocated to mental health programs.

7. What additional comments and suggestions do you have for the student?

This is a really nice proposal with clear, succinct descriptions and justifications. The proposal touched on some of the potential challenges and biases that could impact the study.

If this were a longer proposal with supplemental documentation, I would recommend Amandine consider including a few other details, including but not limited to:

- The timing of the survey and when calls would be made to improve response (i.e., evening and weekend calls)
- Details about the challenge of reaching people with cellphones vs. landlines

- Scripts and assurances of confidentiality to provide during interviews; details about how a household member would be selected for interviewing and if additional members of a household would also be included (would this be limited to adults, etc.)
- Details about how this study might engage with public health officials in NC and the local jurisdictions
- Details about how this same survey might be completed in other jurisdictions

Response: items 1, 2 and 3 were reviewed and added to the proposal.

Items 4 and 5 would be considered for a longer proposal. The North Carolina Department of Health and Human Services (NCDHHS) and its program the Hope 4 NC could be engaged in the survey. After hurricane Florence, the Hope 4 NC program helped people to learn coping skills and strategies to reduce the impact of trauma, loss and stress they experience during the hurricane. They also provided assessment and referrals for services. 200 counselors targeted the most impacted counties and provided door-to-door behavioral health outreach. Hope 4 NC was supported through funding from FEMA and Substance Abuse and Mental Health Services Administration (SAMHSA) ((NCDHHS, 2019). In September 2019, the NCDHHS announced that over 200,000 people impacted by Hurricane Florence were served by the Hope 4 NC behavioral health crisis counseling program. Among these 200,000 people, more than 32,000 were referred for more intensive community services in behavioral health and disability services (RHA, n.d.). Having the Hope 4 NC program's support would be extremely valuable for further research on inequities in access to MHS as they closely worked with the most impacted victims.

4. Katy Seib

1. The student makes a compelling case that the proposed research is necessary: Strongly Agree
2. The proposal is well-reasoned and tailored to the project's aims: Agree
3. The project is original and pioneering: Strongly Agree
4. How could the proposal have been more responsive to the review criteria? This proposal meets the review criteria very well.

Response: no response needed

5. What improvements could be made to the theory and structure of the proposal? The survey questions should be in validated formats (i.e. likert scale) and allowed for capture of qualitative data/respondent elaboration for some of the questions. Qualitative options and elaboration not only allow for the capture of additional information that may not be ascertained in a quantitative manner, but also gives the respondent the satisfaction of elaborating on their experience which may provide perceived benefits including value of participating in the study. Additional questions may be useful to capture not just whether counseling was received but the perceived value /impact on outcome.

Response: While collecting qualitative data would provide valuable information, this survey's objective is to provide evidence on possible relationships between predisposing characteristics, enabling resources, perceived needs and barriers to care and utilization/non utilization of MHS. If the results are indeed statistically significant, this would illustrate disparities between sub-populations in the use of MHS. These disparities could be further studied through additional research involving in person survey collecting qualitative data.

The questionnaire was built based on Andersen's Behavioral Model of Healthcare Utilization. This behavioral model has been extensively used in research on the utilization of health services and has been applied to a broad range of health services sectors and diseases (Babitsch et al., 2012). For this reason, questions cannot be written using validated formats such as Likert scale as this would not provide the information needed to reach the study's aims.

6. What would have improved the argument that the grant proposal is original and pioneering? Additional options including online surveys and in person surveys.

Response: Face-to-face interview would have been the best option as such protocol would offer the possibility of precisely targeting the populations of interest, including the most vulnerable. However, it would involve higher costs and thus would decrease the size of the data collected. If the proposed research is funded and brings significant results (i.e. identify specific factors predicting MHS utilization), face-to-face interviews would be an appropriate choice for future research focusing on these specific factors. Online surveys were not considered in this proposal since they would require to contact participants by phone first and because of their low response rates.

7. What additional comments and suggestions do you have for the student?

Most existing studies, when published, make their tools available – it might be helpful to review other similar works and methods. The work proposed addresses very important issues and I hope you continue you interest in this aspect of public health.

Response: Since the proposed study is a thesis project and not an actual proposal to a current funding announcement, the student was asked to only develop the following sections: Project Summary, Project Narrative, Specific aims, Research strategy, and Bibliography. However, a section on the tools of the study would definitely be added if the proposal were to be submitted.

5. Ellen Whitney

1. The student makes a compelling case that the proposed research is necessary: Strongly Agree
2. The proposal is well-reasoned and tailored to the project's aims: Strongly Agree
3. The project is original and pioneering: Neither Agree nor Disagree
4. How could the proposal have been more responsive to the review criteria? The proposal does a good job making a compelling case that the proposed research is necessary and provides background information to make the case. Additionally, the proposal is well-reasoned and tailored to the project's aims. However, the applicant could benefit from additional thought to how to make the proposal "pioneering".

Response: this proposal does not include specifically innovative methodologies. While it cannot be qualified as "pioneering", the aims of the study are innovative, would contribute to the public health literature, and would provide critical information for planning future research and mental health response programs.

5. What improvements could be made to the theory and structure of the proposal? The applicant does an excellent job explaining the approach and will utilize a well-established behavioral model. For the selection criteria for communities, the applicant should also consider which counties experienced more than one hurricane in the recent past. This may help define the "dose-response" relationship between disasters and mental disorders.

The sample selection may be biased as households may have a landline or cell phone. The sample design needs to efficiently incorporate both types of phone numbers to control cost, bias, and variance.

Response: selecting communities that experienced more than one hurricane would provide information on the dose-response relationship between disasters and mental disorders. However, this "dose-response" relationship is complex and the dose-response can be linked to other types of events such as personal trauma, man-made disasters (e.g. mass shooting) or other types of natural disasters (e.g. flood). The student proposes to add a question to the survey asking the participants if they have experienced another hurricane than Florence, as this could be associated with MHS utilization. Then, the dose-relationship could be further studied in future research, through qualitative survey.

After receiving feedback from Mrs. Whitney, the student conducted more research and found information on how to incorporate cell phone number into the sample. Sample selection was originally based on random-digit dialing of landline numbers with a geographic screening to determine if potential participants were living in the counties impacted by hurricane Florence. Cellphone sampling was excluded because of the difficulty to associate a cellphone number with a geographic area. However, the company Marketing Systems Group offers geographic targeting for cellphone sampling by compiling credit-based data crossed with proprietary sources ((Pew Research Center, 2015). The grant proposal will include the use of the services of Marketing Systems Group to include both landline and cell phone sampling and thus decrease selection bias.

6. What would have improved the argument that the grant proposal is original and pioneering?

While the proposal is not pioneering, it seeks to explore an area where research is greatly needed. To make the proposal "pioneering", the applicant could consider "informal" counseling services offered by non-traditional providers such as community groups and churches in addition to traditional providers. Adding a geographic component to the proposal may also be considered pioneering. For each respondent, map how close they are to mental health providers/services. It would also be interesting to know how many insurance plans offer mental health service as a benefit and to what extent. Insurance claims data would be another good source of data to explore to see how much utilization there was post hurricane in the geographic area of study.

Response: Questions on non-traditional providers and mental health coverage by insurance companies were added to the questionnaire. Geographic components and insurance claims data could be included in future research that would look more closely into the different factors that influence MHS utilization.

7. What additional comments and suggestions do you have for the student?

The applicant may consider adding additional variables to the model. Mapping location of services relative to the respondent would offer another layer to explore – disparity in access to mental health providers. The number of mental health providers per a given area would be worth considering in a model as well. In Georgia, many mental health providers are not taking new patients and do not take insurance so costs are often out of pocket. Is there a way to tell how many providers take insurance in NC? If the findings of the study demonstrate that SES and lack of insurance is a barrier to seeking mental health services, another study with more of an economic focus would be "willingness to pay" for low SES families.

Response: Since the grant announcement has a fairly limited budget and timeline ($250,000 over 2 year), expanding the scope of work does not seem feasible. However, Mrs. Whitney's input would be valuable in future research. Indeed, psychological consequences following a hurricane are not distributed equally and pre-, peri- and post-disaster factors influence mental health outcomes (Goldmann & Galea, 2014). Research demonstrates that individual-level indicators of socioeconomic disadvantage (persons of color, women, unemployment) are associated with higher risk of post-disaster mental disorders (Norris, Friedman, Watson, et al., 2002; Raker et al., 2019). Exploring disparity in access to mental health providers would also provide valuable information on how to better allocate resources and foster service utilization for vulnerable populations.

<u>Questionnaire suggestions:</u>

Q3: use full definitions to align with OMB Directive 15 definitions of race/ethnicity.

Response: Question 3 will be changed to align with OMB Directive 15.

Q5: add self-employed; rural NC has many farms.

Response: Self-employed was added to Question 5.

Q14: Consider asking if the respondent has health insurance currently and defining what each category covers as people will vary greatly in how they personally define very good, good, average, and poor. Does it cover mental health services? Some insurance policies only cover catastrophic accidents, others are more comprehensive.

Response: question on MHS coverage was added to the questionnaire.

Q17: consider rephrasing "mental health disorder". The word disorder has a negative connotation and may prevent respondent from answering truthfully or terminate the survey early.

Response: Mental health disorder was replaced by mental health condition.

Q24: Define "professional mental health counseling" within the survey (it is defined in the proposal). In many communities, churches or other organizations (think AA) provide counseling but it is not always by a professionally licensed counselor.

Response: surveyors will explain to the interviewee that mental health professionals are classified as mental health specialists such as psychiatrist, psychotherapist, primary care providers, nurses or mental health counselors. A question on other types of counseling (churches, communities, etc) was added to the questionnaire.

Other comments:

- Consider asking if the hurricane impacted their job. Did the respondent lose their job? If so, did they lose their health insurance coverage?

  Response: questions on hurricane impact on job and health insurance were added to the questionnaire.

- Consider social dynamics, the more a person is connected to community (religious home, community involvement, etc.), the more resilient they may be when faced with a crisis. Are there questions you could include to ascertain connectedness of a respondent?

  Response: the Q26 "Have you received emotional/financial support from family or community after hurricane Florence?" was modified to inquire about sense of community and connectedness.

- Consider reordering the survey questions. Put non threating questions before more sensitive questions.

  Response: The questionnaire was built based on Andersen's Behavioral Model of Healthcare Utilization. This behavioral model has been extensively used in research on the utilization of health services and has been applied to a broad range of health services sectors and diseases (Babitsch et al., 2012). Reordering the survey questions would disrupt the flow between the 3 elements of the behavioral model.

CHAPTER 5: FINAL VERSION OF THE GRANT PROPOSAL

Title: Assessment of mental health service utilization factors following hurricane Florence to inform future response and support programs.

1. Project Summary

Extreme weather events, such as hurricanes, flooding, droughts and fires are becoming more frequent and intense. These disasters impact physical but also psychological well-being of survivors, as they are exposed to stressors such as profound loss, social disruption, deterioration of social and community resources, and loss of perceived safety. Psychological disorders have been observed among victims of natural disasters with symptoms that can linger for months or even for years. Because of the physical and psychological consequences faced by victims of natural disasters, the increase in intensity and frequency of extreme weather events is a public health concern. Moreover, changes in demographic landscapes and urbanization contribute to the increase of people impacted by extreme weather events. For example, rise in coastal population have led to increasing hurricane-related damage along the US coastline. Hurricanes have severely impacted the US and new literature demonstrates increasing intensity of hurricanes and tropical cyclones as climate continues to warm: hurricanes will harm more and more people, leading to more severe physical and psychological consequences.

In order to foster resiliency and minimize long-term symptoms of psychological disorders, delivering mental health services (MHS) after hurricanes is required. However, literature shows that despite current supportive programs and substantial financial investments, most survivors of disasters are reluctant to use MHS and/or face barriers to access these services. The factors influencing MHS use remain unclear and this knowledge gap in utilization factors may have an impact on the efficiency and quality of post-disaster MHS. This gap may also lower their capacity to reach the most vulnerable victims and address their mental health disorders.

The main objective of this grant proposal is to conduct a quantitative survey on survivors of Hurricane Florence (September 2018) in order to collect information on the factors that led victims to use/not use mental health programs. The research will be framed by Andersen's Behavioral Model of Healthcare Utilization and will seek to identify factors that facilitate or

disrupt utilization of MHS. Such information would provide important insights for future disaster response research and could inform and strengthen future mental health response programs.

2. Project Narrative

A growing number of people will suffer from post-disaster psychological disorders as the intensity and frequency of natural disaster increase. As literature shows that most survivors of disasters are reluctant to use MHS and/or face barriers to access these services, there is a pressing need to identify factors that foster or prevent service utilization. An examination of predictors of post-disaster MHS utilization would strengthen mental health response programs and have significant implications on how to better allocate resources in order to provide essential help to the most vulnerable.

3. Specific aims

Despite existing programs and substantial investment in mental health programs, survivors who suffer from psychopathology do not receive support (Wang et al., 2007). The decision to seek and accept help for psychological disorder is a complex process and involves several factors such as availability of healthcare services, socio-demographic characteristics, and economic and social factors (Fleury et al., 2014). Utilization of mental health programs is even more challenging in time of disaster since victims have to overcome financial, structural, and other barriers to obtaining care (Wang et al., 2007). Even though research has demonstrated that the majority of victims of disasters do not utilize MHS, the factors behind this non-utilization have not been well explored.

Since little evidence exists, the purpose of the proposed study is to conduct explanatory research; as such, no specific hypothesis is formulated. The overarching goal of this proposal is to examine the factors that predict MHS use among survivors of natural disasters. The research will be framed by Andersen's Behavioral Model of Healthcare Utilization, which serves to identify factors that facilitate or disrupt utilization of healthcare programs. This framework states that individual use of services can be predicted by (1) predisposing factors such as health beliefs and social structure; by (2) enabling factors such as community/family support and health insurance;

by (3) need factors such as how people view their own health and the symptoms of illness (Lowe, Sampson, et al., 2016). These three elements of Andersen's Model will be included in the quantitative survey of this proposal. Through logistic regression, we will examine the data collected to:

- Aim 1: Identify the factors associated with utilization of MHS.
- Aim 2: Identify the factors associated with non-utilization of MHS.

The proposed research seeks to provide evidence of the relationship between predisposing characteristics, enabling resources, perceived needs and barriers to care and utilization/non utilization of MHS. The expected outcome is to illustrate potential disparities between sub-populations in the use of MHS. These disparities could be taken into consideration in MHS planning and could be further studied in future research.

4. Research strategy

A. Significance

Victims of natural disasters face consequences such as injuries, loss of habitation, food insecurity and exposure to infectious diseases (Smith et al., 2018). Disasters impact physical but also psychological well-being of survivors, as they are exposed to stressors such as profound loss, social disruption, deterioration of social and community resources, and loss of perceived safety. People who experience these disasters and do not develop psychopathology are characterized as "resilient", meaning that their coping and adaptation mechanisms allow them to continue functioning and go back to their normal social and professional life. Being resilient does not mean the absence of psychological symptoms following a disaster as most survivors experience a number of responses in the aftermath of a traumatic event, such as anger, guilt, sadness, and numbness (den Ouden et al., 2007). These responses can be seen as normal reactions in abnormal events and most survivors may experience distress for a short period of time but quickly go back to their pre-disaster level of functioning (Goldmann & Galea, 2014).

Even though studies have shown that a large proportion of disaster victims exhibit a trajectory of stably low symptoms, some victims will suffer from short- and long-term psychological disorders (Norris et al., 2009). Psychological problems such as posttraumatic stress

disorder (PTSD), major depression disorder (MDD), generalized anxiety disorder (GAD) and panic disorder (PD) have been observed among victims of natural disasters (Norris, Friedman, Watson, et al., 2002). Victims suffering from mental health disorders have symptoms that can linger for months or even for years (Norris, Friedman, & Watson, 2002) and, if untreated, can lead to other disorders such as substance abuse (Gavrilovic, Schutzwohl, Fazel, & Priebe, 2005).

Psychological consequences following a hurricane are not distributed equally and pre-, peri- and post-disaster factors influence mental health outcomes (Goldmann & Galea, 2014). Research demonstrates that individual-level indicators of socioeconomic disadvantage (persons of color, women, unemployment), previous exposure to traumatic event and pre-disaster mental health conditions are associated with higher risk of post-disaster mental disorders (Norris, Friedman, Watson, et al., 2002; Raker et al., 2019). A study on the mental health consequences of hurricane Katrina targeting low income Black women found that four in five respondents experienced moderate or severe damage to their homes and nearly one in three respondents had a relative or a friend who died during the hurricane. Among this population, 43.8% suffered from post-traumatic stress symptoms (PTSS) after 11 months (Raker et al., 2019).

Peri-disaster risk factors play also a significant role in mental health psychopathologies. The severity of exposure to disaster is the most predictive factor of mental illness and research has illustrated a “dose-response” relationship between disasters and mental disorders. The type of disaster, its magnitude, duration, and the death toll can predict the risk of psychopathology (Goldmann & Galea, 2014). Lastly, post-disaster risk factors are also predictors of the development of mental disorders. Stressors such as property damage, displacement, job loss and injury can increase the vulnerability to psychopathology. Reduction in social support and community relationship are also associated with post-disaster mental disorders. Moreover, studies have shown that higher levels of social support are associated with resilience (Goldmann & Galea, 2014).

Because psychological consequences following a hurricane are not distributed equally, it would be interesting to investigate if access to mental health counseling is equitable or if those who need help the most do not receive it. Mental health care has been shown to be successful

and hold the promise of reducing the duration and minimizing the level of post disaster psychological disorders (Gavrilovic et al., 2005) and yet most victims do not use MHS.

While the incidence of mental health disorders following hurricanes have been well studied, a limited amount of literature exists on the availability and utilization of post-hurricanes mental health programs by those who have experienced a hurricane. Only a few studies have assessed the existing mental health support programs and the MHS use (J. A. Boscarino et al., 2014). The literature also shows that despite current supportive programs and substantial financial investments, 56.8% of victims who need MHS, either do not receive help or do not use the existing services (Lowe, Norris, et al., 2016)). Most survivors of disasters are reluctant to use MHS and/or face barriers to access these services (Rodriguez & Kohn, 2008). The factors influencing service use remain unclear even though Andersen's Behavioral Model of Healthcare Utilization suggests that it can be predicted by predisposing factors, enabling factors and perceived needs (Lowe, Sampson, et al., 2016). The reasons of this non-utilization have not been well explored, leaving a knowledge gap that urgently needs to be filled. Indeed, although most individuals following a disaster do not develop mental health disorders, a sizable proportion does. Among those who develop psychological disorders, those who do not seek or receive help may develop severe and lasting disorders (Rodriguez & Kohn, 2008).

Conducting explanatory research on the factors that predict MHS use among survivors of natural disasters would have important public health implication as it would contribute to stronger mental health response programs. It would also provide valuable information on how to better allocate resources and foster service utilization for vulnerable populations. To better understand MHS utilization factors, this grant proposal is organized around two aims: using quantitative study, the first objective is to examine which factors are associated with utilization of MHS, i.e. factors that foster the use of MHS. The second objective is to explore which factors are associated with non-utilization of MHS, i.e. factors that prevent the use of such programs.

B. Approach

The two aims presented in the significance statement will be examined using the same approaches described in the following section:

- Theoretical framework:

The overarching objective of this grant proposal is framed by Andersen's Behavioral Model of Healthcare Utilization. It is a multilevel model that take into consideration both individual and contextual determinants of health services use. Andersen describes three major components (Babitsch et al., 2012):

(1) Predisposing factors include demographic characteristics such as age and sex, social factors such as education, occupation, ethnicity and family status, and mental factors such as health beliefs (values and knowledge on health and health services).
(2) Enabling factors include financing and organizational factors such as income, health insurance, patient's capability to pay for health services, and source of care. They also include transportation and travel time to seek care, distribution of healthcare facilities, but also community and family support.
(3) Need factors include individuals' perceived need for healthcare (i.e. how they evaluate their own health and symptoms of illness) and evaluated need (i.e. assessment by healthcare provider).

This behavioral model has been extensively used in research on the utilization of health services and has been applied to a broad range of health services sectors and diseases (Babitsch et al., 2012). Thus, it is appropriate to use this model in the context of post-disaster to conduct research on utilization factors of MHS.

- Target event:

Hurricane Florence was the first major hurricane of the 2018 Atlantic hurricane season. On August 30, 2018, it emerged near Cape Verde as a strong tropical depression. For the next several days, Florence maintained a steady west northwestward motion and became a category 4 hurricane by September 5, 2018. It reached its peak intensity on September 11 when the hurricane was located about 725 miles east-southeast of Cape Fear, North Carolina. The weakening hurricane approached the southeastern coast of North Carolina late on September 13 and Florence made landfall as a category 2 hurricane near Wrightsville Beach, North Carolina on September 14 (NOAA, 2019b). *See Hurricane Florence route in Appendix A.*

With winds of 140 mph and rainfall up to 50 inches, Florence produced extensive damage along the South and North Carolina coasts (N. W. S.-. NOAA, 2019). *See Hurricane Florence observed precipitation in Appendix B.* The storm caused $17 billion in damage, affected 304,000 households and resulted in 40 fatalities. Over more than 130,000 people have registered with the Federal Emergency Management Agency (FEMA) for individual assistance and a budget of $108 million was approved for individual assistance for homeowners and renters (NCDHHS, 2018; NCOSBM, 2018).

State of Emergency in both Carolinas was declared on September 11, 2018. Before Hurricane Florence made landfall, FEMA and its local partners (e.g. the North Carolina Department of Health and Human Services) were on the ground assisting state and local governments. Disaster Survivor Assistance teams went door to door to 113,069 homes in damaged areas to provide information on assistance. A Disaster Distress Helpline in English and Spanish was available to victims of Florence (FEMA, 2019). The North Carolina Department of Health and Human Services (NCDHHS) provided mental health counseling programs through The Hope 4 NC program. This program helped people to learn coping skills and strategies to reduce the impact of trauma, loss and stress they experience during the hurricane. They also provided assessment and referrals for services. 200 counselors targeted the most impacted counties and provided door-to-door behavioral health outreach. Hope 4 NC was supported through funding from FEMA and Substance Abuse and Mental Health Services Administration (SAMHSA) (NCDHHS, 2019). In September 2019, the NCDHHS announced that over 200,000 people impacted by Hurricane Florence were served by the Hope 4 NC behavioral health crisis counseling program. Among these 200,000 people, more than 32,000 were referred for more intensive community services in behavioral health and disability services (RHA, n.d.).

This grant proposal will target survivors of hurricane Florence. This hurricane has been selected for different reasons: a. It happened in 2018, which is relatively recent. Selecting a hurricane that is recent may limit recall bias; b. As mentioned earlier in this section, Florence had a severe impact on the Carolinas, affecting more than 304,000 households. Given this number, selecting a representative sample of victims seems feasible.

- Target population:

The study population will be selected based on the following criteria:

(1) Because the severity of exposure to disaster is the most predictive factor of mental illness and because research has illustrated a "dose-response" relationship between disasters and mental disorders (Goldmann & Galea, 2014), this study will target populations living in North Carolina in the counties that were the most impacted by Hurricane Florence. The list of most impacted counties is available on the website of the National Weather Service, National Oceanic and Atmospheric Administration website (NOAA, 2018).

(2) Research demonstrates that individual-level indicators of socioeconomic disadvantage (persons of color, women, unemployment), previous exposure to traumatic event and pre-disaster mental health conditions are associated with higher risk of post-disaster mental disorders (Norris, Friedman, Watson, et al., 2002; Raker et al., 2019). Using this information, and to limit bias and reach diverse populations, we will select counties with populations with diverse characteristics and income levels. More specifically, we will select counties with populations with different income levels, different levels of education, and different ethnicities. This information is available on the U.S. Census Bureau website (Census, n.d.).

(3) The same reasoning will be used within each county as we want to cover high- and low-vulnerable populations. In order to conduct research in diverse neighborhoods, target areas will be determined using the Centers for Disease Control (CDC) social vulnerability index (CDC, 2018a). Social vulnerability regroups factors such as poverty and lack of access to transportation that weaken community's capacity to prevent population suffering and financial loss in case of disaster (CDC, 2018b). The social vulnerability index (SVI) is calculated based on U.S. Census data that are grouped into four themes: Socioeconomic Status, Household Composition, Race/Ethnicity and language, and Housing and transportation. SVI maps depict the social vulnerability of communities within a specified county by census tracks and is used to help emergency response workforce to identify communities that will most likely need support during and after a disaster (CDC, 2018b). Based on these criteria, the proposed study will target Beaufort, Carteret, and Onslow counties. *U.S. Census data and SVI maps are attached in Appendix C and D.*

- Sampling:

Sample selection will be based on random-digit dialing for landline with a geographic screening to determine if potential participants are living in the counties impacted by hurricane Florence. Cellphone sampling will be done by hiring the company Marketing Systems Group that offers geographic targeting for cellphone sampling by compiling credit-based data crossed with proprietary sources (Pew Research Center, 2015. Based on literature, the response rate of telephone surveys varies between 30% and 45% and sampling size varies between 500 and 1500 (A. Boscarino et al., 2004; Lowe, Sampson, et al., 2015; Wang et al., 2007). Thus, to reach a sample size of 1,000 participants, 2,500 telephone numbers will be dialed, which appears to be feasible since the three counties have a total of 113,080 households. Trained professional surveyors will contact participants in the evening/weekend to increase response rate. They will carry out the questionnaire after describing the survey to the participants and obtaining verbal consent. Surveyors will use a computer-assisted telephone interviewing system to conduct the interviews. Interviewers will also have a list of mental health institutions in the event they have to provide assistance to an individual who requires counseling. Because 12.8% of the population of Onslow county is of Hispanic origin and because 10.3% of the residents speak a language other than English at home, the questionnaire will also be available in Spanish. All adults (18 year and older) will be potential participants.

The questionnaire *(attached in Appendix E)* is organized in three sections:

- The first section (Q1 to Q29) includes socio-demographics questions as well as questions on enabling factors (health insurance, access to transportation, family support, etc.) to be asked to all participants.
- The second section (Q30 to 34) is designed for individuals who answer affirmatively when asked if they received “professional” counseling for mental health disorders following the hurricane. “Professionals” are classified as mental health specialists such as psychiatrists, psychotherapists, primary care providers, nurses or mental health counselors.

- The third section (Q35 – 37) is designed for individuals who answer negatively when asked if they received professional counseling for mental health disorders following the hurricane. This questionnaire will focus on factors potentially associated with non-utilization of MHS.

- Data analysis:

The dependent variables are the utilization and the non-utilization of MHS. The independent variables are the factors that may affect the use of MHS. They include but are not limited to: age, ethnicity, gender, education level, household income, access to transportation, medical insurance, knowledge of availability of services and perceived need. Differences on demographic characteristics between individuals who used/those who did not use MHS will be examined using Chi-Square tests (for categorical variables) and t-test (for continuous variables). Factors associated with utilization/non-utilization of MHS will be examined using multiple logistic regression.

C. Expected Results and Study Limitations

The purpose of the proposed study being to conduct explanatory research, we do not seek for the data analysis to accept or reject a hypothesis. Instead, we expect to obtain statistically significant results that illustrate which factors foster the use of MHS (Aim 1) and which factors prevent the use of MHS (Aim 2). If the results are indeed statistically significant, this would illustrate disparities between sub-populations in the use of MHS. These disparities could be taken into consideration in MHS planning to strengthen future response programs. This study could also serve as ground work for additional research on inequities in access to MHS that would provide valuable information on how to better allocate resources and foster service utilization for vulnerable populations.

The data collection method, landline random digit dialing and cellphone dialing based on credit-based data crossed with proprietary sources, may exclude individuals who do not own a telephone such as those who live in precarious conditions and may need mental health counseling. Face-to-face interview would have been the best option as such protocol would offer the possibility of precisely targeting the populations of interest, including the most vulnerable.

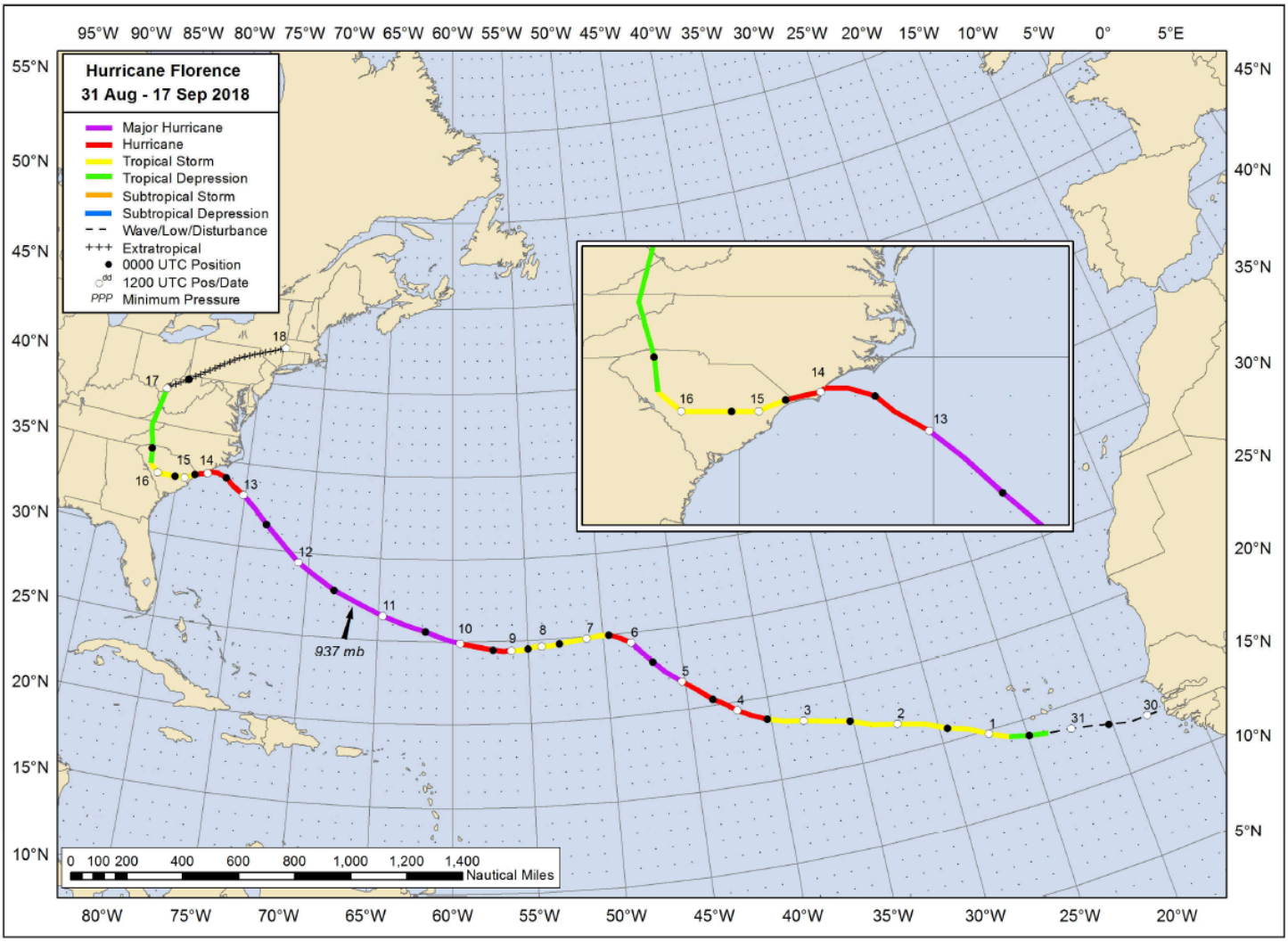
However, such protocol involves higher costs and thus would decrease the size of the data collected. If the proposed research is funded and brings significant results (i.e. identify specific factors predicting MHS utilization), face-to-face interviews would be an appropriate choice for future research focusing on these specific factors.

For Aim 2, people who did not receive MHS may be reluctant to tell the truth about whether they could have used mental health counseling because of stigma around mental health. If they acknowledge they needed help, participants may be uncomfortable sharing the reason(s) why they did not receive help (e.g. no medical insurance or no transportation mode). To limit this from happening, surveyors will provide the participants with a rationale on the importance of this study before answering questions. This rationale will emphasize the need to better understand utilization/non utilization factors of MHS in order to build stronger and more inclusive programs and provide mental health counseling to those who need it the most.

5. Appendices

Appendix A

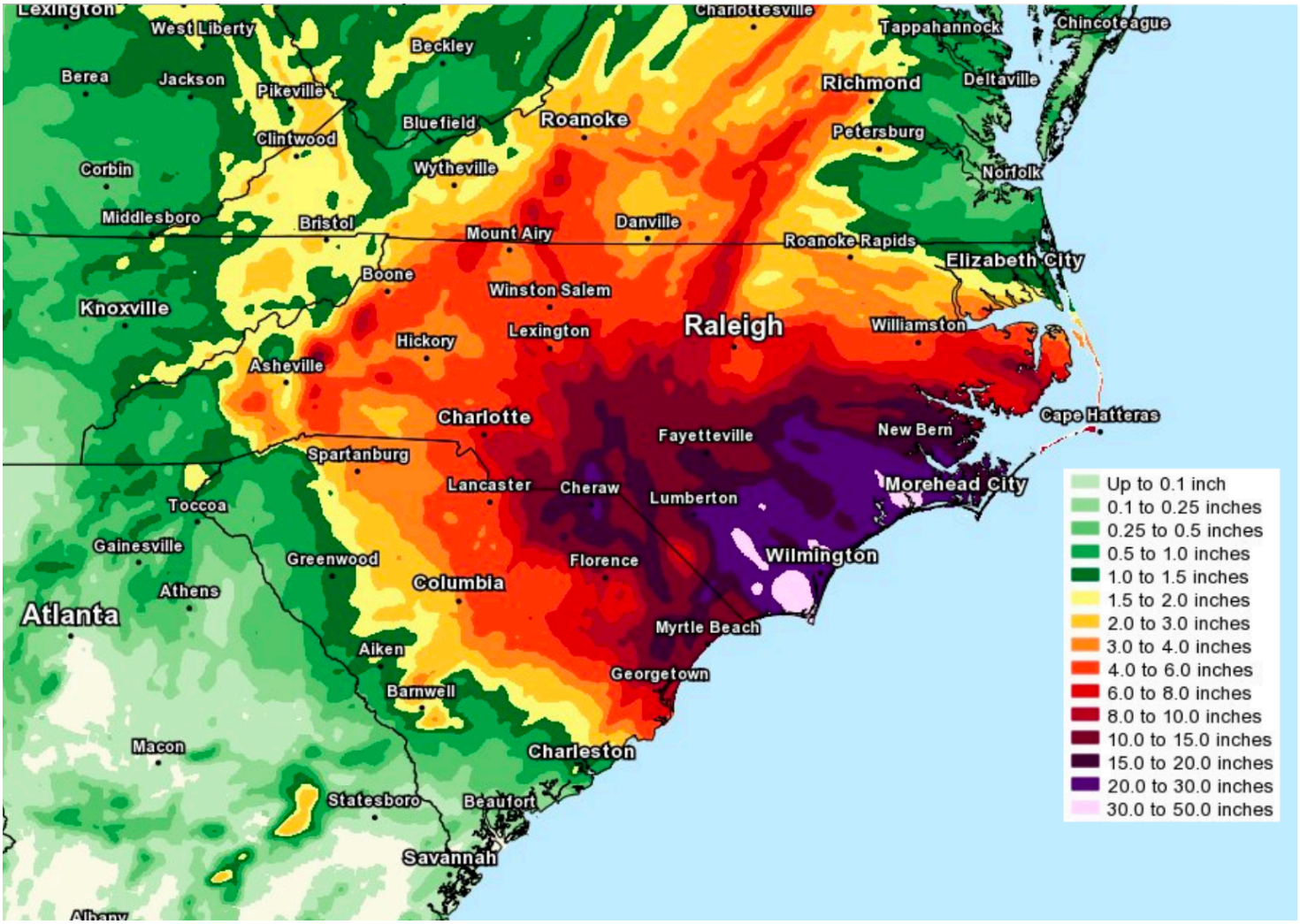
Best track positions for Hurricane Florence, 31 August–17 September 2018. NOAA Weather Prediction Center.



Appendix B

Hurricane Florence observed precipitation (inches) during the period 13–18 September 2018.

NOAA National Weather Service.



Appendix C

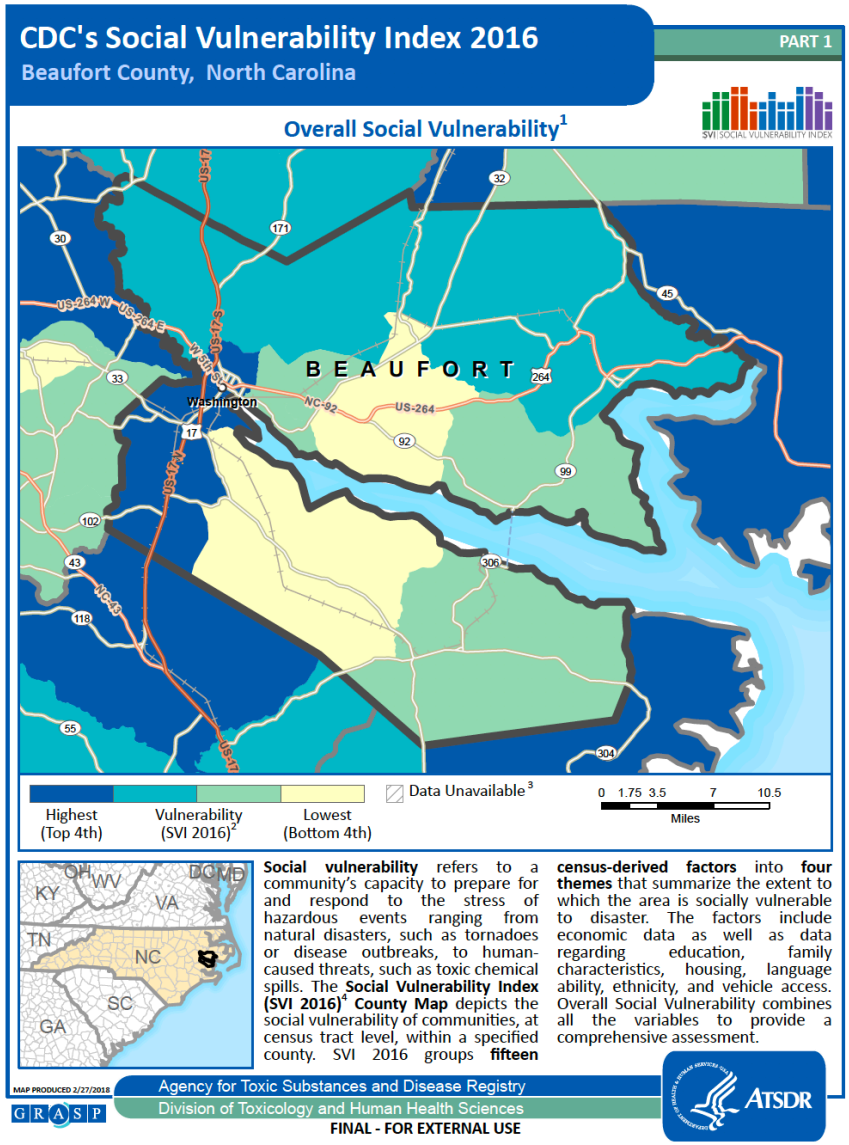
U.S. Census Data: Beaufort County, Carteret County and Onslow County, North Carolina.

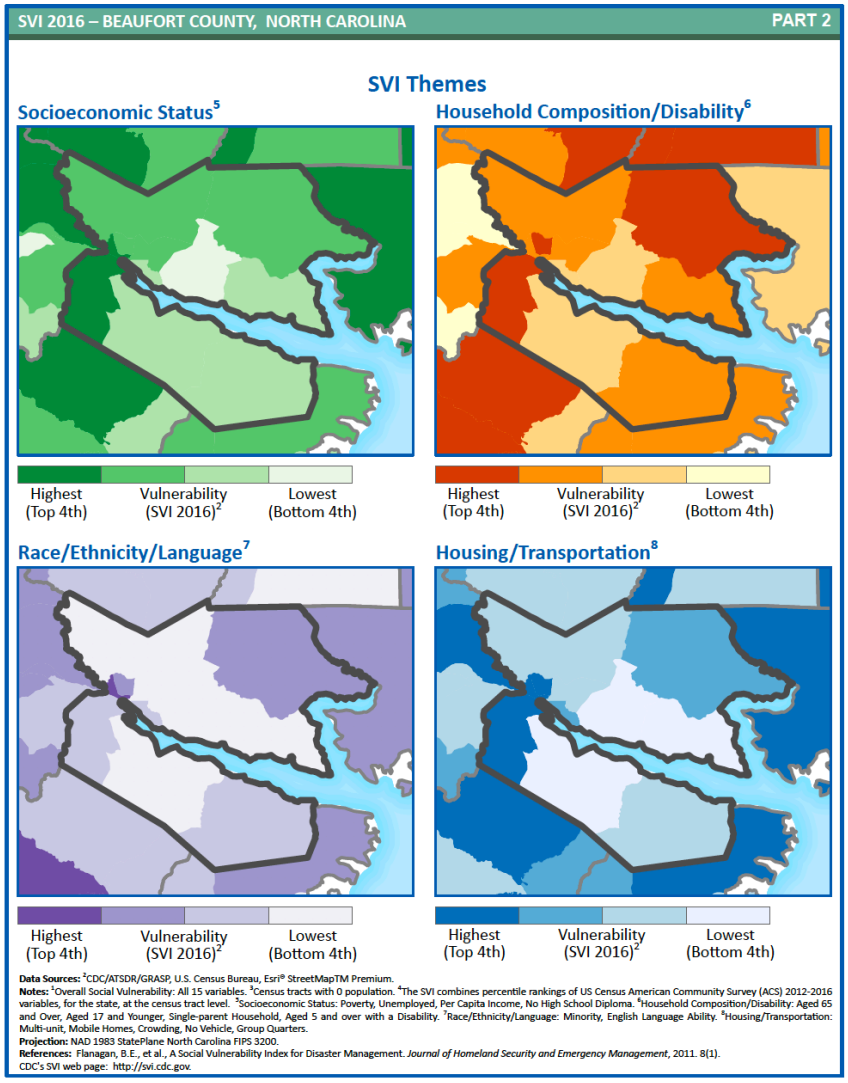
All Topics	Carteret County, North Carolina	Onslow County, North Carolina	Beaufort County, North Carolina
Population estimates, July 1, 2019, (V2019)	**69,473**	**197,938**	**46,994**
PEOPLE			
Population			
Population estimates, July 1, 2019, (V2019)	**69,473**	**197,938**	**46,994**
Population estimates, July 1, 2018, (V2018)	69,524	197,683	47,079
Population estimates base, April 1, 2010, (V2019)	66,463	177,801	47,784
Population estimates base, April 1, 2010, (V2018)	66,463	177,799	47,768
Population, percent change - April 1, 2010 (estimates base) to July 1, 2019, (V2019)	4.5%	11.3%	-1.7%
Population, percent change - April 1, 2010 (estimates base) to July 1, 2018, (V2018)	4.6%	11.2%	-1.4%
Population, Census, April 1, 2010	66,469	177,772	47,759
Age and Sex			
Persons under 5 years, percent	⚠ 4.1%	⚠ 8.8%	⚠ 4.8%
Persons under 18 years, percent	⚠ 17.6%	⚠ 24.5%	⚠ 20.1%
Persons 65 years and over, percent	⚠ 25.0%	⚠ 9.2%	⚠ 24.0%
Female persons, percent	⚠ 51.0%	⚠ 44.8%	⚠ 52.2%
Race and Hispanic Origin			
White alone, percent	⚠ 90.0%	⚠ 76.2%	⚠ 71.7%
Black or African American alone, percent (a)	⚠ 5.8%	⚠ 15.9%	⚠ 25.1%
American Indian and Alaska Native alone, percent (a)	⚠ 0.6%	⚠ 0.9%	⚠ 1.1%
Asian alone, percent (a)	⚠ 1.3%	⚠ 2.2%	⚠ 0.5%
Native Hawaiian and Other Pacific Islander alone, percent (a)	⚠ 0.2%	⚠ 0.3%	⚠ 0.1%
Two or More Races, percent	⚠ 2.2%	⚠ 4.5%	⚠ 1.5%
Hispanic or Latino, percent (b)	⚠ 4.3%	⚠ 12.8%	⚠ 8.0%
White alone, not Hispanic or Latino, percent	⚠ 86.5%	⚠ 65.9%	⚠ 65.7%
Population Characteristics			
Veterans, 2014-2018	7,954	24,448	3,130
Foreign born persons, percent, 2014-2018	3.3%	4.0%	3.0%
Housing			
Housing units, July 1, 2018, (V2018)	50,725	80,259	26,265
Owner-occupied housing unit rate, 2014-2018	72.2%	52.8%	70.4%
Median value of owner-occupied housing units, 2014-2018	$207,900	$153,900	$128,300
Median selected monthly owner costs -with a mortgage, 2014-2018	$1,404	$1,257	$1,221
Median selected monthly owner costs -without a mortgage, 2014-2018	$427	$382	$464
Median gross rent, 2014-2018	$896	$998	$713
Building permits, 2018	378	1,036	140
Families & Living Arrangements			
Households, 2014-2018	29,690	64,065	19,325
Persons per household, 2014-2018	2.28	2.71	2.42
Living in same house 1 year ago, percent of persons age 1 year+, 2014-2018	85.7%	71.4%	94.2%
Language other than English spoken at home, percent of persons age 5 years+, 2014-2018	5.5%	10.3%	5.8%

Computer and Internet Use			
Households with a computer, percent, 2014-2018	90.2%	93.3%	79.0%
Households with a broadband Internet subscription, percent, 2014-2018	82.4%	85.5%	65.4%
Education			
High school graduate or higher, percent of persons age 25 years+, 2014-2018	91.1%	91.2%	87.6%
Bachelor's degree or higher, percent of persons age 25 years+, 2014-2018	28.4%	21.4%	19.4%
Health			
With a disability, under age 65 years, percent, 2014-2018	14.5%	14.2%	13.1%
Persons without health insurance, under age 65 years, percent	⚠ 13.3%	⚠ 9.9%	⚠ 13.1%
Economy			
In civilian labor force, total, percent of population age 16 years+, 2014-2018	56.4%	46.4%	53.6%
In civilian labor force, female, percent of population age 16 years+, 2014-2018	52.9%	54.6%	49.6%
Total accommodation and food services sales, 2012 ($1,000) (c)	164,400	353,051	50,147
Total health care and social assistance receipts/revenue, 2012 ($1,000) (c)	283,725	491,728	186,547
Total manufacturers shipments, 2012 ($1,000) (c)	343,677	270,979	1,462,057
Total merchant wholesaler sales, 2012 ($1,000) (c)	85,729	139,069	360,748
Total retail sales, 2012 ($1,000) (c)	972,796	2,213,042	548,353
Total retail sales per capita, 2012 (c)	$14,384	$12,076	$11,543
Transportation			
Mean travel time to work (minutes), workers age 16 years+, 2014-2018	23.2	21.2	24.6
Income & Poverty			
Median household income (in 2018 dollars), 2014-2018	$54,428	$49,491	$43,688
Per capita income in past 12 months (in 2018 dollars), 2014-2018	$32,005	$23,783	$26,233
Persons in poverty, percent	⚠ 9.8%	⚠ 15.1%	⚠ 18.1%

Appendix D

CDC's Social Vulnerability Index 2016: Beaufort County, Carteret County and Onslow County, North Carolina.



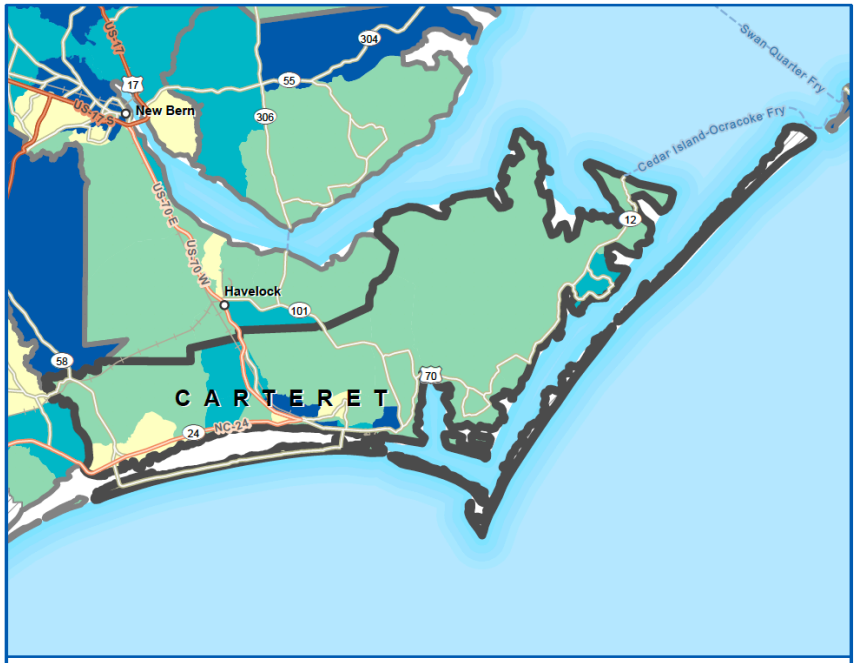


CDC's Social Vulnerability Index 2016

Carteret County, North Carolina

PART 1

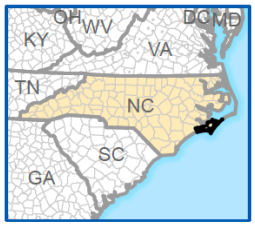
Overall Social Vulnerability[1]



Highest (Top 4th) | Vulnerability (SVI 2016)[2] | Lowest (Bottom 4th)

Data Unavailable[3]

0 2.5 5 10 15 Miles



Social vulnerability refers to a community's capacity to prepare for and respond to the stress of hazardous events ranging from natural disasters, such as tornadoes or disease outbreaks, to human-caused threats, such as toxic chemical spills. The **Social Vulnerability Index (SVI 2016)[4] County Map** depicts the social vulnerability of communities, at census tract level, within a specified county. SVI 2016 groups **fifteen census-derived factors** into **four themes** that summarize the extent to which the area is socially vulnerable to disaster. The factors include economic data as well as data regarding education, family characteristics, housing, language ability, ethnicity, and vehicle access. Overall Social Vulnerability combines all the variables to provide a comprehensive assessment.

MAP PRODUCED 2/27/2018

GRASP

Agency for Toxic Substances and Disease Registry

Division of Toxicology and Human Health Sciences

ATSDR

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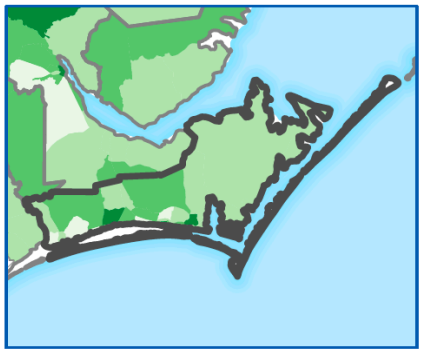
SVI 2016 – CARTERET COUNTY, NORTH CAROLINA

PART 2

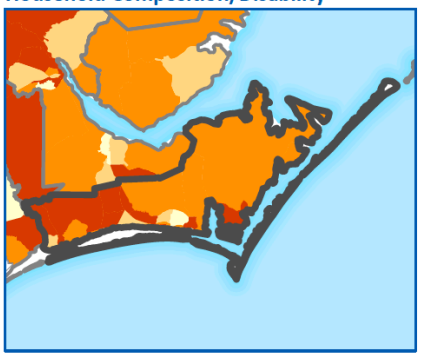
SVI Themes

Socioeconomic Status[5]



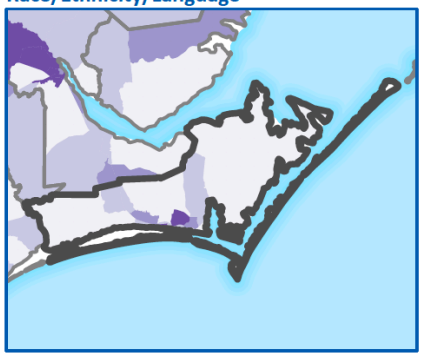
Highest (Top 4th) | Vulnerability (SVI 2016)[2] | Lowest (Bottom 4th)

Household Composition/Disability[6]



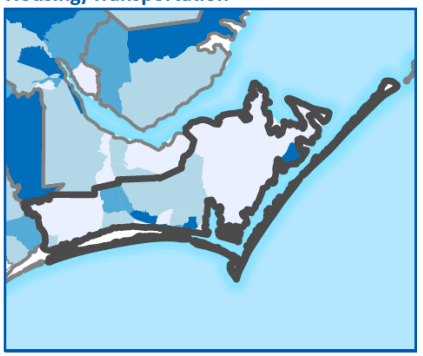
Highest (Top 4th) | Vulnerability (SVI 2016)[2] | Lowest (Bottom 4th)

Race/Ethnicity/Language[7]



Highest (Top 4th) | Vulnerability (SVI 2016)[2] | Lowest (Bottom 4th)

Housing/Transportation[8]



Highest (Top 4th) | Vulnerability (SVI 2016)[2] | Lowest (Bottom 4th)

Data Sources: [2]CDC/ATSDR/GRASP, U.S. Census Bureau, Esri® StreetMapTM Premium.

Notes: [1]Overall Social Vulnerability: All 15 variables. [3]Census tracts with 0 population. [4]The SVI combines percentile rankings of US Census American Community Survey (ACS) 2012-2016 variables, for the state, at the census tract level. [5]Socioeconomic Status: Poverty, Unemployed, Per Capita Income, No High School Diploma. [6]Household Composition/Disability: Aged 65 and Over, Aged 17 and Younger, Single-parent Household, Aged 5 and over with a Disability. [7]Race/Ethnicity/Language: Minority, English Language Ability. [8]Housing/Transportation: Multi-unit, Mobile Homes, Crowding, No Vehicle, Group Quarters.

Projection: NAD 1983 StatePlane North Carolina FIPS 3200.

References: Flanagan, B.E., et al., A Social Vulnerability Index for Disaster Management. *Journal of Homeland Security and Emergency Management*, 2011. 8(1).

CDC's SVI web page: http://svi.cdc.gov.

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CDC's Social Vulnerability Index 2016

Onslow County, North Carolina

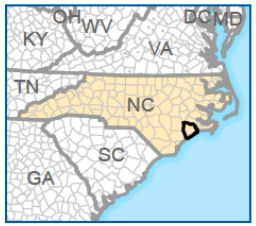
PART 1

Overall Social Vulnerability[1]

Highest (Top 4th) | Vulnerability (SVI 2016)[2] | Lowest (Bottom 4th)

Data Unavailable[3]

0 1.75 3.5 7 10.5
Miles



Social vulnerability refers to a community's capacity to prepare for and respond to the stress of hazardous events ranging from natural disasters, such as tornadoes or disease outbreaks, to human-caused threats, such as toxic chemical spills. The **Social Vulnerability Index (SVI 2016)[4] County Map** depicts the social vulnerability of communities, at census tract level, within a specified county. SVI 2016 groups **fifteen census-derived factors** into **four themes** that summarize the extent to which the area is socially vulnerable to disaster. The factors include economic data as well as data regarding education, family characteristics, housing, language ability, ethnicity, and vehicle access. Overall Social Vulnerability combines all the variables to provide a comprehensive assessment.

MAP PRODUCED 2/27/2018

GRASP

Agency for Toxic Substances and Disease Registry
Division of Toxicology and Human Health Sciences

ATSDR

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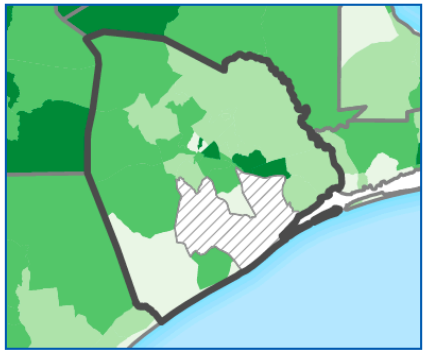
SVI 2016 – ONSLOW COUNTY, NORTH CAROLINA

PART 2

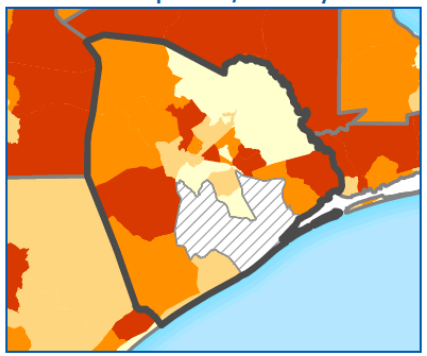
SVI Themes

Socioeconomic Status[5]



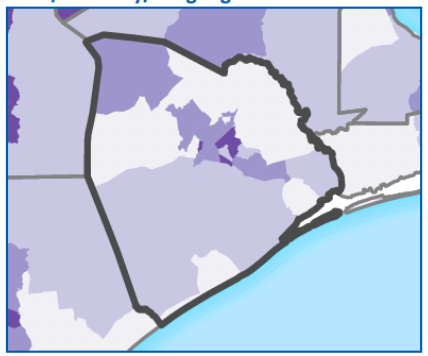
Highest (Top 4th) | Vulnerability (SVI 2016)[2] | Lowest (Bottom 4th)

Household Composition/Disability[6]



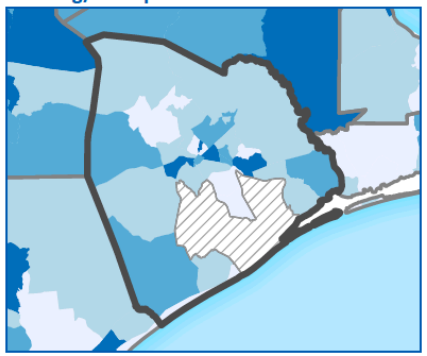
Highest (Top 4th) | Vulnerability (SVI 2016)[2] | Lowest (Bottom 4th)

Race/Ethnicity/Language[7]



Highest (Top 4th) | Vulnerability (SVI 2016)[2] | Lowest (Bottom 4th)

Housing/Transportation[8]



Highest (Top 4th) | Vulnerability (SVI 2016)[2] | Lowest (Bottom 4th)

Data Sources: [2]CDC/ATSDR/GRASP, U.S. Census Bureau, Esri® StreetMapTM Premium.
Notes: [1]Overall Social Vulnerability: All 15 variables. [3]Census tracts with 0 population. [4]The SVI combines percentile rankings of US Census American Community Survey (ACS) 2012-2016 variables, for the state, at the census tract level. [5]Socioeconomic Status: Poverty, Unemployed, Per Capita Income, No High School Diploma. [6]Household Composition/Disability: Aged 65 and Over, Aged 17 and Younger, Single-parent Household, Aged 5 and over with a Disability. [7]Race/Ethnicity/Language: Minority, English Language Ability. [8]Housing/Transportation: Multi-unit, Mobile Homes, Crowding, No Vehicle, Group Quarters.
Projection: NAD 1983 StatePlane North Carolina FIPS 3200.
References: Flanagan, B.E., et al., A Social Vulnerability Index for Disaster Management. *Journal of Homeland Security and Emergency Management*, 2011. 8(1).
CDC's SVI web page: http://svi.cdc.gov.

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Appendix E

Interview guide

1. What is your age?
    a. 18-24 years old
    b. 25-34 years old
    c. 35-44 years old
    d. 45-54 years old
    e. 55-65 years old
    f. Over 65

2. What gender do you identify as?
    a. Female
    b. Male
    c. Prefer not to answer
    d. Other (specify)

3. What is your ethnicity?
    a. Hispanic or Latino
    b. Black or African American
    c. Native American or American Indian
    d. White
    e. Asian/Pacific Islander
    f. Two or more
    g. Other (specify)
    h. Prefer not to answer

4. What is the highest degree or level of education you have completed?
    a. Some High School, no degree
    b. High School Degree or equivalent
    c. Bachelor's Degree
    d. Master's Degree
    e. Doctorate
    f. Other (specify)

5. What is your current employment status?
    a. Employed Full-Time
    b. Employed Part-Time

c. Self-employed
d. Unemployed (currently looking for work)
e. Unemployed (not currently looking for work)
f. Student
g. Retired

6. What is your marital status?
    a. Single
    b. Married or in domestic partnership
    c. Divorced or separated
    d. Widowed

7. What is your annual household income?"
    a. Less than $25,000
    b. $25,000 - $50,000
    c. $50,000 - $75,000
    d. $75,000 - $100,000
    e. $100,000 - $150,000
    f. More than $150,000

8. Including yourself, how many people live in your household?
    a. 1
    b. 2
    c. 3
    d. 4 and more

9. Do you have access to transportation?
    a. Yes
    b. No (go to 11)

10. If yes, what transportation mode do you use?
    a. Personal vehicle
    b. Family members who has a vehicle
    c. Public transportation
    d. Bicycle/motorcycle
    e. Other (specify)

11. Is English your native language?
    a. Yes
    b. No

12. How would you assess your physical health?
    a. Very good
    b. Good
    c. Average
    d. Poor

13. How would you assess your mental health?
    a. Very good
    b. Good
    c. Average
    d. Poor

14. Do you have medical insurance?
    a. Yes
    b. No (go to Q17)

15. If yes, does your medical insurance cover mental health care?
    a. Yes
    b. No

16. If you have medical insurance, how would you evaluate your coverage?
    a. Very good
    b. Good
    c. Average
    d. Poor

17. Do you have a primary care physician?
    a. Yes
    b. No

18. Have you ever been treated/are you currently being treated for mental health condition?
    a. Yes
    b. No

19. Was your home damaged because of hurricane Florence?
    a. Yes
    b. No (go to 20)

20. If yes, did you have to leave your home?
    a. Yes
    b. No

21. Were you injured during Hurricane Florence?
    a. Yes
    b. No

22. Was a relative/close friend injured/killed during Hurricane Florence?
    a. Yes
    b. No
23. Did you lose your job following hurricane Florence?
    a. Yes
    b. No

24. If yes, did you lose your medical coverage?
    a. Yes
    b. No

25. Have you experienced another hurricane before Florence?
    a. Yes
    b. No

26. Have you received emotional support from family or community after hurricane Florence?
    a. Yes
    b. No

27. If yes, who provided emotional /support? (check all that apply)
    a. Family members
    b. Counseling groups
    c. Community members
    d. Religious homes

28. How would you assess the impact of hurricane Florence on your life?
    a. Not impactful
    b. Impactful
    c. Very impactful

29. Have you received professional mental health counseling following Hurricane Florence? (surveyors will explain to the interviewee that mental health professionals are classified as mental health specialists such as psychiatrist, psychotherapist, primary care providers, nurses or mental health counselors)
    a. Yes
    b. No (go to Q 32)

For the interviewees who answer affirmatively to Q29:

30. Did you seek for help or did someone reach out to you?
    a. Sought for help
    b. Someone reached out

31. If someone reached out to you, was it:
    a. By phone
    b. Door to door
    c. Received brochure/documentation at home

32. What type of counseling did you receive?
    a. In person
    b. Online/on the phone

33. For how long did you receive counseling?
    a. One time
    b. 1 month
    c. 2-6 months
    d. 6+ months
    e. Still receiving counseling

34. How was this counseling covered?
    a. By medical insurance
    b. Paid out of pocket
    c. By FEMA/State organization

d. Other (specify)

For the interviewees who answer negatively to Q29:

35. Could you have used mental health counseling?
    a. Yes
    b. No (go to 37)

36. If yes, why didn't you receive mental health counseling?
    a. Did not know such programs were available
    b. Did not know where to find mental health resources
    c. No transportation mode
    d. Distrust in mental health professionals
    e. Do not have medical insurance
    f. Other (specify)

37. Following the hurricane, have you received information on mental health counseling programs such as the Hope 4 NC program?
    a. Yes
    a. No

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