Understanding Residents' Perceptions of FEMA Buyout Programs in Small Rural

Municipalities: A Case Study of Grifton, North Carolina

By

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ABSTRACT

The small rural town of Grifton, situated between Pitt and Lenoir counties, adjacent to

Contentnea Creek, and near the Neuse River in eastern North Carolina (N.C.), has faced several

major flood events due to hurricanes. As a result, the community has needed to seek out

residential buyouts through the Federal Emergency Management Agency's (FEMA's) Hazard

Mitigation Grant Program (HMGP)—a policy tool that aims to mitigate the risks and damages

associated with flooding by purchasing properties in flood-prone areas and converting them into

open spaces. While deemed beneficial, literature on buyouts indicates that these programs are

economically taxing on communities, slow to implement and close out, and introduce possible

inequities that impact vulnerable populations and minorities. These issues directly affect

homeowners' resiliency and adaptation to flooding, and this research contextualized it in a place-

based study—examining eastern N.C. flood events and the risks posed on small rural

municipalities. United States (U.S.) Census Bureau data was obtained and compared Grifton and

Pitt County, N.C. demographics to note any trends or deviations. Housing Assistance (HA),

Hazard Mitigation Assistance (HMA), and Public Assistance (PA) programs were analyzed to show how FEMA responded to federally declared disasters in Grifton. A survey questionnaire was posted in two Grifton Facebook groups to examine residents' familiarity, perceptions, and experience with flood events and buyout programs. 19 individual questionnaire responses were recorded, with respondents noting unfamiliarity with buyout program processes, long disaster recovery times, lack of incentives from FEMA, and uncertainties in buyout finalization. Ideas for future research included conducting GIS analyses, performing cross-sectional and longitudinal studies, and examining land and property values for any notable impacts on Grifton's economy. Recommendations for improvements on buyout programs were proposed, like effective community outreach and education, expediting buyout processes, and increased funding. From this research, scholarly discourse should initiate around FEMA's buyout programs concerned with small rural municipalities like Grifton.

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Municipalities: A Case Study of Grifton, North Carolina

A Thesis

Presented to the Faculty of the Department of Geography, Planning, and Environment

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DEDICATIONS

This thesis is dedicated to my first feline companion, Sir Artemis, or Artie, for short. Loved and adored by many, Artie succumbed to complications from feline immunodeficiency virus (FIV) and feline leukemia virus (FeLV) on July 28, 2021, at 3:57 am. Friends and family will forever remember Artie for his unique, loud personality, steadfast neediness for attention and cuddles, and beautiful heterochromatic eyes.

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CHAPTER 1: INTRODUCTION

Small rural municipalities in coastal plain areas, particularly in N.C., are accustomed to catastrophic flooding associated with tropical cyclones and other forms of excessive rainfall (University Connections, 2019). Typically, these communities struggle to recover because of limited financial resources and adverse topographic conditions—to name a few challenges. Their fight for resilience underscores the urgent issue of climate change. Climate change has further exacerbated flood frequency and magnitude because of increasing precipitation events (University Connections, 2019). Therefore, flood risks in these communities are becoming more prominent. However, environmental impacts associated with flood risks are not the only factor that needs assessment. One solution to reducing flood risks and strengthening flood mitigation in these vulnerable communities is the implementation of buyout programs—these are policy tools used for acquiring land occupied by flood-prone residential developments, relocating households out of flood risk areas, and have significant implications in the realm of federal disaster policy (BenDor et al., 2020; Freudenberg et al., 2016). However, recent literature on buyout programs indicates some issues regarding its policy that need to be addressed.

Relatively limited research has been conducted on buyout programs and their processes (Baker et al., 2018). Most existing research has looked at buyouts in urban contexts, with minimal studies examining these programs in a rural framework. Additionally, much of the scholarly discussions on buyouts have focused on the pre-buyout phase, which refers to "what happens before a buyout has focused on factors that influence residents' decisions related to buyout participation" (Baker et al., 2018, p. 457). The post-buyout phase has also been observed in literature and includes experiences on post-relocation and impacts. However, research on the peri-buyout phase, or "the lived experiences of residents during the buyout process", is only

represented in a few studies (Baker et al., 2018, p. 457). This thesis examines concerns about buyout programs during the peri-buyout phase. Grifton, N.C., is used as a case study to apply these buyout programs in the context of small rural municipalities.

1.1 Study Area Context

  With a total population of 2,448 (U.S. Census Bureau, n.d.-a), Grifton, N.C., is a low-income, racially-balanced, rural community situated in both Pitt and Lenoir counties—roughly 20 miles SSW of the city of Greenville, N.C., and approximately 12 miles NE of the city of Kinston, N.C. Figure 1 shows the city limits of Grifton, depicted by the yellow polygons, along with building footprints, depicted by the small, grey polygons, overlayed on satellite imagery in ArcGIS Pro. Water features, depicted by the blue lines, and flood hazard areas, depicted by the red lines, are also shown. Inset maps in the top right are provided to show Grifton's location in surrounding counties and state boundaries.
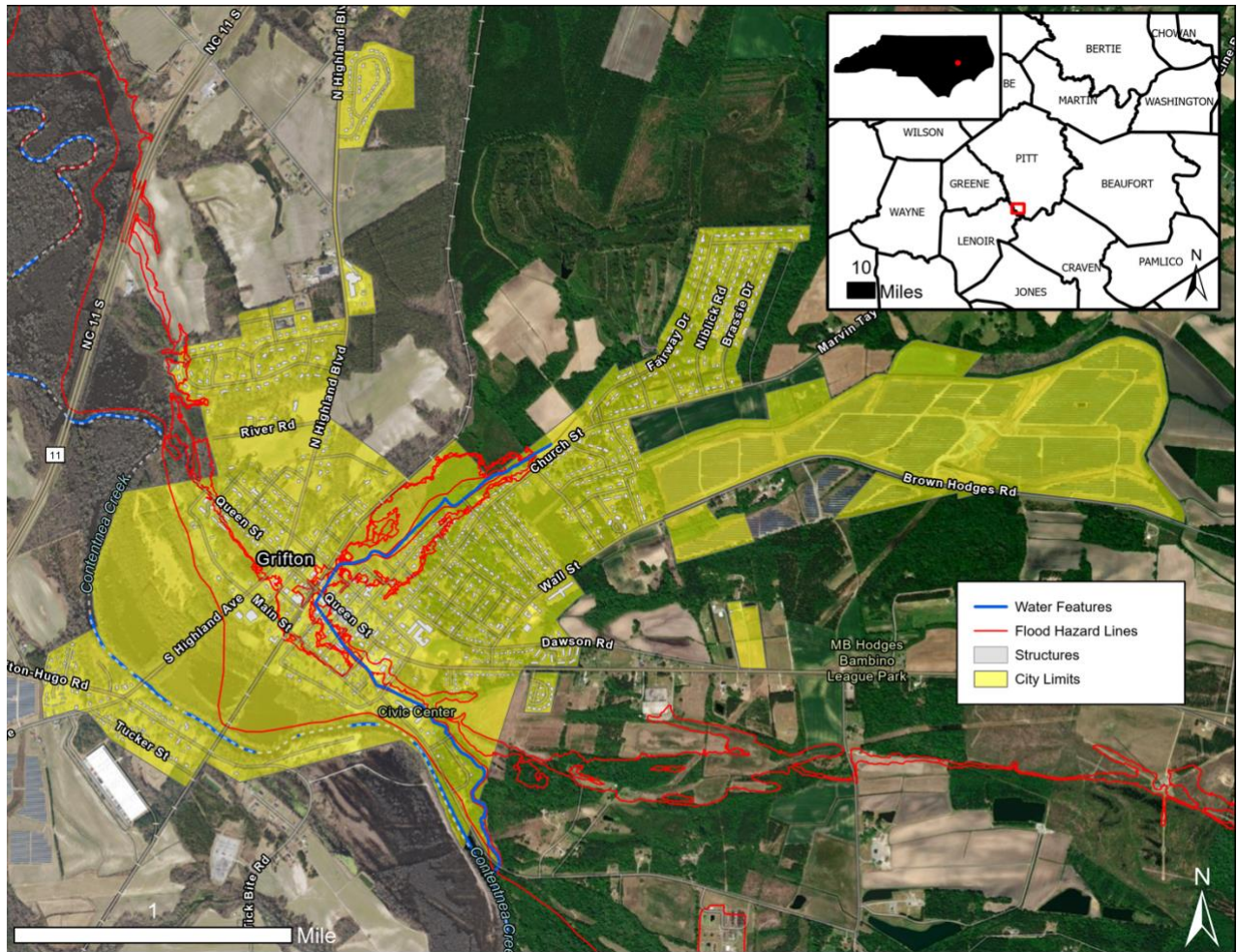
Figure 1. Map of city limits, building structures, water features, and flood hazards in Grifton, N.C. (Sources: *Pitt County Government, 2017; NC Floodplain Mapping Program, n.d.-a; NC Floodplain Mapping Program, n.d.-b*)

Grifton has been impacted numerous times by floods—most notable in recent history, Hurricane Matthew in 2016 and Hurricane Florence in 2018. Hurricane Matthew wreaked havoc in eastern N.C. Interim Grifton town manager Mark Warren noted that "this flood has damaged perhaps 20 to 30 homes, and most of the town [was] without electricity" and "the only grocery [store] we've got is underwater…so that makes food that much more an important item to get down here…the only clothing store here is the Dollar Store [and] that's underwater" (Price, 2016). Heavy rainfall from tropical systems runoff into the Neuse River and Contentnea Creek, a

southeast-flowing tributary of the Neuse River. Both drainages are notorious for overflowing their banks. Additionally, two areas north of Contentnea Creek, Mill Branch Creek and the Grifton Canal, are prone to flooding during and after intense rainfall. An area south of Contentnea Creek, Eagle Swamp, is also susceptible to flooding. (Weitz & East Carolina University, 2014). With Grifton being no stranger to major flood events, a few buyout programs have been implemented in the community resulting from hurricanes. These hurricanes were Hurricane Floyd in 1999, Hurricane Matthew, and Hurricane Florence.

1.2 Research Questions

This study aimed to examine and better understand perceptions of FEMA buyout programs in small rural municipalities using Grifton as a case study. The following research questions were explored:

1. How did FEMA respond to federally declared disasters in Grifton?

2. What are Grifton residents' perceptions about buyout programs, and what were those residents' reactions to major flood events?

CHAPTER 2: LITERATURE REVIEW

A review of the literature about buyout programs and the effects flooding has on homeowners and their vulnerability, resiliency, and adaptation to such is presented. This review also focuses on flooding in eastern N.C., highlighting communities' vulnerability to hazardous events like hurricanes. Sections 2.1 and 2.1.1 provide an overview of buyout programs and some of the issues associated with them. Section 2.2 discusses the impact of flooding on homeowners, including their vulnerability, resiliency, and adaptation to such events. Section 2.3 examines eastern N.C. flooding events to give a more localized, purposeful context for this research and the need for more consideration of small rural municipalities due to flood vulnerability.

2.1 Buyout Programs

Buyout programs are a policy tool used for acquiring land occupied by flood-prone residential developments, relocating households out of flood risk areas, and have significant implications for federal disaster policy (BenDor et al., 2020; Freudenberg et al., 2016). Dating back to the 1970s, buyout programs are predominantly funded by FEMA and the Department of Housing and Urban Development (HUD) through federal grants, but these programs are typically implemented by state and local governments (Curran-Groome et al., 2022; Freudenberg et al., 2016). FEMA, for instance, "administers three types of hazard mitigation assistance grants", which are the HMGP, the Flood Mitigation Assessment (FMA) grant, and the Pre-Disaster Mitigation (PDM) grant, which all intend to reduce federal fund dependency, improve resiliency, and decrease risks associated with future disasters (BenDor et al., 2020, p. 2). Figure 2 depicts a generalized timeline of a buyout program and how each entity involved plays a role in the process. Incorporating state and local governments (applicant and sub-applicant, respectively),

homeowners (participants), and federal agencies, like FEMA and the National Flood Insurance

Program (NFIP), these buyout programs present themselves in a multifaceted, extensive

structure. It is important to note the responsibilities each entity is concerned with, as FEMA's

designated tasks must be completed before state and local governments can act on theirs, which

are indicated by the dashed arrows. For instance, local governments cannot immediately

implement buyout programs in their affected communities after a flood event until FEMA has

announced funding availability and the state government has made that funding available to them

(Moore & Weber, 2019). As for homeowners, they must wait until the funding agency and

buyout applicants have concluded their duties before participation can begin.
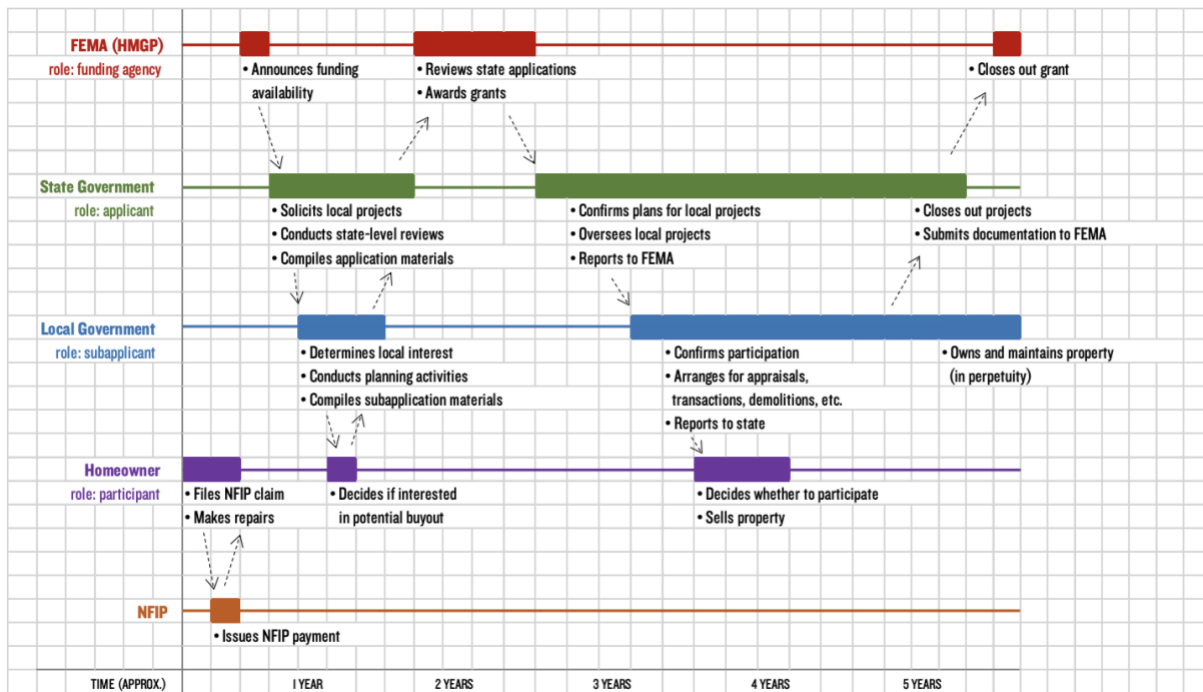
Figure 2. Generalized timeline of a buyout program and its constituents. (Source: *Moore & Weber, 2019*)

Specifically, with state and local governments, however, they have the authority and flexibility to

determine which households are eligible for a buyout based on predetermined criteria, informing

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their communities about buyout programs, and deciding what, if applicable, is the level of social and financial assistance provided to homes through the process (Curran-Groome et al., 2022). Although these programs vary in procedure and purpose, most buyout programs result in a public agency, such as a town, city, or county government, acquiring properties from homeowners and utilizing that land for less risky purposes like parkland or open space. However, some structures that once occupied that land can be rebuilt under more strict building codes and elevation requirements, although HUD typically handles this. (Freudenberg et al., 2016). Since buyout programs have become a major focus of flood mitigation strategy, FEMA has funded the acquisition of over 55,000 flood-damaged properties across the nation since 1993, with the aftermath of hurricanes like Sandy (2012), Matthew (2016), and Harvey (2017) drastically increasing this number (BenDor et al., 2020). The sixth assessment report published by the Intergovernmental Panel on Climate Change (IPCC) in 2022 notes that "the proportion of hurricanes in stronger categories has likely increased globally over the past 40 years" (Hicke et al., 2022, p. 11). The report observes "*medium confidence* that onshore propagation speed of hurricanes making landfall in the US has slowed detectably since 1900" (Hicke et al., 2022, p. 11). This observation, in turn, directly contributes to "increases in local rainfall and coastal flooding associated with these storms" (Hicke et al., 2022, p. 11). With climate change contributing to the increase in frequency and intensity of these floods, alongside a rise in floodplain development and greater magnitude and costs of flood damage, it is expected that the implementation of buyout programs will become more frequent.

2.1.1 Issues with Buyout Programs

Research highlights that current buyout programs struggle to meet the needs of affected communities. Wait times for buyout exceed over several years, making this form of assistance difficult to pursue and contributes to inequities in recovering from flooding disasters (Moore & Weber, 2019; Siders & Gerber-Chavis, 2021). Siders & Gerber-Chavis (2021), in an analysis conducted by the Natural Resources Defense Council (NDRC), reported that from the time of a disaster to the close of a buyout grant is five years (see Figure 2 in Section 2.1 for more details regarding the timeline and process). For homeowners, this is likely longer because buyout administrators typically wait until all affected residential properties have been purchased and demolished. This process is two to three years longer if federal funds are allocated instead of state and local resources. Therefore, FEMA's slow and disorganized buyout program is a last resort when private-market choices fail. This is because property value decreases due to higher vulnerability to flooding hazards and less occupancy in these affected neighborhoods (Elliot et al., 2020). Although it is important to note that the buyout policy is strictly a voluntary process—homeowners are not forced by FEMA or by state and local governments to sell their homes—those who do sell their property are faced with the difficulty of properly receiving assistance (de Vries & Frazer, 2012). Long wait times contribute to a less effective, less accessible, less equitable, and often coercive process of acquiring these flood-damaged properties (Moore & Weber, 2019; BenDor et al., 2020; Siders & Gerber-Chavis, 2021).

Recent literature suggests that there is a lack of understanding of differences in how buyouts are administered. The costs for state and local governments, and the long-term well-being of participants and communities, are directly impacted by differences in administration (Curran-Groome et al., 2022; Siders & Gerber-Chavis, 2021). Siders & Gerber-Chavis (2021)

explain some of these differences, noting that they are "due to creativity on the part of buyout administrators and changing state and federal policies" and can lead to "inconsistent interpretations of federal policy" that creates misunderstandings (p. 1). The variations in buyout implementation ultimately affects buyout participants and communities. For buyout participants, their concern lies in the amount they are compensated for their property and the additional services received from buyout administration, if any. At the same time, communities worry about the expense of the buyout program and how the acquired lands can be used (e.g., parks/open spaces). The process of buyouts frequently demands that administrators navigate challenging decisions. Administrators' values and comprehension of local context greatly influence their approach to these decisions. Determinations such as selecting buyout locations, determining home valuations, and deciding on the provision of relocation assistance necessitate administrators to strike a balance among conflicting values and priorities—often leading to inequities within the programs. These observed differences stem primarily from specific local factors such as property values, housing availability, and demographics (Siders & Gerber-Chavis, 2021).

Curran-Groome et al. (2022) find that "the costs of buyout activities—i.e., all costs other than those of purchasing the property—can be very substantial, with median activity costs of nearly $23,000 per property across local and state activities" (p. 1) in North Carolina. Suggestions to lighten the financial burden for state and local governments include asking FEMA to ensure an ample number of staff members are allocated to support states and local communities in the implementation of buyout projects, and to provide funding to states in a manner that enables them to offer top-notch technical assistance to their respective communities. Additionally, FEMA can review its current standards concerning community engagement

activities to ensure that local and state governments fulfill the minimum requirements for informing relevant parties about buyout opportunities. This includes outreach strategies such as offering template communication materials and comprehensive guidance from FEMA and respective states by improving the quality and scope of communications while alleviating the workload of local governments. Overall, those agencies have multiple pathways to improve the outcomes, speed, and cost of buyout projects. This can be achieved by allocating resources towards essential buyout activities that minimize delays, attenuation, and miscommunication while promoting fair and inclusive participation in these buyout projects. From the work of Siders & Gerber-Chavis (2021) and Curran-Groome et al. (2022), a conclusion can be made that buyouts that present these drawbacks tarnish disaster mitigation and climate adaptation strategies. These issues must be addressed so buyout programs are a more suitable option as flood events become more frequent (Moore & Weber, 2019).

Another issue in buyout programs is racial inequities during implementation. Buyouts not only intervene with local floodplains but also local housing markets. Thus, these communities and neighborhoods remain racially segregated (Elliot et al., 2020). The federal government, a predominant force in floodplain management, also has a history of discriminatory housing policy through the Federal Housing Administration (FHA), with problematic past policies, such as redlining, and attempting to keep neighborhoods and communities racially divided (Elliot et al., 2020). Furthermore, racial inequities in wealth and political power, alongside segregation, diminish the effectiveness of the buyout program because water can be seen from two viewpoints—an amenity or a threat (Elliot et al., 2020). For instance, water can be seen as an amenity by wealthy, privileged white households who can capitalize on this resource because it can be seen as desirable to live by or on. On the other hand, water can be seen as a threat, such as

in the Lower Ninth Ward of New Orleans. Neighborhoods and communities in this area are predominantly comprised of poor people and people of color who live adjacent to environmentally compromised water. This perpetuates the understanding that these communities are racially restricted settlement options (Elliot et al., 2020). Racial privilege plays a fundamental role in the local implementation of federal buyout programs in many ways on many different scales because, on average, white individuals have better access to financial resources (Elliot et al., 2020).

Historical and ongoing environmental injustices are closely connected to buyout programs (Shi et al., 2023). In the historical context, this refers to housing constructed in flood-prone locations, and the ongoing context refers to which group of individuals gets access to buyout resources. Some injustices include buyout programs fragmenting poor communities or clearing neighborhoods seen as disfigured, as well as a "lack of transparency in buyout decision-making" because underprivileged households are not familiar with buyout processes and their technicalities (Shi et al., 2023, p. 4). These injustices present in buyouts lead to the deterioration of social systems "due to systemic environmental racism in terms of where housing has been built and who is able to shape these policies" (Shi et al., 2023, p. 4). Furthermore, these injustices perpetuate discrimination based on social class and race, limited decision-making authority, inadequate representation, and unequal distribution of resources among individuals from racialized or other marginalized identity groups. A prime example of this is seen where, typically, "housing options accessible to low-income, racial minorities are more likely to be concentrated in inland flood zones" (Shi et al., 2023, p. 4). Recovery efforts and climate change adaptation initiatives following disasters, including buyouts, can serve as vessels for alleviating discrimination issues by addressing disparities and combating other social vulnerabilities.

Employing participatory and collaborative approaches that directly tackle the social

vulnerabilities created due to discrimination is an applicable solution. This allows policymakers

and administrators to fulfill the needs of low-income, marginalized individuals and households

more effectively by mitigating their flooding risks.

2.2 Homeowners' Vulnerability, Resiliency & Adaptation to Flooding

Homeowners face many challenges regarding flooding preparedness, mitigation, and

recovery due to flaws in buyout programs. These challenges include outdated building

ordinances, pre-existing gentrification within neighborhoods and communities, and inadequate

access to information on a feasible alternative to recover from and adapt to a disaster. For

example, elevating a structure is sometimes not an option for homeowners in rural municipalities

because of costs, limited access to resources, and even property characteristics (e.g., unsuitable

soil composition). Homeowners may not be informed of a buyout process until months after their

property has either been damaged or destroyed by a flooding event, the National Flood Insurance

Program (NFIP) has paid a damage claim, and rebuilding efforts are either in progress or finished

(Moore & Weber, 2019). Due to delays in the buyout process, homeowners who desperately

need federal assistance must make the difficult decision to rebuild, sometimes on the same site,

after a flood disaster and hoping there will not be another (Moore & Weber, 2019). For

individuals who choose not to rebuild, Martin and Nguyen (2021) note that "households make

two decisions about moving—they decide to move out of their residence and they decide where

to live next" (p. 436). These locational choices are vital to the foundation of the buyout program

process. Although relocation is a must due to flood vulnerability, decisions around buyouts may

introduce problems like housing age, place attachment (e.g., sense of identity linked to a specific

space, like a childhood home), and racial composition of neighborhoods (Martin, 2019; Martin & Nguyen, 2021).

Place attachment and other psychological variables related to flood experience directly affect decisions on accepting a buyout and relocating. Worry, fatalism, and risk perception, to name a few factors, are associated with one another and impact relocation decisions (Robinson et al., 2018). Specifically, when examining risk perception and worry, there is a positive correlation between these factors and the possibility of buyout acceptance. Moreover, experiences with flooding are positively correlated with knowledge regarding the subject (past, present, and/or future), making necessary adjustments to lessen flood damage, and risk perception (Robinson et al., 2018). Insuring property, elevating a home, and creating an emergency preparedness kit are all considerable protective measures in flood mitigation. However, research shows that when the perception of flood risk is more serious, there is an increased chance of accepting a buyout (Robinson et al., 2018).

Socio-demographic characteristics also affect a homeowner's perception of building resiliency and adapting to flood events. Low-income property owners and residents of historically under-invested communities typically struggle with resiliency and adaptation. FEMA's Benefit-Cost Analysis (BCA) process sees these individuals' property values as insignificant due to lower cost-benefit ratios, so a buyout is not likely offered to these neighborhoods (Moore & Weber, 2019). As for homeowners who can take advantage of buyout programs when available, some repercussions result from this decision. For example, Lincoln City, a predominantly black neighborhood in Kinston, N.C., was devastated by the flooding from Hurricane Floyd in 1999. The neighborhood was purchased through a buyout program, where houses were demolished, and utility infrastructure was removed—leaving only pavement where

trees and shrubs eventually grew over the now-abandoned community (Martin, 2019). As homeowners of Lincoln City took the initiative to move, this created instability in the social and economic frameworks of the adjacent neighborhoods. This is because affordable housing was lost in the buyout process, causing low-income renters and homeowners to resort to public housing. This, in turn, centralized the concentration of black low-income households on the east side of town (Martin, 2019). Had Lincoln City been excluded from the buyout, it is more than likely that those houses would have had a much lower market value than before Hurricane Floyd due to the increased flood hazard risks (Bin & Polasky, 2004). That was unlikely in that situation, though, as homeowners were given a choice to participate in the buyout but had to relocate due to no reasonable financial alternatives.

Lipuma (2021) describes how "buyouts benefit both participants and the surrounding community by permanently removing the possibility of future losses because people and infrastructure are no longer exposed to flood impacts in that location" (p. 11). Additionally, creating open spaces can achieve long-term flood resiliency. By doing so, communities can save on their expenses due to reduction in flood insurance costs, increased property values, mitigating the risk of property damage, indirect improvements in water quality, and greater recreational opportunities (Lipuma, 2021). Research conducted by Zavar (2015) surveyed residents from five different neighborhoods within the Wolf Run Watershed in western Lexington, Kentucky, were surveyed. The study found that without the implementation of buyouts following the floods in 1992 and 1997, property values would have dramatically dropped due to the poor conditions of repeatedly flooded homes. Moreover, the residents believed that neighborhood property values would remain the same or increase because of buyout vacated lands converted into open space.

Had the flooded properties not been acquired during the buyouts, property values would have continued to deteriorate and created future financial difficulties for those neighborhoods.

2.3 Eastern N.C. Flood Events and the Risks Posed to Small Rural Municipalities

Case studies on flood assessments of N.C. communities dominate the literature. Here, the primary focus is understanding how floods pose a significant risk to small rural municipalities, particularly in the context of eastern N.C. While it is evident that climate change has exacerbated flood risks and coastal hazards, permitting more frequent and intense events to occur, Mukherji et al. (2023) highlight the challenges that rural coastal regions face. Compound events, as Mukherji et al. (2023) describe, are a "combination of multiple drivers and/or hazards that contributes to societal or environmental risk" or a "combination of events that are not themselves extreme but lead to an extreme event or impact when combined" (as cited in Zscheischler et al., 2018, p. 470). Additionally, water hazards associated with compound events are directly related to flood risks that can be the costliest disasters in the U.S. Mukherji et al. (2023) explain furthermore that research indicates "flood damage probabilities tend to be highest in areas of low elevation that are near streams and receive extreme precipitation" (p.1), which fits the topographical and geographical description of Grifton, N.C. As noted previously, Hurricanes Floyd, Matthew, and Florence in 1999, 2016, and 2018, respectively, have battered the eastern N.C. rural communities over the last decade. Mukherji et al. (2023) note "Hurricane Matthew broke precipitation records set during the 1999 Hurricane Floyd" and that "excessive rainfall over the Tar-Pamlico, Neuse, Cape Fear, and Lower Pee Dee watersheds led to significant riverine flooding" (p. 2). Hurricane Florence, only two years after Hurricane Matthew made landfall, "toppled many of Matthew's records in Eastern North Carolina", with a consensus from

these two tropical systems that "water was the principal driver of morbidity/mortality and property damage" (Mukherji et al., 2023, p. 2). Moreover, Hurricane Matthew and Florence flooded a combined 264,958 properties valued at $75.1 billion. Due to how similar the landfall of Matthew and Florence were, Mukherji et al. (2023) emphasize that "76 percent of the properties in eastern North Carolina that were flooded during Matthew were also flooded during Florence" (p. 2).

Another example can be seen by examining a town larger than Grifton, the flood-prone city of Kinston, N.C., which is situated north of the Neuse River. De Vries et al. (2011) found the city to be temporally more vulnerable than the surrounding watersheds based on ethnohistoric research conducted from 2002 to 2006. The 1980s damming of the Neuse River, outdated floodplain maps, low monitorization of floodplain development, turnover of floodplain officials and residents, and incorrect temporal placement of flood events all enhanced vulnerability in Kinston, N.C. Thus, the city's stakeholders were very misinformed and uneducated on the space-time flood risks present during and after Hurricane Floyd struck (de Vries, 2011). A more recent case study on the Neuse River indicates an increase in flood inundation extent (Pokhrel et al., 2020). The study observed a higher flood hazard and risk in the future and, more importantly, emphasized the need for future flood risk forecasting and using projected climate data to establish and implement effective strategic plans for future floodplain management (Pokhrel et al., 2020).

Pokhrel et al. (2020) and de Vries (2011) highlight this urgency for local, state, and federal officials to better understand the flood risks posed on small rural municipalities that face topography constraints. Grifton shares a similar fate to its neighboring city of Kinston. Mukherji et al. (2023) note, "hazard mitigation practices and the challenges in rural communities that

compound barriers to mitigation in rural areas are mostly missing from the larger conversations on community resilience". Small rural municipalities are often overlooked due to the heavy focus on more suburban/urbanized communities. Local governments are responsible for implementing all mitigation efforts related to hazards. Mukherji et al. (2023) describe that "it is uncertain whether local governments have the capacity to carry out mitigation projects and actions aimed at building resilient communities" due to numerous factors including political interests, coordination with government officials, participation from public stakeholders, commitment to evaluation, the roles of planners, and organization capacity (p. 5). This problem is further elaborate on, as these rural municipalities are mostly unnoticed in academic literature because there is a failure to address how impactful compound coastal water events are, how they directly affect (and enhance) flood risk, among other issues, and the barriers to achieving proper mitigation. Policymakers must consider the challenges presented by these rural communities' ever-increasing flood risks as they continue to be limited in assistance in all facets.

Repeatedly, it is observed just how vulnerable Grifton, N.C., is to flood risks and how catastrophic compound flood events can be. For instance, in February 2021, several days of consistent rainfall surrounded one of the town's neighborhoods with floodwaters, leaving homeowners unable to get to their properties (Jordan & Hasuer, 2021). In November of 2018, two weeks after Hurricane Florence made landfall near Wrightsville Beach, N.C., news reporter Jeremy Markovich from WFAE 90.7 based out in Charlotte, N.C., visited Grifton. He noted "a lot of standing water, a campground…washed out…a lot of vultures here eating the fish that got left behind…a lot of bugs" and observed how much the mosquitoes stand out and how large they were (Markovich, 2018). Additionally, Markovich (2018) had noted that Contentnea Creek was still eight feet higher than normal. With such events like these, and with climate change

projected to exacerbate the frequency and extent of flooding, much consideration for

implementing effective hazard mitigation strategies must be done for small rural municipalities

that are vulnerable to these costly disasters.

CHAPTER 3: METHODS

This study used a quantitative approach to answer the following research questions presented in the introduction:

1. How did FEMA respond to federally declared disasters in Grifton?

2. What are Grifton residents' perceptions about buyout programs, and what were those residents' reactions to major flood events?

3.1 Secondary Data Collection and Analyses

Several secondary data sources (e.g., the U.S. Census Bureau and OpenFEMA) were required for a better understanding of the demographic composition of Grifton, the impacts from federally declared disasters, and of FEMA involvement. Selected demographic, economic, and housing factors from the U.S. Census Bureau were analyzed and compared with that of Pitt County, N.C., to note any trends or deviations. Public program data through OpenFEMA were accessed to evaluate the relevant federally declared disasters that impacted Grifton. These included the HA program data on both homeowners and renters, data on mitigated properties through the HMA grant programs, and information about PA program applicants. With these secondary data sources, a descriptive statistical analysis was conducted.

3.2 Primary Data Analysis: Sampling, Questionnaire Structure, and Survey Procedure

A questionnaire was conducted to collect data from Grifton residents who experienced major flood events and dealt with buyout programs. Due to the difficulties in reaching the study subject and the purpose of sample data not in the generalization of the population characteristics,

a nonprobability sampling technique was used. The type of sampling method that was used was voluntary response sampling, a type of sampling made up of self-chosen participants.

Approved by East Carolina University's University and Medical Center Institutional Review Board (ECU UMCIRB; IRB approval No: 21-001221; see Appendix A), this questionnaire was built in Qualtrics (https://www.qualtrics.com/)—an online survey platform that allows for the creation, distribution, and analysis of surveys. The questionnaire beings with the consent form (see Appendix B), followed by four major sections (see Appendix C):

- Section 1: Demographics
- Section 2: Experience with flood events
- Section 3: Familiarity, experience, and perceptions of the floodplain buyout program
- Section 4: Future Plan

Figure 3 below shows the structure of the questionnaire. The consent page introduced the principal investigator, the research in general terms, its purpose, the expected time to complete the survey, the overall structure of the questionnaire, emphasis on voluntary participation and confidentiality, and how to contact the ECU UMCIRB and the principal investigator for any questions, comments, or concerns. Upon completion of reading the consent page, respondents were asked if they consent and were directed to the start of the questionnaire.

The questionnaire first asked respondents a few demographic questions (Section 1) such as age, income level, education level, race/ethnicity, property ownership, and length of residency in Grifton and Pitt County. In section 2, respondents were asked about their experience with flood events, covering three major hurricanes (Floyd, Matthew, and Florence in 1999, 2016, and 2018, respectively), as well as any other heavy rainfall events not associated with those

hurricanes. Respondents were asked to select which weather events they were impacted by and then were prompted with some general questions regarding the amount of damage their property suffered and how long it took them to recover from each of the selected events. To enhance their recollection, hurricanes were listed in reverse chronological order. In section 3, respondents were asked more detailed questions about topics such as if they were offered to participate in a buyout program and if they participated in one. For each hurricane-induced flood event, the questions went into greater detail about specifics like when the paperwork for the buyout program was started and completed, actions that were taken during the process regarding their property. Respondents were also asked some satisfactory and happiness questions relating to the buyout programs itself and each level of government, their actions, and how well each entity implemented the buyout. The questions were deemed optional due to their specific nature and potential difficulty for the Grifton residents to answer. While it was crucial to receive as many responses to these questions as possible, it is reasonable and acceptable that respondents had limited knowledge of those ideas. In section 4, respondents were asked an open-ended question about whether would participate in another buyout program.
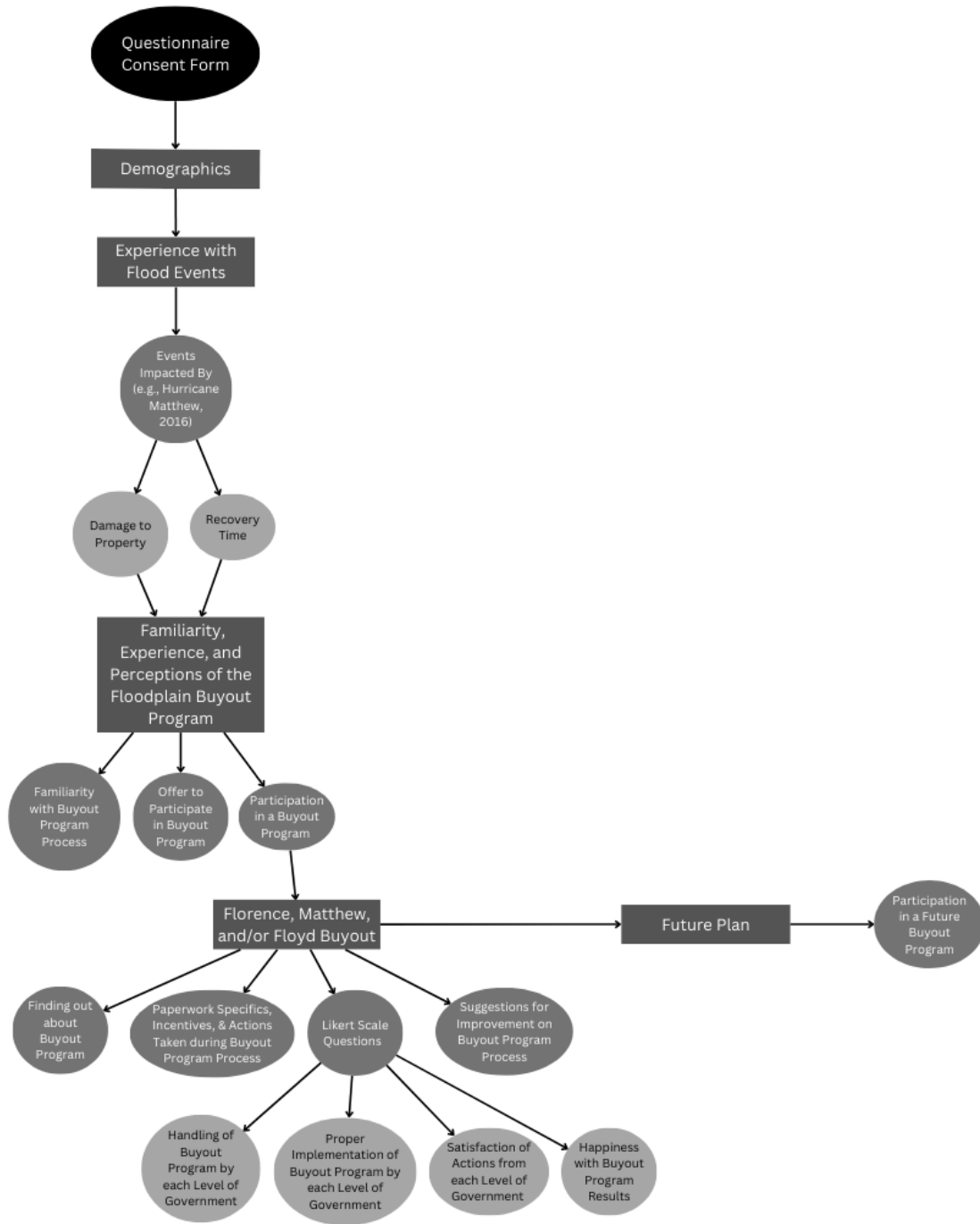
Figure 3. Flow chart of the questionnaire structure.

The survey was posted several times in two separate Facebook groups for Grifton town

members to participate in. "The Grifton Gang", a private Facebook group with over 1,400

members as of March 2023, and the "Town of Grifton Sounding Board", a public Facebook group with a little more than 500 members as of March 2023, were the two groups used in collecting responses. The inquiry to participate in the questionnaire was posted multiple times—twice in the public Facebook group and five times in the private Facebook group—between August 2022 and January 2023.

CHAPTER 4: RESULTS

4.1 U.S. Census Bureau Data Analysis

Tables 1-8 below compare demographic characteristics of Grifton and Pitt County using two U.S. Census Bureau surveys—the 2020 Decennial Census and 2021 American Community Survey (ACS) 5-Year Estimates. Race, ethnicity, sex, age, income, housing, health, and education were considered. The racial makeup of Grifton and Pitt County (Table 1) shows a relatively even split in population among white individuals and other races. A similar ethnic composition of populations (Table 2) is observed for Grifton and Pitt County. Table 3 indicates a slightly higher percentage of female individuals in Grifton and Pitt County. Grifton's median age (Table 4) is slightly higher than Pitt County's. Grifton's median household income (Table 5) is almost $20,000 lower than that of Pitt County. Note that Grifton's poverty percentage is slightly higher than Pitt County's. Table 6 shows similar occupied and vacant housing numbers for Grifton and Pitt County. Note the smaller percentage of homeowners in Grifton. The percentage of the disabled population (Table 7) in Grifton represents just over one-fifth of the entire population and is slightly higher than in Pitt County. Note that a relatively similar percentage of populations without healthcare coverage are seen across both. Lastly, a significant percentage of Pitt County's population has obtained a bachelor's degree or higher (Table 8) than compared to Grifton.

Table 1. Racial composition of populations in Grifton and Pitt County, N.C. (Source: *U.S. Census Bureau, n.d.-a*)

Race	Grifton, N.C.		Pitt County, N.C.	
	Population (n)	Percentage of Total Population	Population (n)	Percentage of Total Population
White	1,167	47.7%	88,790	52.2%
Black or African American	986	40.3%	60,414	35.5%
American Indian and Alaska Native	8	0.3%	711	0.4%

Asian	7	0.3%	3,078	1.8%
Native Hawaiian and other Pacific Islander	2	0.1%	106	0.1%
Some other race	129	5.3%	7,779	4.6%
Two or more races	149	6.1%	9,365	5.5%
TOTAL	**2,448**	**100.0%**	**170,243**	**100.0%**

Table 2. Ethnic composition of populations in Grifton and Pitt County, N.C. (Source: *U.S. Census Bureau, n.d.-a)*

	Grifton, N.C.		Pitt County, N.C.	
Ethnicity	**Population (n)**	**Percentage of Total Population**	**Population (n)**	**Percentage of Total Population**
Hispanic or Latino	262	10.7%	12,968	7.6%
Not Hispanic or Latino	2,186	89.3%	157,275	92.4%
TOTAL	**2,448**	**100%**	**170,243**	**100.0%**

Table 3. Sex composition of populations in and in Grifton and Pitt County, N.C. (Source: *U.S. Census Bureau, n.d.-a)*

	Grifton, N.C.		Pitt County, N.C.	
Sex	**Population (n)**	**Percentage of Total Population**	**Population (n)**	**Percentage of Total Population**
Male	1,130	46.1%	80,026	47.0%
Female	1,318	53.9%	90,217	53.0%
TOTAL	**2,448**	**100%**	**170,243**	**100.0%**

Table 4. Characteristics of populations and people in Grifton and Pitt County, N.C. (Source: *U.S. Census Bureau, n.d.-b)*

Characteristics	**Grifton, N.C.**	**Pitt County, N.C.**
Median Age (n)	42.0	32.9
Older Population (65 years and older, %)	16.2%	13.4%

Table 5. Characteristics of income and poverty in Grifton and Pitt County, N.C. (Source: *U.S. Census Bureau, n.d.-b)*

Characteristics	**Grifton, N.C.**	**Pitt County, N.C.**
Median Household Income ($)	$31,903	$50,422
Poverty (%)	27.5%	20.7%

Table 6. Characteristics of housing in Grifton and Pitt County, N.C. (Sources: *U.S. Census Bureau, n.d.-a; U.S. Census Bureau, n.d.-b*)

Characteristics	Grifton, N.C.	Pitt County, N.C.
Median Gross Rent ($)	$547	$846
Homeownership Rate (%)	36.0%	51.2%
Total Housing Units (n)	1,089	80,515
Occupied Housing Units (n)	962	70,016
Vacant Housing Units (n)	127	10,499

Table 7. Characteristics of health in Grifton and Pitt County, N.C. (Source: *U.S. Census Bureau, n.d.-b*)

Characteristics	Grifton, N.C.	Pitt County, N.C.
Disabled Population (%)	21.3%	14.4%
Percentage of Population Without Healthcare Coverage	11.4%	9.9%

Table 8. Educational attainment of populations in Grifton and Pitt County, N.C. (Source: *U.S. Census Bureau, n.d.-b*)

Educational Attainment (Population 25 years and older)	Grifton, N.C.	Pitt County, N.C.
High School or equivalent degree	30.8%	24.4%
Some college, no degree	27.8%	20.3%
Associate's degree	11.8%	12.5%
Bachelor's degree	4.6%	20.4%
Graduate or professional degree	3.2%	12.2%

4.2 OpenFEMA Data Analysis

Tables 9 and 10 below display the disasters registered through FEMA's HA program for homeowners and renters in Grifton, respectively. Each row displays the total number of valid registrations, the total number of those FEMA applicants who received an inspection, and the total number of FEMA applicants approved for federal disaster relief under the program. Registrations are only valid if the homeowners and renters are in a state and country that has declared Individual Assistance (IA) and registered within the FEMA-designated registration period. The IA program assists those whose primary residences were damaged or destroyed in a man-made or natural disaster (*Individual Assistance | N.C. DPS*, n.d.). Note the large number of valid registrations, inspections, and approvals in both tables.

Table 9. FEMA's HA Program registration data for homeowners in Grifton. (Source: *FEMA, n.d.-a*)

Disaster	Total valid registrations	Total inspected	Total approved for FEMA assistance
DR-4285-N.C. (Hurricane Matthew, 2016)	360	261	159
DR-4393-N.C. (Hurricane Florence, 2018)	228	167	61

Note. Data on Hurricane Floyd (1999) was not available.

Table 10. FEMA's HA Program registration data for renters in Grifton. (Source: *FEMA, n.d.-b*)

Disaster	Total valid registrations	Total inspected	Total approved for FEMA assistance
DR-4285-N.C. (Hurricane Matthew, 2016)	257	166	132
DR-4393-N.C. (Hurricane Florence, 2018)	104	69	23

Note. Data on Hurricane Floyd (1999) was not available.

Mitigation planning and projects funded by FEMA through the HMA grant program effectively reduces burdens from disaster losses and protect life and property from future disaster damages (FEMA, n.d.-c). The HMA grant programs, which are the HMGP, FMA, and Building Resilient Infrastructure and Communities (BRIC), aim to achieve the goal of reducing or eliminating hazard risks to people and property. Table 11 below shows the total mitigated properties in Grifton, resulting from Hurricanes Floyd, Irene, Matthew, and Florence. Mitigations included acquisition, elevation, relocation, wind retrofit, wildfire retrofit, seismic retrofit, floodproofed, or safe room/wind shelter (FEMA, n.d.-c). While not included in the table, it is necessary to address that most of the mitigated properties in Grifton were acquired and demolished. Specifically, 83.6% of the mitigated properties were acquired and demolished in response to Hurricanes Floyd and Irene. All mitigated properties in response to Hurricanes Matthew and Florence were acquired and demolished. The HMGP was responsible for designating and managing appropriate property actions for all mitigated properties. Most of these

properties were either single-family or manufactured homes. This included both rented and owned properties. Owned properties were specified as either principal or secondary residences.

Table 11. Total mitigated properties through FEMA's HMA programs in Grifton. (Source: *FEMA, n.d.-d*)

Disaster	Total mitigated properties
DR-1292-N.C. (Hurricane Floyd & Irene, 1999)	103
DR-4285-N.C. (Hurricane Matthew, 2016)	21
DR-4393-N.C. (Hurricane Florence, 2018)	10

Note. FEMA joined data for Hurricanes Floyd and Irene.

Figure 4 below illustrates a list of public entities in Grifton that requested PA in some form due to an event or incident declared as a disaster. These public entities are referred as "subgrantees" by FEMA, or PA applicants. PA is known as FEMA's principal grant program, providing financial assistance to communities that are recovering from major declared disasters or emergencies (FEMA, n.d.-e). Note that the same three subgrantees requested PA across each federally declared disaster listed. These subgrantees were the local fire rescue department, sewage district, and the town itself. All occurrences in the figure resulted from hurricanes.
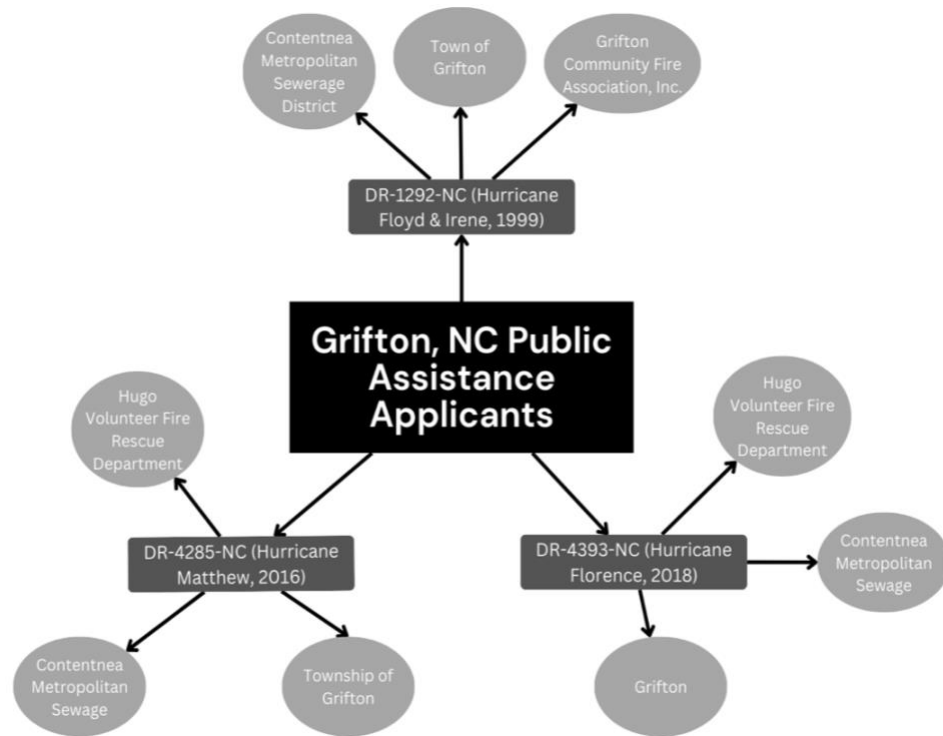
Figure 4. Mind map of PA program applicants in Grifton, N.C. (Source: *FEMA, n.d.-e*)
<u>Note:</u> FEMA joined data for Hurricanes Floyd and Irene.

Disclaimer: These products use the FEMA's OpenFEMA API, but is not endorsed by FEMA. The Federal Government or FEMA cannot vouch for the data or analyses derived from these data after the data have been retrieved from the Agency's website(s).

4.3 Questionnaire Details and Responses

The questionnaire for current Grifton residents was open from August 2022 until February 2023. Qualtrics reports that 19 individual responses were recorded across both Facebook groups. Due to the anonymity of the responses, it is unclear how many are from either group. The low number of responses could be due to a myriad of different reasons, such as the method of collection, complex questionnaire structure (see Figure 3), and the trustworthiness of

the source (link to the questionnaire). Regarding the collection method, it may have introduced a need for more personal interaction between the principal investigator and the respondent, ultimately making respondents hesitant to answer the questionnaire.

Additionally, respondents may have felt that the process was impersonal or less engaging because no face-to-face questionnaire was distributed. The link to the questionnaire may have sparked a lack of trust between the principal investigator and the respondent and may have even raised some privacy concerns. Notably, the credibility or security of the program it was distributed through (Qualtrics) may not be familiar to most respondents, which creates worries that their personal information could be compromised or misused. The lack of needed resources to access the questionnaire, such as an electronic device, internet, and Facebook group membership, may have contributed to the low number of responses. Regarding privacy concerns, the lack of responses may be attributed to respondents being cautious about sharing their thoughts about the buyout program and providing sensitive information. Another factor that could have led to a lack of responses could be the estimated time of completion, which, although it was predicted to be around 15-20 minutes, some may have felt this was burdensome, too complex given the length of it, or had a lack of motivation.

Respondents were made aware on the consent page of the questionnaire before they could begin that their responses could not be linked back to them in any way and could not be traced back to them or anyone, including the principal investigator. Therefore, no respondent's IP address, location coordinates, or anything sensitive/private was provided along with their response record. Also, respondents were informed that their participation was voluntary and that most of the questions, especially regarding their familiarities, thoughts, and perceptions of the buyout program, were optional and could stop at any time.

4.3.1 Demographics of Respondents

Factors such as age, gender, income level, race, ethnicity, and education were asked of the respondents. Figures 5-9 display the responses to these demographic characteristics listed above, respectively. There are several things to note about the demographic characteristics of the respondents. Predominantly white middle-aged and elderly individuals filled out the questionnaire (Figures 5 and 8). Three-fourths of the questionnaire responses were completed by individuals who identified as female (Figure 6). Most respondents make $50,000-$74,999 a year (Figure 7). Almost one-fourth of the respondents chose not to disclose their income. There were no Hispanic or Latino (of any race) respondents. Every respondent has had some form of a college education (Figure 9).
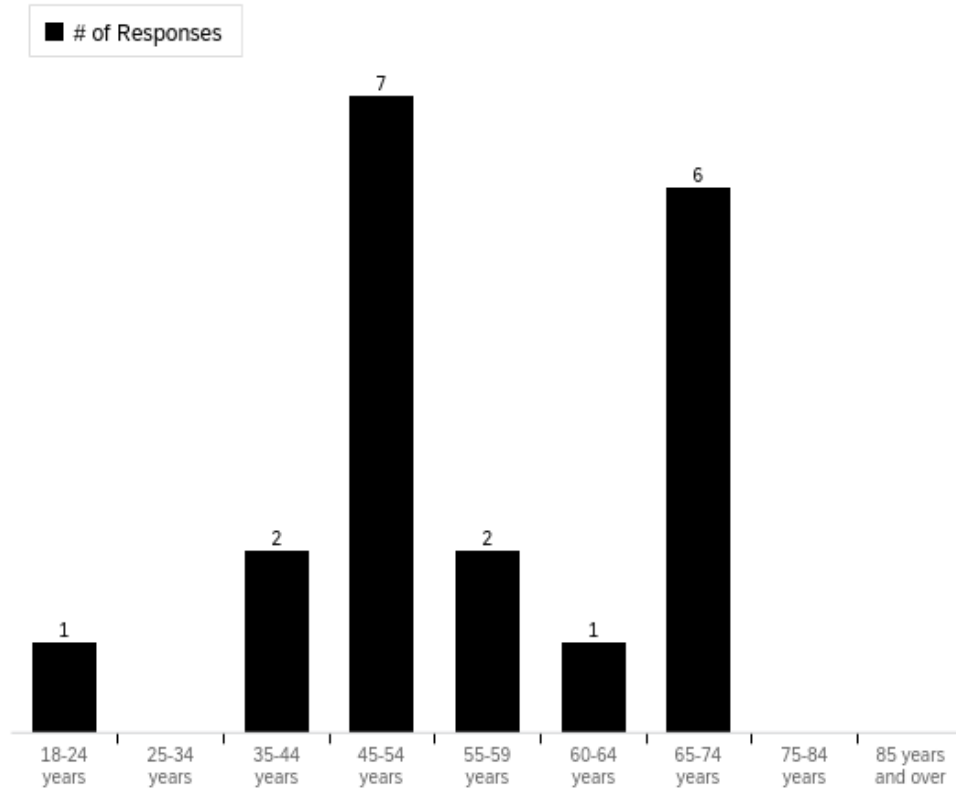
Figure 5. Age range of respondents.
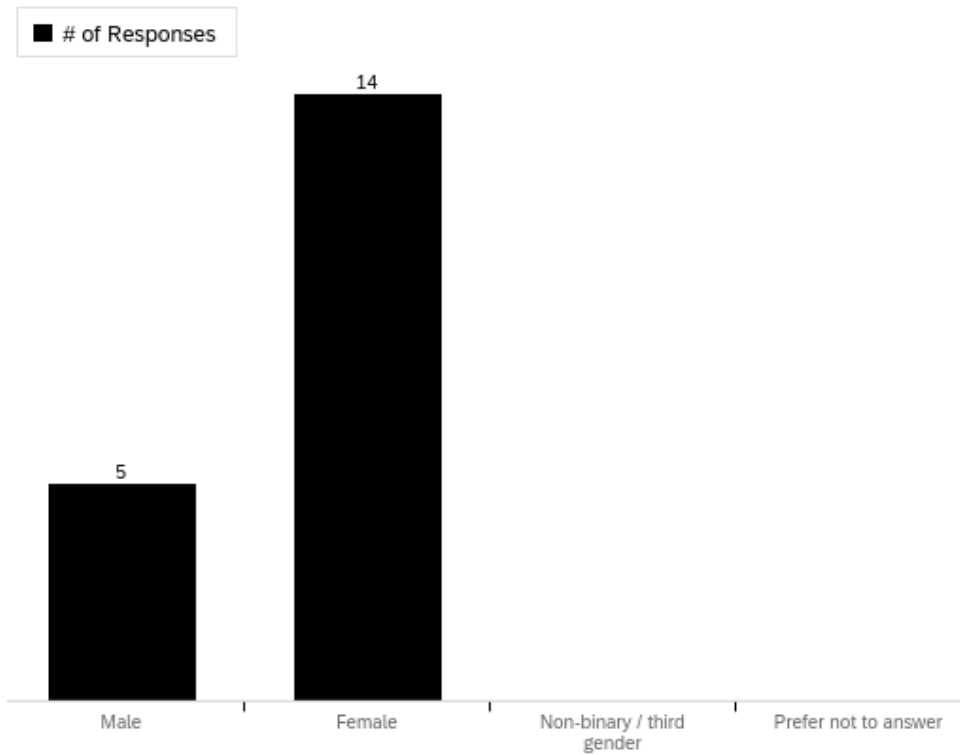
Figure 6. Gender of respondents.
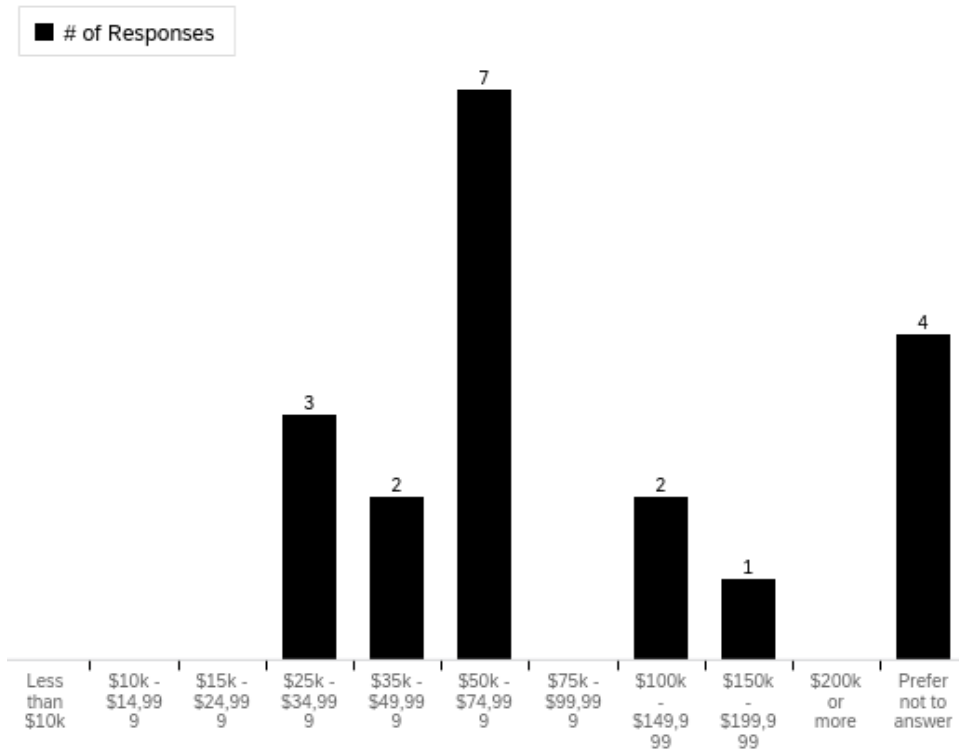
Figure 7. Income level of respondents.
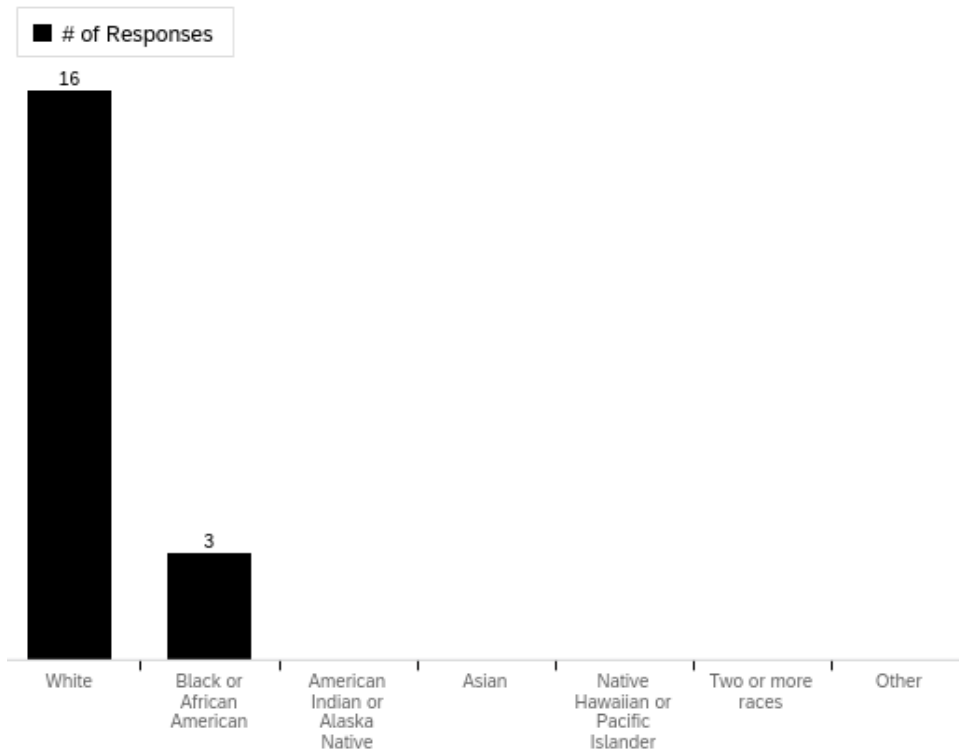
Figure 8. Race of respondents.
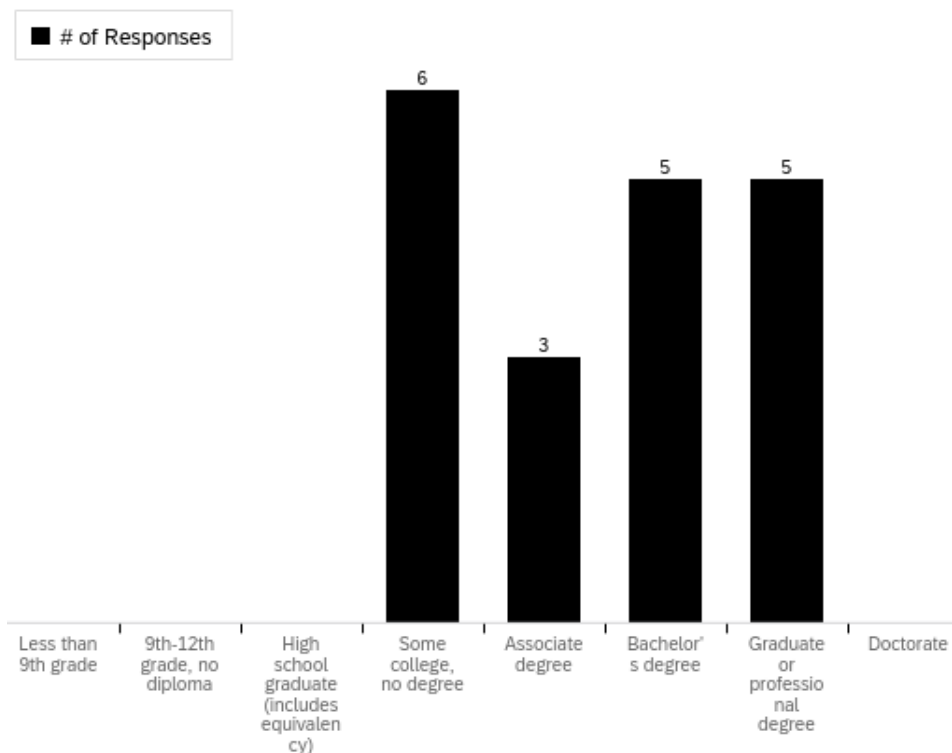
Figure 9. Education level of respondents.

Figures 10-12 show the responses to questions regarding property ownership and residency. Respondents also provided their statuses on their property ownership (e.g., own) and their length of residency in both Grifton and Pitt County. About 95% of individuals who responded to the questionnaire indicated owning property. One individual noted they neither own or rent their property, which may indicate they may live with another individual who owns or rents a property they reside in. None of the respondents indicated that they were renting. Also, most respondents revealed that they have lived in Grifton (66.7%) and Pitt County (88.2%) for a decade or longer. It is important to note that the questions about length of residency saw less than 19 responses for each, meaning missing data (no responses).
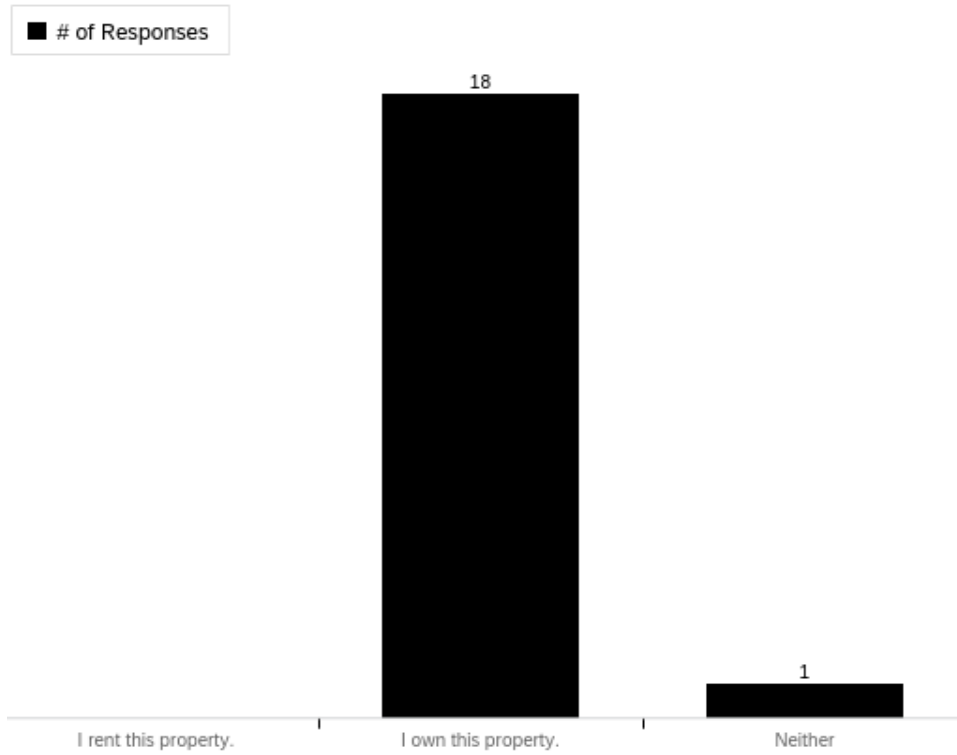
Figure 10. Property ownership of respondents.
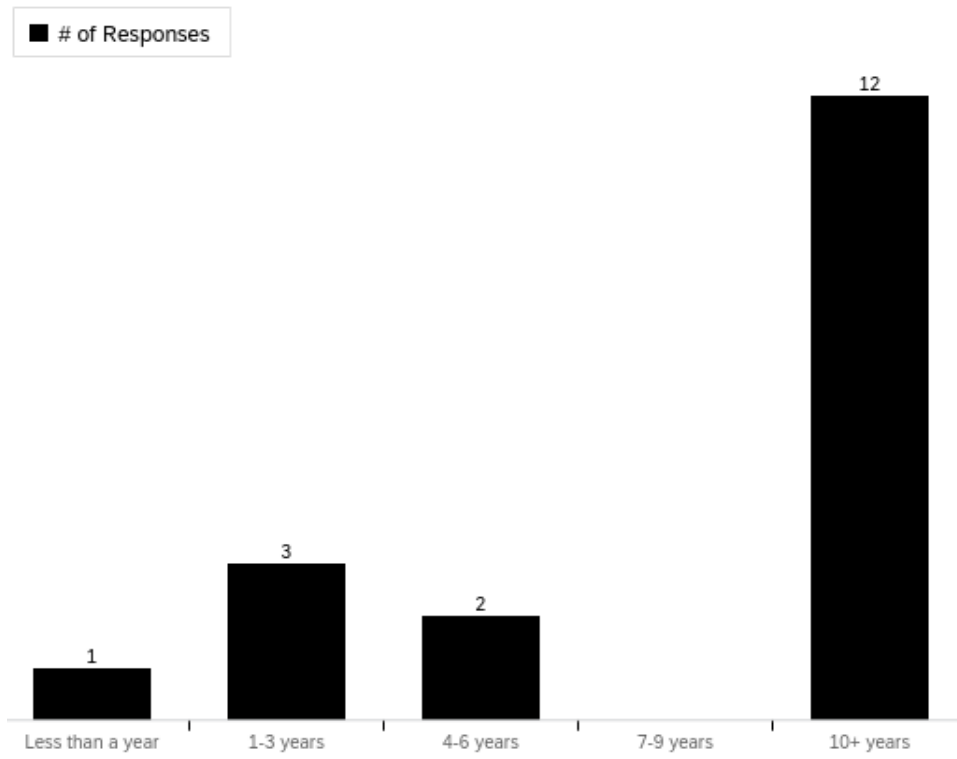
Figure 11. Length of Grifton residency of respondents.
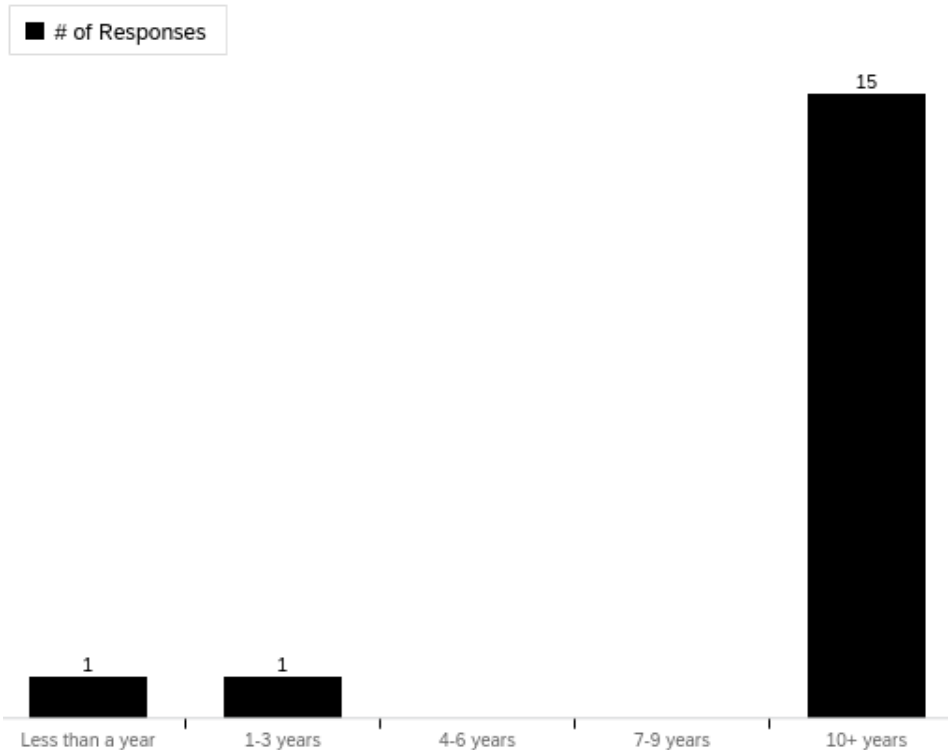
Figure 12. Length of Pitt County residency of respondents.

4.3.2 Respondents' Experience with Flood Events

Here, respondents answered which flood events impacted them. The questionnaire focused on any heavy rainfall events within the past decade, alongside three notable hurricanes that left a longstanding impact on the community—Floyd (1999), Matthew (2016), and Florence (2018). Figure 13 displays the number of responses for respondents impacted by one or more, or none, of the weather events listed. A total of 44 occurrences were reported across 17 respondents, implying that some identified impact by one or more events. Note that four respondents indicated no impact from the events listed.
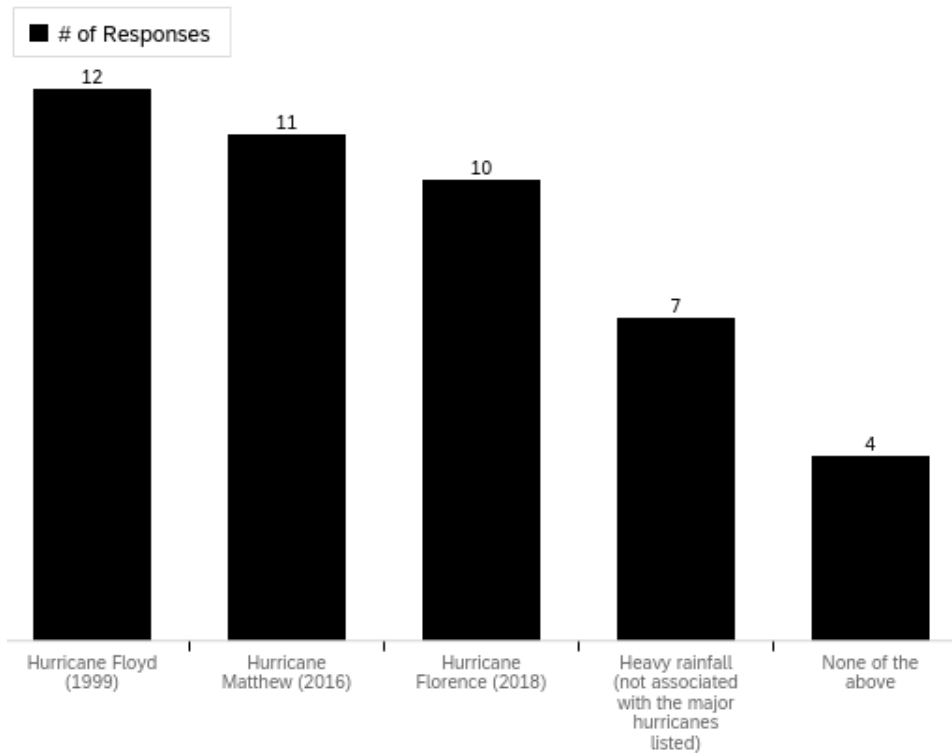
Figure 13. Respondents' impact by weather events.

Figures 14 and 15 shows responses regarding instances of property impacts and damage

to property from heavy rainfall events within the past decade, respectively. Six of the seven

respondents who indicated being impacted by any heavy rainfall event(s) gave their responses

(Figure 14). The remaining respondent did not answer the question. Among the six respondents,

five noted that their property was impacted multiple times within the last decade. When asked

about the amount of damage received to their property, four of those six respondents reported

minor damage (Figure 15). Minor damage implies such impacts as breakaway structures and

appurtenant structures being damaged or removed, no physical damage to the main structure, and

very minimal to no floodwater impacts. The remaining damage categories are clarified in Figure

14.
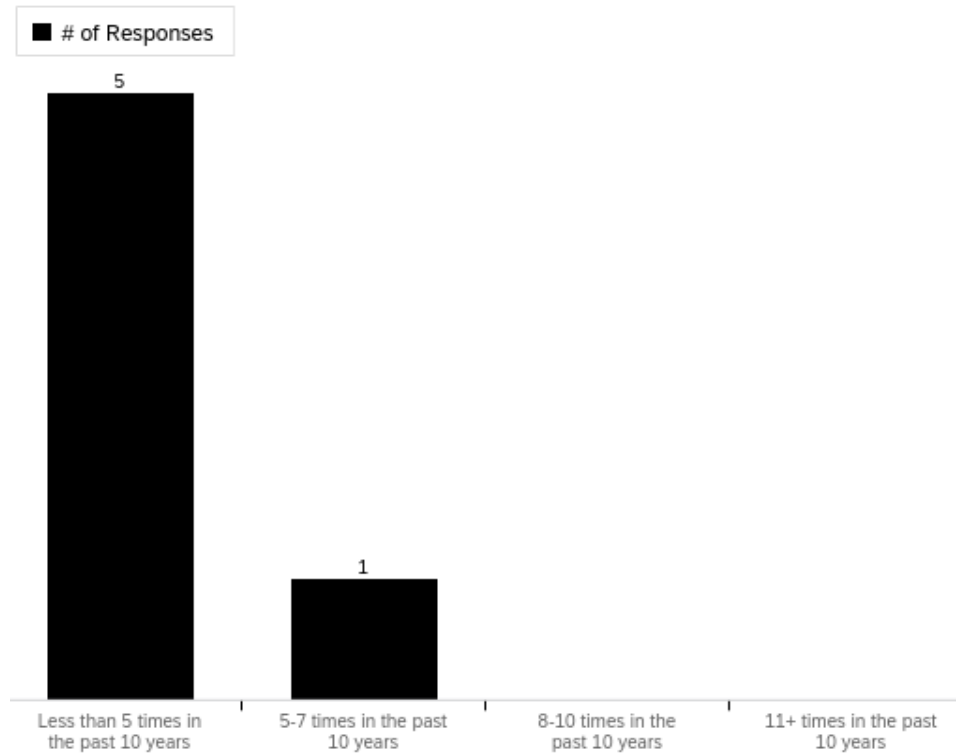
Figure 14. Respondents' cases of property impact by heavy rainfall events.
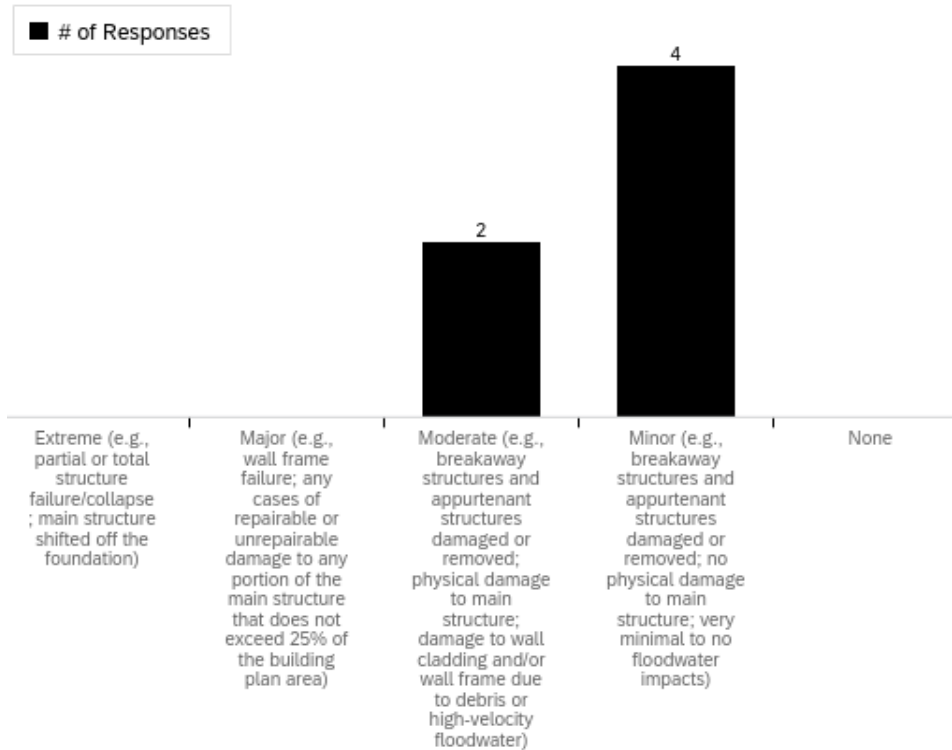
Figure 15. Respondents' damage to property from heavy rainfall events.

Four respondents identified that it took them longer than four weeks to recover from the damage their property received due to one or more heavy rainfall events. The remaining two respondents did not report. Figures 16-18 display responses from individuals regarding the damage they received to their property Hurricanes Florence, Matthew, and Floyd, respectively. Of the 10, 11, and 12 respondents who indicated being impacted by Hurricanes Florence, Matthew, and Floyd, respectively, only nine, nine, and 11 of them, respectively, gave their answers regarding damage to property. Most respondents indicated minor damage across all disasters, with Hurricane Florence having the least impact (Figure 16). Some respondents also reported damage higher in magnitude than minor. Four respondents indicated moderate damage from Hurricane Matthew (Figure 17). Two respondents had major damage and only one respondent had moderate damage resulting from Hurricane Floyd (Figure 18).

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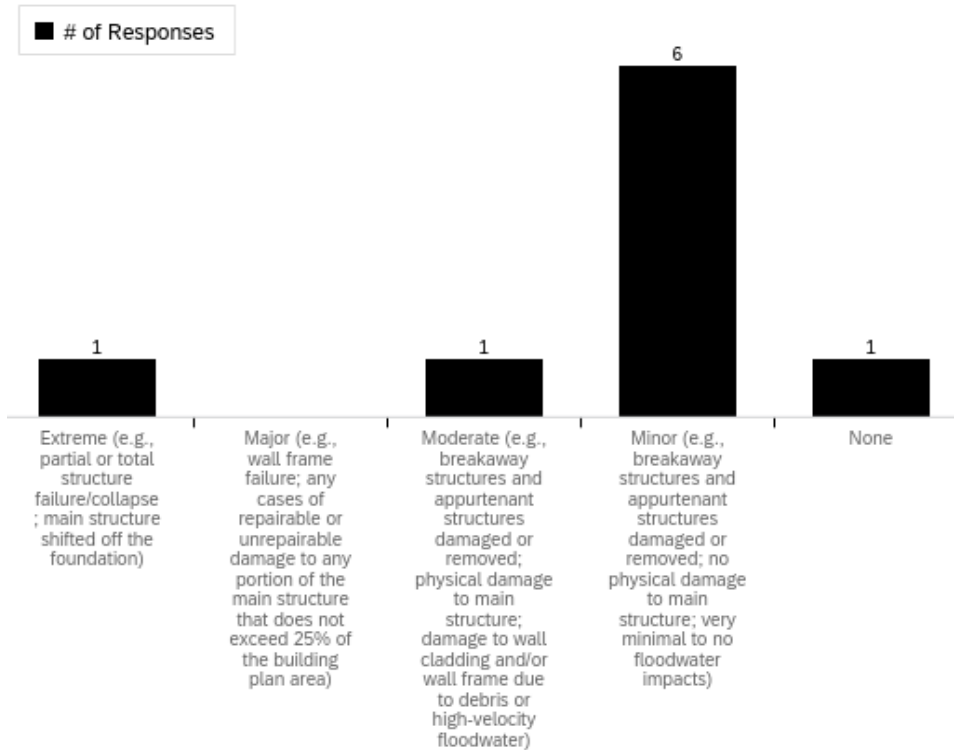
Figure 16. Respondents' damage to property from Hurricane Florence (2018).
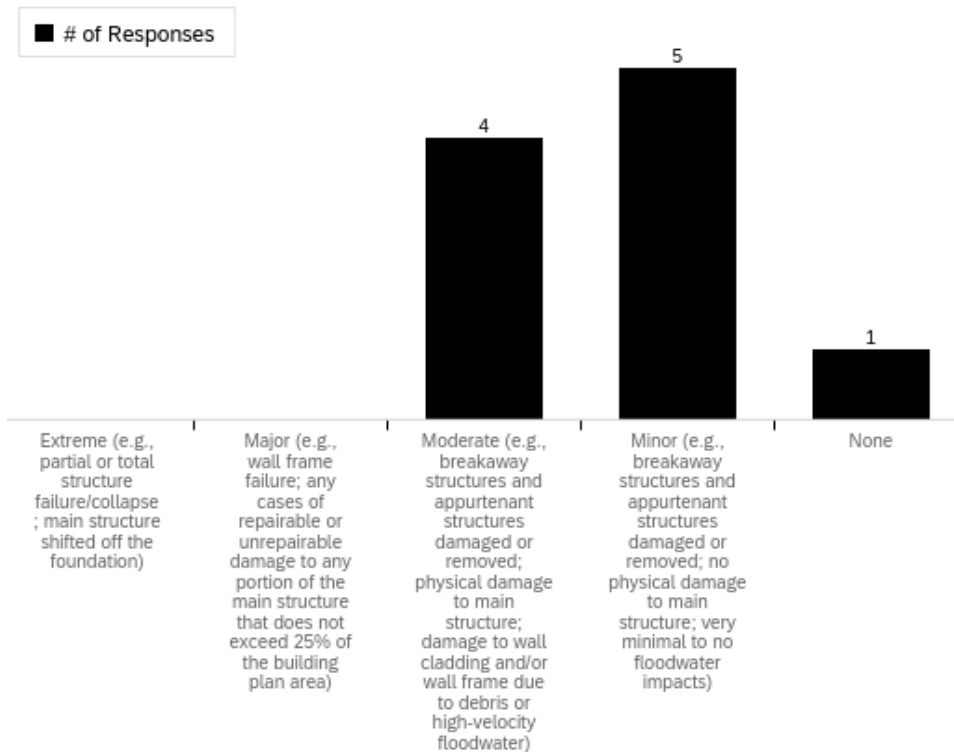
Figure 17. Respondents' damage to property from Hurricane Matthew (2016).
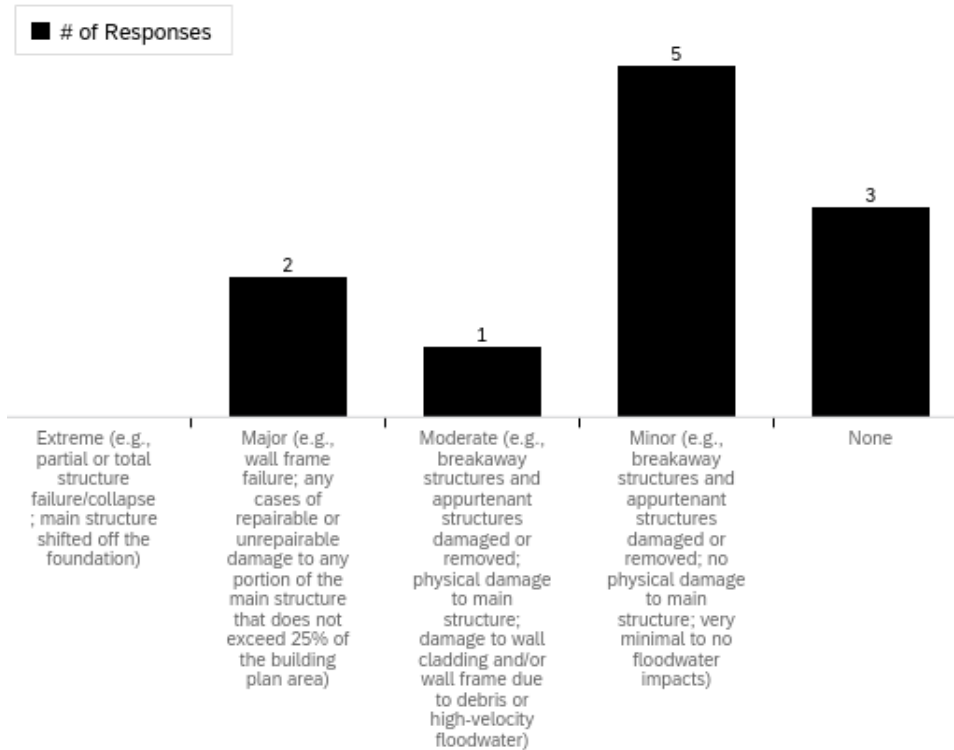
Figure 18. Respondents' damage to property from Hurricane Floyd (1999).

Property damages reflect recovery times from all three hurricanes. Most respondents identified that it took longer than 1-2 weeks. In some instances, especially during Hurricane Matthew and Floyd, most respondents noted it took them longer than a month to recover—a few responses noted up to half a year or more.

4.3.3 Respondents' Familiarity, Experience, and Perceptions of the Floodplain Buyout Program

Figure 19 depicts the answers of respondents on their familiarity with the floodplain buyout program process. Of the 19 respondents, only 13 reported answers. Most respondents indicated they were unfamiliar with the floodplain buyout program process, while five noted some level of familiarity with the program. The questionnaire did not ask for specifics regarding

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familiarity with buyout programs, so the extent of their familiarity with the buyout program process and services offered may vary.
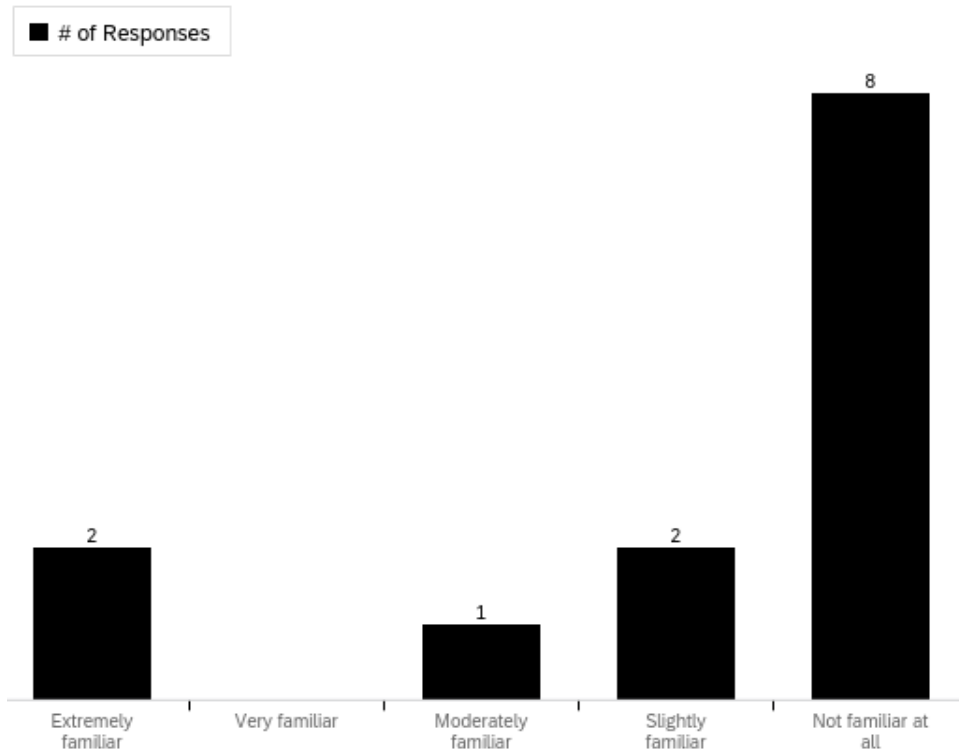
Figure 19. Respondents' familiarity with the floodplain buyout program process.

A question was asked regarding respondents being offered to participate in any buyout program. Of the 19 respondents, only 13 reported answers. All 13 respondents noted no offer from a public agency to participate in any buyout program. No responses were recorded for offers to participate in buyout programs related to Hurricanes Florence, Matthew, and Floyd. Figure 20 displays respondents' participation in buyout programs for the associated disasters. Of the 19 respondents, only eight reported participations. This means that eight participants did not receive an offer from a public agency but sought out a buyout on their own. Considering that there were eight respondents, and a total of 21 instances of participation in a buyout program

totaled across all three disasters, this implies that several of the respondents participated in more than one buyout program.

One idea to note about participation in a buyout program is that this may contradict familiarity with it. What is meant by this is respondents may know what a buyout program is and participate in it, but that does not necessarily mean they are familiar with how it operates at its core. More than likely, respondents see buyout program as an opportunity to receive any financial relief to help rebuild or relocate to another property. They may not give much thought to the process and its functions.
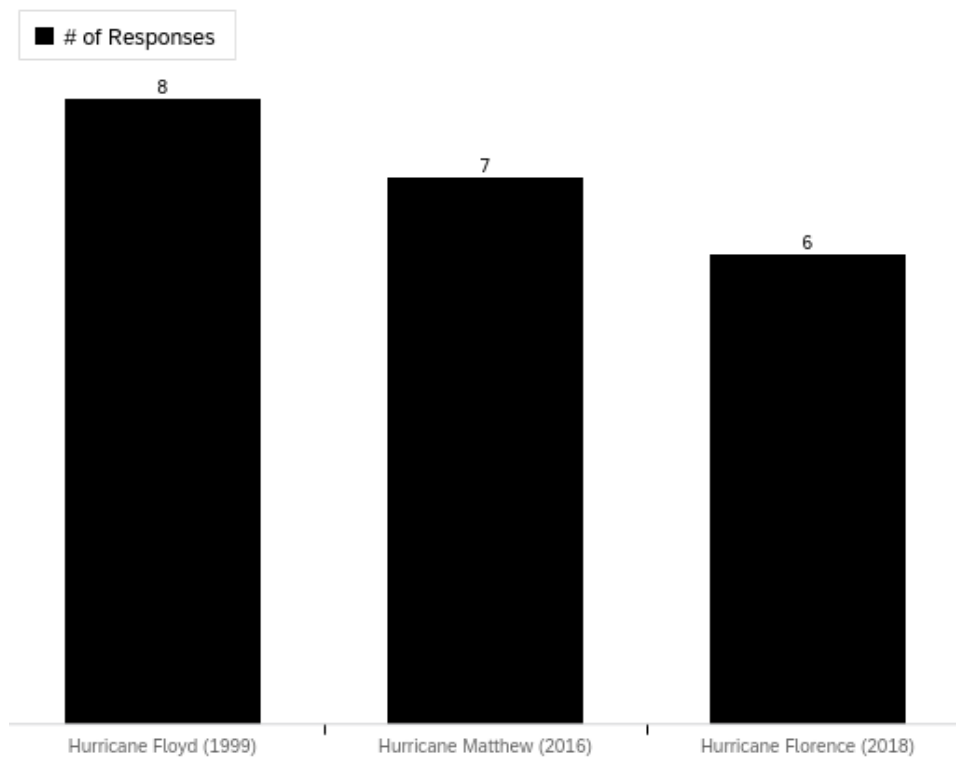
Figure 20. Respondents' participation in a floodplain buyout program.

4.3.3.1 Hurricane Florence (2018) Buyout Program

Of the six respondents that indicated participation in Hurricane Florence's buyout program, only one answered how they found out about it: "word of mouth, was not offered buyout". Zero answers were recorded when respondents were asked when they began the paperwork for the buyout and when the paperwork was completed. Two respondents noted no incentives (e.g., funds) were offered to them and indicated no information was given regarding when their application would be finalized. The remaining four respondents did not report. Two respondents specified no action (i.e., did not relocate, did not elevate property, etc.) was taken during the buyout process. Again, the remaining four respondents did not report.

Respondents' perception on how each level of government handled the buyout program, on the Likert Scale from 0 to 5, where 0 = extremely bad, 3 = neither good or bad, and 5 = extremely good, was met with only one answer. The remaining five respondents did not report. The respondent gave Grifton a rating of 5, or "extremely good, on how it handled the buyout. The respondent did not give ratings for governments of the county, state, and nation. The number of responses were very low on this question due to the limited data collection method. Since the questionnaire was distributed using a nonprobability sampling technique, the data does not fully represent the overall Grifton residents' perceptions nor the quality of effort each level of government put into handling the buyout program.

Proper implementation of the buyout program across each level of government was asked of respondents, using the Likert Scale between 0 and 5, where 0 = definitely not, 3 = might or might not, and 5 = definitely yes. Only one respondent answered, while the remaining five did not report. Again, only Grifton received a rating, while the other levels of government did not. The respondent gave a rating of 2, which lies between "probably not" and "might or might not".

This means the respondent did not feel strongly about Grifton properly implementing the buyout program.

Respondents were asked about their satisfaction with each level of government and their actions during the buyout program using the Likert Scale, where 0 = extremely dissatisfied, 3 = neither satisfied nor dissatisfied, and 5 = extremely satisfied. Again, this question was met with only one response, and the remaining five respondents did not report. The respondent provided only a rating for Grifton, with all other levels of government receiving no rating. The respondent answered two, between "somewhat dissatisfied" and "neither satisfied nor dissatisfied," meaning they were slightly dissatisfied with Grifton's action during the buyout program process. Zero responses were received for the happiness of results regarding the buyout program process. One respondent commented on what, if anything, could have been done better during the buyout program process by stating they were "not offered a buyout".

4.3.3.2 Hurricane Matthew (2016) Buyout Program

Of the seven respondents who indicated they participated in Hurricane Matthew's buyout program, only two responded to how they learned about it. One respondent stated they heard about the buyout program through an informational booth, while another noted FEMA as their source of information. Two respondents provided answers regarding when the paperwork began for the buyout, while the remaining five did not. One respondent noted they did not complete the paperwork, while the other stated they forgot about a year after the flooding. Three respondents noted that no incentives (e.g., funds) were offered to them, while the four remaining respondents did not report. One respondent answered that it took them between a week to a month to complete the buyout paperwork. The remaining six respondents did not report. Two respondents

noted they were unaware of when the buyout process would be finalized. At the same time, one respondent answered with a question mark—likely because they did not understand what the question was asking. The remaining four respondents provided no answer.

As far as actions taken during the buyout process, two respondents indicated they did not take any, while one respondent noted they ended up rebuilding. The remaining four respondents provided no answer. Likert scales were used to gauge perceptions, just like in Hurricane Florence. Two respondents rated how each level of government handled the buyout program, while the remaining five did not. Grifton averaged a rating of 2, which falls on the scale between "somewhat bad" and "neither good nor bad". Pitt County averaged a response of one, represented on the scale as "somewhat bad". Both state and federal averaged a reaction of 0.5, which falls on the scale between "extremely bad" and "somewhat bad".

Respondents' perception on each level of government and if they properly implemented the buyout program was met with only one response, while the remaining six respondents provided no answers. The respondent gave Grifton a rating of 3, which falls on the scale as "might or might not". Pitt County, the state, and the federal governments all received a response of 0, represented on the scale as "definitely not". Again, only one respondent gave their satisfaction ratings with each level of government and their actions during the buyout process, while the remaining six respondents did not give ratings. Grifton received a rating of 2, which falls on the scale between "somewhat dissatisfied" and "neither satisfied nor dissatisfied". Pitt County, the state, and federal governments all received a rating of 0, or "extremely displeased". Two respondents provided answers for their overall happiness with the results of the buyout program process, while the remaining five did not. An average reaction of 1.5 was recorded, falling between "somewhat displeased" and "neither pleased nor displeased". Two respondents

answered the question of what, if anything, could have been done better during the buyout program process. One respondent replied, "we got NO help because we owned our home and made too much money" and the other replied they "were not offered".

4.3.3.3 Hurricane Floyd (1999) Buyout Program

Of the eight respondents who indicated they participated in the buyout program, one responded to how they learned about it. The remaining seven respondents did not give their answers. The respondent noted they heard about the buyout program from FEMA. One respondent answered the question of when they began the paperwork for the buyout with "?"—again, this may indicate they did not understand what the question was asking. Two respondents received no incentives from the buyout nor were informed of when the buyout process would be finalized. The remaining six respondents reported no information. One respondent indicated it took them a week and a month to complete the buyout paperwork, while the other seven respondents did not answer. Two respondents answered actions taken during the buyout process: "No" and "rebuilt". The remaining six respondents did not report.

Again, Likert scales were used to gauge perceptions. Only one respondent provided ratings for how each level of government handled the buyout program, while the remaining seven did not. Grifton received a rating of 2, or "somewhat bad" and "neither good nor bad". Pitt County, the state, and federal governments all received a rating of 0, or "extremely bad". Perceptions on proper implementation of the buyout program across all levels of government garnered only one response as well. Again, seven respondents provided no answer. Grifton received a rating of 2, between "probably not" and "might or might not". Pitt County, the state, and the federal governments all received a zero rating, or "definitely not". Respondents'

satisfaction with each level of government and their actions during the buyout process was met with only one response, while the remaining seven respondents did not answer. Grifton received a rating of 3, or "neither satisfied nor dissatisfied". Pitt County, the state, and federal governments received a rating of 0, or "extremely dissatisfied".

Happiness with the buyout program process results garnered two responses, while the remaining six respondents did not provide answers. An average rating of 1.5 was given, between "somewhat displeased" and "neither pleased nor displeased". Specifically, one respondent rated their happiness as 3, or "neither pleased nor displeased"; the other respondent gave a rating of 0, or "extremely displeased". For what could have been done better during the buyout program process, only one respondent answered. The respondent said, "help everyone who got flooded not just low income". The remaining seven respondents provided no answer.

4.4 Future Plan of Respondents

Respondents were asked if they would participate in another buyout program and provided details as to why or why not. Only five respondents answered. "Na" (most likely means N/A), "can't say. Don't know much about it", "never have to much money", "Yes", and "never participated" were the responses—all unique answers, which goes to show the differing of opinions on buyout programs implemented in Grifton.

CHAPTER 5: DISCUSSION

5.1 Answering Research Questions

This research focused on how buyout programs and major flood events affect small rural municipalities. In the case of Grifton, a few key points could be gleaned from federally declared disasters in Grifton and how FEMA responded to them. As noted in the results, three subgrantees requested public assistance from FEMA in the aftermath of Hurricanes Floyd, Matthew, and Florence (see Figure 4). Again, these subgrantees were the local fire rescue department, sewage district, and the town itself. The OpenFEMA datasets used in this research gave significant insight into the hundreds of different FEMA registrations, inspections, and approvals of affected owned and rented properties across Hurricanes Matthew and Florence. FEMA's involvement highlights Grifton's need for support and shows how impactful hurricanes like Matthew and Florence were on the community. Mitigated properties through FEMA's HMA programs showed most properties were either single-family or manufactured homes being acquired and demolished (see Table 11). Specifically, roughly 90% of the total mitigated properties (120/134) from all three federally declared disasters were acquired and demolished.

Questionnaire responses from Grifton residents brought about several points that need consideration. For instance, respondents (eight of 13) are unfamiliar with buyout programs and their processes. As mentioned in the results, the extent of respondents' familiarity with the buyout program process and services offered may vary because specifics were not asked. While unfamiliarity can be seen in a positive mindset (e.g., respondents are unfamiliar with the buyout process because of lack of exposure due to minimal effects from major flood events), negative takeaways can also be interpreted from this. For example, a lack of community outreach concerning buyout program processes can often lead to confusion and uncertainty in buyout

participation (Siders & Gerber-Chavis, 2021). Baker et al. (2018) note that buyout administrators influence how participants experience the buyout process due to a lack of trust and communication. Furthermore, these participants also feel ignored by these administrators because of minimal to no presented opportunities for their communities to be involved in the process. This directly harms residents' familiarity. Again, while no specifics were asked in the questionnaire, discussions in Siders & Gerber-Chavis (2021) and Baker et al. (2018) imply that participants' unfamiliarity with buyout program processes is a common issue.

Another observation gathered from the questionnaire is that some respondents participated in one or more buyout programs, with some damage to their property, but those who answered about receiving funds or assistance from FEMA indicated not receiving any. Research from Siders & Gerber-Chavis (2021) notes this is usually the case, and it depends on whether community members or the local government initiated the buyout. While buyouts led by community members ensure those participants receive purchase offers, buyout initiation from the local government is often more technical. A set of prioritization criteria are used to identify which households receive assistance (Siders & Gerber-Chavis, 2021). Some examples of this can include properties that received the most damage or simplifying future land use effectiveness by acquiring parcels adjacent to one another. These prioritization criteria most often result in offers being "made to a small number of households, and programs end up acquiring just 5-15 properties" (Siders & Gerber-Chavis, 2021, p. 4). Considering this analysis, Pitt County implemented each buyout program addressed in the questionnaire, most likely due to insufficient resources in Grifton (*Buyout Property Leasing | Pitt County, NC*, n.d.; *Floodplain Management | Pitt County, NC*, n.d.). Again, Grifton was one of the subgrantees requesting PA from FEMA after each hurricane (see Figure 4), suggesting urgent assistance. With responses indicating no

funds or assistance from FEMA, in a total of seven respondents across three buyouts, those individuals and their properties likely did not meet the criteria set by Pitt County to receive incentives.

The uncertainty of whether a respondent's buyout application would be finalized (e.g., lack of communication/follow-ups by involved governments) can be viewed as problematic because they are left waiting. This issue is observed throughout all three buyouts, with two respondents reporting no information on buyout finalization in each. This observation directly supports the claims of long wait times discussed in BenDor et al. (2020), Curran-Groome et al. (2022), Moore & Weber (2019), and Siders & Gerber-Chavis (2021). Respondents also noted long recovery times, although those were directly related to disaster events and not buyout processes. Still, these long recovery times from disasters and wait times from buyouts harm homeowners' resiliency and adaptation to such experiences. With these observations in mind, ratings on each level of government regarding buyout program processes resulted in better opinions of Grifton than of the county, state, and nation. However, only one or two respondents gave such critiques. These responses should not reflect the entire community's opinion on each level of government because there were very minimal. Applying these results to the respondents who indicated unfamiliarity with buyout program processes, however, implies that proper education and outreach techniques (see Chapter 6 for more discussion on this) need to be executed in Grifton to inform the community about how buyout programs work, who implements them, and more. Again, Pitt County was responsible for issuing all three buyout programs. Educating Grifton residents about these policy tools may have resulted in higher ratings for other levels of government, besides Grifton, for those respondents who provided such, as well as fewer respondents indicating unfamiliarity.

5.2 Additional Findings

Although not directly related to the proposed research questions, additional discoveries in secondary data analyses and recent literature highlighted some concerns regarding how flooding due to these disasters has impacted Grifton economically and environmentally. One of the largest economic impacts revealed from related flood events can be seen with Grifton being left without a grocery store for nearly three years when hurricane flooding forced previous local businesses to close, including American supermarket chain Piggly Wiggly, being flooded out after the events due to Hurricane Matthew (WITN Web Team, 2022). As of late December 2022, the town now has an independently owned and operated grocery store known as Food Pride, built with future flood events in mind—constructed in a location away from flood-prone zones (Hefner, 2022). A lack of a leading supermarket in town since 2019 suggested that Grifton most likely saw decreased economic activity because a customer base no longer existed, conceivably diminishing local employment opportunities for Grifton residents.

U.S. Census Bureau data for median household income and total housing units suggest that related flood events have affected these variables. For instance, when comparing the 2021 ACS 5-Year Estimates (see Table 5) with the 2011 ACS 5-Year Estimates for median household income, a notable difference can be seen, with 2011 estimating a value of $38,500—overall, a slight decrease, with the exact difference being $6,597 (U.S. Census Bureau, n.d.-c). Comparing the 2020 Decennial Census (see Table 6) with the 2010 Decennial Census regarding total housing units also yields a slight decrease, with 2010 reporting 1,130 (U.S. Census Bureau, n.d.-d). Specifically, 1,040 total units were occupied, and 90 were vacant. Tying this in with the total number of properties acquired and demolished over the last decade (134) suggests that Grifton's tax base was impacted. Research from Martin (2021) supports this claim, mentioning that

neighborhood change and loss slow the increase of property values, the building of new homes, and economic growth in a community. Whether or not these properties were converted into open spaces or natural areas, typically, they are not included in property taxes but do provide tax incentives (Sundberg, n.d.). From these findings, it is likely that Grifton experienced a reduction in tax revenue, which can impact funding for public services and infrastructure.

Although previous discussions suggest that environmental impacts from major flood events in Grifton are predominately negative, some impacts can be seen as positive. For example, properties in Grifton that received either assistance from FEMA or mitigation measures through the HMGP directly contribute to positive flood mitigation techniques. Whether these structures were relocated, removed, or elevated, these mitigation efforts help reduce the risk of future flood damage in flood-prone areas. Not only is protecting lives and property achievable in this method, but it also ensures floodwaters can flow more freely, which reduces the potential for downstream flooding. Ecological restoration also is a product of buyout programs. For instance, Grifton's Contentnea Creekside Overlook Park was established in 2002 after the flooding from Hurricane Floyd in collaboration with local, county, and state organizations (*Contentnea Creekside Overlook Trail*, 2019). Identified as an open space, Contentnea Creekside Overlook Park represents an effort to improve biodiversity, water quality, and habitat creation for wildlife.

5.3 Limitations and Future Research

Limitations exist in this research and must be noted. The most significant limitation is observed in the questionnaire data. With only 19 individual responses recorded, various questions were left unanswered or answered by only one or two respondents. Again (see Section 4.3 for specifics), data collection (e.g., survey distribution due to COVID-19 protocols and

limitations) and complex questionnaire structure (see Figure 3) are to blame for such. Also, the questionnaire focused on only three major flood events. Biases within the demographics portion of the questionnaire are present, with responses not fully representative of Grifton's entire population. For example, comparing the racial composition of the respondents and Grifton yielded drastically different results (see Table 1 and Figure 8).

Another instance can be seen regarding household income, where more wealthy respondents were represented in the data (see Figure 7) versus what the U.S. Census Bureau reported on Grifton (see Table 5). Therefore, there is almost no representation in the responses from low-income minority residents. This gives a rather skewed perception of buyout processes because marginalized groups are at a greater risk of hazardous events, experience more damage from them (e.g., non-durable housing), and struggle more with recovery (Siders & Gerber-Chavis, 2021). Data analysis on FEMA buyouts indicated some federally declared disasters not included in the questionnaire, like Hurricane Isabel (2003) and Hurricane Irene (2011). Allowing these in the questionnaire may complicate the response process. However, suppose a better method of surveying was implemented, along with including more instances of major flood events in Grifton. In that case, it may initiate the potential of acquiring more responses that better represent residents' perceptions, familiarity, and experiences with local buyout programs.

Future research can include in-depth analyses of economic and environmental impacts on the town of Grifton as they relate to major flood events and buyout programs. For instance, GIS analyses can be applied to discover any environmental gains and/or losses due to buyout programs. This method can include observing land-use changes and overlaying point data from buyout programs to give a visual context as to what properties were mitigated. Potential economic impacts can be examined further using Pitt County's Online Parcel Information

System (OPIS; https://gis.pittcountync.gov/opis/) because of its collection of land and property values. Observing these potential fluctuations with every considered federally declared disaster allows for more insight. Conducting cross-sectional and longitudinal studies across several other small rural municipalities with similar topography and demographics may offer an entirely new, rich understanding of perceptions on buyout programs.

CHAPTER 6: CONCLUSION

A lack of scholarly discourse surrounding small rural municipalities' perceptions of buyout programs, as well examining such policy tools during the peri-buyout phase, serves as the purpose for this thesis. The main objective of this research was to better understand this concept by using the coastal plains town of Grifton, N.C., as a case study. Impacted by notable flood events like Hurricane Floyd in 1999, Hurricane Matthew in 2016, and Hurricane Florence in 2018, buyout programs were implemented in the community to reduce flood risks. These federally declared disasters highlighted Grifton's vulnerability to such events because of pre-existing flood hazards (e.g., proximity to Contentnea Creek and the Neuse River).

An analysis of U.S. Census Bureau data indicated a few demographic components suggesting flood vulnerabilities exist, like relatively low median household income, relatively high poverty rates, and disabled residents making up one-fifth of Grifton's population. An analysis of OpenFEMA data highlighted FEMA's response to federally declared disasters in Grifton. Hundreds of owned and rented properties were registered, inspected, and approved for federal assistance. Many properties were mitigated through FEMA's HMA programs and roughly 90% of those were acquired and demolished. Three subgrantees requested public assistance from FEMA in the aftermath of Hurricanes Floyd, Matthew, and Florence. Questionnaire responses from Grifton residents revealed unfamiliarity with buyout program processes, lack of funds or assistance from FEMA, long disaster recovery times, and uncertainty in buyout finalization. These observations were supported in several other buyout studies.

It is important to suggest a few recommendations to improve the overall effectiveness of FEMA's buyout programs in the context of small rural municipalities based on this study. One of the vital suggestions to promote progressive discourse around these buyout programs is targeted

community outreach and education. It can be observed in the literature review and from specific respondents in the questionnaire that there is limited knowledge about the buyout process and how it functions. In the context of this study, again, it is Pitt County's role to provide knowledge to Grifton about buyout programs. Proactive outreach and educational efforts should be employed to inform homeowners and renters in these small rural communities about these policy tools and their benefits. Considering this solution expands new opportunities for communities to learn about and participate in these programs when needed. For example, residents who indicate a positive experience from a buyout are likely to spread information word-of-mouth to others to garner increased community interest in such programs (Siders & Gerber-Chavis, 2021). Additionally, Siders & Gerber-Chavis (2021) inform that holding numerous community meetings that support the varying schedules of residents, providing proper translators for groups who require them, addressing personal questions from the community, designating one spokesperson to provide residents with up-to-date, accurate information, and encouraging collaboration between local organizations (e.g., churches), FEMA, and other agencies and non-profit organizations are all outreach techniques that enrich discussion around buyout programs.

Another recommendation, again, stems from issues highlighted in the literature review, results, and discussion sections. Expediting the buyout process is an essential factor to consider, as it helps FEMA provide funding and mitigation strategies quicker while lessening the time it takes for communities to recover from and adapt to floods—whether that is to rebuild, elevate property, relocate, etc. This is a struggle already for small rural municipalities that do not have the needed resources. Decreasing wait times for buyouts coincide with participation and outreach, as this helps to increase acceptance rates. Offering buyout programs multiple times, dedicating staff, and experts to address unusual legal situations regarding properties, and tackling

relocation needs are all takeaways for addressing both issues. Siders & Gerber-Chavis (2021) provide insight, suggesting several tips for decreasing buyout implementation time. Such proposals include hiring experienced staff, whether in-house or contractors, to apply for federal funding and administer buyouts, perform as many inspections and appraisals as possible in conjunction with listing all applicants, including alternates, on buyout program forms to avoid any delays or funding loss, bundling properties to decrease benefit-cost analyses time, and creating a streamlined process that decreases the time for hiring appraisers, inspectors, demolition experts, etc., while also establishing a state or local source of funding to pay for beforehand costs. In addition to the last point, a single contractor could be designated for managing buyouts and completing any sub-contracting.

Increased funding is another primary recommendation for improving buyout program processes. Several sub-recommendations listed above rely on FEMA, state, county, and local funds. Advocating for increased funds could pay dividends for all parties involved and positively impact the two recommendations discussed previously. As noted earlier, small rural municipalities are already limited in funding allocated to disasters. Encouraging policymakers, relevant agencies, stakeholders, and community members at all branches to engage in discourse can help highlight the buyout program's benefits and the need for additional resources when applicable. Pairing this with community outreach strategies could yield a meaningful conversation that promotes political and financial backing—which, in turn, supports future land use planning and zoning regulations. Grant programs and partnerships (i.e., community organizations, environmental groups, and philanthropic entities) can blossom from this multi-faceted concept because collaborating and forming partnerships promotes increased expertise and resource access. Cost-sharing programs, cost-benefit analyses, and prioritizing certain

factors (e.g., flood risk severity) over others to ensure properly allocated funds, to name a few other examples, are all practical solutions to consider if buyout programs are centered around these small rural municipalities. Not doing so introduces concerns like community fragmentation, relocation challenges, and social inequities.

Although the recommendations as mentioned previously are vital to improving buyout programs, there must be consideration of other suggestions, such as providing financial incentives to increase voluntary participation, collaborating with FEMA experts on developing and integrating comprehensive land use, zoning policies, and floodplain management plan with obtainable flood mitigation goals into local, future buyout programs using a multidisciplinary approach, ensuring social equity is achieved through prioritization criteria so that vulnerable populations can receive the assistance they need, and continuously evaluate and adapt buyout programs on a community basis through feedback, monitoring data, and performing cross-sectional and longitudinal studies alongside other communities facing similar challenges. With this plethora of recommendations to strongly ponder, FEMA's buyout programs can become a more reliable, equitable, and wide-ranging policy tool that ensures these small rural municipalities are given the needed assistance. While additional research is needed for a better understanding of Grifton residents' perceptions of buyout programs, along with other similar small rural municipalities, this thesis may serve as the forefront of critically analyzing these policy tools in the context of these communities.

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APPENDIX A: UMCIRB RESEARCH APPROVAL LETTER

EAST CAROLINA UNIVERSITY
University & Medical Center Institutional Review Board
4N-64 Brody Medical Sciences Building· Mail Stop 682
600 Moye Boulevard · Greenville, NC 27834
Office **252-744-2914** ⊛ · Fax **252-744-2284** ⊛ · **rede.ecu.edu/umcirb/**

Notification of Exempt Certification

From: Social/Behavioral IRB
To: Jacob Blankenship
CC: Misun Hur
Date: 3/2/2022
Re: UMCIRB 21-001221
      Understanding Small, Rural Municipality's Flooding Preparedness: A Case Study of Grifton, North Carolina

I am pleased to inform you that your research submission has been certified as exempt on 3/1/2022. This study is eligible for Exempt Certification under category # 2a & 4a.

It is your responsibility to ensure that this research is conducted in the manner reported in your application and/or protocol, as well as being consistent with the ethical principles of the Belmont Report and your profession.

This research study does not require any additional interaction with the UMCIRB unless there are proposed changes to this study. Any change, prior to implementing that change, must be submitted to the UMCIRB for review and approval. The UMCIRB will determine if the change impacts the eligibility of the research for exempt status. If more substantive review is required, you will be notified within five business days.

Document	Description
Consent_Eng (1).doc(0.01)	Consent Forms
Consent_Eng (1).doc(0.01)	Recruitment Documents/Scripts
Grifton_Research_Questionnaire.docx(0.01)	Surveys and Questionnaires

For research studies where a waiver or alteration of HIPAA Authorization has been approved, the IRB states that each of the waiver criteria in 45 CFR 164.512(i)(1)(i)(A) and (2)(i) through (v) have been met. Additionally, the elements of PHI to be

collected as described in items 1 and 2 of the Application for Waiver of Authorization have been determined to be the minimal necessary for the specified research.

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

APPENDIX B: QUESTIONNAIRE CONSENT FORM

Dear Grifton Resident,

       I, Jacob Blankenship, am a graduate student at East Carolina University in Department of Geography, Planning, and Environment. I am asking you to take part in my research study entitled, "*Understanding Small, Rural Municipality's Flooding Preparedness: A Case Study of Grifton, North Carolina*".

The purpose of this research is to better understand the floodplain buyout process and how it might impact, negatively or positively, Grifton, North Carolina in a socio-economic framework. By doing this research, I hope to uncover any issues associated with the FEMA buyout program using Grifton, North Carolina as my case study. Furthermore, I am interested in collecting the residents of Grifton's thoughts and perception on the buyout process and their thoughts on major flood events. Your participation is completely voluntary, but strongly recommended.

You are being invited to take part in this research because you are a Grifton, North Carolina resident. The amount of time it will take you to complete this study is *about 15-20 minutes.*

You will be asked questions about your demographics (i.e., age, gender, etc.), your experience with major flood events, your familiarity, experience, and perceptions of the FEMA floodplain buyout program, and a question regarding your future thoughts about participating in a buyout program—either for the first time or again, if applicable. Please read each question carefully and answer to the best of your ability. We consider that completion and return of the survey questionnaire indicates consent to participate in the study.

Because this research is overseen by the ECU Institutional Review Board (IRB approval No: 21-001221), some of its members or staff may need to review my research data. However, the information you provide will not be linked to you in any way. Therefore, your responses cannot be traced back to you by anyone, including me.

If you have questions about your rights as someone taking part in research, you may call the UMCIRB Office at phone number 252-744-2914 (days, 8:00 am-5:00 pm). If you would like to report a complaint or concern about this research study, you may call the Director of UMCIRB Office, at 252-744-1971.

You do not have to take part in this research, and you can stop at any time. If you decide you are willing to take part in this study, continue with the questionnaire on the next page. You must be 18 years or older to participate in the research.

Thank you for taking the time to participate in my research.

Sincerely,

Jacob Blankenship, Principal Investigator
blankenshipja20@students.ecu.edu

APPENDIX C: QUESTIONNAIRE

What is your age?

○ 18-24 years (2)

○ 25-34 years (3)

○ 35-44 years (4)

○ 45-54 years (5)

○ 55-59 years (6)

○ 60-64 years (7)

○ 65-74 years (8)

○ 75-84 years (9)

○ 85 years and over (10)

What is your gender?

○ Male (1)

○ Female (2)

○ Non-binary / third gender (3)

○ Prefer not to answer (4)

What is your income level?

○ Less than $10,000 (1)

○ $10,000 - $14,999 (2)

○ $15,000 - $24,999 (3)

○ $25,000 - $34,999 (4)

○ $35,000 - $49,999 (5)

○ $50,000 - $74,999 (6)

○ $75,000 - $99,999 (7)

○ $100,000 - $149,999 (8)

○ $150,000 - $199,999 (9)

○ $200,000 or more (10)

○ More than $150,000 (11)

○ Prefer not to answer (12)

What is your race?

○ White (1)

○ Black or African American (2)

○ American Indian or Alaska Native (3)

○ Asian (4)

○ Native Hawaiian or Pacific Islander (5)

○ Two or more races (6)

○ Other (7)

What is your ethnicity?

      ○ Hispanic or Latino (of any race) (1)

      ○ Not Hispanic or Latino (2)

What is your education level?

      ○ Less than 9th grade (1)

      ○ 9th-12th grade, no diploma (2)

      ○ High school graduate (includes equivalency) (3)

      ○ Some college, no degree (4)

      ○ Associate degree (5)

      ○ Bachelor's degree (6)

      ○ Graduate or professional degree (7)

      ○ Doctorate (8)

What is your property ownership?

      ○ I rent this property. (1)

      ○ I own this property. (2)

      ○ Neither (3)

How long have you lived in Grifton?

○ Less than a year (1)

○ 1-3 years (2)

○ 4-6 years (3)

○ 7-9 years (4)

○ 10+ years (5)

How long have you lived in Pitt County?

○ Less than a year (1)

○ 1-3 years (2)

○ 4-6 years (3)

○ 7-9 years (4)

○ 10+ years (5)

End of Block: Demographics

Start of Block: Experience with flood events

Which weather events were you impacted by?

☐ Hurricane Floyd (1999) (1)

☐ Hurricane Matthew (2016) (2)

☐ Hurricane Florence (2018) (3)

☐ Heavy rainfall (not associated with the major hurricanes listed above) (4)

☐ None of the above (5)

End of Block: Experience with flood events

You indicated that you were impacted by **a heavy rainfall event.** Please answer the following questions below:

How often was your property impacted within the last 10 years?

○ Less than 5 times in the past 10 years (1)

○ 5-7 times in the past 10 years (2)

○ 8-10 times in the past 10 years (3)

○ 11+ times in the past 10 years (4)

How much damage did your property receive?

○ Extreme (e.g., partial or total structure failure/collapse; main structure shifted off the foundation) (1)

○ Major (e.g., wall frame failure; any cases of repairable or unrepairable damage to any portion of the main structure that does not exceed 25% of the building plan area) (2)

○ Moderate (e.g., breakaway structures and appurtenant structures damaged or removed; physical damage to main structure; damage to wall cladding and/or wall frame due to debris or high-velocity floodwater) (3)

○ Minor (e.g., breakaway structures and appurtenant structures damaged or removed; no physical damage to main structure; very minimal to no floodwater impacts) (4)

○ None (5)

How long did it take you to recover from the event? (Approximation can be given in days, months, or years)

_____

You indicated that you were impacted by **Hurricane Florence (2018)**. Please answer the following questions below:

How much damage did your property receive?

○ Extreme (e.g., partial or total structure failure/collapse; main structure shifted off the foundation) (1)

○ Major (e.g., wall frame failure; any cases of repairable or unrepairable damage to any portion of the main structure that does not exceed 25% of the building plan area) (2)

○ Moderate (e.g., breakaway structures and appurtenant structures damaged or removed; physical damage to main structure; damage to wall cladding and/or wall frame due to debris or high-velocity floodwater) (3)

○ Minor (e.g., breakaway structures and appurtenant structures damaged or removed; no physical damage to main structure; very minimal to no floodwater impacts) (4)

○ None (5)

How long did it take you to recover from the event? (Approximation can be given in days, months, or years)

_____

End of Block: Florence - event

Start of Block: Matthew - event

You indicated that you were impacted by **Hurricane Matthew (2016)**. Please answer the following questions below:

How much damage did your property receive?

○ Extreme (e.g., partial or total structure failure/collapse; main structure shifted off the foundation) (1)

○ Major (e.g., wall frame failure; any cases of repairable or unrepairable damage to any portion of the main structure that does not exceed 25% of the building plan area) (2)

○ Moderate (e.g., breakaway structures and appurtenant structures damaged or removed; physical damage to main structure; damage to wall cladding and/or wall frame due to debris or high-velocity floodwater) (3)

○ Minor (e.g., breakaway structures and appurtenant structures damaged or removed; no physical damage to main structure; very minimal to no floodwater impacts) (4)

○ None (5)

How long did it take you to recover from the event? (Approximation can be given in days, months, or years)

_____

You indicated that you were impacted by **Hurricane Floyd (1999)**. Please answer the following questions below:

How much damage did your property receive?

○ Extreme (e.g., partial or total structure failure/collapse; main structure shifted off the foundation) (1)

○ Major (e.g., wall frame failure; any cases of repairable or unrepairable damage to any portion of the main structure that does not exceed 25% of the building plan area) (2)

○ Moderate (e.g., breakaway structures and appurtenant structures damaged or removed; physical damage to main structure; damage to wall cladding and/or wall frame due to debris or high-velocity floodwater) (3)

○ Minor (e.g., breakaway structures and appurtenant structures damaged or removed; no physical damage to main structure; very minimal to no floodwater impacts) (4)

○ None (5)

How long did it take you to recover from the event? (Approximation can be given in days, months, or years)

_____

How familiar are you with the process of a floodplain buyout program?

○ Extremely familiar (1)

○ Very familiar (2)

○ Moderately familiar (3)

○ Slightly familiar (4)

○ Not familiar at all (5)

Were you **offered to participate** in a floodplain buyout program?

○ No (1)

○ Yes (2)

Based on the following events listed below, were you **offered** a floodplain buyout? (Please mark all that apply)

☐ Hurricane Floyd (1999) (1)

☐ Hurricane Matthew (2016)   (2)

☐ Hurricane Florence (2018)   (3)

Did you **participate** in a floodplain buyout program?

○ Yes (1)

○ No (2)

Based on the following events listed below, which of them did you **participate** in? (Please mark all that apply)

☐ Hurricane Floyd (1999) (1)

☐ Hurricane Matthew (2016) (2)

☐ Hurricane Florence (2018) (3)

You indicated that you participated in the floodplain buyout program after **Hurricane Florence (2018).**

How did you find out about the floodplain buyout program?

_____

When did you begin the paperwork for the floodplain buyout program? (month and year)

_____

Did you receive any incentives (e.g., funds) from the buyout program?

○ Yes (1)

○ No (2)

When was the paperwork completed?

○ Within a week after... (1)

○ Between a week to a month after... (2)

○ Between a month and three months after ... (3)

○ Between three and six months after... (4)

○ Between six months and a year after ... (5)

○ Over a year after... (6)

Were you informed when the process would likely be finalized?

○ Yes. By when? (approximate timeline): (1)
_____

○ No (2)

What actions were taken during the process? (for example, did you relocate? Did you elevate your property?, etc.)

_____

_____

_____

_____

If applicable, how did each level of government handle the buyout program?

	Extremely bad	Somewhat bad	Neither good nor bad	Somewhat good	Extremely good
	0	1	3	4	5
Town of Grifton ()					
Pitt County ()					
State ()					
Federal ()					

If applicable, did each level of government properly implement the buyout program?

	Definitely not	Probably not	Might or might not	Probably yes	Definitely yes
	0	1	3	4	5
Town of Grifton ()					
Pitt County ()					
State ()					
Federal ()					

How satisfied were you with each level of government and their actions during the process?

	Extremely dissatisfied	Somewhat dissatisfied	Neither satisfied nor dissatisfied	Somewhat satisfied	Extremely satisfied
	0	1	3	4	5
Satisfaction of Grifton's actions ()			▮		
Satisfaction of Pitt County's actions ()			▮		
Satisfaction of state government ()			▮		
Satisfaction of federal government ()			▮		

How happy were you with the results of the buyout program process?

	Extremely displeased	Somewhat displeased	Neither pleased nor displeased	Somewhat pleased	Extremely pleased
	0	1	3	4	5
Happiness ()			▮		

What, if anything, could have been done better during the buyout program process? You may suggest actions for the town, County, State, and federal government.

_____

_____

_____

_____

_____

End of Block: Florence - buyout

Start of Block: Matthew - buyout

You indicated that you participated in the floodplain buyout program after **Hurricane Matthew (2016).**

How did you find out about the floodplain buyout program?

_____

When did you begin the paperwork for the floodplain buyout program? (month and year)

_____

Did you receive any incentives (e.g., funds) from the buyout program?

    ○ Yes (1)

    ○ No (2)

When was the paperwork completed?

    ○ Within a week after... (1)

    ○ Between a week to a month after... (2)

    ○ Between a month and three months after ... (3)

    ○ Between three and six months after... (4)

    ○ Between six months and a year after ... (5)

    ○ Over a year after... (6)

Were you informed when the process would likely be finalized?

    ○ Yes. By when? (approximate timeline): (1)
    _____

    ○ No (2)

What actions were taken during the process? (for example, did you relocate? Did you elevate your property?, etc.)
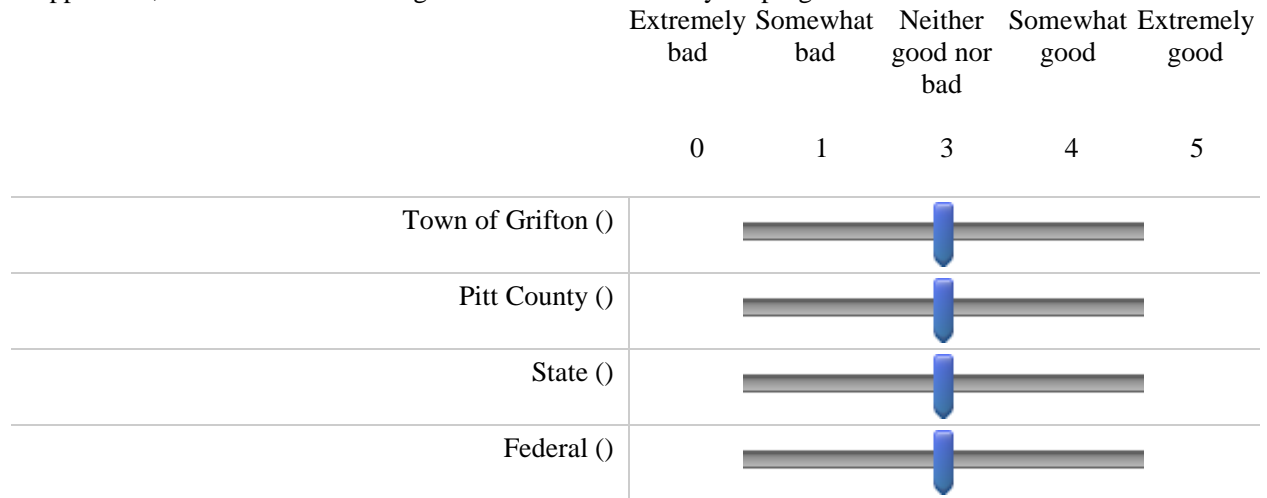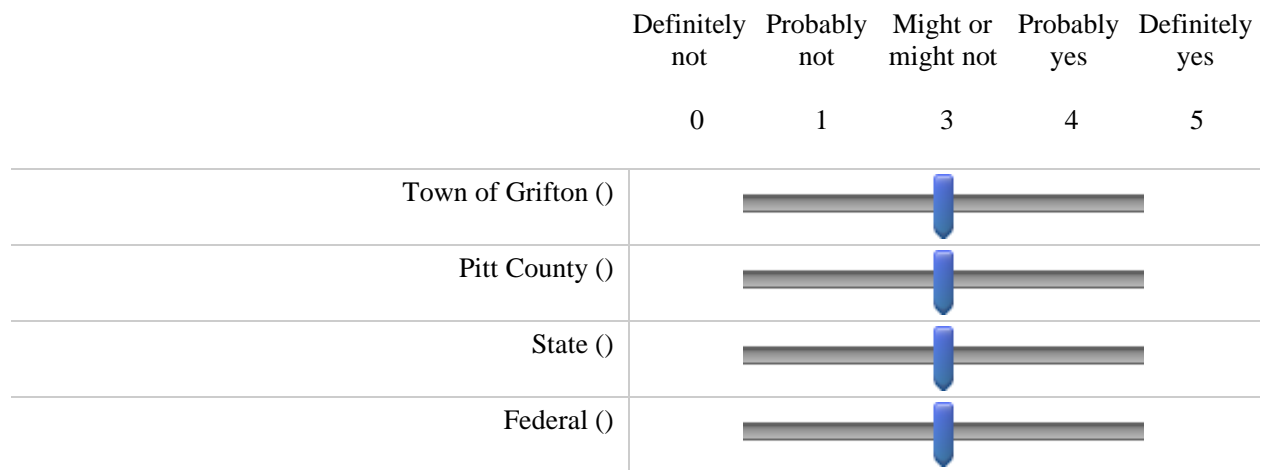
_____

_____

_____

_____

_____

If applicable, how did each level of government handle the buyout program?

	Extremely bad	Somewhat bad	Neither good nor bad	Somewhat good	Extremely good
	0	1	3	4	5
Town of Grifton ()					
Pitt County ()					
State ()					
Federal ()					

If applicable, did each level of government properly implement the buyout program?

	Definitely not	Probably not	Might or might not	Probably yes	Definitely yes
	0	1	3	4	5
Town of Grifton ()					
Pitt County ()					
State ()					
Federal ()					

How satisfied were you with each level of government and their actions during the process?

	Extremely dissatisfied	Somewhat dissatisfied	Neither satisfied nor dissatisfied	Somewhat satisfied	Extremely satisfied
	0	1	3	4	5

Satisfaction of Grifton's actions ()	
Satisfaction of Pitt County's actions ()	
Satisfaction of state government ()	
Satisfaction of federal government ()	

How happy were you with the results of the buyout program process?

	Extremely displeased	Somewhat displeased	Neither pleased nor displeased	Somewhat pleased	Extremely pleased
	0	1	3	4	5
Happiness ()					

What, if anything, could have been done better during the buyout program process? You may suggest actions for the town, County, State, and federal government.

_____

_____

_____

_____

_____

End of Block: Matthew - buyout

Start of Block: Floyd - buyout

You indicated that you participated in the floodplain buyout program after **Hurricane Floyd (1999).**

How did you find out about the floodplain buyout program?

_____

When did you begin the paperwork for the floodplain buyout program? (month and year)

_____

Did you receive any incentives (e.g., funds) from the buyout program?

    ◯ Yes (1)

    ◯ No (2)

When was the paperwork completed?

    ◯ Within a week after... (1)

    ◯ Between a week to a month after... (2)

    ◯ Between a month and three months after ... (3)

    ◯ Between three and six months after... (4)

    ◯ Between six months and a year after ... (5)

    ◯ Over a year after... (6)

Were you informed when the process would likely be finalized?

    ◯ Yes. By when? (approximate timeline): (1)
    _____

    ◯ No (2)

What actions were taken during the process? (for example, did you relocate? Did you elevate your property?, etc.)

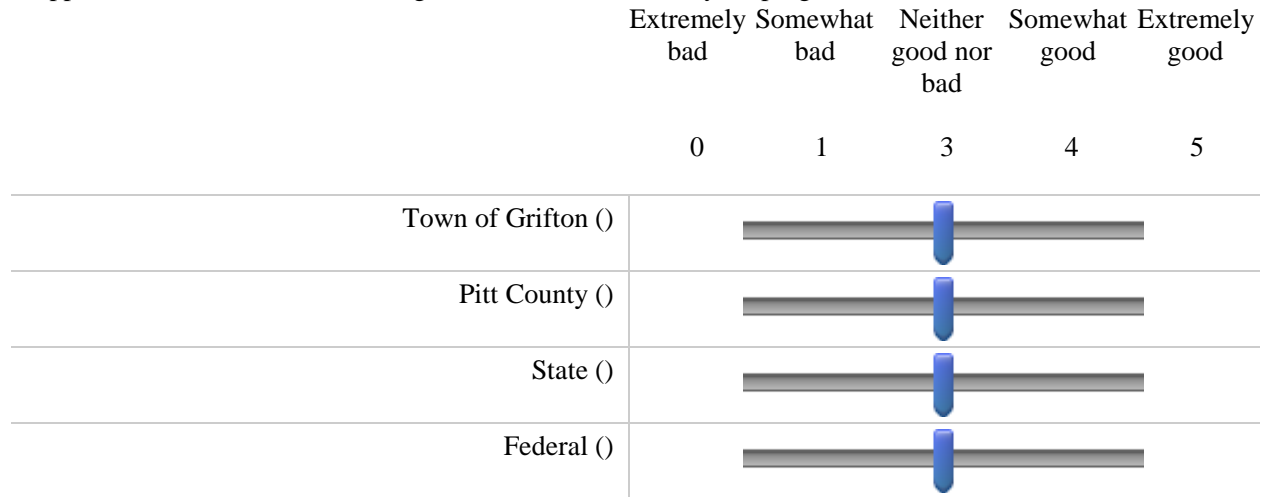_____

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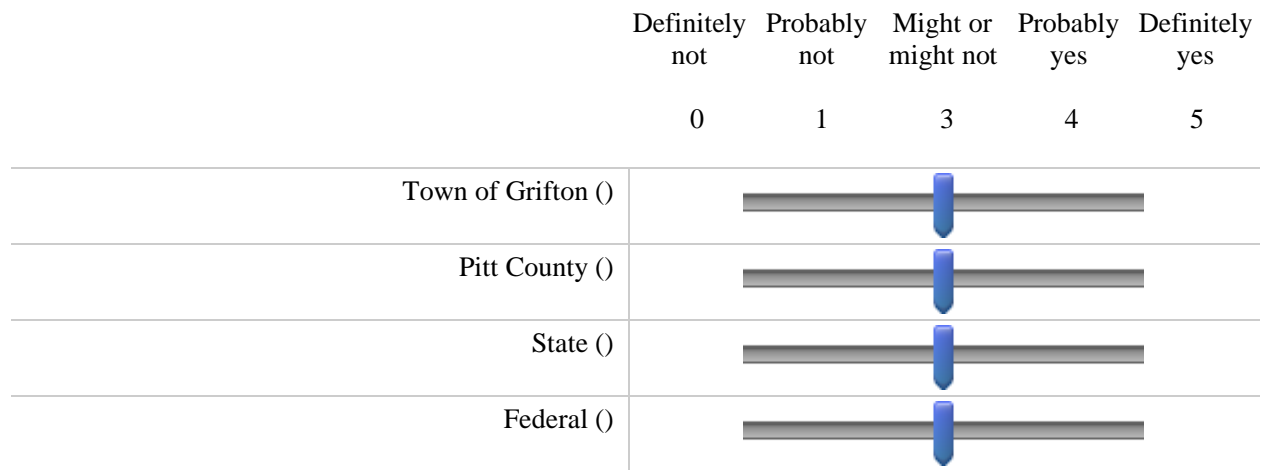_____

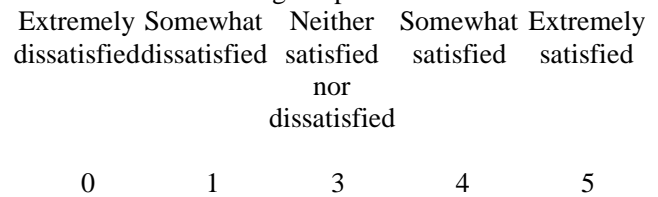If applicable, how did each level of government handle the buyout program?

	Extremely bad	Somewhat bad	Neither good nor bad	Somewhat good	Extremely good
	0	1	3	4	5
Town of Grifton ()					
Pitt County ()					
State ()					
Federal ()					

If applicable, did each level of government properly implement the buyout program?

	Definitely not	Probably not	Might or might not	Probably yes	Definitely yes
	0	1	3	4	5
Town of Grifton ()					
Pitt County ()					
State ()					
Federal ()					

How satisfied were you with each level of government and their actions during the process?

	Extremely dissatisfied	Somewhat dissatisfied	Neither satisfied nor dissatisfied	Somewhat satisfied	Extremely satisfied
	0	1	3	4	5

Satisfaction of Grifton's actions ()	
Satisfaction of Pitt County's actions ()	
Satisfaction of state government ()	
Satisfaction of federal government ()	

How happy were you with the results of the buyout program process?

	Extremely displeased	Somewhat displeased	Neither pleased nor displeased	Somewhat pleased	Extremely pleased
	0	1	3	4	5
Happiness ()					

What, if anything, could have been done better during the buyout program process? You may suggest actions for the town, County, State, and federal government.

_____

_____

_____

_____

_____

End of Block: Floyd - buyout

Start of Block: Future Plan

Would you participate in another buyout program? Why or why not?

_____

_____

_____

_____

_____