Review of Hurricane Michael

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Abstract

This paper will review the effects of Hurricane Michael and how it specifically impacted the state of Florida. It will also assess the emergency management cycle and critique how Florida was able to prepare and recover from the disaster. Lastly, the paper will provide recommendations on what could have been done differently or what should stay the same. The paper will conclude with a summary of the findings of the paper and what the most important lessons should be taken from this assessment.

Introduction

Back in 2018, the United States was hit with a category 5 hurricane named Michael. This was the largest hurricane since Hurricane Andrew back in 1992 (Thompson, 2021). While there was a large area affected including Central America, the Caribbean islands, the United States East Coast, and even as far as the Iberian Peninsula, the following paper will only focus on the state of Florida as the impacted community (Beven, et. al., 2019). Since a hurricane of this magnitude was not recorded for the past 26 years, it is important to see how people responded to this natural disaster. The following paper will review the aftermath of the hurricane, who was affected, what was done before, during, and after the storm, as well as recommendations for future hurricanes.

Disaster Overview

On October 7, 2018, Hurricane Michael was declared a tropical storm near the Yucatan Peninsula. By the next day, the storm headed towards the western tip of Cuba as it intensified into a Category 1 Hurricane. The growth of the storm was rapid. By October 9th, the hurricane was deemed a major Category 3, and headed towards the United States through the Gulf of Mexico. According to WFXRTV, Hurricane Michael rapidly intensified into a very dangerous Category 5 hurricane right before making landfall in Panama City, Florida on October 10. On October 11, 2018, the state of Florida declared a state of emergency. This was the first Category 5 hurricane to make landfall since Hurricane Andrew in 1992 (Beven et al., 2019). The wind speeds reached up to 161 mph which were reported from Florida up to North Carolina. The winds traveled up the coast all the way to New Jersey (Beven et al., 2019).

However, while many other areas in the United States were affected, the destructive target that this paper will focus on is the state of Florida. Hurricane Michael's track across the

southeastern United States resulted in widespread rains of 3 to 6 inches and localized rainfall totals in excess of 10 inches. The maximum storm total rainfall was reported at 13.01 inches near Black Mountain, North Carolina, while Lynn Haven, Florida, reported a storm total of 11.62 inches. These rains caused some freshwater flooding in both Cuba and the United States. Significant freshwater flooding occurred across portions of Honduras, Nicaragua, and El Salvador as a result of these rains. Michael produced 16 known tornadoes, including 2 in Florida, 3 in Georgia, 4 in South Carolina, and 7 in Virginia. The tornadoes were all rated 0 or 1 on the Enhanced Fujita scale.

Impact of the Hurricane

A total of 54 individuals were killed by the impact of the hurricane, 43 of those individuals were in Florida (Little, 2019). According to data gathered by the Florida Office of Insurance Regulation by November 2, 2020, the total estimated insured losses in Florida was equal to approximately $9,132,526,254, while the total paid losses equaled about $8,510,860,259. However, this does account for indemnity payments but excludes loss adjustment expenses (Florida Office of Insurance Regulation, 2020). This damage means that buildings and properties need to be restored. It also means that a large number of people may be looking for housing.

Hurricanes have a large impact on the real estate market including affordable housing (Shalhout, 2018). According to Shalhout, hurricanes can have both short term and long term effects on the housing market as a whole (2018). Once a disaster hits an area there are different occurrences that happen in the real estate market. Some studies that Shalhout explores showed that there is a general increase in home prices after a disaster (2018). Another study revealed that

house prices can rise a maximum of three to four percent for three years after a hurricane hits an area (Shalhout, 2018).

Hurricane Michael also had an impact on Florida's agricultural community. Farmers in Florida suffered from a lot of damages that were caused by the storm, and it is estimated that about one million acres of Florida's crops, including nuts, cotton, fruits, beef farms, other dairy products, and vegetables, were impacted by the hurricane (Peckenpaugh et al., 2018). Around forty percent of the state's entire peanut crop, which is worth around $22 million, was destroyed by the hurricane (Peckenpaugh et al., 2018). While foods can be imported into the state, Florida's agricultural community was still impacted by the hurricane resulting in short- and long-term challenges including repairing the farms and recovering from the economic losses caused by the hurricane.

Community Review

Many communities were impacted by the destructive nature of the hurricane. Despite the preparedness of the disaster due to Florida often being the target of hurricanes. Most significantly, Michael's winds and storm surge caused devastating to catastrophic damage in Bay County, Florida, with the worst of the damage occurring in Mexico Beach and at the Tyndall Air Force Base (AFB). In Mexico Beach, it is estimated that 1,584 buildings out of 1,692 in the town were reported damaged, with 809 of those reported destroyed (Beven et al., 2019). While exact numbers are not available from the Tyndall AFB, every building was reported damaged with many destroyed. The winds and surge also caused less severe, but extensive, damage elsewhere in the eastern portion of the Panama City metropolitan area. This resulted in a total of more than 45,000 structures damaged and more than 1,500 destroyed in Bay County, including severe damage to two hospitals (Beven et al., 2019). Widespread damage also occurred along the

Florida Gulf Coast east of the Panama City area to Alligator Point. In Gulf County, over 2,000

structures suffered minor damage, while more than 1,200 received major damage and 985

structures reported as destroyed (Beven et al., 2019). An additional 80 structures were reported

destroyed in Franklin County. Coastal highways were also washed out in several places between

Panama City and Alligator Point. Relatively minor damage was reported along the coast east of

Alligator Point to near Keaton Beach.

Identified Community Capacities

Florida's capacities were at a low point prior to the previous hurricane in 2017, Hurricane

Irma. Hurricane Irma was one of the costliest hurricanes to hit the United States (Orlando, 2017).

In fact, Hurricane Irma was the fifth costliest hurricane to impact the mainland United States

causing around $50 billion in damage (Orlando, 2017). This prior hurricane had a large impact

on the capacities of the state of Florida. Due to the impact, FEMA was also in the state.

According to CNN, FEMA will stay in an area for years after a disaster   still providing

assistance in various areas such as housing, mitigation and bolstering community response

(Willingham, 2017). This is considered a community asset before Hurricane Michael. Despite

much research on community assets before Hurricane Michael, other identifiable community

capacities could not be found.

Vulnerabilities and Community Demographics

Hurricane Michael caused massive disruption and danger to those along the panhandle of

Florida. The state of Florida may be prepared in some ways for hurricanes due to the fact that the

state is often impacted by this form of natural disaster. In fact, the state of Florida has been hit by

120 hurricanes between 1851-2018 (Heil, n.d.). That is 41% of the 292 hurricanes that have hit

the United States during that time making it the most hurricane prone state by far compared to

the 2nd most hurricane prone state, Texas, which has been hit 64 times between 1851-2018 (Heil, n.d.).

So, while Florida is the most hurricane prone state, there are still many vulnerabilities that are exploited by such powerful natural disasters as well as many vulnerable populations. Unfortunately, Hurricane Michael directly impacted multiple vulnerable populations such as individuals who are elderly, have mobility impairments, people with medical issues, those who lack transportation, and/or do not speak English. According to Direct Relief, "Florida counties struck today by Hurricane Michael – both the coastal counties under evacuation orders and the inland counties people fled to – are among the most socially vulnerable in the United States, according to Direct Relief's analysis of the data from the U.S. Centers for Disease Control and Prevention (CDC)" (2018). Using the CDC's Social Vulnerability Index (SVI), a person can gauge how vulnerable a certain area may be. This index is applied to the U.S. with a 100 point number scale ranging from 0-1 with 0 being the least vulnerable and 1 being the most vulnerable. According to the SVI, all of the counties in the United States average a rating of 0.5 and the state of Florida averages at 0.69. However, several counties that were hit have a SVI score ranging from 0.92-0.99 (Direct Relief, 2018). For example, Gadsden County, FL scored a 0.99 on the SVI, meaning that these counties were extremely vulnerable to being impacted by Hurricane Michael (Direct Relief, 2018).

<div align="center">**Emergency Management Cycle Assessment**</div>

Disaster Preparedness

Prior to the hurricane, Florida had some preparations in place that may assist different populations. As stated previously, Florida is often a target for tropical storms and hurricanes. In fact, Florida was already receiving funds to recover from previous hurricanes and better prepare

for the next potential hurricane. The funds were given due to the signing of the "Bipartisan Budget Act of 2018." This action provided funds for a wide range of those affected by the hurricanes and the wildfires in California including tax breaks for organizations deemed important for recovery including NASCAR (U.S. Department of Health & Human Service, 2021). The U.S. Department of Health & Human Service also writes, "$90 billion in emergency supplemental appropriations for disaster relief efforts for communities crippled by hurricanes in Puerto Rico, the U.S. Virgin Islands, Florida and Texas" (2021; *The bipartisan budget act*, 2018). These funds were not the only preparations made for a potential hurricane.

In November of 2017, the Emerald Coast Health Care Coalition (HCC), conducted what is called a Coalition Surge Test (CST). A CST is an annual exercise to identify gaps in surge and response readiness. The activities performed in this test help test current evacuation plans and disaster responses, as well as develop improved strategies for disaster and emergency response (2021). This test included all of the hospitals in the Emerald Coast which covered 10 counties on the northwest coast of Florida.

The test helped "reduce the burden on individual facilities and maintain high quality of care for those affected by the hurricane" (U.S. Department of Health & Human Service, 2021). Representatives of the Bay Medical Center stated that, "If the HCC had not pushed us to complete the CST tabletop exercise, we might have failed to execute a timely response … Thanks to the training and preparation exercises facilitated by the Emerald Coast HCC, we had the right forms and supplies in place to successfully evacuate within 36 hours." (U.S. Department of Health & Human Service, 2021). An important piece of disaster preparedness relies on the hospital's capabilities and the Emerald Coast HCC took proper steps to prepare just in time for the destruction of Hurricane Michael.

Disaster Response

As the community of the state of Florida had preparations in place for a possible hurricane, immediate response was needed as soon as it was discovered the hurricane would reach land. On Monday October 8, 2018, Governor Rick Scott ordered mandatory evacuations for the Panhandle along Florida (MacFarlane, 2018; Florida Association of Counties, 2018). The governor stated that "Michael is a massive storm that could bring total devastation to parts of our state," (MacFarlane, 2018). Counties were evacuated in specific orders based on damage and danger potential. The residents were urged strongly to evacuate and told that "if they were to stay home, and a tree fell on your house, there's nobody who can respond to help you" (MacFarlane, 2018). Schools were evacuated and the initial mandate stated that the schools would be closed for a week until further notice. Tyndall Air Force base was evacuated of non-mission and civilian personnel, while the aircraft on Tyndall and Hulburt fields were immediately moved to a safer location (MacFarlane, 2018). The aircraft at Eglin Air Force base followed not long after. Airlines, including Southwest, soon enacted its flexible rebooking policy, meaning that it did not cost any extra to change the dates of the flight. Overall, these are only a few of the recorded responses that Florida took in response to Hurricane Michael.

Disaster Recovery

After the enormous power of Hurricane Michael, there was a lot of work that needed to be done to start the recovery processes. According to the Federal Emergency Management Agency (FEMA), as of October 19, 2020, approximately $3 billion was given to Florida, "in grants, loans and flood insurance payments" to help with the destruction caused by the hurricane (2020). Many of the funds were directed to assist people with temporary housing while homes were being repaired and about $1 billion was set aside for "debris removal, rebuilding of

infrastructure and to reimburse state and local governments for emergency response costs"

(FEMA, 2020). However, even with the federal funds provided to assist with the recovery

efforts, it still fell short of the estimated $18.4 billion in damages (Berlan, 2020; U.S.

Department of Commerce, 2019). So, while the funds available helped, it was not enough to

cover a majority of what was damaged or destroyed. According to Berlan, one of the reasons that

negatively affected recovery efforts in Florida was the lack of media attention to the severity of

the disaster, which in turn reduced the amount of donations that could have been generated

(2020).

      While many places were affected and destroyed by the hurricane, national parks across

Florida also faced severe damages and "set [a] new devastation record" (Florida State Parks,

n.d.). However, to be able to work on recovery efforts, teams from different parks across the

state, that were unaffected, were deployed to help clear debris, assist with cleanup efforts, and

make sure the parks were safe (Florida State Parks, n.d.). However, due to Hurricane Michael,

about five parks have been closed and have not been reopened due to safety concerns (Florida

State Parks, n.d.).

Disaster Mitigation

      Due to the high prevalence of hurricanes making landfall in Florida, there are several

different mitigation strategies that are used to help reduce the effects of the next hurricane.

Florida has a state mitigation plan that has prepared for approximately 21 different potential

natural and man-made disasters (Waterman, 2018). The report covers Florida's overall goal and

mission of the mitigation report and helps provide a clear risk assessment of all the 21 potential

hazards that the state is most likely to face (Waterman, 2018). When looking at the overall plan,

one of the main objectives is to increase "initiatives and policies that protect the state's cultural,

economic, and natural resources," as well as "[increasing] public and private sector awareness and support for hazard mitigation in Florida" (Waterman, 2018, pg. 38). However, the report does not specify specific actions that should be taken in the event of a hurricane in order to prepare for the potential damages.

Yet, while the previous report does not have the specific action steps to prepare for a hurricane, according to a presentation by Bay County, Florida, there are approximately four types of mitigation projects that organizations can apply for grants to be able to complete (2019). The four projects include,

> *Acquisition* [emphasis added]: Acquiring and relocating/demolishing structures from hazard-prone areas. *Retrofit* [emphasis added]: Retrofitting structures to protect them from floods, high winds, earthquakes, or other natural hazards. *Elevation* [emphasis added]: Elevating existing structures to avoid flooding damages. *Drainage* [emphasis added]: Constructing certain types of minor and localized flood control projects. (Bay County Florida, 2019, pg. 93)

These mitigation strategies are generally used in hurricane prone locations to help reduce the effects that a hurricane would have in that area. The funds that help to support these projects come from the Florida Hurricane Catastrophe Trust Fund which has approximately $7 million per year (Bay County Florida, 2019, pg. 87). According to Zurichna, a national insurance company, one of the first steps that needs to be done in order to help mitigate the damages of flood waters, potentially caused by a hurricane, is to create an "emergency response plan" (2018). This plan should include preparations beforehand, right before, and after the flooding has occurred. For example, steps that could be taken before would include, "filling fuel tanks serving emergency generators," while right before you would need to do things such as "protecting and

relocating vital … records, [or] removing outdoor equipment" (Zurichna, 2018). Overall, any steps that can be taken beforehand are extremely important in helping to reduce the effects that a hurricane can bring.

<div align="center">**Recommendations**</div>

In order to better prepare for future natural disasters, such as hurricanes, it is necessary to evaluate future policies, the effectiveness of current strategies, those who respond to disasters, as well as education related to hurricanes in Florida. The following section will look at the aforementioned areas and see what could be applied to Hurricane Michael and future hurricanes.

Future Policy

A key area that needs to be addressed when it comes to natural disasters is to be able to have effective policies in place to help provide funding and regulations to manage resources. Approximately $19.1 billion were allocated to help address the damages that were caused by Hurricane Michael, however, near the end of 2018, the Trump Administration wanted to re-allocate $13.4 billion of those funds to address the border wall (Cordeiro, 2019; Gould, 2019). When looking at this policy, it is fairly evident that this is not a recommended course of action since the total damages were estimated to be $18.4 billion in the state of Florida (U.S. Department of Commerce, 2019). With this in mind, redirecting federal aid into an alternative project is counterproductive to the health and well-being of the affected areas and should be avoided. While the attempt to move the funds was unsuccessful, it is still something to keep in mind for future disasters that affect a large area and cause a lot of damages.

Another key area of future policy that would be helpful in the event of a disaster, is to have laws in place to help with evacuation and shelter-in-place orders that are not restricted to local discretion. Based on a review done by McGinty et al., "the government should ensure that

hospitals are evacuated, ideally before essential services and patient care are disrupted" (2016, pg. 82). The research study focused on the importance of having laws and regulations in place that would be able to have hospitals evacuate, shelter-in-place, or do nothing with the threat of a disaster (McGinty et al., 2016). In their research of Hurricane Sandy in 2012, it was noted that only a few hospitals in New York voluntarily evacuated prior to the storm making landfall, but that multiple others did not and faced structural damages to the hospitals (McGinty et al., 2016). By having laws in place that would help to preemptively address evacuation or shelter-in-place orders, patients and staff in health care settings can be more prepared compared to last minute evacuation or shelter-in-place orders.

Research on Best Practice

When responding to hurricanes, there are several factors that need to be reviewed to respond efficiently and promptly. The following section reviews previous research on how past hurricanes were addressed and what should be done in the future. This section will also offer recommendations of what could have been done for Hurricane Michael. Prior to a disaster, adequate resources need to be available to address the consequences of such said disaster. In a study, MacKenzie et al. were able to examine two disasters, the Deepwater Horizon oil spill and Hurricane Katrina, and utilized a resource allocation model to estimate the cost needed for potential disasters (2021). The resource used is called the "Interoperability Input-Output Model (IIM) which is an economic model that translates direct losses in individual industries due to a disruption to total production losses in the entire economy" (MacKenzie et al., 2021, pg. 2). Utilizing this tool, one "should allocate billions of dollars to prepare for a hurricane … [since] a hurricane is more likely and more costly" (2021, pg. 13). However, when it came to Hurricane Michael, Florida did not have the adequate funds set aside to respond appropriately considering

they were still using money from the Bipartisan Budget Act of 2018 (U.S. Department of Health & Human Service, 2021; *The bipartisan budget act*, 2018).

Since governments need to budget billions of dollars in preparation for a hurricane, according to MacKenzie et al., it can be noted for Hurricane Michael that earlier in the year around February, funds were already made available for Florida to utilize for hurricane relief. Approximately $90 billion was set aside for "Puerto Rico, the U.S. Virgin Islands, Florida and Texas" to address damages that were caused by Hurricane Harvey and Irma the previous years (*The bipartisan budget act*, 2018). However, by the time Hurricane Michael hit in October, the funds to address the previous hurricane damages were then used to address the current disaster and Florida needed additional funds that were provided in June of 2019 (Contorno, 2019; Cordeiro, 2019; Gould, 2019). This situation shows the importance of budgeting appropriately for potential future disasters, especially when Florida has the highest rate of hurricanes (Heil, n.d.).

After Hurricane Michael swept through the state, many homes and buildings were damaged or destroyed. However, based on observations from Sullivan et al., there were several buildings which sustained much less damage to those around them (2018). Further exploration discovered that, "strategically placed nails, some small metal connectors and window shutters that created a sealed package — low-cost reinforcements that determined whose home survived and whose was destroyed by the power of Hurricane Michael (Sullivan et al., 2018). By using more reinforcements and careful placement, several homes built by Habitat for Humanity were better able to withstand the wind speed caused by the hurricane (Sullivan et al., 2018). So, even after many previous hurricanes and building codes being updated, there are still things that

people can do that could help better defend their homes from future hurricanes (Sullivan et al., 2018).

Responding to Disasters

In responding to disasters, there are many different organizations and fields that are utilized in order to be able to respond appropriately. According to Reifels et al., "the extended scope for mental health professional involvement in disaster responses beyond the traditional role" is vital in addressing disasters (2013). Based on the research, mental health professionals can provide, not only therapy services, but also advocate for better policies and practices to be put in place before a disaster occurs (Reifels et al., 2013). However, the research also shows the importance of having a multidisciplinary approach to disasters (Ishiwatari et al., 2020; Reifels et al., 2013; Schmeltz et al., 2013). In a research project by Schmeltz et al. in 2013, one of the key findings to effective disaster planning is good coordination from all members involved in the preparation, response and recovery. For example, having, "Collaborations between government and on-the-ground volunteer responders" is vital to disaster response (Schmeltz et al., 2013). In future disasters, Florida needs to make sure that those who are responding and assisting with recovery efforts are part of a multidisciplinary approach to better help people in a variety of situations.

Another key group of professionals who are vital in disaster planning, response, and recovery are social workers. However, there are several different roles that social workers can play in these types of situations. According to Nikku, one of the more historical roots that social work has in disaster response is in the "psychosocial interventions" aimed at helping individuals after a disaster (2015). Yet, social workers can help in coordinating disaster relief efforts, advocating for better policies and resources, while also providing counseling services to those

affected (Nikku, 2015). By incorporating social workers into the planning process and other areas of disaster preparation, Florida will be able to expand its services to affected communities much more efficiently due to the versatile skill set that social workers bring to the table.

Education

One of the first steps that needs to be taken before a natural or man-made disaster occurs is to have the proper education available to different groups that could be potentially affected. For example, first responders need to be aware of what their role is when a disaster strikes, members of the public need to know what to do to keep themselves and their families safe, and organizations need to plan a response to such a situation. When looking at community preparedness and education, Basolo et al. surveyed residents in Miami-Dade County, Florida to see their perceptions, beliefs, and actions in relation to hurricanes (2017). In the study, participants were asked about their beliefs about hurricane preparedness and specific actions that were related to being prepared (Basolo et al., 2017). However, an interesting find that the study uncovered was that "households may rely on government readiness or preparedness for a hurricane instead of taking protective action at the individual level" yet, "the results suggest that a proportion of households feel more prepared if they perceive government is ready to respond and they also understand preparedness as a shared responsibility of the household and institution" (Basolo et al., 2017, pg. 15). Overall, this study highlights the importance of education in relation to disaster preparedness as some members of the community may depend entirely on local or federal government in times of crisis.

Conclusion

In 2018, Florida was devastated by Hurricane Michael. The hurricane lasted around 5 days starting on October 11 and ending around October 16 in the United States, however, the

impact lasted much longer. The state of Florida contained many vulnerabilities even before Hurricane Michael hit, such as previous damage from Hurricane Irma, which was one of the costliest hurricanes to hit the United States, as well as a high index score on the SVI. Prior to Hurricane Michael, certain preparations were being undertaken for future disaster response and recovery such as providing funds from the Bipartisan Budget Act of 2018, running evacuation tests in regional hospitals, and setting aside FEMA resources. So, while these preparations did help with mitigating some of the effects of the hurricane, a better response could have been used had the state of Florida done more work in advance. According to the research, better policies and practices related to disaster response as well as evidence-based strategies could have been used to address Hurricane Michael. For future hurricanes, Florida can work to educate citizens to be better prepared to deal with a hurricane while providing practical examples of what people can do. Not only that but setting aside enough money to be able to respond and recover is necessary for any future hurricanes. Based on the review of this paper, it is recommended that Florida implement more strategies from both a legislative and practical standpoint to be able to respond much more efficiently to the high volume of hurricanes that the state experiences.

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