

THE CHALLENGE OF FINANCIAL RECOVERY FROM DISASTERS: THE CASE OF FLORIDA HOMEOWNERS AFTER HURRICANE MICHAEL

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The Challenge of Financial Recovery from Disasters: The Case of Florida Homeowners After Hurricane Michael

Kyle Sweeney, Helen Wiley, and Carolyn Kousky ¹

I. Summary

Tropical cyclones and hurricanes have caused the most damage of all weather-related disasters in the United States since 1980. These storms are responsible for the five costliest disasters in U.S. history with average direct damage costs of almost \$21.5 billion per event (NOAA 2022). The Wharton Risk Center, in partnership with the Resilience Action Fund, undertook a survey of homeowners who experienced Hurricane Michael in 2018 in order to identify the full range of costs that hurricanes impose, document the financial recovery of those who suffer property damage from a hurricane, and explore determinants of financial resiliency.

We found that the costs of hurricanes are wide ranging, extending beyond just property damage. Additional expenses can include, for example, paying for evacuation, temporary housing, medical expenses, debris clean-up, generators, and fuel. Prices of many building materials and services surged after the disaster, further increasing costs. Survivors also reported costly disruptions in services, including electricity and cell phone service, lack of access to food and banking, and transportation disruptions. Some experienced fraud and theft, adding to their losses, and cash illiquidity in the weeks following the storm. The higher costs, sometimes coupled with lost income from the storm, can have long-lasting negative financial impacts, such as reductions in savings, the need to service additional debt, and having to defer important expenses. Lower income households reported greater financial burden from the storm. Those who had insurance were better insulated against negative financial impacts.

2. Hurricane Michael

On October 9, 2018, Hurricane Michael struck the Florida Panhandle as a fierce Category 5 storm with winds that reached 160 mph; it then traveled across the southeast, impacting multiple states (NOAA 2019a). Hurricane Michael was the first Category 5 hurricane on record to impact the Florida Panhandle and the first Category 5 storm to make landfall in the

¹ We would like to thank the Lloyd's Tercentenary Research Foundation and Resilience Action Fund for support of this work.

contiguous United States since Hurricane Andrew in 1992.² Figure 1 shows the track of the storm. It is estimated that the storm caused \$25 billion worth of damage, as it ravaged property and infrastructure. Of the \$25 billion in damages, only \$7.4 billion was insured (Sassian 2019). NOAA estimated that Florida was the most impacted state with \$18.4 billion of losses, followed by \$4.7 billion worth of damages in Georgia, and \$1.1 billion in southeastern Alabama; smaller amounts of damage were also recorded in North Carolina, South Carolina, and Virginia (NOAA 2019b).

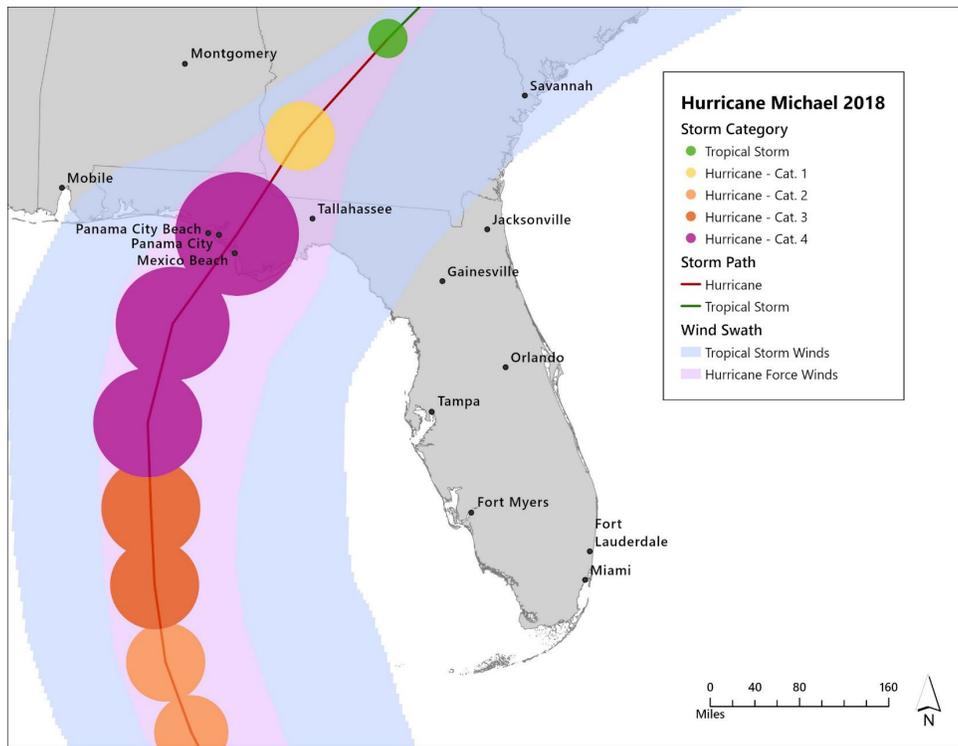
The most severe damage in Florida occurred in the Bay County localities of Mexico Beach and Panama City. According to FEMA's damage estimates, the average flood damage statewide experienced by affected homes was \$11,932 (FEMA 2022). Of the 1,700 buildings within Mexico Beach's city limits, approximately 48% of the structures were completely obliterated and 46% sustained severe damage (Local Mitigation Strategy Working Group for the Communities of Bay County 2020). In addition to damage from the winds, storm surge was estimated at 9 to 14 feet. Flooding was exacerbated by heavy rainfall, with some areas of Florida registering nearly a foot of precipitation during the storm (NOAA 2019b).

Compared to other parts of the state, the panhandle region of Florida was later to adopt stronger building codes and this may have made structures more vulnerable to Michael. Since 2001, new construction in other parts of the state had been required to withstand winds of 170 mph (Fineout 2018). These codes were adopted in the panhandle in 2007 (but at a lower windspeed of 130 mph), but since they only apply to new construction or substantial retrofits, most buildings at the time of Michael were not built in compliance with this code.³ The storm left approximately 22,000 of Bay County's 180,000 residents without a home. One year after the storm, almost 5,000 people were still homeless and one in six insurance claims had still not been resolved (Schneider 2019).

² Hurricane Andrew, which caused an estimated \$15.5 billion dollars in insured losses, triggered calls for more stringent building codes. Over the next ten years, the state of Florida studied taking over building codes from local control. In 2002, after years of preliminary studies and legal challenges, Florida's first statewide building code went into effect. It has since been updated six times. The current edition is the 2020 Florida Building Code, which went into effect Dec 31, 2021.

³ Bay County's population grew rapidly from 1970 to 2010, which parallels the construction of its buildings. It is unclear if Bay County had a building code before 1974, when Florida mandated that counties choose one of four code models. Regardless, the wind standard for single family homes would likely have been below 100 mph.

Figure 1. Hurricane Michael Track



Data Source: National Hurricane Center (a division of the National Oceanic and Atmospheric Administration/National Weather Service)

3. Survey Methodology

The Wharton Risk Center, in partnership with the Resilience Action Fund, a non-profit organization dedicated to educating consumers and policymakers to create stronger, more resilient homes and communities, teamed up to survey survivors of Hurricane Michael about the costs they experienced from the storm and the resources they could access for recovery. The objective of the survey was to identify challenges people face in rebuilding their homes and the drivers of post-disaster financial resilience.

The survey was deployed predominantly in Mexico Beach and Panama City, which are both located in Bay County. Recruitment began on July 7, 2021. Participants were recruited through multiple channels, including a Facebook ad campaign targeting a 30-mile radius around Mexico Beach, spots on four local radio stations, and outreach to local community groups. One in 10 respondents who completed the survey by July 18, 2021 was given a \$30 gift card as an incentive to participate, and one in 10 who completed it by July 24, 2021 was given a \$20 gift card.

In total, 147 participants initiated the survey with 100 participants completing the entire survey. According to data from the U.S. Census (2020), respondents were wealthier and whiter than the general Bay County population. The median household income of survey respondents was approximately \$65,000 (compared to \$54,316 for the county overall). Of the 100 respondents who completed all questions, 91 self-identified as Caucasian (while for the county, 82% are white). Almost all respondents (94%) indicated they were homeowners; we have thus limited our analysis to this group, since we do not have a large enough sample to draw inferences about renters. Of our homeowners, 77% were owners of a free-standing single-family house. Looking at owners, our analysis in this report includes a total of 97 full responses and 43 additional partial responses.

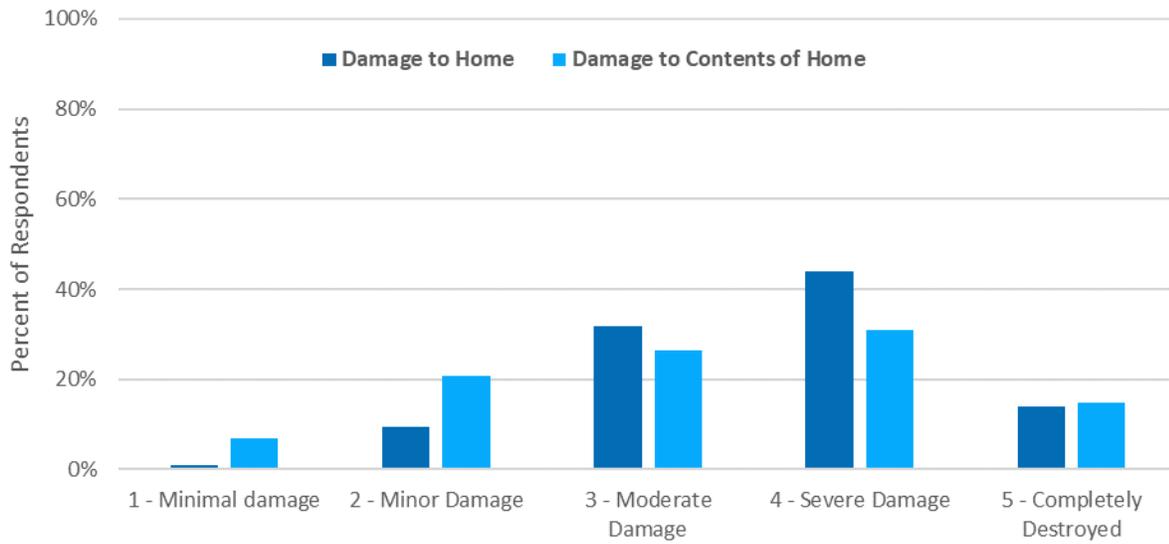
4. Financial Impacts of Hurricane Michael

4.1 Property Damage

As can be expected, given the widespread devastation the storm caused, most survey respondents reported heavy damage to their home and contents, as shown in Figure 2. We found that 90% of respondents reported moderate damage or greater, with 14% stating their entire home was destroyed. Damage to the contents of homes was slightly less severe, but followed the same general pattern as seen in the figure.

Rebuilding does not occur quickly. Respondents reported that on average it took 18 months to repair their home. For those that reported “severe damage” or that their home was “completely destroyed,” the average time to repair the home was 22.45 and 20.5 months, respectively. For those with “minimal” and “minor damage,” the average time to repair was much less, at 4.3 months, while those who experienced “moderate damage” spent 16.6 months repairing their homes. While those with lower levels of damage may be back in a fully functioning home in less than a year, for those with serious damage, it can take closer to two years or more. Indeed, a couple respondents noted that their home was still not rebuilt at the time of the survey.

Figure 2: Damage to Home and Contents



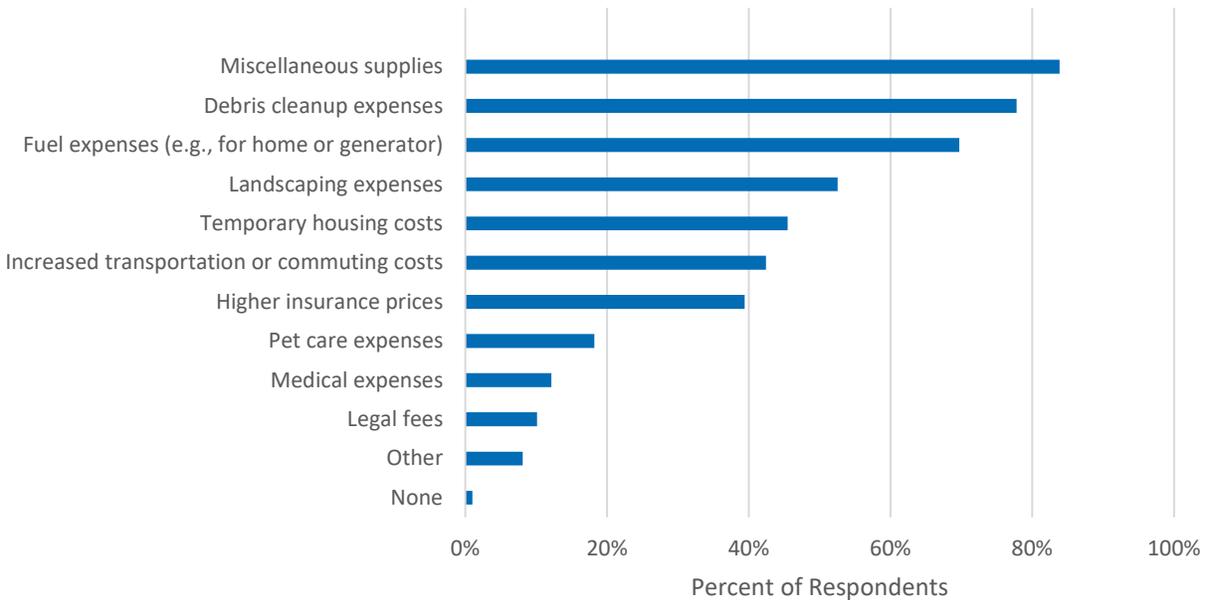
Note: 107 people answered the question asking about damage to their home and 87 answered the question asking about damages to their possessions.

4.2 Additional Expenses

Beyond damage to their home and contents, respondents reported a wide range of other costs as shown in Figure 3. A majority of respondents noted having to pay for supplies, debris cleanup, and fuel, such as for a generator. Other additional costs included landscaping expenses, temporary housing, and higher commuting or transportation costs. A smaller percent of respondents also reported legal fees, medical expenses, and pet care expenses due to the storm.

Notably, almost 40% also noted increases in insurance prices. Since flood insurance provided by the federal National Flood Insurance Program does not raise rates in response to a storm event, this must be from their homeowners insurance company. Only 8 respondents selected “other” and the costs they mentioned included food prices, storage fees, and surcharges to utility bills.

Figure 3: Additional Hurricane Costs



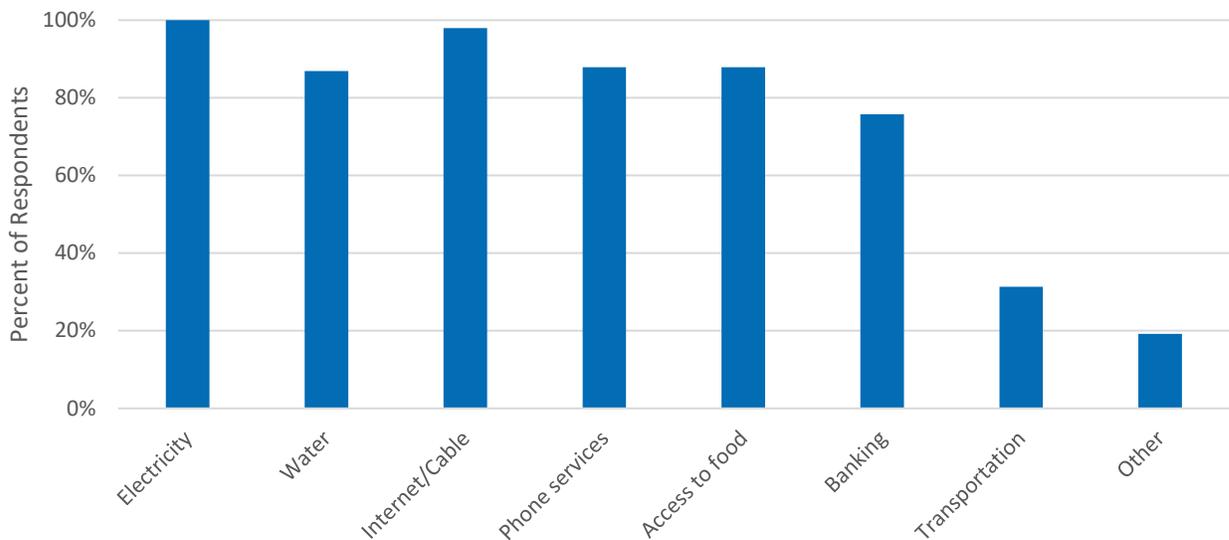
Note: 99 respondents answered this question.

Mandatory evacuations were issued in many places in the panhandle in advance of Hurricane Michael. Such orders are made to protect lives in the face of dangerous storms. Since most lives are lost to flooding and storm surge, the mandatory evacuation zones tended to focus on areas near the coast. After the storm, Bay County found that only one-fifth of those ordered to evacuate actually did so, although most people in Mexico Beach evacuated since police had gone door-to-door issuing warnings (Allen 2019).

We found that evacuation imposes costs on households. Out of our sample, 51 respondents reported evacuating. Among this group, they report an average cost of around \$1,500 in evacuation expenses. These respondents were asked to report how financially burdensome their evacuation experience was on a 1 – 10 scale (1 being not at all burdensome and 10 being extremely burdensome). The average response was 5.04. Unsurprisingly, evacuation expenses were much more burdensome for those of lower income. The average income of those reporting a high degree of burden (9 or 10) was \$33,000. For those that answered that the costs were low burden (1, 2, or 3), the average income was \$77,285. While our sample is small, we also found that households with members that might need more time or support for evacuation (such as children, someone over 75, or pets), reported that evacuation costs were, on average, higher on our scale (average 5.4) than those without such individuals in the home (average 4.4). Burdensome evacuation costs may deter people from leaving in advance of a storm and also increase overall storm costs.

Households also reported a number of service disruptions as shown in Figure 4. Every respondent (out of a total of 99) reported losing electricity and over 80% also reported losing water, internet/cable, phone, and access to groceries. Around 75% also lost banking services. A smaller share (31%) reported transportation disruptions. Of the 19 respondents who selected “other,” 11 specified a lack of gasoline as a service disruption. Another 5 respondents also highlighted that they lost food reserves in their freezer due to electrical outages.

Figure 4: Service Disruptions Experienced from Hurricane Michael



Note: 99 respondents answered this question.

Finally, when asked if they experienced fraud during the recovery process, just under a third (30 of 99) respondents who answered this question reported that they had experienced some fraud in recovery. In an open text follow-up, respondents most often noted scamming and price gouging from contractors, construction workers, and clean-up companies. One individual wrote, “Contractors took an obvious opportunity to take advantage of [the] situation. They overpriced materials and labor, did not honor contracts. They hired inexperienced workers and [provided] low-quality service.”

Several respondents also reported possessions stolen by workmen. Another stated, “It wasn’t fraud like a contractor ripping me off, but people repeatedly burglarized my house, looting, vandalizing, no matter what I did to try to protect my property. This was completely rampant, out of control, and the police could do nothing to stop it. The ability of law enforcement to keep order was not good in my area.” Fraud, theft, and vandalism further escalate costs to households from a disaster event.

4.3 Lost Income

We found that 40% of respondents reported lost income as a result of the storm. This includes a reduction in hours worked, loss of a job, or being furloughed. When asked to elaborate on their lost income in an open text format, respondents noted losing jobs due to places of work being destroyed, having reduced income due to their places of work simply not being open, and having to travel farther to keep their jobs. One respondent wrote:

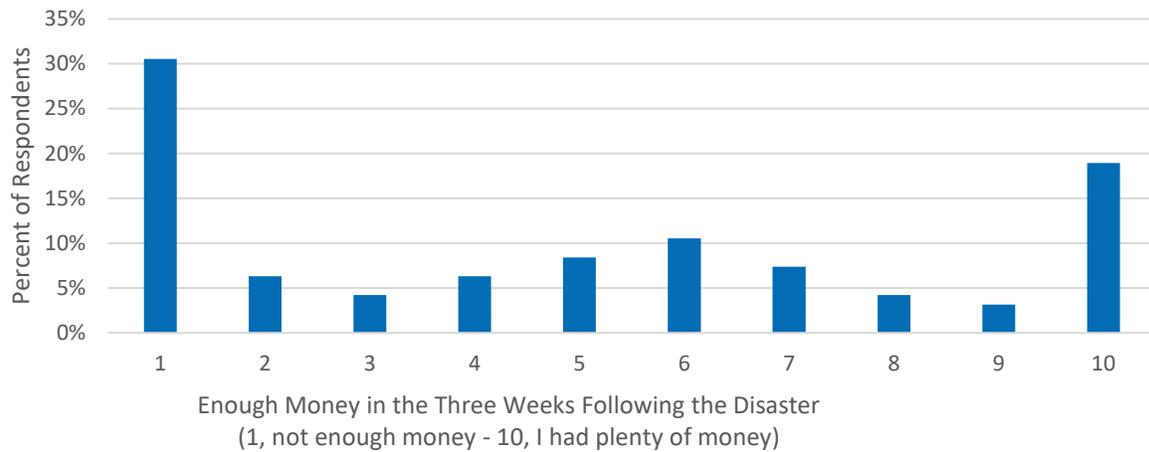
I worked as a nurse practitioner and the hospital my practice was associated with was severely damaged from the storm and didn't reopen for 3 months. My office building was destroyed. When we secured another office, I had to drive 30 minutes further to work and my hours were cut in half for over 3 months. My spouse is self-employed and had no cell service for about 3 weeks and no internet service to his office for almost 2 months.

Other respondents noted they had a home-based business that was shut down from the storm damage. These losses of income occur at the same time households are experiencing an increase in expenses and exacerbate the financial impact of the storm. While the majority of respondents did not report lost income, for some, it was because they were already retired and on fixed incomes.

4.4 Perceptions of Financial Impacts

As just discussed, hurricanes can cause a wide range of costs, many of which are immediate financial burdens for those impacted. We asked respondents to respond on a 10-point scale if they had sufficient funds for these extra costs in the three weeks after the hurricane from 1 (not enough money) to 10 (plenty of money). This is shown in Figure 5. As seen in the figure, many had severe liquidity issues during the first 3 weeks post-disaster (even though the sample represented a wealthier-than-average segment of Bay County's population). We group respondents into those experiencing high financial burden (1, 2, or 3), medium financial burden (4, 5, 6), and low financial burden (7, 8, 9). We find that household income is negatively associated with a respondent reported financial burden. This finding holds after controlling for types of damage from Hurricane Michael and severity of damage. (Results available from authors upon request.)

Figure 5: Financial Burden of Immediate Hurricane Costs



Note: 95 Respondents answered this question.

We also asked survey respondents a series of open response questions about their most important expenses, most unexpected expenses, and most disruptive expenses. There are many overlaps in the most common types of expenses noted across these questions as shown in Table 1. While many respondents noted direct costs, defined as those that result from the immediate impact of the storm, such as property damage, many also noted indirect costs, which are defined as follow on costs from initial destruction. This includes, for example, costs from the service disruptions discussed above.

Table 1: Top Four Reported Expense Categories

Most Important Expense	Most Unexpected Expense	Most Disruptive Expense
Temporary Housing (24)	Temporary Housing (15)	Temporary Housing (36)
Gas and Generators (23)	Housing Repairs (14)	Housing Repairs (18)
Housing Repairs (19)	Food and Water (14)	Service Disruptions (19)
Food and Water (19)	Gas and Generators (10)	Gas and Generators (12)

Note: Numbers in parentheses show the number of respondents that reported a given expense category in their open text responses. Only the top four expense categories are included in this table for each open text question. Responses with related expense types were grouped into categories (e.g. “Housing Repairs” includes responses on roofing and tarp costs).

When asked to reflect on the most important expenses in the immediate aftermath of Hurricane Michael, responses were wide ranging. Of the 98 respondents who answered the question, 24 mentioned housing and 23 identified gas and generator issues as their most important expense post-disaster (many respondents listed multiple expenses, so respondents may be double counted in these numbers). Also of note were housing repair costs, food and

water, and debris costs which were referenced by 19, 19, and 8 respondents, respectively. One respondent stated that it cost \$19,000 to clear fallen trees off their 1-acre property. Another stated the importance of “securing a company to tarp the roof and hiring a company to address the fast-growing mold.” Fifteen of the 19 respondents noting repair costs focused specifically on tarping or repairing their roofs.

Less common responses to this question helped illustrate how indirect costs and financial impacts were perceived as very important expenses for some respondents. Several noted lack of access to financial support, such as not having employment in the immediate aftermath and being unable to use credit cards. Another noted that their most important expense was “Funding our escape and survival away from the area because I had three medically fragile family members to keep safe.” Someone else shared: “Making sure my family and those people I was landlord over were alive and had food, water, and medicine. I had 29 adults I was responsible to keep alive ‘til the Calvary showed up 9 days later.” Health challenges were referenced by two respondents, with one respondent going 6 days without dialysis. Responses like this one indicate how broad the costs of a severe storm are to residents, going far beyond just property repairs.

In response to being asked what expense was most unexpected after Hurricane Michael, responses spanned similar categories to those noted under the question about the most important expense. 14 respondents wrote about unexpected repair and clean-up costs like removal of trees and other debris, the cost of tools and supplies to use in clean-up and demolition, and challenges in finding someone to do the work at prices they could afford. One specifically discussed the costs of “hiring a company to remove my water/mold damaged contents and determine what can be saved and ultimately stored.” Unlike with the most important expense question, only two respondents specifically noted roof repairs as an unexpected cost, perhaps suggesting that although roof damage was widespread, many were expecting it.

There were 10 respondents that noted needing to find gasoline for generators and cars as the most unexpected expense. One respondent also noted gasoline costs for commuting to work daily after having to move 56 miles away, while others just noted travel costs broadly. There were 14 respondents who wrote about food and water expenses and access challenges as being most unexpected, with one specifically noting, “food and water after everything in home spoiled or was no longer available.” Three respondents wrote about the need to replace all their clothes or specific items like buying jackets due to a cold front in the location where they were evacuated. Additionally, respondents described not being able to pay bills, unexpected legal fees, and needing to buy new cell phones or plans because they lost service in the days after the hurricane.

Eight respondents identified various unexpected costs associated with their insurance policies. Of these, two respondents mentioned being surprised by insurance deductibles. In many hurricane-prone areas, homeowners insurance policies have a so-called “hurricane deductible,” which is typically much higher than the deductible for other types of losses. A few respondents noted that insurance did not cover the actual cost of replacement or temporary housing. Some policies may not have full replacement cost coverage and some policies may have limited coverage for alternate housing. These are details of their insurance policy that homeowners should understand before being faced with disaster losses. Unfortunately, such restrictions may be buried in fine print or homeowners may choose the cheapest insurance when making a purchase decision on a sunny day, not realizing the impact it will have on their recovery. One respondent wrote of “the enormous amount of time I had to spend working on my insurance claim, and the emotional toll it took.” Working with appraisers and adjusters, and for some, lawyers, added time and stress. Another said that their insurance costs rose post-disaster. The Florida Office of Insurance Regulation did put in place a freeze on price increases for 90 days after Hurricane Michael, but after this, firms may have requested approvals for rate increases. As noted above, since flood insurance policies, provided by the federal government, do not change prices in response to storm events, this comment must be directed at homeowners insurance.

When asked what expenses were most disruptive, two respondents simply stated “everything.” However, 19 other respondents noted service disruptions like lack of electricity, internet, and cellular reception, with one also noting the temporary “cash only society” in place of online banking services. One respondent wrote that with no cell service for weeks, they were unable to contact anyone other than neighbors. Several also wrote that they were stuck on their properties due to debris, but could not contact anyone. Another specifically stated that they did not have electricity for two months. Needing to buy gas to run generators due to other service disruptions was also a common response (12 respondents), or as one respondent stated, “fueling the car for 4 hours of daily commutes.” Another wrote that “stores limited sales to 15 dollars. Hardly enough gas for the generator AND driving to the store 20 miles north of [Panama City].” Given the lack of food availability close by, fuel costs and shortages were likely made worse by survivors needing to repeatedly drive far away to get food. Seven respondents noted finding food as their most disruptive expense and needing to get to the store whenever they had stock of specific items.

We found that 36 respondents described their most disruptive expenses as losing or replacing their homes, temporary housing costs, or even being homeless. 18 respondents described repair costs, with one writing, “probably getting a new roof because a lot of contractors were not from this area and were not trustworthy. And roofing is expensive and went up after the storm.” This phenomenon of higher rebuilding costs in the aftermath of a disaster due to shortages of supplies or labor is referred to as demand surge and is commonly observed after severe natural catastrophes. Only a few respondents noted large upfront costs like their

insurance deductibles, down payments on new home, or building loan closing costs. Several respondents also wrote about credit card payments, loans payments, loss of jobs, or lost time at work. And finally, two respondents described medical challenges as most disruptive, with one writing about their healthcare who noted: “I got sick after the hurricane and I’m still sick and have spent half my insurance money on health care.”

5. Funding Sources for Recovery

After a natural disaster, homeowners may turn to various sources to fund their recovery. This can include using their own savings, taking on debt, using insurance proceeds, or receiving assistance from the government, family or friends, or charitable organizations. The sources of recovery dollars used by survey respondents are shown in Figure 6.

The most common source was homeowners insurance claims payments. In of our sample, 37% of respondents had both homeowners and flood insurance, 42% only had homeowners insurance, 3% only had flood insurance, and 17% did not have either. Homeowners insurance, which covers wind damages, was much more common amongst respondents than flood insurance which covers storm surge and rainfall related flooding damages. A little over 36% of respondents with insurance indicated that their insurance (from all policies) was sufficient to cover the full costs of repairing/rebuilding their home and of replacing items inside their homes. Of the 29 respondents who answered that their insurance was sufficient, 100% had homeowners insurance, while only 45% had flood insurance.

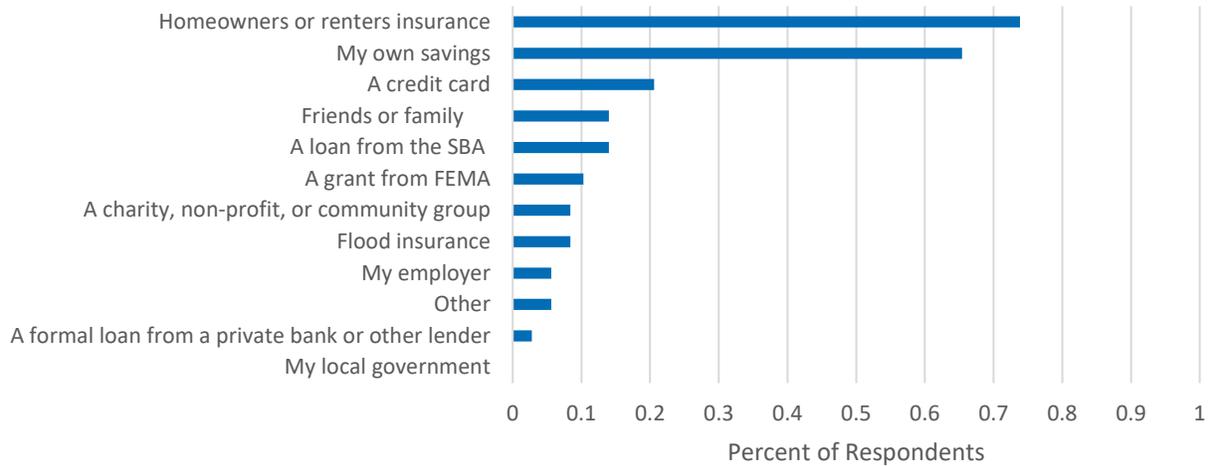
The next most common source of recovery funds was using one’s own savings. We found 66% of respondents had to dip into their own savings for recovery. Homeowners with savings can often better buffer the financial shock of a disaster, but they will have lost savings that could have been used for future expenses like education or retirement, leaving them in a worse financial position after the disaster.

Debt was also a source of financing, but, of course, would have to be repaid over time. Roughly 20% of respondents took on credit card debt and 14% received a federal disaster loan from the Small Business Association, which offers disaster loans to households.

Only a small share of respondents noted that direct aid or assistance financed their recovery. FEMA grants were used by only 10% of respondents. For those that did receive government assistance, it was often not enough. Of the more than 30,000 homeowners that received funding through FEMA’s Individuals and Households Program after Hurricane Michael, the average award was only \$4,771 (FEMA 2022). This program is designed only to make homes safe and habitable after a disaster and not to bring them back to pre-disaster conditions and sometimes is not offered if the recipient might instead be eligible for an SBA loan (Sweeney et

al. 2022). In addition, 9% noted they received financial assistance from a charitable group or from friends or family.

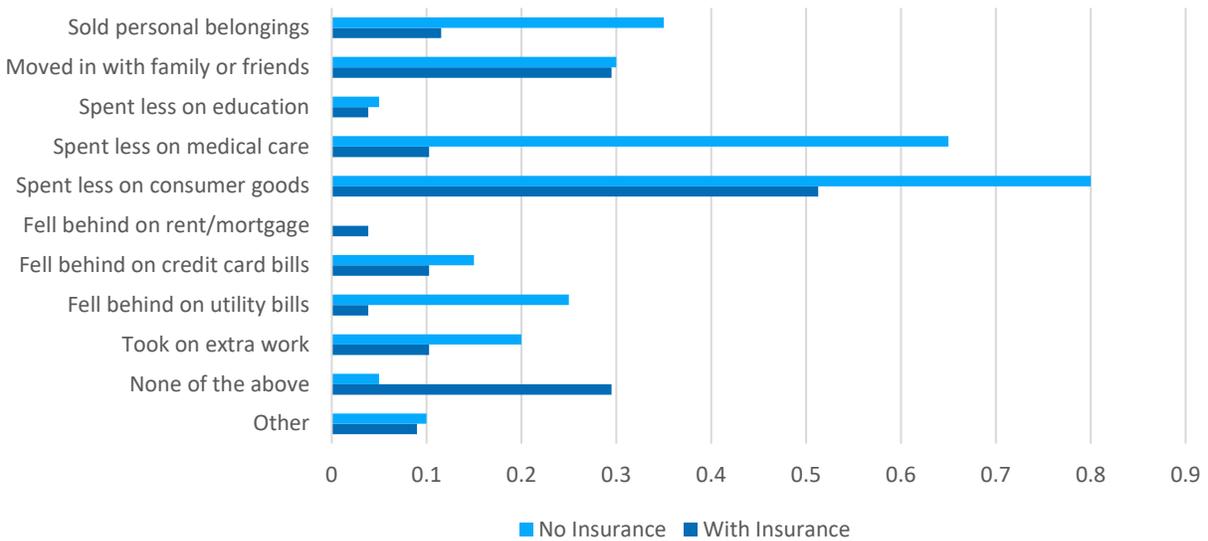
Figure 6: Sources Used for Recovery



Note: 107 Respondents answered this question.

When asked to reflect on all sources of financial support they received, roughly three quarters of respondents reported that they received insufficient funds from external sources to fully cover all financial costs. This likely explains why many respondents report undertaking a variety of other activities to help pay for costs incurred as a result of Michael. This is shown in Figure 7. Notably, however, those with insurance needed to engage in these additional coping mechanisms much less often than those without insurance. Insurance thus seems to offer financial protection for homeowners, making them less likely to need to reduce expenditures on other items and less likely to fall behind on bills or have to take on additional work.

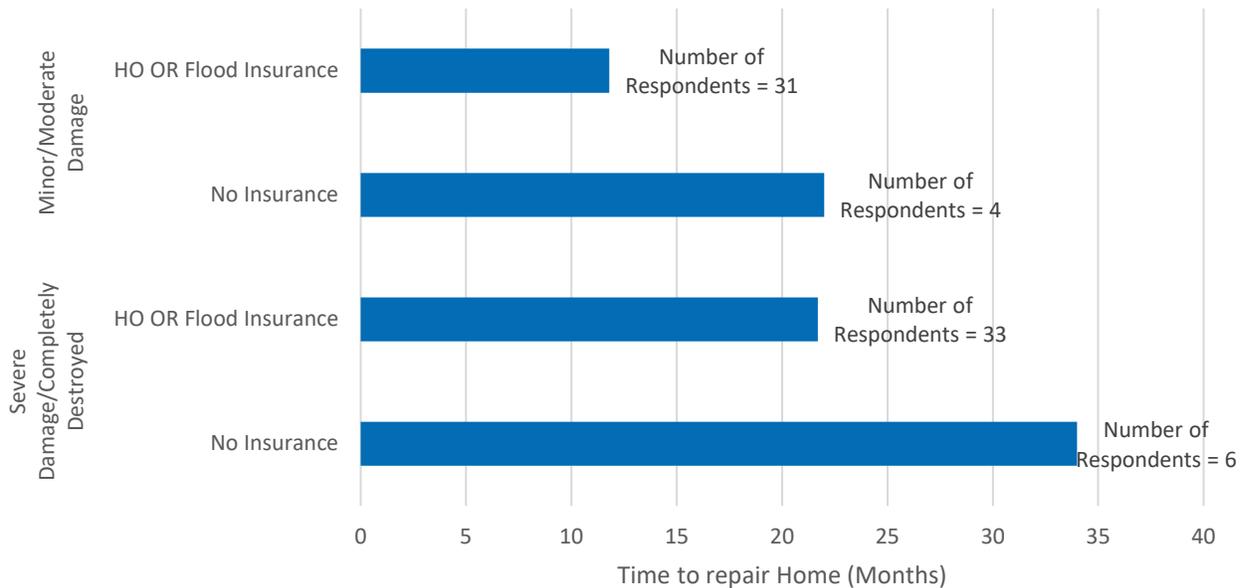
Figure 7: Actions to Pay for Additional Costs



Note: 97 Respondents answered this question (78 with insurance and 19 without insurance).

We also find that insurance speeds rebuilding times, presumably by providing more and faster funds than other sources. Figure 8 shows the self-reported time to repair a respondent’s home broken down by the amount of damage and whether they had no insurance or had either homeowners or flood insurance (or both). The fastest rebuilding time, at still about a year, was for those with only minor or moderate damage and insurance. The longest rebuilding time was for those with severe damage and no insurance, at 34 months.

Figure 8: Time to Recovery by Damage and Insurance



Note: Figure for those owning single family homes.

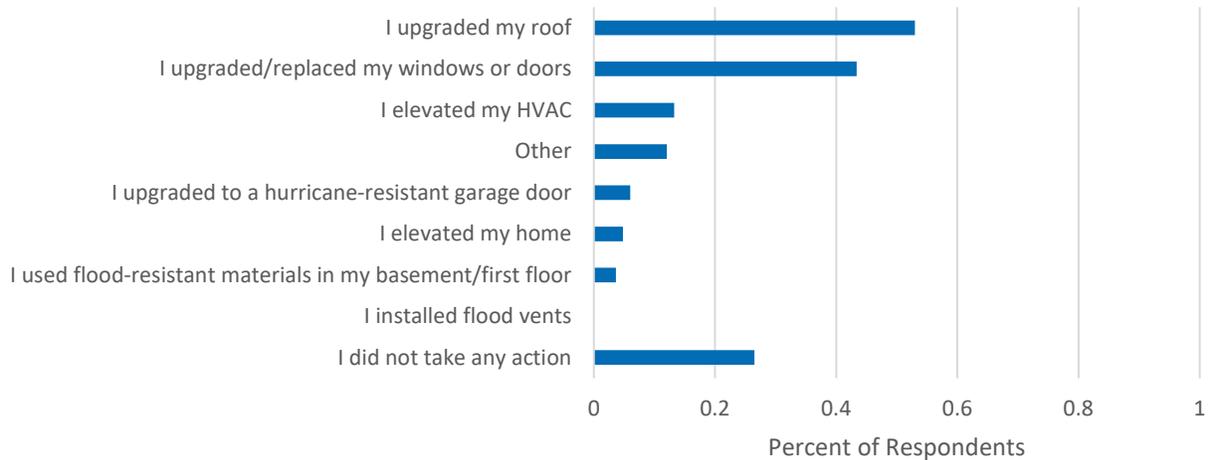
In response to the open text question “Thinking about all the assistance you received after Hurricane Michael to cover your costs, what assistance was the most surprising?” many survey respondents noted assistance like free meals, \$200 checks they did not apply for from the Red Cross and Salvation Army, and community help. Some respondents noted help from their employers like receiving a loan without interest or continuing to receive a paycheck despite not being able to work for a month. One respondent stated that their insurance wrote them a check on the spot for immediate needs. While 64 respondents noted these unexpected sources of assistance, 21 respondents used this opportunity on the survey to note how little assistance they received. For example, some specifically noted that were surprised FEMA did not provide greater assistance, such as the respondent that stated, “The only real assistance I received was from FEMA and it wasn’t a great deal of money.”

6. Building Back Better

The rebuilding process can be an important opportunity to adopt hazard mitigation measures that will make structures better able to withstand the next storm. Only 28 respondents answered a question asking if they received information on how to lower losses from future disasters. Of those, 43% (12) said they received information on this topic from the government and 36% (10) indicated they received information from insurance. When asked about undertaking hazard mitigation activities, we found that around 73% of respondents undertook some risk reduction in their rebuilding. This is shown in Figure 9. The most common mitigation action was upgrading their roof, which was done by 53% of respondents. The next most

common action was upgrading windows or doors, with 43% of respondents choosing this option. Of those that undertook some mitigation action, 41% of respondents indicated that they only undertook one mitigation measure while 59% answered that they undertook more than one action when repairing their property. Notably, of the 22 respondents who did not take any mitigation, 8 indicated it was because their house had been upgraded in the past and 9 noted they were not at risk.

Figure 9: Adopting Mitigation Measures in Rebuilding



Note: 83 Respondents answered this question.

7. Conclusion

Natural disasters can have wide-ranging and long-lasting costs for households. Our survey responses from homeowners in Bay County, Florida who suffered through Hurricane Michael identify some of the deep challenges with financial recovery from severe climate events. We found that disaster costs extended far beyond just property damage to also include such costs as debris clean up, purchase of needed supplies, and securing generators or fuel. Households also faced higher costs from commuting and additional living expenses and many lost income due to disruptions from the storm.

Financing all these additional costs is a burden, even for households that were not struggling financially pre-disaster. Households with fewer financial safety nets suffer even more. Federal disaster assistance is insufficient for recovery. Insurance provides important financial resources, and we find those with insurance are less likely to need to engage in costly coping mechanisms, such as reducing expenditures on other needed items, falling behind on bills, or selling personal items. Even with insurance, though, many households still had insufficient financial resources for the myriad costs they faced. Many had to draw down savings or take on debt.

We also found, as has been the case in other disasters, that full recovery takes a long time. It can be years before homes are fully rebuilt. In many cases, this is hampered by demand surge for rebuilding materials and services, contractor fraud and payment delays by insurers. We found that the fastest rebuilding times were for those with more moderate damage and who also had insurance.

These survey results have important implications for public policy challenges related to disaster recovery. Overall, these results make clear that the costs and impacts of disasters are much broader than suggested by just data or reporting on property damage. We also find that our current approaches to disaster finance leave many un-met needs for survivors. Better financial preparedness is needed for those living in high-risk areas. This will require improved risk communication and risk awareness, a wider range of financial preparedness options, and public policy changes to support household financial resilience.

8. References

- Allen, Greg. 2019. Everyone Would Have Left': Putting Lessons From Hurricane Michael To Work. *NPR*. June 7. <https://www.npr.org/2019/06/07/729281299/everyone-would-have-left-putting-lessons-from-hurricane-michael-to-work>.
- FEMA. 2022. OpenFEMA Dataset: Individuals and Households Program - Valid Registrations - v1. <https://www.fema.gov/openfema-data-page/individuals-and-households-program-valid-registrations-v1>
- Fineout, Gary. 2018. Michael lays bare Panhandle's weaker building codes. *NBC News*. <https://www.nbc11news.com/content/news/Michael-lays-bare-Panhandles-weaker-building-codes-497570801.html>
- Local Mitigation Strategy Working Group for the Communities of Bay County. 2020. Local Mitigation Strategy Plan 2020. <https://www.pcgov.org/DocumentCenter/View/5363/Bay-County-Local-Mitigation-Strategy-Plan-2020>
- NOAA. 2019a. Hurricane Michael upgraded to a Category 5 at time of U.S. landfall. <https://www.noaa.gov/media-release/hurricane-michael-upgraded-to-category-5-at-time-of-us-landfall>
- NOAA. 2019b. Hurricane Michael (AL142018) 7–11 October 2018 National Hurricane Center. https://www.nhc.noaa.gov/data/tcr/AL142018_Michael.pdf
- NOAA National Centers for Environmental Information (NCEI). 2022. U.S. Billion-Dollar Weather and Climate Disasters <https://www.ncdc.noaa.gov/billions/>, DOI: [10.25921/stkw-7w73](https://doi.org/10.25921/stkw-7w73)
- Sassian, Maria. 2019. Hurricane Michael Insured Losses Reach \$7.4 Billion. *Insurance Information Institute*. Triple-I Blog. November 15. <https://www.iii.org/insuranceindustryblog/hurricane-michael-insured-losses-reach-7-4-billion/>
- Schneider, Mike. 2019. A year after Michael, Florida community still in crisis. *Associated Press*. October 9. <https://apnews.com/article/ap-top-news-us-news-violence-florida-united-states-0d260a9ec44545458ab1f25b6f969a5a>
- Sweeney, Kyle, Marina Dauer, and Ben Thomas. 2022. Federal Disaster Assistance: An Overview of Post-Disaster Programs. *Wharton Risk Center*. February. Available at: <https://riskcenter.wharton.upenn.edu/wp-content/uploads/2022/03/Disaster-Aid-Primer-March-4-2022.pdf>
- United States Census Bureau. 2020. Census of Population and Housing. <https://www.census.gov/quickfacts/panamacityflorida>. Retrieved February 23, 2022.

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The Wharton Risk Management and Decision Processes Center, established in 1985, is a research center affiliated with the Wharton School at the University of Pennsylvania. Engaging students and faculty throughout the University in collaborations, research projects, and other partnerships, the Center is recognized worldwide as a leader in risk-related research and policy analysis. The Risk Center also serves as a bridge between scholars at Penn and organizations and decision-makers in the public and private sectors.

To learn more about our work, visit <https://riskcenter.wharton.upenn.edu/> or follow us on Twitter @WhartonRiskCtr and LinkedIn at www.linkedin.com/company/wharton-risk-center.

ABOUT THE RESILIENCE ACTION FUND

The mission of the Resilience Action Fund is to empower consumers and policymakers with the knowledge and tools to withstand natural and climate hazards with long-standing and resilient homes and communities.

To learn more about RAF, visit <https://www.buildingresilient.com/>.