

# COUNTING EVERY DEATH WHEN EVERY DEATH COUNTS

A Mixed-Methods Study of  
Hurricane Michael Excess Mortality

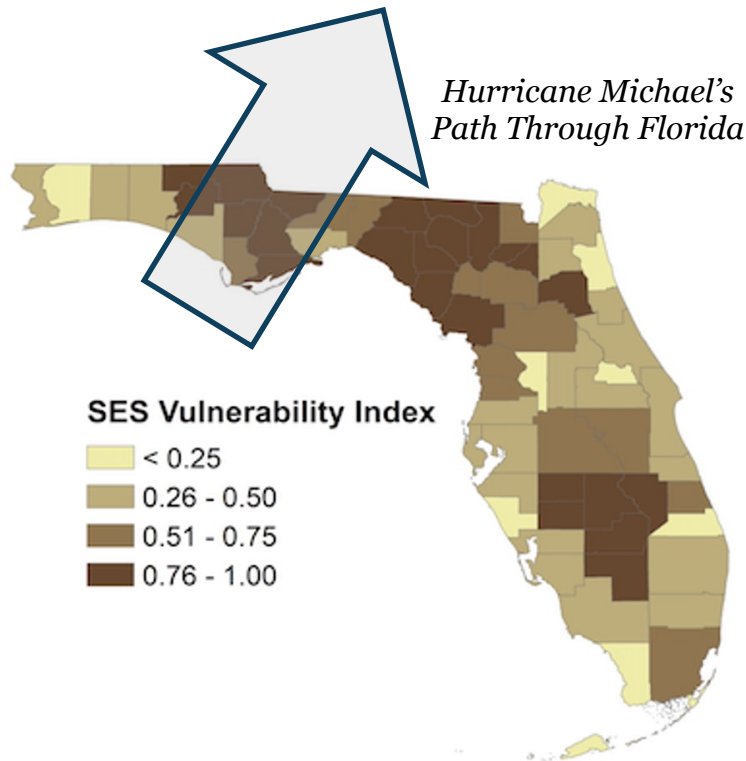
Blake L Scott

*College of Public Health, University of South Florida*



# RESEARCHING HURRICANE MICHAEL'S IMPACT

*More research is needed to fully understand this rare Category 5 hurricane that hit a rural and socioeconomically vulnerable part of the Florida Panhandle in October 2018, resulting in 50 fatalities in Florida and a multi-year recovery period.*



*This 2018 map shows the pockets of higher socioeconomic vulnerability in Florida, particularly the area where Hurricane Michael hit.*

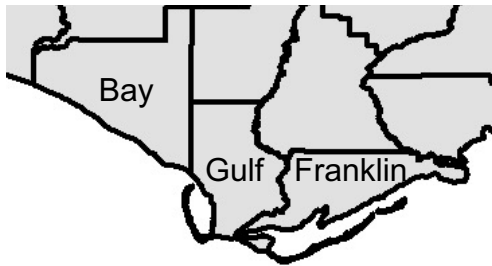
Disasters disproportionately impact vulnerable populations, and vulnerable communities are likelier to experience secondary disasters such as economic downturns and excess mortality.

Excess mortality is the analysis of whether the overall mortality rate of an area increased in the months after a disaster. Though Florida has pockets of vulnerable populations and has experienced more major hurricanes than any other part of the U.S., little research has been done on hurricane-related excess mortality in the state.

The purpose of this study is to determine if the Hurricane Michael impacted area experienced excess mortality and what were the root causes of those changes in health.

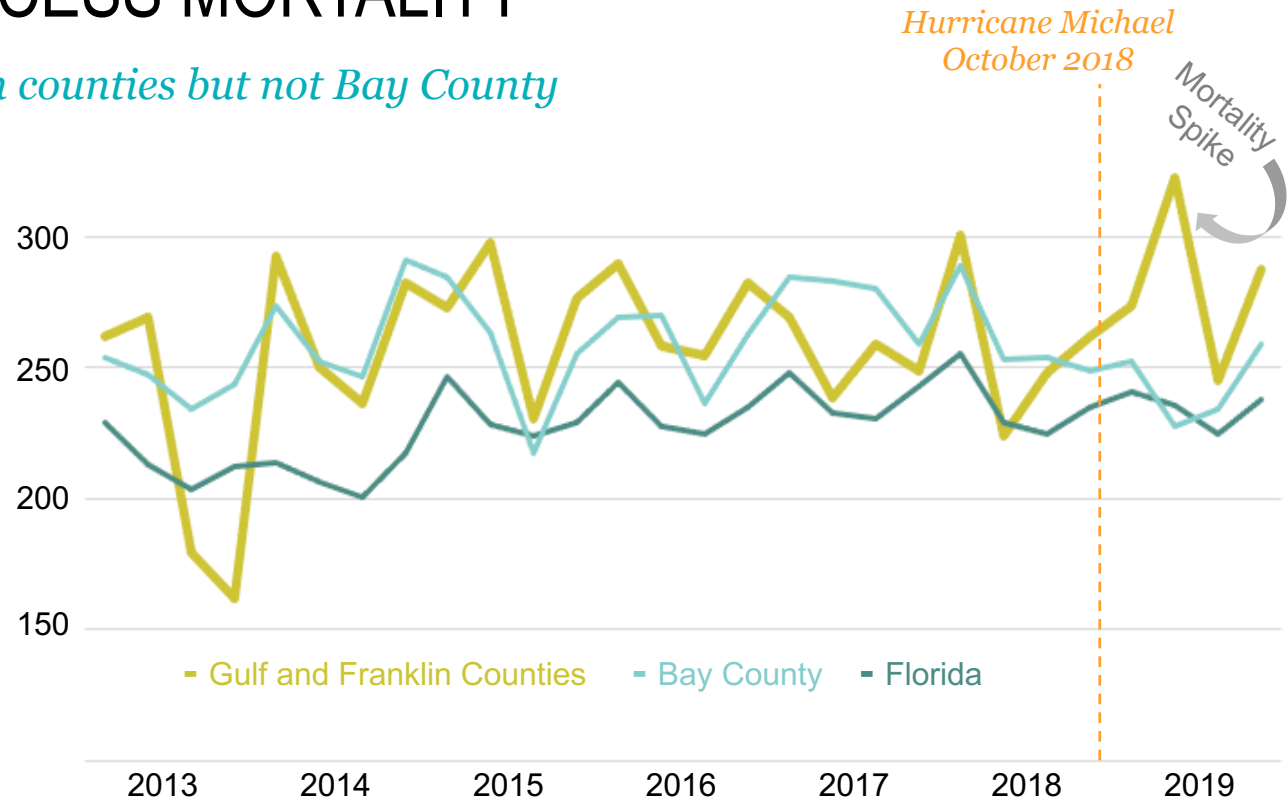
# EVIDENCE OF EXCESS MORTALITY

*Found in Gulf and Franklin counties but not Bay County*



A seasonally adjusted time-series statistical analysis of Bay, Gulf, and Franklin Counties was conducted using death records.

Five years of records before the hurricane were used to establish a predictable mortality trend and forecast what would have been the mortality rate in the area from October 2018 to September 2019, if the storm hadn't happened. That forecast was compared to the actual, observed mortality rate to determine if more deaths occurred than were expected.



This graph of mortality rates from 2013 through 2019 shows a spike in Gulf and Franklin Counties after Hurricane Michael. *Analysis found an estimated 27 additional deaths occurred in Gulf and Franklin Counties in Quarter 2 of 2019 (6-8 months after post-storm). The observed mortality rates was 322.5 but was forecasted to only be 227.8 (95% CI, 159.8-316.0).*

No excess mortality was detected in Bay county, and sensitivity testing confirmed that no erroneous increases in mortality were detected from 2012 to September 2018, when a disaster hadn't occurred.

*\*mortality rates per 100,000*

# ADDITIONAL EXCESS MORTALITY ANALYSIS OF GULF AND FRANKLIN COUNTIES

*Those 55+, Whites, and cancer-related deaths experienced excess mortality*

Adjusted mortality rates were calculated for age groups. In Quarter 2 of 2019, those 55 and older showed evidence of excess mortality. The observed mortality was 771.2, though the forecasted mortality of 575.4 (90%CI, 426.0 - 755.2).

Adjusted mortality rates were calculated by race for Whites and all other races. In Quarter 2 of 2019, Whites experienced an increased in mortality. The observed mortality rate of 365.0 was beyond forecasted projections of 253.9 (95% CI, 177.9 – 352.3). However, Whites accounted for 88% of death records in this count and these findings may be a result of an underrepresentation of populations of color.

**Age:**  
*55+ Age Group*

**Sex:**  
*No Difference*

**Race:**  
*Whites*

**Cause of Death:**  
*Cancer*

Adjusted mortality rates for sex were calculated and used for the analysis. No findings indicated that either males or females experienced excess mortality in the year after Hurricane Michael.

Mortality rates for the top four causes of death were calculated and analyzed. In Quarter 3 of 2019 (9-11 months post-storm) there was an increase in cancer-related deaths. The forecasted mortality rate was 48.7 (90% CI, 28.9 – 76.2), but the observed was 80.6. This is an estimated 9 additional cancer deaths than expected for this quarter.

*\*mortality rates per 100,000*

# QUALITATIVE FINDINGS

*Focus groups and interviews were conducted with Hurricane Michael survivors and responders to ask them about how health and access to health care had changed.*

*Mental health* and *community well-being* were most common mentioned impacts as participants spoke of prolonged depression, anxiety, and PTSD, as well as bad weather causing uneasiness, remaining debris and damage being constant reminders of trauma, and how they were not back to normal. Additionally, *schools* were not fully operational the rest of the school year and children are still exhibiting mental health impacts such as increased bomb threats and psychiatric hospitalizations.

The area lost the few *mental health providers* is had after the storm, but a resilience factor that participants mentioned was *social capital* - the strong, positive connections in the close-knit community led to them emotionally supporting one another during the recovery when mental health services weren't available.

*Basic services* such as electricity, communications, grocery stores, and gas stations were disrupted for months. *Rebuilding* was slow, including for affordable and subsidized housing, leaving many to relocate out of the area.

"Physically, it took us about 11 months beyond the storm to find a home and get settled. Mentally, I still have some anxieties from that dreadful experience."

"We're invested in each other. Because this county is so strong. And then the love that we have for one another."

"Our lower-income families really suffered a lot too. Some of them did not have insurance. Some of them didn't have enough insurance coverage."

"We lost employees who had to move because of housing. Lost their house."

"Yeah, we, we went without power until, well it happened October the 10th and I was without power until December the 14th."

# GROUND-TRUTHING EXCESS MORTALITY

Focus groups and interviews also shed light on *contextual factors that explained how excess mortality* might have happened over six months after Hurricane Michael.

- Health care providers were limited in Gulf and Franklin counties before the hurricane, and they had relied on providers and specialists in Bay County.
- The hurricane destroyed most of the healthcare infrastructure in Bay County, including the only trauma center within 100 miles, which had served as an anchor in the area for specialist care like oncology and cardiology.
- For months after the storm, survivors had trouble filling common prescriptions for chronic conditions and delays in surgeries, preventative health screenings, and specialized care.
- There were healthcare staffing shortages after the hurricane due to clinics not reopening and people relocating.
- The trauma center reopened two years after the storm, and four years later, the area's healthcare industry was still not back to what it was pre-storm.

"Yes, my son in law was diagnosed [cancer] in February. And then it took a long time to get things going. And a lot of his treatments was delayed because of Hurricane Michael."

"You're talking about a town who, before Hurricane Michael, had five to six primary care providers on a normal day."

"We tried to schedule in Tallahassee for my sister and they were three months out. Could not see her to do anything until three months out. And so we said to hell with that and went to MD Anderson"

"Working in the ER, we've seen a lot of visits for months for med refills... six, seven months later, seeing "Oh, I can't get into somebody" and "I'm out of my meds" and "I need my blood pressure medicine refilled".

"Oh yeah, nurse was a friend of mine for Gulf Coast they rebranded through something else now, but they got that whole brand new wing, but they don't have the staffing to fill it."

"The folks that we didn't already transport out, their issues really were trying to make appointments. Finding somebody local. Again, some folks had to go as far away as Dothan."



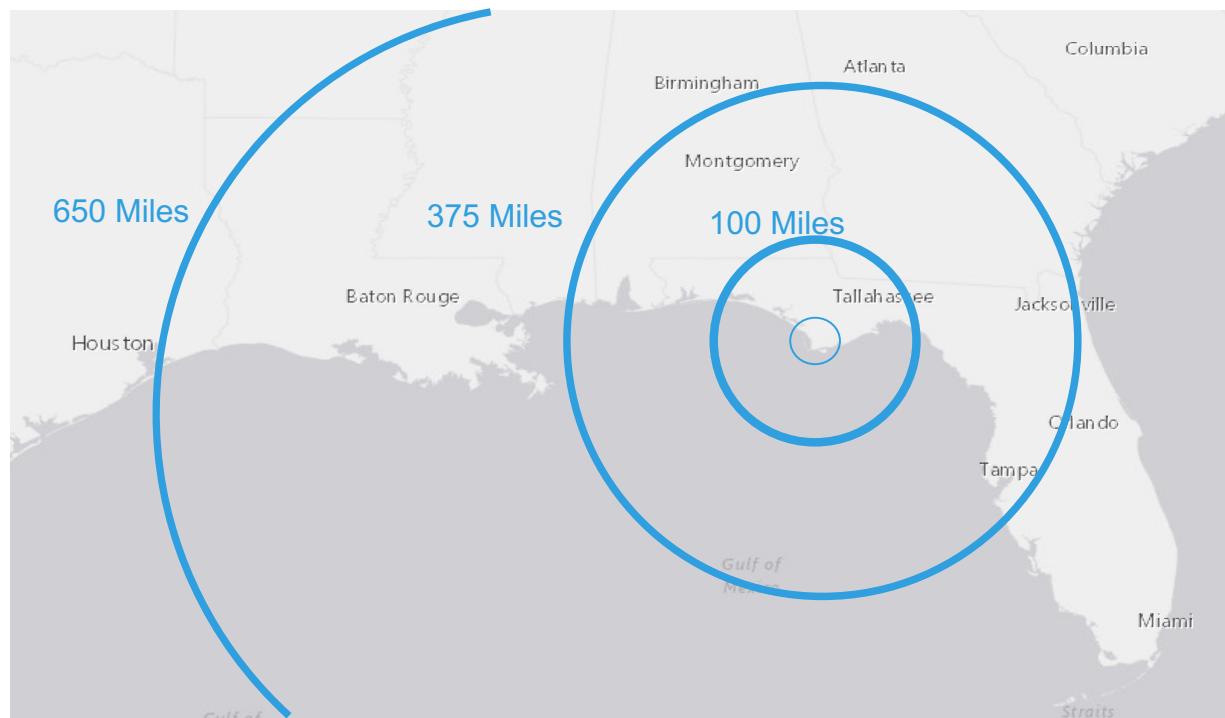
# IMPACT ON ACCESSING HEALTHCARE

## *Traveling over 500 miles away for treatment*

Participants often spoke of having to travel far for healthcare after Hurricane Michael because of the trauma center damage and limited number of local clinics still able to operate during the year after the storm.

They told stories of how hard it was to get an appointment with a nearby specialist. Some noted that even traveling to the next closest facilities, such as Tallahassee, wasn't always an option because those facilities had become inundated with new patients that were also Hurricane Michael survivors.

Those that could afford to do so traveled hundreds of miles away to *Tallahassee, Pensacola, Dothan, Gainesville, Tampa, and as far away as Houston* for specialized care, such as cancer treatment.



# CONNECTING THE DOTS

*The domino effect that led to excess mortality*



The more rural and vulnerable Gulf and Franklin counties had relied on the medical resources in Bay County for specialists.

*Hurricane Michael's damage led to a collapse of the healthcare infrastructure in the area.* Survivors resorted to ER visits for routine prescription refills when they couldn't get an appointment to see a local health care provider and traveled several counties or states away for specialized treatment.

Statistical analysis discovered an estimated *additional 36 deaths throughout the year after the storm.*

Focus group and interview data explained the root causes for excess mortality the year after Hurricane Michael:

- Lack of local healthcare infrastructure and providers, particularly specialists
- Having to travel up to hundreds of miles away for cancer treatment
- Trauma, emotional burnout, and prioritizing recovery efforts over preventative health screenings



## Total Health Impact

*The official fatality count can describe what happened around the time of the storm, though isn't a comprehensive measure of a hurricane's impact on health. Excess mortality is a valuable tool that can expand our understanding of the long-term impacts of hurricanes.*



# WHAT THIS STUDY ADDS

Results, in **green** and **gold** text, fill in the gaps of our knowledge about this historic storm

- Hurricane Michael landfall Oct 10
- Last shelter closes Nov 30 and 60-day state response executive order is continuously renewed for over 2 years (Oct 2018 - Nov 2020)
- Closed schools and *infrastructure disruptions for the rest of the year*

- More mental health resources brought in after community survey finds prolonged trauma
- Bay County trauma center reopens 2 years post-storm
- COVID re-closes schools, *delays rebuilding, and overall slowed recovery efforts*

Pre-Storm



2018

6 Months Post-Storm



1+ Years Post-Storm

3+ Years Post-Storm



- Gulf and Franklin counties are rural, have higher vulnerability, and a limited number of health care providers
- Bay County is more resilient and has the only trauma center within 100 miles

- *Excess mortality in Gulf and Franklin counties*
- *Prolonged increased unemployment and decreases in the healthcare workforce (findings from initial pilot study)*
- *Locals support one another during recovery and experience barriers to accessing healthcare*
- Delays in initial prenatal care visits

- Rebuild Florida Hometown business grant and loan program announced to help restore the local economy
- *Locals say the area is still not back to normal*
- *Children continue to experience psychological symptoms*

# THANK YOU



**Blake L. Scott, Ph.D.**

**College of Public Health | University of South Florida**

[BLScott@usf.edu](mailto:BLScott@usf.edu) | LinkedIn: BLScottEpi

Preferred Pronouns: She/Her



*List of References*