



# Insight on Single Mother's Issues in Emergency Evacuations

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## ABSTRACT

When an emergency evacuation is announced, the head of the household needs to make a responsible and quick decision whether to evacuate their family. The 2017 evacuation of Hurricane Irma is referred to as the largest evacuation in the history of the nation, with approximately 6.5 million Floridians under mandatory or voluntary evacuation orders (Marshall, 2017; Cook, 2017). Florida's 2017 census estimates approximately 51.1 percent of Florida's 21,300,000 residents are women; of which an estimated 4,350,000 are single mother, head of households. Similar to other difficult choices faced by single mothers, the decision to evacuate a regional hurricane presents unique challenges fraught with risk and uncertainty. The ongoing research study investigates the evacuation decision patterns among single mothers and identifies key factors which are likely to contribute to risk perception. This knowledge can be leveraged to better plan for and respond to other large-scale evacuations with the inclusion of single mothers and their families, as well as identifying the best practices moving forward. This presentation presents the initial findings and macroscopic analysis of single mother head of household evacuations from Hurricane Irma. In order to serve single mothers and their families, much can be learned from the analysis of hurricane evacuation data. This presentation discusses a comparison between the evacuation travel patterns in counties with high and low percentages of single-parent homes and provides insights into evacuation patterns. More broadly this information can be used to help single mothers evacuate in a safe, affordable, and timely manner. Emergency evacuations are financially burdensome and result in the potential loss of income for time away from work. In addition, the vulnerability of property left unattended and possible destruction of property could possibly lead to unsafe choices being made.

## INTRODUCTION

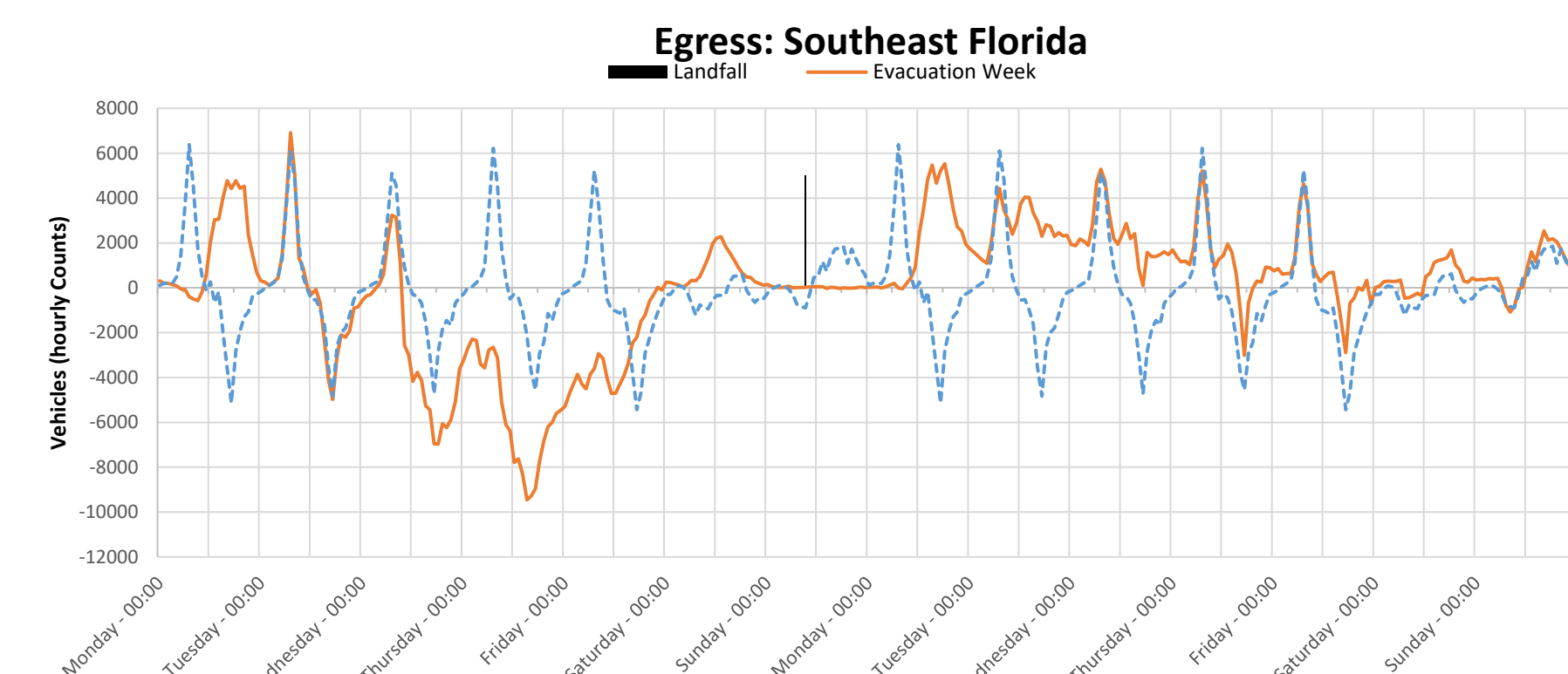
The 2017 evacuation of Hurricane Irma has been referred to as the largest evacuation in the history of the nation, with approximately 6.5 million Floridians under mandatory or voluntary evacuation orders (1). When an emergency evacuation is announced as an alert to the residents of a state, the head of the household needs to make a responsible and quick decision to evacuate their family. Florida's 2017 census estimates approximately 51.1 percent of Florida's 21,300,000 residents are women; of which an estimated 4,350,000 are single mother, head of households. This study applied traffic flow principles to the problems single mothers face when determining their course of action in an emergency evacuation and provides insights toward possible solutions. This presentation presents the initial findings and macroscopic analysis of single mother head of household evacuations from the 2017 Hurricane Irma evacuation. This knowledge can be leveraged to better plan for and respond to other large-scale evacuations with the inclusion of single mothers and their families, as well as identify the best practices moving forward. This presentation discusses a comparison between the evacuation travel patterns in counties with high and low percentages of single-parent homes and provides insights into evacuation patterns for this cohort.

In the case of an evacuation, the state government declares a state of emergency when hurricanes are a category 4 or more. Prior research conducted in the wake of Hurricane Katrina illustrated the effects of the Irma evacuation on the "roadway infrastructure in both spatial and temporal terms" (8). This research furthers prior investigations by quantifying the "Evacuation flow" for single mothers empirically. During the 2017 evacuation from Hurricane Irma, Florida, Governor Rick Scott communicated that Florida was in a state of emergency from the Keys to Tallahassee. The states' warning announcements made a significant impact on the spatial and temporal movement of the evacuation traffic (9). According to Boyd, Wolshon, and Heerden, understanding the relationship between emergency communication and response is important for "disaster planning and response" (9). Related to single mothers, many different organizations have a strong communication network when there is a need for guidance and advice. These organizations can play a part in providing guidance and aid for these vulnerable populations.

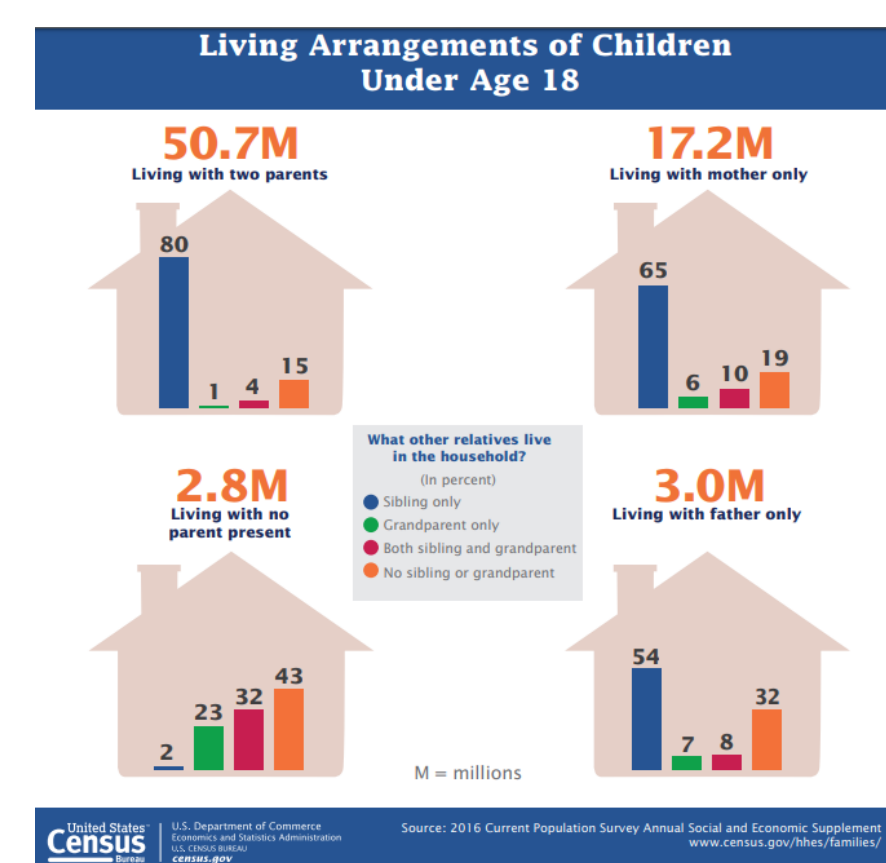
## METHODOLOGY



The SunGuide program gathers roadway data from across the State of Florida. Traffic counts and average travel speeds are reported every hour and archived for analysis. The following graphs represent travel in the time leading up to, during and after Hurricane Irma.



From an engineering perspective, this data was used to determine the population that evacuated the State of Florida. Broadly, the research methodology was carried out in three primary tasks. The first task was data collection and processing, which included research into federal and private organizations or programs available for single mothers in case of a natural disaster. The following was provided by the U.S. Census Bureau to provide information on how many children live in various home settings.



The second task was evaluating evacuee origins and cross-referencing statewide demographic databases. The final step macroscopically estimates the evacuation participation rates of single-parent households.

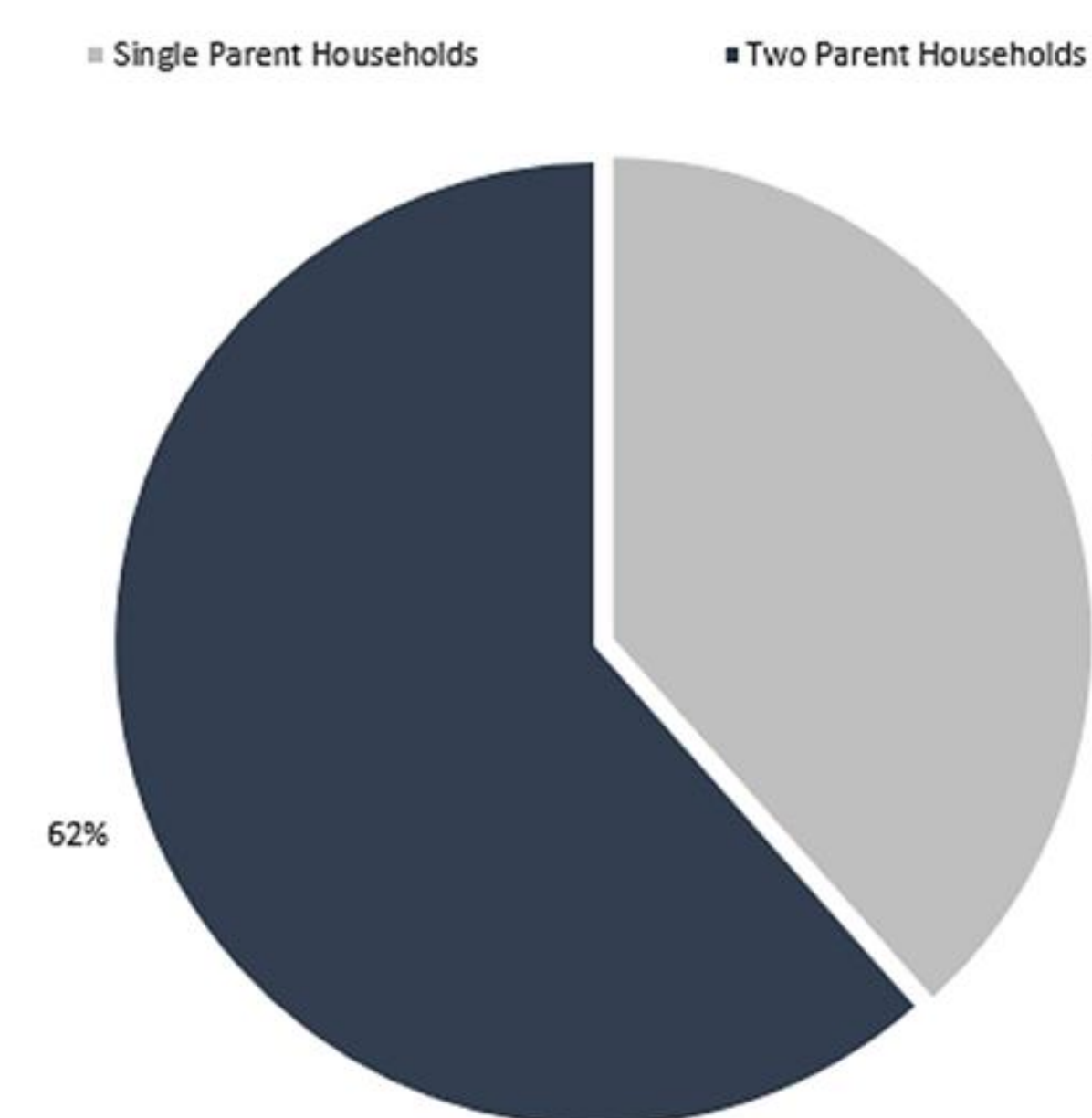
1. Marshall, A. (2017) 4 Maps That Show the Gigantic Hurricane Irma Evacuation, 4 Maps That Show the Gigantic Hurricane Irma Evacuation. Available at: <https://www.wired.com/2017/09/4-maps-show-gigantic-hurricane-irma-evacuation/>. Accessed Jan 5, 2019
2. U.S. Department of Commerce, QuickFacts, 2017. <https://www.census.gov/quickfacts/fact/table/fl/PST045218>. Accessed Jan 10, 2019
3. University of Wisconsin Population Health Institute, 2017 County Health Rankings - Wisconsin, p. 8, 2017. Accessed Jan 15, 2019
4. American Community Survey (ACS), HEALTH FACTORS - CHILDREN IN SINGLE - PARENT HOUSEHOLDS, pp. 7-8, 2017. Accessed Jan 19, 2019
5. Town Charts, Florida Demographics data with population from census Florida Demographics Data the State of Florida, pp. 1-8, 2017. Accessed Jan 10, 2019
6. Kerr and Downs Research, Florida Division of Emergency Management, and Florida Emergency Preparedness Association, Florida Statewide Regional Evacuation Study Program Volume 3-1 West Florida Region, 2010. Accessed Jan 10, 2019
7. U. of Wisconsin, R. W. J. Foundation, and J. Robinson, 2017 County Health Rankings: Michigan. County Health Rankins, 2017. Accessed Jan 15, 2019
8. U.S. Department of State and Bureau of Human Resources, Contingency Planning for Single Parents and Tandem Couples with Children, U.S. Department of State, 2019. <https://www.state.gov/documents/organization/2082.pdf>. Accessed Jan 20, 2019

## RESULTS

The Florida Statewide Regional Evacuation Program contains a report with the region's evacuation population estimates, which summarizes hazard, vulnerability, behavioral, shelter, transportation, demographic and land use analysis. According to Volume 3. Regional Behavioral Survey Report, about 75 percent of vehicles are available to be used in an evacuation event where only 3 percent of households do not own a vehicle to evacuate (5). Therefore, approximately 25 percent of vehicles are not available to be used in evacuations. From this data alone, it could not be concluded that single-mothers are struggling to evacuate because they do not own cars.

Approximately 6.5 million people were under mandatory and voluntary evacuation. Therefore, an estimated 1.5 to 2.0 million single mothers had to evacuate during the 2017 Hurricane Irma event. The 2017 County Health Rankings from the American Community Survey (ACS), measures the percentage of single-parent households to be about 38 percent from the overall population in Florida as shown in Figure 1 (3). The data that was used for this measure was from years 2011 to 2015, this shows that Florida was in the top 10th percentile of U.S. performers and the percentage range in the counties in Florida is between 18 to 63 percent (3).

Single Parent Households Vs. Two Parent Households



The National Council for Single Mothers and their Children Incorporated (NCSMS) is a responsive and active organization that will assist any mother with leadership in dangerous situations. According to a conversation with Terese Edwards, member and part of NCSMS, in Australia were residents can request a "Crisis Payment", which is the only payment linked to natural disasters (Edwards T., personal communication, May 9, 2019). This "Crisis Payment" type of assistance is not found in the United States, but there are websites such as Go Fund Me, that can be of aid to have other people donate money to a certain cause. On the other hand, government offers food programs, help paying utilities, housing, and medical assistance. She also states that depending "upon the disaster that there would be additional support provided by the various relief organizations such as the Red Cross", where the emergency relief provides a range of providers for such situations (Edwards T., personal communication, May 9, 2019). Edwards adds that "[t]his proves problematic and restrictive for many single mothers" and that at currently there is growing awareness of domestic violence and natural disasters (Edwards T., personal communication, May 9, 2019). In addition, Edwards states that "[t]his matter affects single mothers as separation does not mean that they are safe, as safety risk increase at the time of separation and early in separation" (Edwards T., personal communication, May 9, 2019). This brings another issue, if these single mothers are being separated before, during, and after such disasters. From the analysis provided by this study, the United States should create a program similar to the "Crisis Payment." This would allow single-mothers to feel more confident in making the decision to evacuate because they know the cost of the safer option would be less.

## CONCLUSION

In order to serve single mothers and their families, much can be learned from this data which could help these family leaders be prepared to make a quick well-planned decision in times of emergency evacuation. A comparison between the evacuation travel patterns in counties with a high and low percentage of single-parent homes was conducted. This analysis can help determine the difference of evacuation patterns in areas with higher concentrations of single mothers. The ultimate goal of this study was to take these differences and find ways to help single mothers evacuate in a safe, affordable, and timely manner. For example, for single-mothers emergency evacuation may cause huge financial burden including the loss of income for time away from the job combined with the high cost of evacuating such as hotel, restaurant and travel expenses for a week or more. In addition, the vulnerability of property left unattended and possible destruction of property could possibly lead to unsafe choices being made. In addition, advice will be provided to various governmental agencies regarding how to decrease the many risks these families face. Suggestions for better financial policies to help these at-risk families will also be provided.



Currently there are many organizations that give out grants, community support, advice, and information about different issues single mothers have on a day-to-day basis. Organizations such as the NCSMC and The Mommies Network facilitate information and wisdom to other single mothers around the world (7). On the other hand, One Harvest is a non-profit organization that offers quality food boxes to American families after an evacuation. This organization and others like it are fighting one of the biggest issues a single mother faces during and after an evacuation. In addition, the Single Mothers Grants website shares Government Assistance Programs for single mothers that consists of the assistance through grants for nutrition, medical insurance, low-cost rental housing for low-income families, home energy bills, legal assistance, and education (7). In relation to natural disasters, there are no private or public organizations that aid single mothers with any general income assistance. There are several available resources for the general public and available data such as that provided by the Red Cross during a hurricane. Understanding the resources that are statistically available for the State of Florida, we can conclude that vehicle availability for evacuation is present.

There is available statistical data to calculate the number of people from the population that will need assistance during natural disasters, such as low income, unemployed, age and families without vehicles to evacuate. Another part of the population that needs additional assistance is the 40 percent of women who are single mothers who have to make the difficult choice to evacuate their families. This was calculated from the Florida's 2017 and 2018 Census data by macro analyzing the percentage of women and single mothers in comparison to the total population. The comparison between different issues and variables that single mothers come across during an emergency evacuation can change the ability that Department of Transportations (DOTs) assist its residence. This study provided recommendations on how to better prepare single mothers for the decision-making surrounding evacuations.

