



Galveston, TX. Weighted social vulnerability (SV) measure and category 1 & 2 surge zones. You can find this map and create other maps at <http://coastalatlantis.arch.tamu.edu/> (supported by NOAA/TX Seagrant, TX General Land Office and Coastal Services Center/NOAA).

Mapping social vulnerability to enhance housing and neighborhood resilience

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Disasters are not “equal opportunity” events

Over the years, we’ve learned that natural disasters are not actually natural events. What we see are very natural processes impacting areas with relatively high populations, risking the loss of life and loss of property. We’ve also learned

that these ‘natural disasters’ do not affect all people in the same way. In fact, disasters magnify pre-existing social problems, creating populations which are more vulnerable and more at risk. Some groups may find it relatively easy to respond to and recover from a natural disaster. Other groups may have limited access to resources and may find it nearly impossible to respond and recover adequately. These groups are considered socially vulnerable. In a sense, ‘natural disasters’ expose very inherent unnatural inequities. As a community, how can we plan for such disproportionate outcomes? Researchers from Texas A&M University’s Hazard Reduction and Recovery Center wanted to understand the spatial distribution of such socially vulnerable groups to determine if we can predict an area’s ability to anticipate, respond to, and recover from disasters.

To do this, researchers evaluated and mapped social vulnerability indicators with pre-hurricane data (U.S. Census block-group data) in Galveston, TX and equivalent survey data following Hurricane Ike, which made landfall in 2008. To determine areas with particularly high social vulnerability, or hotspots within a community, researchers determined 2nd-order indicators. Based on previous research we know that

KNOWLEDGE TO ACTION: Interpretation for practice

Who should we help EVACUATE:

- Single parent households
- Renters
- Households in poverty
- Non-white households
- Households without vehicles

Who receives disproportionately more DAMAGE:

- Non-white households

Who needs ACCESS to insurance:

Home & Flood Insurance:

- Elderly
- Non-white households
- Individuals that did not complete high school

High socially vulnerable areas were less likely to receive insurance settlements (for those with insurance)

Who needs ACCESS to PUBLIC recovery FUNDS:

- Socially vulnerable groups are not applying for or receiving low interest loans from the Small Business Administration (SBA).

SURVEY DATA: Researchers collected 1500 damage assessments and completed more than 550 household surveys, of 1500 detached housing units that were randomly selected 3 months after Hurricane Ike, which made land fall in Galveston, TX in 2008.

What makes a group socially vulnerable?

The following describes the social vulnerability indicators -2nd Order and 3rd Order- measured.

BASE SV INDICATORS	2nd ORDER	3rd ORDER
1. Single parent households with children/Total Households	Child care needs	Socially Vulnerable Hotspot
2. Population 5 or below/Total Population		
3. Population 65 or above/Total Population	Elder care needs	
4. Population 65 or above & below poverty/Pop. 65 or above		
5. Workers using public transportation/Civilian pop. 16+ and employed	Transportation needs	
6. Occupied housing units without a vehicle/Occupied housing units		
7. Vacant Housing units/Total housing units	Temporary shelter & housing recovery needs	
8. Persons in renter occupied housing units/Total occupied housing units		
9. Non-white population/Total population		
10. Population in group quarters/Total population		
11. Housing units built 20 years ago/Total housing Units		
12. Mobile Homes/Total housing units		
13. Persons in poverty/Total population	Civic capacity needs	
14. Occupied housing units without a telephone/Total occupied Housing units		
15. Population above 25 with less than high school/Total pop above 25		
16. Population 16+ in labor force and unemployed/Pop in Labor force 16+		
17. Population above 5 that speak English not well or not at all/Pop 45		

the following reduces a group’s ability to anticipate, respond to, and recover from disasters:

- Child care needs
- Elder care needs
- Transportation needs
- Temporary shelter & housing recovery needs
- Civic capacity needs

Each of the above 2nd-order social vulnerability indicators was further broken down into measurable base level indicators. There were 17 base level social vulnerability indicators that were measured, which can be seen in the table above. For example, an area’s child care needs was determined by calculating the proportion of single-family households with children and the proportion of the population under the age of 5 years old.

FINDINGS Researchers found that households and neighborhoods, which were considered socially vulnerable experienced:

- later evacuation
- a greater degree of damage sustained
- fewer private and public resources for recovery
- slower and lower volumes of repair and rebuilding activity

What has been found are spatial disparities that persist and are exacerbated for disadvantaged populations at every stage of disaster response

and recovery. Community planners, emergency management personnel, and civic leaders can utilize such information to identify neighborhoods where they can work with local civic organizations, target education programs, locate emergency shelters, and coordinate evacuation pick-ups, etc. to better meet the needs of these populations. This research supports the need for community vulnerability mapping as a tool for emergency management, hazard mitigation, and disaster recovery planning. Indeed, it is critical to use vulnerability mapping to help communities identify areas to inject resiliency, and thereby reduce losses and enhance response and recovery. By reducing inequalities we can increase resilience.

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