

SOCIAL VULNERABILITY AND DISASTER-RELATED HEALTH OUTCOMES



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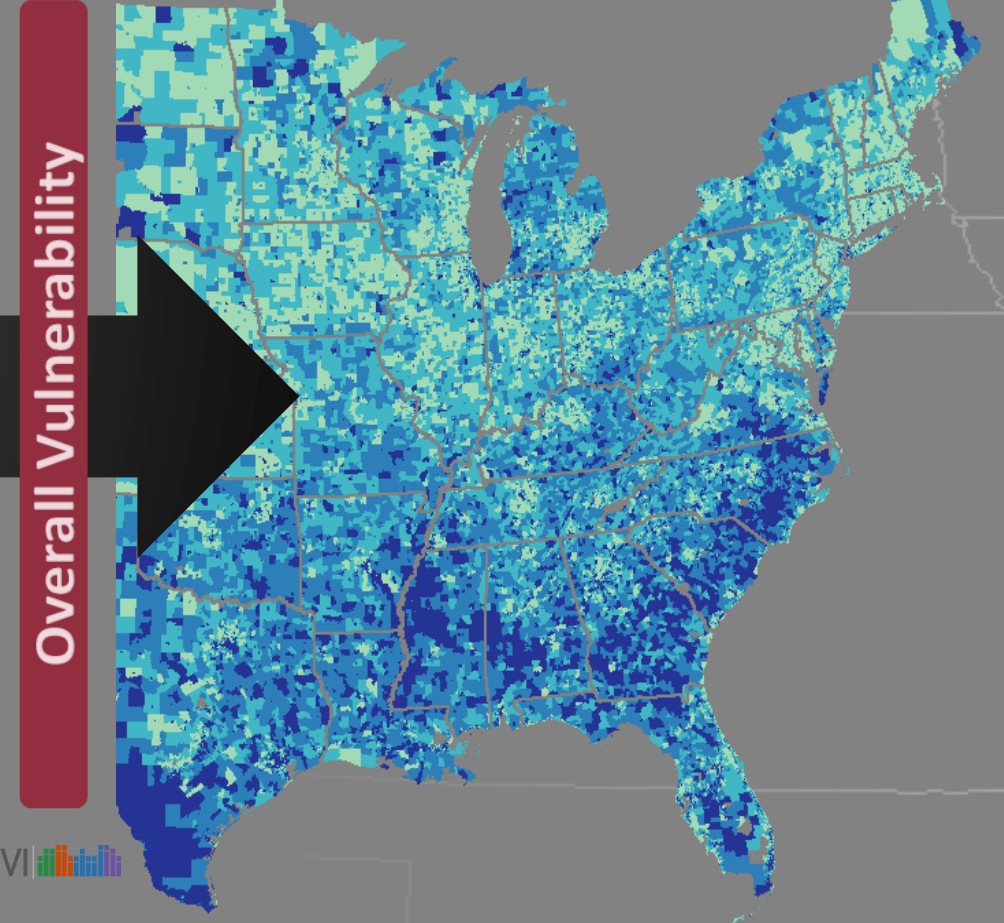
Social vulnerability is a topic of interest in disaster management but the scope of its utility is still undefined. CDC's Geospatial Research, Analysis, and Services Program is evaluating the benefits of considering social vulnerability in the 4 phases of disaster management - preparedness, response, recovery, mitigation. The presented studies suggest that social vulnerability is more useful for predicting mortality and morbidity in less extreme disaster scenarios. Further study should be completed.

Social vulnerability describes a community's resilience to hazards based on its socio-economic and demographic characteristics, in contrast to the physical vulnerability of its natural and built environment.

Social Vulnerability Index (SVI): Released by the Centers for Disease Control and Prevention (CDC) in 2009, the SVI combines 14 socio-demographic variables, grouped into four themes to rank census tracts across the United States. The SVI is purposed to aid state and local governments in planning for all stages of disaster management and has already shown utility for preparedness and recovery phases.

SOCIAL VULNERABILITY INDEX

Below Poverty	Socioeconomic Status
Unemployed	
Income	
No High School Diploma	Household Composition & Disability
Age 65 or Older	
Age 17 or Younger	
Single-Parent Households	Minority Status & Language
Minority Status	
Speaks English "Less than Well"	
Multi-Unit Structures	Housing & Transportation
Mobile Homes	
Crowding	
No Vehicle	
Group Quarters	



Social Vulnerability and Clustering of Hurricane-related Mortality

Research Question: Is there evidence of spatial clustering of disaster-related mortality in census tracts with a high SVI score? In other words, is there more death where there is more vulnerability?

Methods: Bivariate global Moran's I and LISA were used to determine if disaster-related fatalities were spatially clustered by overall SVI values.

Results: The spatial distribution of high and low number of deaths is mildly more dispersed across SVI values than would be expected if underlying spatial processes were random or clustered (Moran's I=-0.02, p=.001). There is little evidence that census tracts with higher social vulnerability experience more disaster-related fatalities.

Bivariate LISA (Deaths & SVI):

Not Significant
Mortality/Morbidity near High SVI
Mortality/Morbidity near Low SVI
No Mortality/Morbidity near High SVI
No Mortality/Morbidity near Low SVI

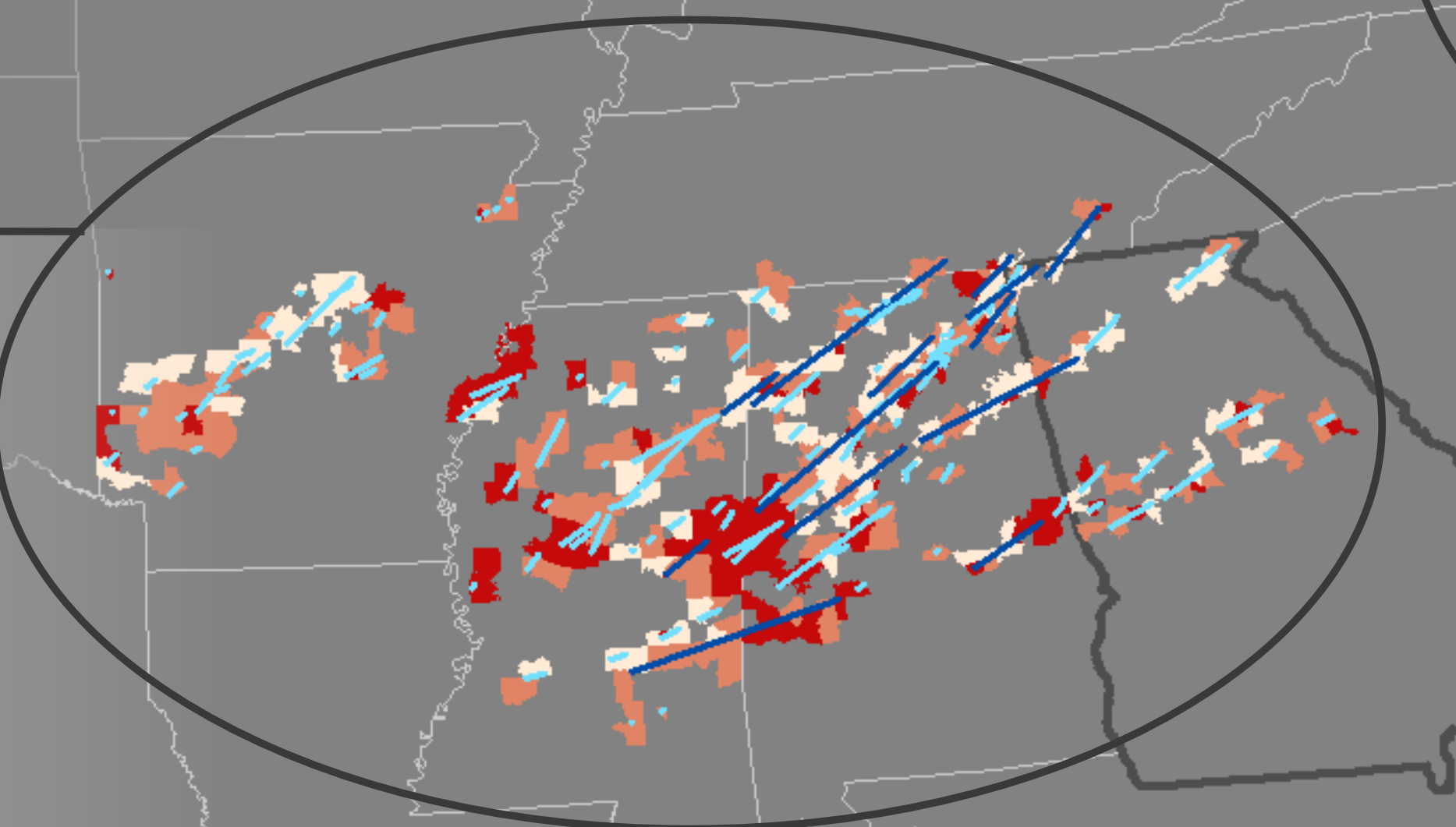
SOFTWARE
 ArcGIS 10.3
 GeoDa
 R

Social Vulnerability in Predicting Tornado-related Mortality

Research Question: Does mortality during the April 2011 Tornado Outbreak in the southeastern US vary according to SVI values? In other words, do we see higher mortality in census tracts with higher social vulnerability as characterized by the SVI?

Methods: Poisson regression was used to model the interaction between tornado presence and the overall SVI on mortality (adjusting for strength of tornadoes) in census tracts of 4 states affected by the 2011 tornado outbreak. Full and reduced models were compared using the chi square deviance goodness of fit test.

Results: Results do not support the hypothesis that SVI modifies the association between tornado presence and mortality in the April 2011 tornado outbreak. Interactions were not found to explain additional variance in the models for any parameterization of the tornado association.



LEGEND

Tornado Strength:

- Weak/Moderate (EF 0-3)
- Strong (EF 4-5)

Social Vulnerability:

- High
- Medium
- Low

SOFTWARE
 ArcGIS 10.2
 SAS 9.2

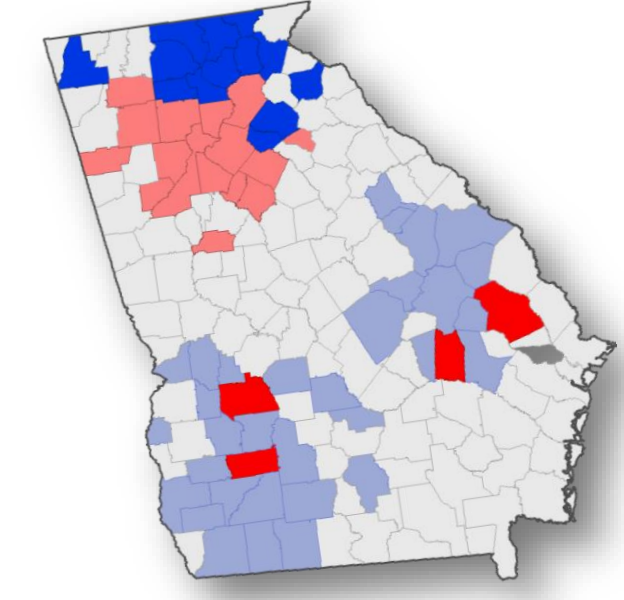
Social Vulnerability and Heat-related Morbidity & Mortality

Research Question: Is there evidence of spatial clustering of heat-related mortality and morbidity in census tracts with a high SVI score?

Methods: Bivariate global and local Moran's I were used to determine if heat-related fatalities were spatially clustered by overall SVI values. Logistic and Poisson regressions were conducted for morbidity and mortality outcome data respectively to test associations with the SVI.

Results: The spatial distribution of high and low number of deaths and hospital admissions is more dispersed across SVI values than would be expected if underlying spatial processes were random or clustered (Admissions: Moran's I=-0.27, p=.001; Deaths: Moran's I=-0.14, p=.001). Regression Analysis presents evidence to suggest high SVI is associated with high heat related morbidity and mortality (p<0.001).

GA Heat-Related Morbidity & SVI



GA Heat-Related Mortality and SVI

