Comparison of Social Vulnerability Indices: New Texas Flood and the Centers for Disease Control and Prevention Indices

Although widely used, existing social vulnerability indices, like the Centers for Disease Control and Prevention Social Vulnerability Index[1] (CDC SVI), are not customized to address specific hazards like flooding, nor are they tailored to the unique social and environmental characteristics of geographic areas. The development of the Texas Flood Social Vulnerability Index (TX F-SVI) addresses these limitations with regard to vulnerability to flood risk by identifying and incorporating parameters specifically relevant to flood risk and social conditions unique to Texans to develop a new index. The factors included significantly influence a household's ability to prepare for, respond to, and recover from flooding. For instance, variables like access to the internet, the condition of aging infrastructure, and the proportion of people with disabilities play critical roles in flood resilience. TX F-SVI was developed in response to the Texas' legislature new focus on flood modeling, flood planning, and flood funding to be available for potential use in flood planning and flood mitigation funding efforts, including for regional and state flood planning.

To develop the new TX F-SVI, the University of Texas was contracted using funding from the Texas Water Development Board. This index was designed to be used, for example, as an additional resource to RFPG's to help them identify and develop potential flood risk reduction solutions by identifying the Texans most vulnerable to catastrophic flooding events. Unlike the more generalized CDC SVI, which the regional flood planning groups relied on during the first cycle of regional flood planning, the TX F-SVI offers a specific Texas and flood-focused lens.

Both the CDC SVI and TX F-SVI are multi-indicator indices designed to assess social vulnerability; however, they differ in how they define the underlying factors and weight the vulnerability factors. Table 1 highlights the key differences between the factors used in the TX F-SVI and the CDC SVI. The TX F-SVI was developed through careful consideration of the potential factors, available data quality, an extensive literature review, and community input to ensure it captures the key factors influencing flood vulnerability in Texas. These key variables include access to phone and internet, environmental risks, housing age, income, migration patterns, the proportion of renters, and distinctions between rural and urban areas.

Figure 1 shows SVI values for Texas census tracts using TX F-SVI (top) and the CDC SVI (bottom). Both indices reveal areas of high social vulnerability, but the TX F-SVI map reflects a more focused view of flood-related vulnerabilities in Texas. The differences between the CDC SVI and the TX F-SVI reflects the more focused approach in identifying areas of high vulnerability to flooding (Figure 2).

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[1] CDC Social Vulnerability Index | FEMA.gov

By providing the TX F-SVI, Texas can better identify those most at risk from flooding and, as appropriate, target flood mitigation efforts more effectively, ensuring attention and, as appropriate, resources can be directed toward the most at-risk populations in Texas, ultimately enhancing resilience and preparedness for future flood events.

Table 1. Comparison of variables used by the TX F-SVI and CDC SVI

VARIABLE	TX F-SVI	CDC SVI
Access to phone/internet	X	
Age	X	X
Disability	X	X
Environmental Risk Factors	X	
Housing Age	X	
Housing Value	X	X
Income	X	
Language	X	X
Migration	X	
Mobile Homes	X	X
No Vehicle	X	X
Minority	X	X
Poverty	X	X
Renters	X	
Rural-Urban	X	
Employment Type	X	
Single Parent Household	X	X
Unemployment	X	X
Crowding[a]		X
Group Quarters[b]		X
Housing type[c]		X
No health insurance[d]		X
No high school diploma[e]		X
TOTAL	18	15

[a] Crowding refers to "more people than rooms" at household level. This is also referred to as housing density. This was mentioned by 0% of people interviewed and was mentioned in <25% of literature reviewed.

[b] Group quarters include such places as college residence halls, residential treatment centers, skilled nursing facilities, group homes, military barracks, correctional facilities, and workers' dormitories. Researchers found no support for this in the literature (0%) as it relates to flooding, and it was mentioned by <25% of people interviewed.

[c] Mobile home, multi-family, single family home. Statistical correlation structure indicated that housing age and mobile homes were good indicators and removing housing type improved the statistical coherence.

[d] This variable had poor data availability/quality. A significant amount of missing data for health insurance rates by census tracts for Texas prevented this variable from being included.

[e] Educational attainment data for Texas demonstrated problematic statistical inconsistencies in the index correlation structure and was removed.

Figure 1: Comparison of Texas Flood SVI vs CDC SVI

Comparison of
SVI Datasets for Texas

Texas Flood Social
Vulnerability Index

CDC Social
Vulnerability Index

Legend

SVI

No Data
Low (0 - 0.25)
Low-Medium (0.26 - 0.50)
Medium-High (0.51 - 0.75)
High (0.76 - 1)

State Boundary

County Boundaries

N

250
Miles

DISCLAIMER: This map was generated by the Texas Water Development Board using GIS (Geographic Information System) software. The scale and location of all mapped data are approximate. Map date: 10/08/2024
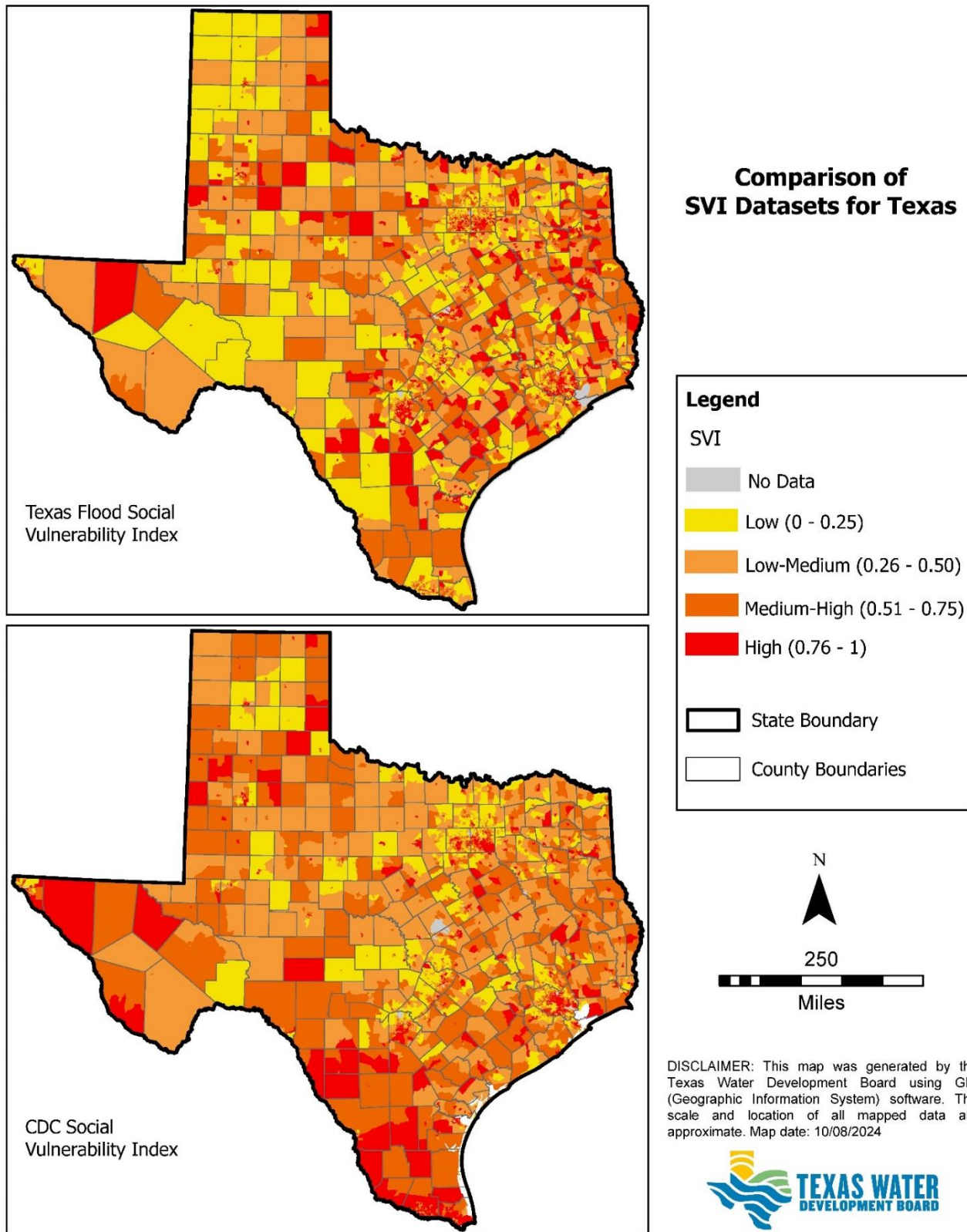
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Figure 2: Difference in Texas Flood SVI and CDC SVI