

Association of Area Deprivation Index vs. Social Vulnerability Index and COVID-19 Outcomes in Michigan



The State of Michigan has been using the **Social Vulnerability Index (SVI)**¹ to prioritize distribution of COVID-19 testing and vaccination to reduce disparities in COVID-19 across the state. Recently critics have argued that prioritization based on the SVI, which includes race as one of several factors in the index, should not be applied. The **Area Deprivation Index (ADI)**² offers an alternative ranking system that similarly uses socioeconomic data from the Census but does not use race to rank the social disadvantage of geographic areas.

Understanding whether ADI performs similarly to SVI in predicting COVID-19 cases and deaths could inform future decisions about alternative indices to use should the SVI face legal challenges.

A University of Michigan research team examined the association between county-level SVI vs. ADI and cumulative COVID-19 incidence and mortality in Michigan as of March 31, 2021.

¹ <https://www.atsdr.cdc.gov/placeandhealth/svi/index.html>
² <https://www.neighborhoodatlas.medicine.wisc.edu/>

Key findings

- ADI and SVI had similar associations with COVID-19 incidence and mortality** in Michigan overall, though the ADI had stronger associations with mortality:

Index	Incidence		Mortality	
	IRR	95% CI	IRR	95% CI
Area Deprivation Index	1.04	1.00,1.10	1.26***	1.18,1.35
Social Vulnerability Index	1.02	1.00,1.04	1.03	0.99,1.07
Socioeconomic status sub-index	1.00	0.98,1.02	1.04*	1.00,1.08
Household composition sub-index	1.00	0.98,1.02	1.06**	1.02,1.09
Minority status & language sub-index	1.03*	1.01,1.06	0.97	0.93,1.02
Housing & transportation sub-index	1.03*	1.01,1.05	1.00	0.96,1.04

Rankings using SVI are based at the county level, while rankings using ADI are based at the Census block group (neighborhood) level. For comparison purposes, we weighted ADI data by population to the county level.

*p<0.05; **p<0.01; ***p<0.001

- Within the **SVI**'s sub-indices, minority status and housing & transportation were associated with COVID-19 incidence while socioeconomic status and household composition were associated with mortality:



socioeconomic status
(income, employment, education)



minority status & language
(racial minority, limited English)



household composition
(age, disability, single-parent)



housing & transportation
(housing type, crowding, vehicle)

Implications for policy and practice

ADI can be used as an alternative to **SVI** in pandemic planning to allocate resources such as testing and vaccines in an equitable manner. Some considerations when deciding between use of SVI and ADI:

- ADI does not include race/ethnicity while SVI does include race as a factor, which could have legal implications.
- While SVI is available at the county or Census tract level, ADI is available primarily at the Census block group (neighborhood, i.e., zip+4) level. Thus, SVI is better used for targeting larger geographic areas compared with ADI, which is better used to target specific neighborhoods with greater social disadvantage.

Data & Methods

Data were drawn from the CDC Social Vulnerability Index (SVI), the University of Wisconsin Neighborhood Atlas® (ADI), and the New York Times (COVID-19 data). Mixed effects negative binomial regression adjusted for population density and urbanicity and including an offset for total county population was used to estimate the association of county-level SVI and ADI on COVID-19 incidence and mortality.

The SVI includes 4 sub-indices comprised of 15 Census/American Community Survey (ACS) measures: socioeconomic status (% below poverty, % unemployed, per capita income, % aged ≥25 with no high school degree); household composition and disability (% age ≥65, % age ≤17, % age ≥5 with disability, % single-parent households with children aged <18); minority status and language (% racial/ethnic minority [all non-white/non-Hispanic], % with limited English speaking ability); and housing and transportation (% housing in structures with ≥10 units, % mobile homes, % occupied housing units with >1 person per room, % households without vehicles, % persons in institutionalized group quarters).

The ADI includes 17 Census/ACS measures (poverty, income, and education have the largest weights in the index): % population age ≥25 with <9 years of education, % population age ≥25 with at least a high school diploma, % of employed persons age ≥16 in white collar occupations, median family income, income disparity (ratio of households with <\$10,000 annual income to households with ≥\$50,000 annual income), median home value, median gross rent, median monthly mortgage, % owner-occupied housing units (home ownership rate), % unemployed, % below poverty, % below 150% of poverty, % single-parent households with children aged <18, % occupied housing units without a motor vehicle, % occupied housing units without a telephone, % occupied housing units without complete plumbing, % occupied housing units with >1 person per room)

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