Charting Paths to Prevention: Mapping Social Vulnerability and Alcohol-Related Deaths

South Southwest
Prevention Technology Transfer Center

Purpose

Alcohol-related deaths (ARD) represent a significant public health concern globally, contributing to a substantial burden of morbidity and mortality (Park & Kim, 2020). While individual-level factors such as alcohol consumption patterns and health behaviors undoubtedly influence these outcomes, the role of broader social determinants cannot be overstated. Research increasingly suggests that alcohol-related deaths are not randomly distributed but are instead closely intertwined with underlying social vulnerabilities and inequities (Karaye et al., 2023).

This data brief explores the association and complex interplay between social vulnerability and alcohol related deaths for the South Southwest (SSW) Prevention Technology Transfer Center (PTTC) area (Arkansas, Louisiana, New Mexico, Oklahoma, and Texas), shedding light on how social determinants of health (SDOH) intersect with patterns of alcohol misuse and mortality. It also identifies potential avenues for targeted intervention and policy development to mitigate the disproportionate impact of alcohol-related deaths on vulnerable communities. This information underscores the importance of adopting a comprehensive and equity-focused approach to alcohol misuse prevention and intervention that addresses underlying structural inequities (Boyd et al., 2023).

For this brief, we used data extracted from two Centers for Disease Control and Prevention (CDC) data sources: the Social Vulnerability Index (SVI) and the CDC Wide-ranging ONline Data for Epidemiologic Research (WONDER) database (CDC, 2023; CDC, 2024). The SVI provides a comprehensive framework for evaluating vulnerability by synthesizing data on socioeconomic status, household composition, minority status, and housing and transportation access (CDC, 2024). By mapping and quantifying these dimensions, the SVI offers insights into the structural inequities and systemic barriers that shape communities' ability to withstand and recover from health crises. WONDER includes population data produced by the National Center for Health Statistics (NCHS) at CDC. Mortality information is collected by state registries and provided to the National Vital Statistics System. Data are based on death certificates for U.S. residents.

SOCIAL VULNERABILITY VARIABLES

HOUSEHOLD CHARACTERICSTICS

Aged 65 & Older

Aged 17 and Younger

Civilian with a Disability

Single-Parent Households

English Language Proficiency

SOCIOECONOMIC STATUS

Below 150% Poverty

Unemployed

Housing Cost Burden

No High School Diploma

No Health Insurance

RACE & ETHNIC STATUS

Hispanic or Latino (of any race); Black and African American, Not Hispanic or Latino; American Indian and Alaska Native, Not Hispanic or Latino; Asian, Not Hispanic or Latino; Native Hawaiian and Other Pacific Islander, Not Hispanic or Latino; Two or More Races, Not Hispanic or Latino; Other Races, Not Hispanic or Latino.

HOUSING TYPE & TRANSPORTATION

Multi-Unit Structures

Mobile Homes

Crowding

No Vehicle

Group Quarters

Note: Race/ethnic status characteristics are included in the SVI due to the health inequities experienced by groups (access to healthcare, etc.).

Figure 1.

Methodology

From the WONDER Underlying Cause of Death dataset (2016 to 2020), age-adjusted alcohol-related death rates per 100,000 (ARD) were obtained by selecting International Classification of Disease and Death (ICD-10) Codes X45, X65, and Y15 (i.e., alcohol poisonings overdose and all other alcohol-induced causes.

For each state, the 16 SVI factors expressed as percentages were averaged and then converted into quartiles from lowest vulnerability (1) to highest vulnerability (4) as follows: SVIQ-1, SVI-2, SVI-3, and SVI-4. Before analysis, Cronbach's alpha was conducted on the set of 16 variable percentages to determine their interrelatedness. The 16 items were appropriate for a composite score based on significant reliability measures. Each ARD value (Age-Adjusted rates per 100,000) was also assigned as Quartile 1, 2, 3, or 4 using a quartile formula in Excel, with Quartile 1 as the lowest ARD rate and Quartile 4 the highest.

If counties or parishes had either SVI or ARD missing or suppressed, they were excluded from the analysis and show up on the map in gray. For ARD, suppressed values were defined as fewer than 10 cases, and unreliable values were defined as fewer than 19 cases. For each state there were varying levels of suppressed, unreliable or missing data, with New Mexico having the most counties values present at 70% (see Table 1), while Arkansas and Louisiana had less than a third of their counties/ parishes with values that could be mapped. Overall the 5-state region had 180 of 502 counties (36%) with data for both SVI and ARD.

For each county, the ARD and SVI Quartiles were averaged and rounded to obtain a new quartile (i.e., an ARD Quartile of 1 and an SVI Quartile of 3 is an average of 2 and is recorded as Quartile 2). Maps for each state were generated using Tableau Public using the average ARD and SVI Quartile for each county or parish. Correlations were examined using SPSS and Kendall's Tau-B to detect any significant relationships between ARD and SVI.

The relationship between ARD and SVI was also analyzed for the region using Kendall's Tau-b statistic. While there may be counties and parishes within each state whose data do not necessarily follow the predicted pattern, the correlation between ARD and SVI was statistically significant, but not strong (τ_b = 0.2, p < .001).

The state map quartiles were created with ARD and SVI data from that respective state only for practical use by prevention professionals to help focus efforts and resources.

Findings

Table 1 below shows the individual ARD and SVI quartile values for each state. The maps that follow show the intensity of the averaged quartiles for ARD and SVI (ARD/SVI) at the county/parish level. Higher quartiles indicate a higher SVI and ARD combined. Gray indicates missing, suppressed, or unreliable county data. For each state the highest SVI and ARD counties/ parishes (Quartile 4) are also listed. While there is a moderate positive relationship between SVI and ARD, meaning the higher the SVI composite score, the higher the alcohol-related death rate overall for the region, the combined ARD/SVI value is an average of the individual quartiles for ARD and SVI, so it is possible that for any given county/ parish the ARD and SVI are not perfectly aligned. For example, in Boone County, Arkansas, the ARD quartile was 4 (highest) and the SVI was 1 (lowest), which average to Quartile 3, shaded yellow on the map. For Boone County, this indicates that a high ARD is potentially being influenced by factors other than those in the SVI model. Conversely, in Hidalgo County, Texas the ARD quartile was 1 (low) and the SVI was 4 (high), also averaged to Quartile 3 (yellow) on the map. This indicates there may be protective factors at play in this county that are mitigating the impact of high social vulnerability, at least on alcohol related deaths. Particularly for counties in quartiles 2, and 3, it is worth examining SVI and ARD separately to get a clearer picture of risk and protective factors.

Table 1. Minimum and Maximum Values for SVI and ARD Quartiles with Available County/Parish Data

	SVI Minimum and Maximum Values by Quartile				ARD Rates per 100,000 Minimum and Maximum Values by Quartile				Counties Represented in Data Analysis		
	1	2	3	4	1	2	3	4	# Counties/ Parishes	Values Present	Data Unavailable
Arkansas	10 - 11	12	13	14 - 16	4 - 9	10 - 11	12 - 14	15 - 19	75	27%	73%
Louisiana	11 - 12	13 - 14	15	16 - 17	4 - 6	7 - 8	9 - 12	13 - 15	64	28%	72%
New Mexico	13 - 15	16	17 - 18	19 - 21	15 - 23	27 - 30	31 - 44	47 - 137	33	70%	30%
Oklahoma	10 - 12	13	14	15 - 16	7 - 12	13 - 14	15 - 19	20 - 28	77	49%	51%
Texas	9 - 12	13 - 14	15 - 16	17 - 23	3 - 8	9	10 - 11	12 - 22	253	32%	68%

ARKANSAS

Combined Social Vulnerability Index and Alcohol-Related Death Rate by County

Quartile 4 Counties
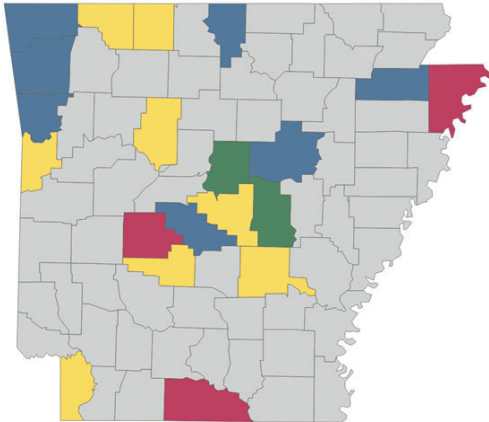
Garland
Mississippi
Union

Figure 2.

LOUISIANA

Combined Social Vulnerability Index and Alcohol-Related Death Rate by Parish

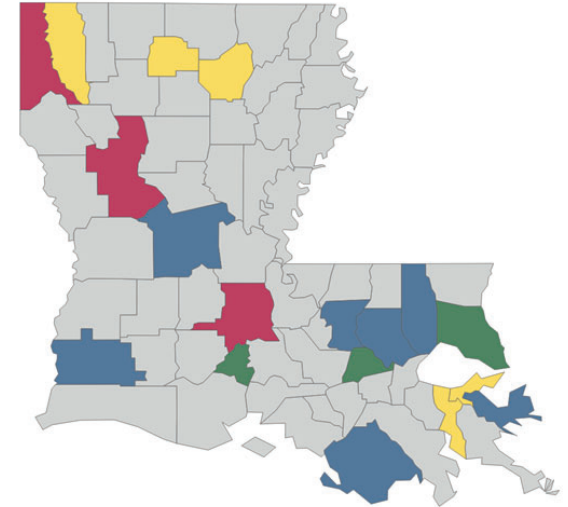**Quartile 4 Parishes**

Caddo
Natchitoches
St. Landry

Figure 3.

NEW MEXICO

Combined Social Vulnerability Index and Alcohol-Related Death Rate by County

Quartile 4 Counties
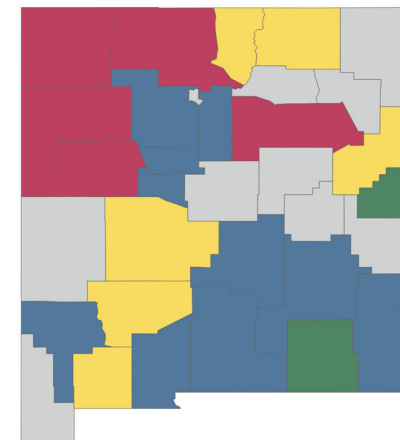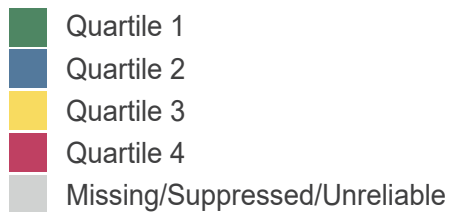
Cibola
McKinley
Rio Arriba
San Miguel
San Juan

Figure 4.

Average Quartile for SVI and ARD

- Quartile 1
- Quartile 2
- Quartile 3
- Quartile 4
- Missing/Suppressed/Unreliable

OKLAHOMA

Combined Social Vulnerability Index and Alcohol-Related Death Rate by County

Quartile 4 Counties

Caddo
McCurtain
Muskogee
Pittsburg
Seminole

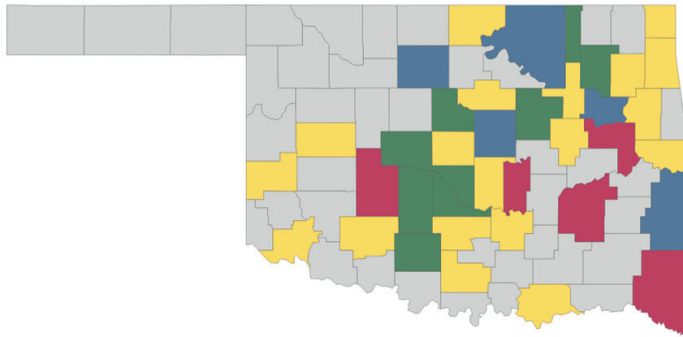Figure 5.

TEXAS

Combined Social Vulnerability Index and Alcohol-Related Death Rate by Parish

Quartile 4 Counties

Bexar
Caldwell
Cameron
Ector
Howard
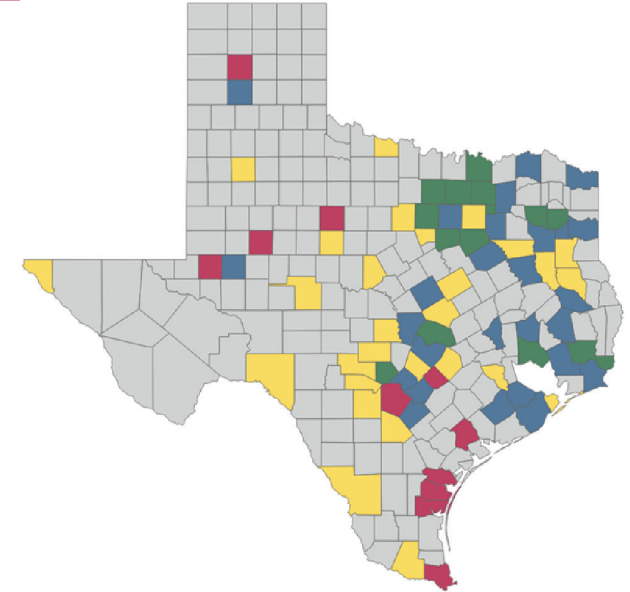Jones
Kleberg
Potter
Nueces
San Patricio
Victoria

Figure 6.

Average Quartile for SVI and ARD

- Quartile 1
- Quartile 2
- Quartile 3
- Quartile 4
- Missing/Suppressed/Unreliable

For more information about the data on a state and county level, please email pttc6@ou.edu.

Implications

Alcohol-induced deaths in the SSW increased 58% for males and 133% for females from 2010 to 2020. The ability to look at local social vulnerability data can help prevention professionals identify additional risk and protective factors in areas where the burden of alcohol misuse is the highest. By learning more about the relationship between SVI and ARD, prevention professionals can advocate for policy changes, interventions, and research that has the potential to curb further harm to individuals from alcohol misuse and its consequences. Prevention professionals can also adapt their current strategies to make prevention services more accessible, particularly for vulnerable populations and communities. Below are some more suggestions:

1. Identify data sources in your community for specific vulnerability factors to get a clearer picture of what contributes to overall vulnerability in your community.

2. Educate clinicians and service providers on the importance of providing holistic services for vulnerable populations. Ask about barriers to accessing services, such as transportation or childcare, and make appropriate referrals (Andermann & CLEAR Collaboration, 2016).

3. Encourage clinicians to implement patient navigator programs to connect vulnerable populations to culturally safe services and improve access (Andermann & CLEAR Collaboration, 2016).

4. Develop and sustain coalition work at the local level to advocate for policy change and implement strategies that mitigate the effects of social vulnerability factors on alcohol use, including strategies that target advertising and sales of alcohol to vulnerable populations.

5. Partner across community groups to reduce the stigma and normalize seeking help for alcohol use related problems.

6. Pay attention to intersectionality and involve a diverse population in adapting and/or tailoring evidence-based practices to reduce barriers to participation in prevention services (e.g. provide transportation, food, etc.).

7. Build relationships with new partners that can increase community resources and readiness to support alcohol prevention strategies that address needs of vulnerable communities.

Additional Factors

For substance misuse and mental health disorders the Social Determinants of Health (SDOH) model contains additional factors that could be influencing outcomes (Healthy People, 2024). The SDOH includes social and community contextual factors, including language and literacy skills; access to transportation, education, nutritious foods, physical activity; and the presence of violence, racism, discrimination, and polluted air and water. Information about the presence or absence of SDOH in a community may be readily available in existing data sources, or special data collection teams may need to be organized to collect data. In addition to encouraging the collection of SDOH related data, prevention professionals can also conduct community readiness assessments to address SDOH.

Social Determinants of Health

- Education Access and Quality
- Health Care Access and Quality
- Neighborhood and Built Environment
- Social and Community Context
- Economic Stability

Social Determinants of Health
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Healthy People 2030

References

Andermann, A., & CLEAR Collaboration (2016). Taking action on the social determinants of health in clinical practice: a framework for health professionals. *CMAJ : Canadian Medical Association Journal = Journal de l'Association Medicale Canadienne, 188*(17-18), E474–E483.
https://doi.org/10.1503/cmaj.160177

Boyd, R. C., Castro, F. G., Finigan-Carr, N., Okamoto, S. K., Barlow, A., Kim, B. E., Lambert, S., Lloyd, J., Zhang, X., Barksdale, C. L., Crowley, D. M., Maldonado-Molina, M., Obasi, E. M., & Kenney, A. (2023). Strategic directions in preventive intervention research to advance health equity. *Prevention Science: The Official Journal of the Society for Prevention Research, 24*(4), 577–596.
https://doi.org/10.1007/s11121-022-01462-5

Centers for Disease Control and Prevention. (2024, February 22). *CDC/ATSDR SVI fact sheet.* Centers for Disease Control and Prevention.
https://www.atsdr.cdc.gov/placeandhealth/svi/fact_sheet/fact_sheet.html

Centers for Disease Control and Prevention. (2023, July 12). *General help for CDC Wonder.* Centers for Disease Control and Prevention.
https://wonder.cdc.gov/wonder/help/main.html#What%20is%20WONDER

Centers for Disease Control and Prevention. (2023, September 18). *Racism and health.* Centers for Disease Control and Prevention.
https://www.cdc.gov/minorityhealth/racism-disparities/index.html

Karaye, I. M., Maleki, N., & Yunusa, I. (2023). Racial and ethnic disparities in alcohol-attributed deaths in the United States, 1999-2020. *International Journal of Environmental Research and Public Health,* 20(8), 5587.
https://doi.org/10.3390/ijerph20085587

Park, S. H., & Kim, D. J. (2020). Global and regional impacts of alcohol use on public health: Emphasis on alcohol policies. *Clinical and Molecular Hepatology,* 26(4), 652–661.
https://doi.org/10.3350/cmh.2020.0160

Meghani, S. H., & Gallagher, R. M. (2008). Disparity vs inequity: Toward reconceptualization of pain treatment disparities. Pain Medicine (Malden, Mass.), 9(5), 613–623.
https://doi.org/10.1111/j.1526-4637.2007.00344.x

South Southwest Prevention Technology Transfer Center. (2023, March 20). *Women and Alcohol: Drinking to Cope in a Pandemic World.* Women and Alcohol: Drinking to Cope, SSW Data Brief.
https://pttcnetwork.org/wp-content/uploads/2023/03/Women-and-Alcohol-Data-Brief.pdf

Strategic directions in preventive intervention research to advance health equity. *Prevention Science: The Official Journal of the Society for Prevention Research, 24*(4), 577–596.
https://doi.org/10.1007/s11121-022-01462-5

U.S. Department of Health and Human Services. (2024). *Healthy people 2030.* Office of Disease Prevention and Health Promotion.
https://health.gov/healthypeople/objectives-and-data/social-determinants-health