

County-Level Structural Racism and Covid-19 Mortality Rates among non-Hispanic White, non-Hispanic Black, and Hispanic Populations

Structural racism is a central driver of the disproportionate burden of COVID-19 mortality borne by Black and Hispanic communities in the United States (Aburto et al. 2022; Garcia et al. 2021; Luck et al. 2023). Throughout the pandemic, these groups experienced significantly higher death rates than non-Hispanic Whites, reflecting not individual behaviors but the cumulative effects of racialized power hierarchies embedded in U.S. institutions. Structural racism, defined by Brown and Homan (2024) as “a multifaceted, interconnected, and institutionalized system of relational subordination for people of color and superordination for White people that is observable as manifest racial inequalities in life chances” (143), is evident in unequal access to health care, precarious labor market participation, residential segregation, and educational inequities. These institutional disadvantages heightened exposure to the virus, constrained access to treatment, and ultimately produced disproportionate mortality for Black and Hispanic populations (Garcia et al. 2021).

While prior research has documented links between structural racism and health outcomes such as infant mortality, depression, and chronic disease (Brown and Homan 2024; Chae et al. 2018; Hardeman et al. 2018), COVID-19 revealed the urgency of understanding how structural racism operates across multiple, interconnected domains (Abraham et al. 2021; Yearby and Mohapatra 2020). Yet, most existing studies isolate single institutions (e.g., residential segregation) or focus narrowly on Black populations, leaving Hispanic disparities comparatively understudied. This study addresses these gaps by examining county-level structural racism and its relationship to Black-White and Hispanic-White disparities in COVID-19 mortality, providing one of the first multifaceted assessments of how structural racism has shaped pandemic outcomes.

Research questions:

1. How closely is structural racism associated with non-Hispanic Black, Hispanic of any race, and non-Hispanic White Covid-19 mortality rates?
2. How much of this association is explainable by spatial autocorrelation and area-level controls? (This work will be conducted between now and the conference.)

Methods

Data. County by race/ethnicity Covid-19 crude mortality rates comes from the National Center for Health Statistics via CDC Wonder (National Centers for Health Statistics 2023). Counties with insufficient data are excluded results in 1,221 counties with non-missing data for Covid-19 Mortality. However, the race/ethnicity specific data vary based on data availability. There are 1,219 counties included for Non-Hispanic Whites, 702 for Non-Hispanic Blacks, and 615 counties for Hispanics. Data for our structural racism measure comes from published county-level tables from the 2015-19 American Community Survey, accessed via www.socialexplorer.com. These variables include county-level race/ethnicity-specific estimates of median household income, unemployment rates for persons ages 16+, poverty rates, and home ownership rates. We also estimate residential segregation using the dissimilarity index comparing each non-White group to non-Hispanic Whites in the same county. We also add race/ethnicity-specific jailing rates constructed by the Vera Institute for Justice for 2019. To better reflect racial/ethnic disparities in the political and health care domains where county-level estimates are not consistently available, we are also exploring including state-level measures of health insurance coverage, voter registration rates, and voter participation rates, but do not include these in the present estimates. Finally, before the conference we will add longitudinal comparisons for the 1990 and 2000 Decennial Census and the 2006-10 American Community Survey.

Structural Racism. To construct our county-level structural racism index, we follow Brown and Homan (2024) in constructing racial/ethnic ratios for each measure besides residential segregation, such that non-White statistics are in the numerator for unfavorable outcomes (unemployment, poverty, and home rental rates) and non-Hispanic White statistics are in the numerator for favorable outcomes (household income and education). All measures are transformed into standardized z-score and subsequently averaged. Counties with at least 1,000 residents in each compared racial/ethnic group are included in these measures.

Table 1: Structural Racism Measures across Domains

Domain	Measure
Segregation	Dissimilarity Index
Criminal-Legal	Incarceration Rate
Economic	Poverty Rate % Renting % Unemployed Median Household Income
Education	% with HS diploma % with BA degree

Covid-19 Mortality. County Covid-19 mortality rates are crude mortality rates calculated using the equation below:

$$CMR = \frac{D^{COVID-19}}{2020 \text{ Mid-Year Population}} \times 1,000$$

County mortality rates are calculated for the total population and each racial/ethnic subgroup (Non-Hispanic Whites, Non-Hispanic Blacks, and Hispanics).

Results

Figure 1 displays county-level structural racism indices and Covid-19 mortality rates (2020–2023) overall and by racial/ethnic group. Black–White structural racism is most intense across the Deep South and pockets of the Midwest, while Hispanic-White structural racism is strongest across the Southwest, Texas counties bordering Mexico, California’s Central Valley, and South Florida. Crude mortality is highest in the Southeast and Appalachia, echoing those broad patterns. NH-Black mortality clusters in the Deep South and in urban counties of the Midwest/Mid-Atlantic, NH-White mortality is more diffuse with pockets in Appalachia, the Upper Midwest, and parts of the Mountain West, and Hispanic mortality is elevated along the Southwest border, in Southern California/Central Valley, and South Florida. Overall, areas with higher structural racism scores align with hot spots of same-group Covid-19 mortality.

Figures 2 displays bivariate county maps of Black–White structural racism with NH-Black and NH-White Covid-19 mortality rates, so magenta/purple tones indicate high racism-high mortality and teal tones indicate low racism-high mortality. For NH-Black, high-high clusters concentrate across the Deep South’s Black Belt and Gulf Coast and in several urban counties in the Mid-Atlantic and Midwest, while some rural Southern counties show high mortality even at lower measured racism. For NH-White, high-high patterns are more diffuse, with concentrations in Appalachia, parts of the Upper Midwest and Northeast, and scattered pockets in the Mountain South; much of the West appears sparse or missing due to small group counts. Overall, the NH-Black map shows a tighter alignment between high structural racism and elevated mortality in the South, whereas the NH-White map spreads mortality risk more broadly across Appalachia and northern regions.

Figure 3 displays maps of Hispanic-White structural racism and Covid-19 mortality rates for Hispanic and NH-Whites. Higher Hispanic-White structural racism aligns with elevated Hispanic Covid-19 mortality along the Southwest border (South Texas, New Mexico, Arizona), in Southern California and the Central Valley, and in South Florida, with additional clusters around major immigrant destinations in the Northeast and Mid-Atlantic. By contrast, NH-White mortality concentrates in Appalachia, the Ohio River Valley, and parts of the Upper Midwest and Northeast, showing only partial overlap with the geography of Hispanic-White structural racism; many Southwest and coastal California counties with higher racism scores have comparatively lower NH-White mortality, while some Mountain West and Great Plains counties show the opposite. Overall, the Hispanic map shows a tighter spatial correspondence between higher racism scores and mortality in border, agricultural, and immigrant destinations, whereas NH-White mortality follows Appalachian and northern patterns largely independent of the Hispanic–White racism index.

Conclusion & Future Steps

Across U.S. counties, higher structural racism scores tend to coincide with elevated Covid-19 mortality within the corresponding group. However, preliminary bivariate regression analyses remain inconclusive. A likely explanation is that these analyses do not adjust for county-level age structures, which may serve as an important confounding factor. NH-White mortality is more prominent in Appalachia, the Upper Midwest, and parts of the Northeast, and only partly overlaps with the racism indices, implying additional drivers beyond these measures. Overall, the figures indicate that structural racism is a geographically patterned risk environment associated with group-specific mortality, pointing to the need for targeted public health and structural interventions where scores and deaths jointly clusters. Future steps will be to account for the age structure of the county and conduct formal spatial analyses to account for any spatial autocorrelation. Subsequent analyses will also incorporate health insurance coverage into the structural racism indices and will use multi-level modeling to incorporate both county- and state-level covariates.

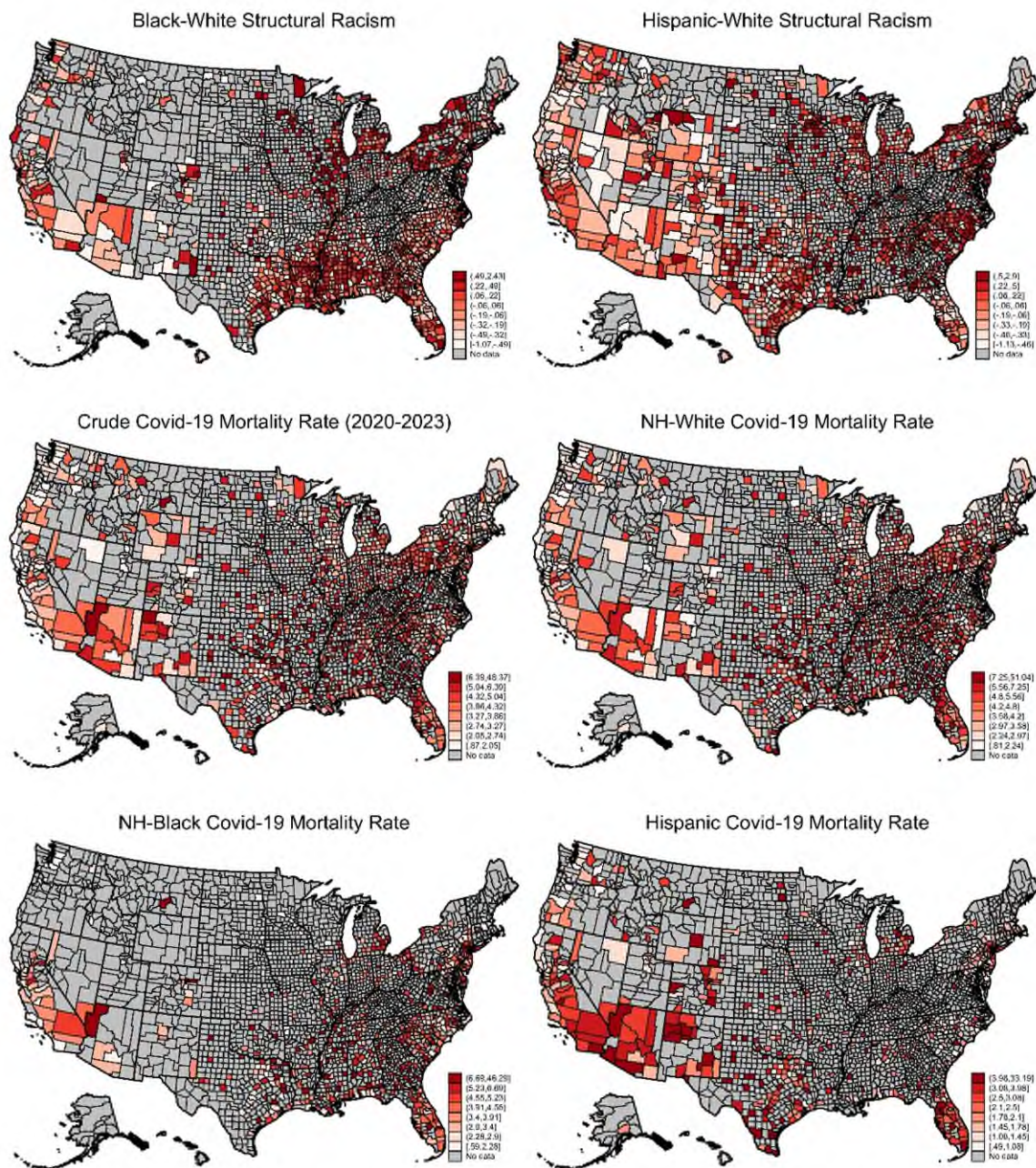
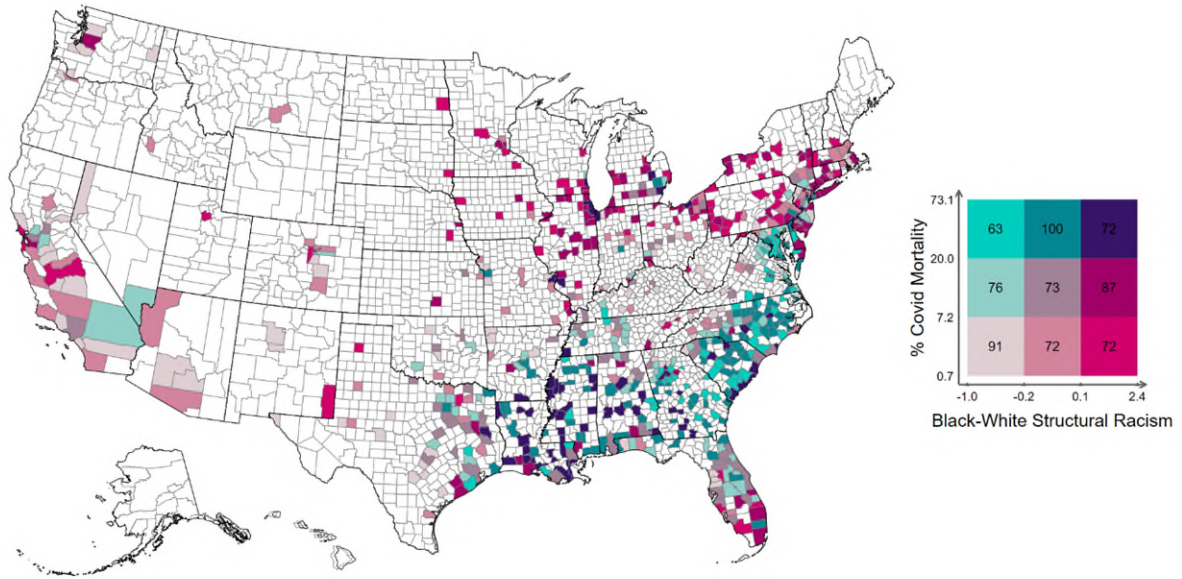


Figure 1: Descriptive Choropleth Maps of Structural Racism and Covid-19 Mortality Crude Mortality Rates

NH-Black



NH-White

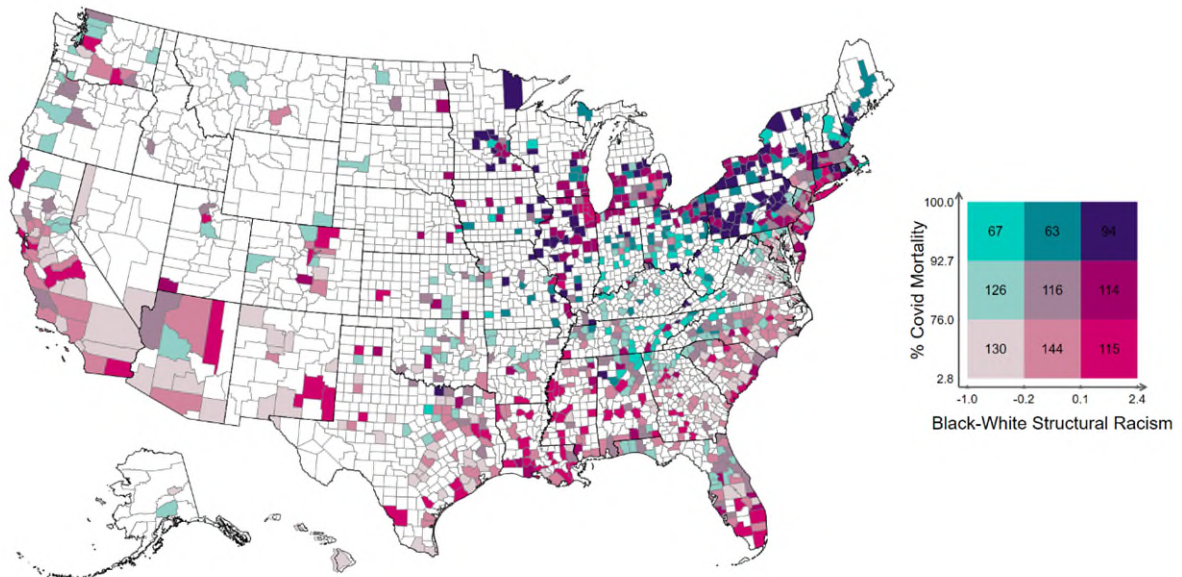
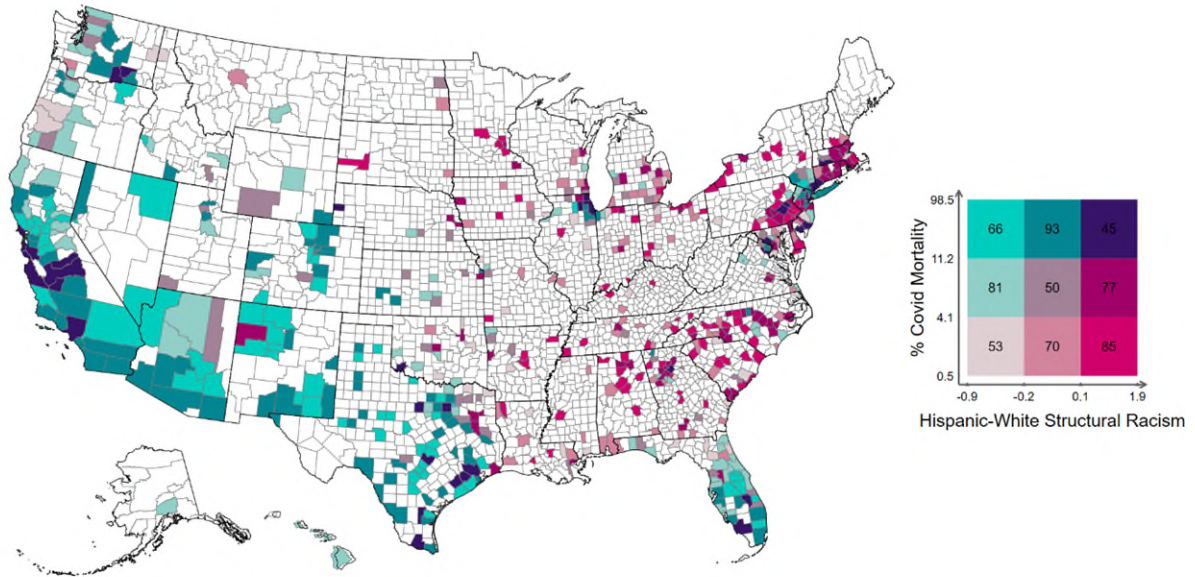


Figure 2: Bivariate choropleth map depicting the association between Black–White structural racism indices at the county level and race-specific distribution of Covid-19 mortality

Hispanic



NH-White

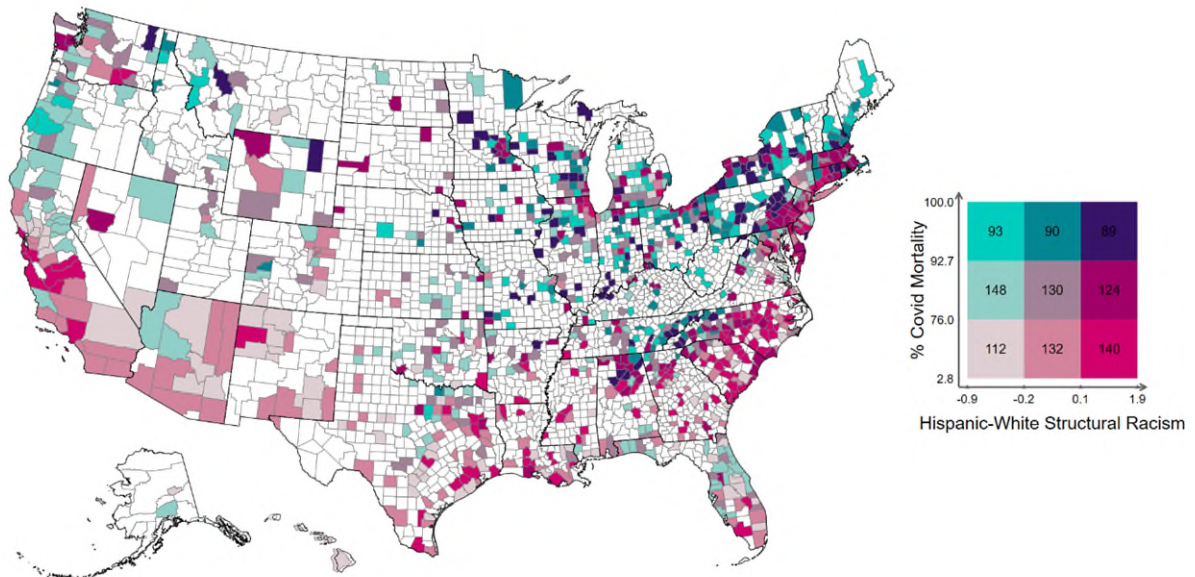


Figure 3: Bivariate choropleth map depicting the association between Hispanic-White structural racism indices at the county level and race-specific distribution of Covid-19 mortality

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