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Spatiotemporal Trend of Racial Disparities in HIV incidence in the United States: County-level Analyses From 2008 to 2021

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BACKGROUND

- Despite ongoing efforts to address racial disparities in HIV incidence, the Black/African American and Hispanic/Latino populations continue to be disproportionately affected by new HIV diagnoses.
- The current study aimed to explore the **temporal trend of racial disparities in HIV incidence at the county level** across the United States from 2008 to 2021, and to identify **potential social determinants** that contribute to these variations.

METHODS

- **Data source:** County-level HIV diagnosis rate data were retrieved from **AIDSVu**. Then we retrieved the Social Vulnerability Index (SVI) and demographic data from the **U.S. Census Bureau**. Data were provided at the county level and were linked using Federal Information Processing Standards (FIPS) codes.
- We used **three measurements to quantify racial disparities in HIV incidence**, **including rate ratio, index of disparity (ID), and population-weighted ID.**
- Temporal trends in these indices were analyzed using the **Joinpoint regression**.
- **Linear mixed-effects models** were applied to explore the relationship between racial disparities in HIV new diagnosis rates and social vulnerability index (SVI), as well as other social determinants variables.

RESULTS

Table 1 The association between the overall SVI and different measures of racial disparities in HIV incidence in the US

Disparity measure	β(95%CI)
Black-to-White rate ratio	-1.49 (-2.94~-0.04)
Hispanic-to-White rate ratio	-0.24 (-1.14~0.66)
Index of Disparity	-26.50 (-54.72~1.72)
Population weighted Index of Disparity	-39.50 (-65.57~-13.43)

Policies to reduce HIV incidence should target both high-SVI areas with higher HIV incidence and low-SVI areas with greater racial disparities in incidence.

RESULTS

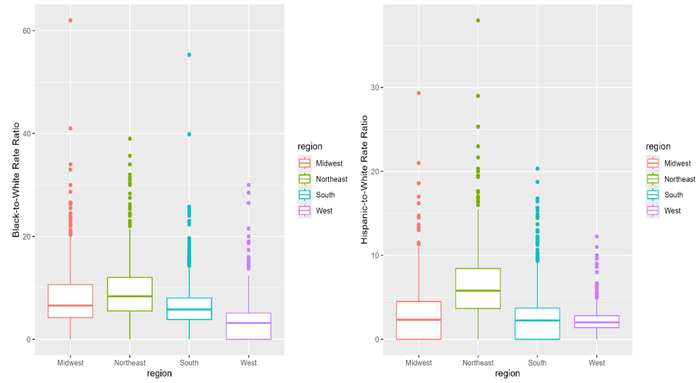
- The **Black-to-White rate ratio** (Average Annual Percent Change [AAPC] = -1.41, p<0.05) and the **Hispanic-to-White rate** (AAPC=-1.60, P<0.05) displayed an overall **decreasing trend.** However, the **weighted ID** showed a significant **upward trend** (AAPC=1.32, P<0.05).
- Counties with **higher social vulnerability** had **lower degrees of racial disparities in HIV incidence**, indicated by lower values of Black-to-White rate ratio (β=-1.49, p<0.05) and population-weighted ID (β=-39.50, p<0.05).

Table 2 Joinpoint Regression

Disparity measure	Period	APC(95%CI)	AAPC(95%CI)
Black-to-White rate ratio	2008-2012	-4.58*(-8.01,-2.82)	-1.41*(-1.91,-1.01)
	2012-2015	3.42*(0.58,5.17)	
	2015-2021	-1.61*(-3.94,-0.85)	
Hispanic-to-White rate ratio	2008-2010	-14.78*(-19.09,-3.25)	-1.60*(-2.32,-0.05)
	2010-2021	1.00*(0.13,2.73)	
ID	2008-2010	-4.02*(-5.70,-0.58)	-0.26(-0.53,0.19)
	2010-2021	0.44*(0.08,1.28)	
Population weighted ID	2008-2021	1.32*(1.01,1.60)	1.32*(1.01,1.60)

RESULTS

Figure 1 Black-to-White and Hispanic-to-White ratios by region



- The median **Black-to-White incidence rate ratio** is highest in the Northeast, at 8.33, followed by the Midwest of 6.57, the South 5.78, and the West 3.14. The median **Hispanic-to-White incidence rate ratio** was also highest in the Northeast, at 5.80, followed by the Midwest 2.33, the South 2.25, and the West 2.00.

CONCLUSIONS

- From 2008 to 2021, Black-to-White and Hispanic-to-White HIV rate ratios declined, but rising weighted ID suggests **widening disparities**. Regional differences highlight the need for targeted, equity-focused interventions.
- Social factors, particularly the SVI, were strongly associated with racial disparities in these, highlighting the need for targeted interventions addressing **social determinants** to reduce HIV racial disparities.

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