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“To What Extent Does Social Environmental Ranking Explain Racial Disparities in Breast Cancer Survival in Louisiana”

INTRODUCTION: In Louisiana, NHB women are 40.5% more likely to die from breast cancer than NHW women and are more likely to be diagnosed at younger ages and later stages. NHB patients disproportionately experience adverse social determinants of health that shape the quality of cancer care. The Social Environmental Ranking (SER) is a composite measure of neighborhood-level social and environmental conditions, which may contribute to these disparities. Although SER has been associated with cancer outcomes, its role in racial disparities in breast cancer survival remains poorly understood in population-based studies. Thus, this study assesses differences in overall survival (OS) and cause-specific survival (CSS) across levels of neighborhood social-environmental burden and evaluates the extent to which this burden contributes to the NHB-NHW breast cancer survival disparity in Louisiana.

METHOD: We linked de-identified Louisiana Tumor Registry patient records for 6,454 NHB and 13,379 NHW women (≥ 20) diagnosed with first primary breast cancer between 2016 and 2022 to the 2022 CDC Environmental Justice Index SER scores at the census tract level; death certificate-only and autopsy-only cases were excluded. SER percentiles were grouped into quartiles (Q1=lowest burden, Q4=highest burden). Outcomes were OS and CSS; the primary exposures were race (NHB vs. NHW) and SER. Descriptive statistics, Kaplan-Meier analysis with log-rank tests, and multivariable Cox proportional hazards models were used. Covariates were added sequentially (age and diagnosis year; stage and molecular subtype; then treatment and comorbidity) with SER entered last after each adjustment covariate set to assess its contribution to the NHB-NHW disparity.

RESULTS: NHB patients were more likely to reside in high-SER neighborhoods and to present with advanced-stage disease and triple-negative breast cancer. Kaplan-Meier analyses showed significantly poorer OS and BCSS among NHB women and among patients residing in higher-SER neighborhoods (both log-rank $p < 0.0001$). After adjustment for age and diagnosis year, NHB women had significantly higher overall mortality (HR = 1.36, 95% CI: 1.28–1.45) and breast cancer-specific mortality (HR = 1.57, 95% CI: 1.44–1.71) than NHW women. Adjusting for SER attenuated the NHB-NHW disparity by 25% (OS) and 24.5% (CSS) beyond age and diagnosis year, and by 32.9% (OS) and 32.2% (CSS) after further adjustment for stage and subtype. SER continued to attenuate the disparity even after adjustment for treatment and comorbidity.

CONCLUSION: Higher neighborhood-level social-environmental burden was independently associated with poor OS and CSS. SER may capture dimensions of neighborhood disadvantage beyond traditional clinical prognostic factors. Incorporating SER into cancer surveillance may improve identification of high-risk populations and inform targeted interventions.

KEYWORDS: Breast Cancer Survival, Health Disparities, Social-Environmental Ranking