

## **Disparities in Cancer Incidence: A Composite Measure to Identify High-Burden Populations, Sites, and Key Drivers in an NCI-Designated Catchment Area**

D. Antonio, T. Manning

*Robert H. Lurie Comprehensive Cancer Center of Northwestern University*

### **1. Background**

NCI-Designated Cancer Centers assess cancer burden across diverse populations in their catchment areas, aiming to identify high-burden populations and cancer sites and understand the drivers of disparities. Surveillance data is commonly used to compare cancer outcomes across demographic groups, cancer sites, and geographic regions. However, the vast amount of data and multiple comparisons can make it challenging to interpret trends effectively.

### **2. Goals**

We developed a composite disparity measure combining absolute and relative differences to pinpoint cancer sites, counties, and race/ethnicity groups experiencing disproportionate cancer burden in the Robert H. Lurie Comprehensive Cancer Center's catchment area. We also explored associations between social determinants of health and disparities.

### **3. Solutions and Methods**

Age-adjusted incidence rates for all cancer sites (2017-2021) from the United States Cancer Statistics were used to calculate absolute and relative differences for each race/ethnicity group compared to their average rate across the nine catchment area counties. These measures were scaled and log-transformed to create a composite disparity score. Social determinants, including labor force participation, insurance coverage, routine medical checkups, urbanicity, and a behavioral risk factor score, were obtained from the American Community Survey (2017-2021) and the U.S. Centers for Disease Control and Prevention (CDC) PLACES (2021). The composite disparity score was summarized at the county level and analyzed using a linear mixed-effects model with random effects by cancer site and county.

### **4. Outcomes**

Prostate cancer had the highest composite disparity score, with Kendall and Kane counties experiencing significant disparities. Black non-Hispanics accounted for 88 percent of the prostate cancer disparity. Breast and lung cancers ranked second and third, with Cook County contributing 20-21 percent and Black non-Hispanics representing 53-58 percent of the disparities. Cervical cancer had the lowest overall score but exhibited large disparities between Hispanic (78%) and Black non-Hispanic (22%) groups, with Cook County contributing nearly half (47%) of the burden. The mixed-effects model explained much of the variance in the composite score (Conditional  $R^2 = 0.800$ ). Urban percentage ( $t = 8.89$ ,  $p < 0.001$ ), insurance coverage ( $t = 18.03$ ,  $p < 0.01$ ), and high-risk factor score ( $t = 0.94$ ,  $p < 0.001$ ) were positively associated with disparities. Recent medical checkups ( $t = -79.31$ ,  $p < 0.001$ ) and labor force participation ( $t = -9.42$ ,  $p < 0.001$ ) were linked to lower scores. The lower variance explained by the social determinants (marginal  $R^2 = 0.23$ ) suggests that county and cancer site variations more strongly drive disparities.

## **5. Lessons Learned and Future Directions**

This study highlights the utility of a composite measure to identify high disparity populations and drivers. The findings emphasize the need for focused interventions in high-burden counties and cancer sites and strategic community engagement for populations experiencing significant disparities. Efforts should prioritize high-impact populations and consider both social determinants of health and regional factors, where interventions can substantially reduce cancer burden and produce meaningful improvements in health outcomes.