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HOW ENVIRONMENTAL RISK FACTORS DRIVE RACIAL DISPARITIES IN PROSTATE CANCER STAGES AT DIAGNOSIS

Introduction: Prostate Cancer is the most common cancer among men, contributing approximately 240,000 incidence cases per year that result in an estimated 28,000 deaths among US men mainly ages 65 or older.[1,2] Studies show that socioeconomic, environmental, and dietary factors are related to the racial disparities in prostate cancer outcomes between African American (AA) and Caucasian men (CA).[3] AA men suffer disproportionally more prostate cancer than their CA counterparts. AA men account for 73% higher rates of incidence and more than double the rates of mortality in comparison with CA men.[2] Increased rates in AA men come as their diagnosed at younger ages, with more aggressive tumors, advanced stages, and less effective treatments and poorer outcomes.[2,3] In literature, previous studies examined how racial disparities in prostate cancer such as diagnosis, treatment, and survival are affected by the socio/environmental risk factors like the social determinants of health and chemical exposures.[1-4] In this study, we investigate if environmental risk factors can be seen as potential mediators in the racial disparity of prostate cancer diagnosis, while also quantifying the specific variables of risk towards the observed disparity in prostate cancer stage.

Method: In our cross-sectional study design, a total of 24,647 AA or CA male patients who were diagnosed with prostate cancer between 2010-2018 in LA were included in this study. Among them 15,875 (64.40%) were white and 8,772 (35.59%) black. The research is based on data collected by Louisiana Tumor Registry from 2010-2018. This was merged with 2010 census tract level data along with CDC and Prevention and Agency for Toxic Substances Disease Registry's 2022 Environmental Justice Index data. The study compared the outcome variable (Stage at Diagnosis) against the predictor/exposure variable (AA vs CA patients) to quantify the potential socio/environmental mediators used (Marital Status, Insurance, Poverty, CDI, Ozone, Comorbidity, AceTot, Coal, TOTCR, etc). Using R studio, we first performed descriptive statistics on our data using Chi-Square, T-statistics, and Anova tests, and then conducted a Multiple Mediation Analysis (MMA) to determine essential factors that explain the observed racial disparity in stages.

Results: There is significant racial disparity in prostate cancer diagnosis stages (P-value=0.001). The included variables completely explained the observed disparity as the direct effect became insignificant (DE=-0.21, 95%CI (-0.034, 0.017)). We found the following significant mediators and corresponding relative effects: BMI (35.9%), marital status (31.9%), insurance (7.3%), poverty indicator (0.2%), comorbidity index (4.9%) along with environmental variables like proportion of population with asthma (7.1%), proportion of tract's area within 1-mi buffer of EPA risk management plan site (2.4%), railroad (1.6%), percentage of houses built pre-1980 (lead exposure) (0.9%), walkability (0.3%), and lifetime continuous toxicity exposure (7.3%).

Conclusion: Potential environmental risk factors were seen to have moderate influence (< 20%) towards the impact on explaining observed racial disparity in prostate cancer diagnosis. Factors of social and health related risk however provided substantial impact (> 80%) towards observed racial disparities in prostate cancer diagnosis. From this, future research should

continue to further investigate environmental risk factors in explaining the racial differences in prostate cancer outcomes.