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Associations Between Five-year Cancer Survival, Natural Hazard Risk, Community Resilience, and Social Vulnerability in Louisiana

Cancer survival is influenced by complex interactions among many biological, clinical, social, and environmental factors. Five-year cancer survival refers to the percentage of cancer patients who remain alive for at least five years after their diagnosis, which is commonly utilized as a measure of cancer prognosis. Survival rates vary based on many factors, including climate hazards, socioeconomic status, access to healthcare, and geographic location. Extreme climate events (e.g., hurricanes, tornadoes, and extreme heat, etc.) can disrupt healthcare resources, damage public infrastructure, and induce population displacement, contributing to barriers in treatment.

Associations among five-year cancer survival, aggregated annual losses attributed to climate hazards, social vulnerability, and community resilience across Louisiana parishes were studied. Parish level Cancer Survival Rates were obtained from Louisiana Tumor Registry (LTR), Community Resilience (CR) and Expected Annual Loss (EAL) data were sourced from the FEMA National Risk Index, while Social Vulnerability Index (SVI) were acquired from the CDC. The Ordinary Least Squares (OLS) regression model analyzed the associations. Global Moran's I analysis of the model residuals was conducted to determine if spatial autocorrelation was present across Louisiana parishes.

Significant associations (F-test, $p<0.001$) explained 52.3% ($R^2=0.523$) of the variation in cancer survival rates. No significant spatial autocorrelation was observed among the residuals ($I=0.027$, $p=0.580$). Parishes with negative residuals had lower observed cancer survival rates than predicted by the model.

The limitations of this study include researching stratified annual loss to climate hazard types and their association with poorer survival outcomes. Additionally, specific cancer types were not researched, suggesting that the model is not able to account for specific cancer survival rate associations. This highlights the need for further research into specific annual loss attributed to hazard types or pathways with stratified cancer survival. Communities identified by this model with lower-than-expected cancer survival rates may represent priority areas for public health interventions and resource allocation to improve cancer survival rates.