

Interaction between race and rurality in pediatric cancer survival: an analysis of SEER data

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Background: Cancer is the leading cause of death by disease among children under 15 in the US. While pediatric cancer survival rates have improved significantly over time, they vary by age, sex, cancer type, race/ethnicity, and socioeconomic status.

Significance of the problem: Rural/urban disparities in cancer survival rates have been reported among adults in the US. Few studies have investigated rural/urban differences in pediatric cancer outcomes. Further, there is a dearth of research on the interaction between race/ethnicity and rurality in pediatric cancer outcomes, which may help to identify particularly vulnerable patients.

Hypothesis, problem, or question: The objective of this study was to examine rural/urban differences in pediatric cancer survival in the United States and determine if race/ethnicity modifies the relationship between rurality and survival.

Experimental design: In this population-based longitudinal study, we used data from the Surveillance, Epidemiology, and End Results (SEER)-17 registries database. All primary cases of malignant cancer diagnosed among children aged 0-19 in the US were included. Rural/urban residence was classified using Rural Urban Continuum Codes (classified in 2 levels and 5 levels). Kaplan-Meier curves with a log-rank test were used to examine survival probabilities over time by race/ethnicity and rurality. Cox proportional hazards models were used to compute crude and adjusted hazard ratios (HRs). Interaction terms were used to test whether race/ethnicity was a modifier of the association between rurality and survival.

Results: 61,282 children were included in our study. 90.20% lived in urban counties, and 9.80% lived in rural counties. Overall, 52.10% of cases were Non-Hispanic White, 29.56% were Hispanic (any race), 10.01% were Non-Hispanic Black, 7.64% were Non-Hispanic Asian or Pacific Islander, and 0.69% were American Indian/Alaskan Natives. When modeling rurality as a binary variable, there was a significant interaction between race/ethnicity and rurality ($p=0.0290$). Among Non-Hispanic White children, those living in rural areas had a 1.132 times higher risk of cancer death (HR=1.132, 95% CI: 1.027-1.247). The effect of rurality was not statistically significant among the other racial/ethnic groups. There was no significant interaction when modeling rurality as the expanded 5 category variable ($p=.2426$).

Conclusions: Our study observed lower cancer survival rates among children living in rural areas, especially among White children. Our study is limited by small case numbers among racial/ethnic minorities living in rural areas. Further research is needed to examine the complex interaction between race and rurality and develop targeted multilevel interventions to mitigate disparities.