

# Socioeconomic disparities in survival after high-risk neuroblastoma treatment with modern therapy

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## Abstract

Background: Modern therapeutic advances in high-risk neuroblastoma have improved overall survival (OS), but it is unclear whether these survival gains have been equitable. This study sought to examine the relationship between socioeconomic status (SES) and OS in children with high-risk neuroblastoma, and to investigate whether SES-associated disparities have changed over time. Procedure: In this population-based cohort study, children <18 years diagnosed with high-risk neuroblastoma (diagnosis at age [?]12 months with metastatic disease) from 1991-2015 were identified through the National Cancer Institute's Surveillance, Epidemiology, and End Results database. Associations of county-level SES variables and OS were tested with univariate Cox proportional hazards regression. For a sub-cohort diagnosed after 2007, insurance status was examined as an individual-level SES variable. Multivariable regression analyses with treatment era and interaction terms were performed when SES variables reached near-significance ( $p \leq 0.1$ ) in univariate and bivariate modeling with treatment era. Results: Among 1,217 children, 2-year OS improved from  $53.0 \pm 3.4\%$  in 1991-1998 to  $76.9 \pm 2.9\%$  in 2011-2015 ( $p < 0.001$ ). In univariate analyses, children with Medicaid (hazard ratio [HR]=1.40, 95% confidence interval [CI]=1.05-1.86,  $p=0.02$ ) and those in high-poverty counties (HR=1.74, CI=1.17-2.60,  $p=0.007$ ) experienced an increased hazard of death. No interactions between treatment era and SES variables were statistically significant in multivariable analyses, indicating that changes in OS over time did not differ between groups. Conclusions: Low SES is associated with inferior survival in children with high-risk neuroblastoma. Survival disparities have not widened over time, suggesting equitable access to and benefit from therapeutic advances. Interventions to narrow existing disparities are paramount.

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