

Green and Healthy Communities:

Using spatial data science tools to explore the relationships between urban greenery and health outcomes in the Rio Grande Valley

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Abstract

Building from priorities identified via youth-engaged research in the Rio Grande Valley, this analysis aims to quantify relationships between greenery and health outcomes. Green infrastructure availability was estimated using Landsat-derived NDVI data and merged with local socioeconomic and health indicators for census tracts in Hidalgo County, Texas. Exploratory spatial data analysis, OLS regression, spatial regression, and geographically-weighted regression (GWR) methods were used to investigate how access to greenery relates to selected physical and mental health outcomes. While OLS and spatial models suggest inconsistent and, in some cases, contradictory relationships between NDVI and health outcomes, GWR results reveal substantial spatial non-stationarity, with the direction and magnitude of NDVI–health relationships varying across the county. On average, greenery appears to be beneficial for some mental health measures but detrimental for certain physical health outcomes, with effects differing across urban and rural contexts. These findings illustrate the highly place-based nature of environmental health processes and point to the need for tailored spatial models and more human-centered measures of green infrastructure exposure.