



# Research Week 2021

## A high-resolution rural disadvantage index for study of health disparities

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### Keywords

health disparities, rural health, rurality, index construction

### Abstract

U.S. rural areas face wide-ranging health disparities. However, examining rural disparities is complicated by suboptimal measurement of rurality, including categorical/low spatial resolution measures and poor integration of the demographic, sociocultural, economic, and health-related aspects of rurality. The present research rectified these issues via computation of a 0-100 multidimensional high-resolution rural disadvantage index (RDI) for study of health disparities in Texas. Index construction involved selection and grouping of ten publicly available rural indicator variables into three rural dimensions, creation of a custom census block-sized gridded surface for Texas, areal weighted interpolation of rural indicators to the surface, weighting variables in each rural dimension via variance contributions from three separate principal component analysis (PCA) procedures, and equal weighting of the three dimensions to create the final index. Population density (PD), median income (MI), educational attainment (ED), and diversity (D) were classified as demography-based factors (DBF); road density (RD), PM2.5 air pollution, and built-up area (BA) were classified as spatial-environmental factors (SEF); and healthy food access (HF), health insurance coverage (HI), and primary care physician coverage (PCP) were classified as health-related factors (HRF). PCA results from the DBF dimension attributed PD, MI, ED, and D with weights of 26.4%, 29.1%, 29.9%, and 14.6%, respectively. Results from the SEF dimension attributed RD, PM2.5, and BA with weights of 39.4%, 20.4%, and 40.2%, respectively, while results from the HRF dimension attributed HF, HI, and PCP with weights of 26.5%, 26.9%, and 46.6%, respectively. The produced unitless index had a mean of 50.0, a standard deviation of 9.5, and a median of 49.7. Mapping results showed significant improvements in numerical range and granularity over existing U.S. Census Bureau rural/urban classification of census blocks. The present work displayed the utility of multivariate index construction methods for building multidimensional rural indices to study health disparities at high resolution.