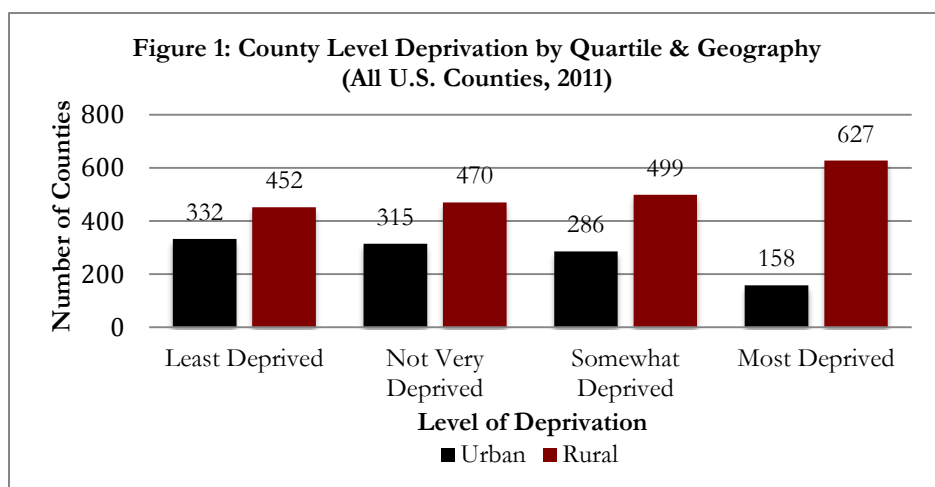


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Area Deprivation is Higher Among Rural Counties—but Not All Rural Counties are Deprived

This brief is the first of two in a series that provides policy makers and interested parties with information on the role of residence and community deprivation on potentially avoidable hospitalizations among children. This brief describes the development of the area deprivation index, examines area deprivation across all U.S. counties, and describes findings when applied to rates of potentially avoidable hospitalizations among a nine-state sample of children.



Key Findings

Rural counties are disproportionately represented among the most deprived—but not all rural counties are deprived.

The effects of residence within levels of area deprivation could be substantial and otherwise missed when examining residence alone.

Consolidating multiple social determinants into a single index may be of use to rural health researchers.

Historically, rural and underserved communities face many challenges that manifest in health disparities. Rural communities often experience higher rates of morbidity and mortality than do their urban counterparts, while significant barriers in providing access to important health services remain a constant struggle.¹⁻⁵

Central to rural disparities are the unique characteristics of these communities, beyond geography, that reflect the social determinants of health (economic and social conditions that influence health). Higher rates of poverty and unemployment, shifting demographics, lower educational achievement, and lack of access to affordable health care represent just some of the determinants more prevalent in rural communities that contribute to observed health disparities.

The University of South Carolina Rural Health Research Center explored this issue further in a study by examining hospitalizations among children due to Ambulatory Care Sensitive Conditions (ACSC). These are diseases, such as asthma or pneumonia, for which hospitalization can be avoided with timely and appropriate primary care. Important social determinants that are more common in, but not exclusive to rural, were collapsed into a single index measuring area deprivation. The index was applied to a nine-state sample of inpatient hospitalizations among children from 2011. The effect of area deprivation and rurality on ACSC hospitalizations was examined.

The study found that rural counties are disproportionately represented among the most deprived—but not all rural counties are deprived. Aggregate county-level rates of ACSC hospitalizations and the subsequent analysis of individual children demonstrated clear increases in hospitalizations from ACSC conditions as the level of area-deprivation worsened. The remainder of this report explains the construction of the index, describes the findings when applied across a nine-state sample of potentially avoidable hospitalizations among children, and discusses the potential implications in using this index for rural health research and policy.

Area Deprivation Index Construction

The primary purpose for creating an index was to provide a practical measure of county-level deprivation using public and readily available data. A review of the literature for existing indices of area-level deprivation was the starting point for determining which measures should be included in the index. We identified three area-level indices similar in concept to the present study, but not directly transferrable. The most closely related index came from Eibner and Sturm⁶, which was heavily influenced by parallel indices constructed in Britain.⁷⁻⁸

The Eibner and Sturm index uses unweighted census-track level data from 16 variables reflecting various social determinants to measure deprivation. Relevant socio-demographic measures included income, poverty, unemployment, high school graduation rate, car ownership, household overcrowding, home ownership, percent married, percent non-white, percent non-English speakers, and access to parks. Five additional health service access and utilization measures were also included (physicians per capita, mental health inpatient and outpatient visits, and healthcare-related businesses) in the Eibner and Sturm index.

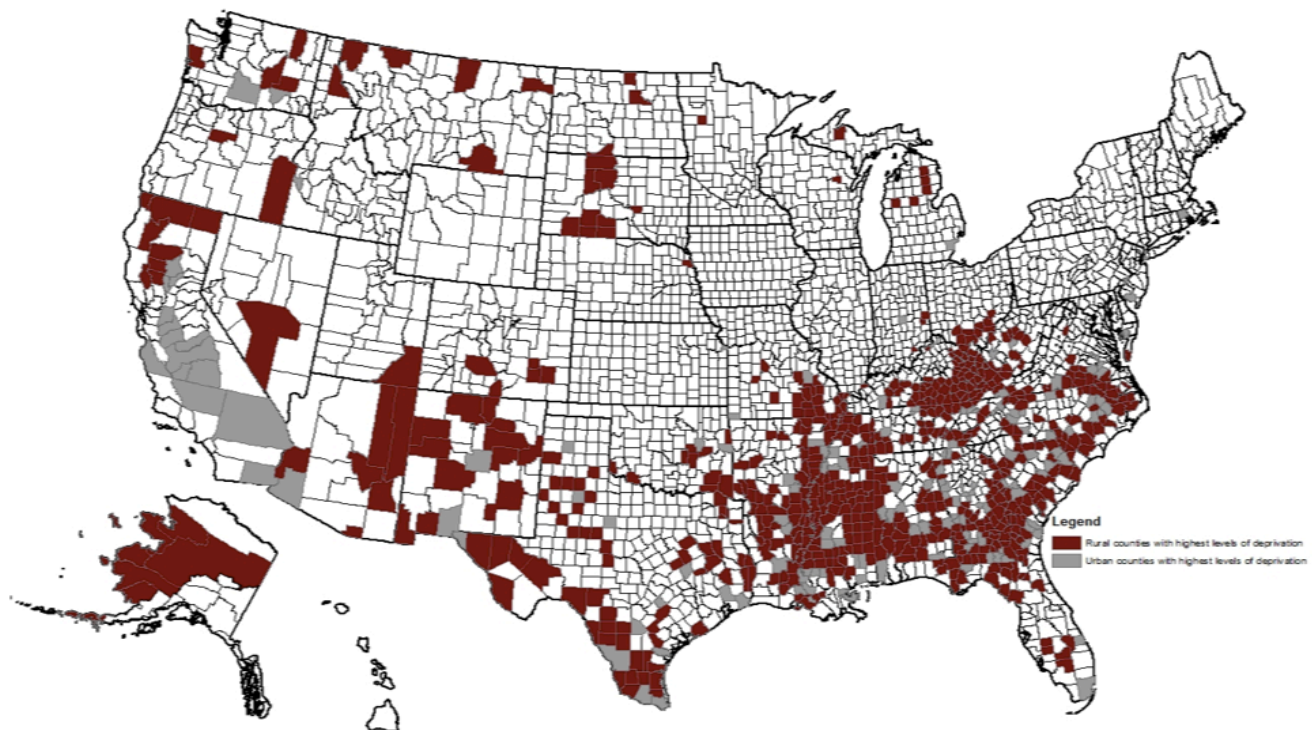
Our index development process paralleled Eibner and Sturm, but used counties rather than census tracts as the level of analysis. Using counties has the advantage of identifiable geo-political boundaries more reliable data.

We began with the 11 socio-demographic variables noted. Examining the influence of health resource capacity separately from social determinants was of specific interest to our study, thus, these measures were not included in the index. From the remaining 11 measures, car ownership was removed for conceptual reasons, as not owning a car is not uncommon in densely populated urban areas. No clean data source for household overcrowding was readily available and this measure was also dropped. Percent minority population in the county was also excluded, recognizing the inappropriateness of labeling “non-white” a less than desirable status.

Using the remaining eight variables (income, poverty, unemployment, high school graduation rate, single parent homes, home ownership, access to parks, and percent non-English speaking residents), a principal components analysis was conducted and five variables retained— income, poverty, unemployment, high school graduation rate, and single parent homes.

These five measures were standardized using z-scores, with the direction of positive or negative change across each variable defined in a consistent direction. The scores for each measure were then summed and the sums divided into quartiles to derive the actual index. It is important to note positioning within the index is relative to the overall distribution of all the counties included in the calculations.

Figure 2: Counties with the Highest Level of Deprivation

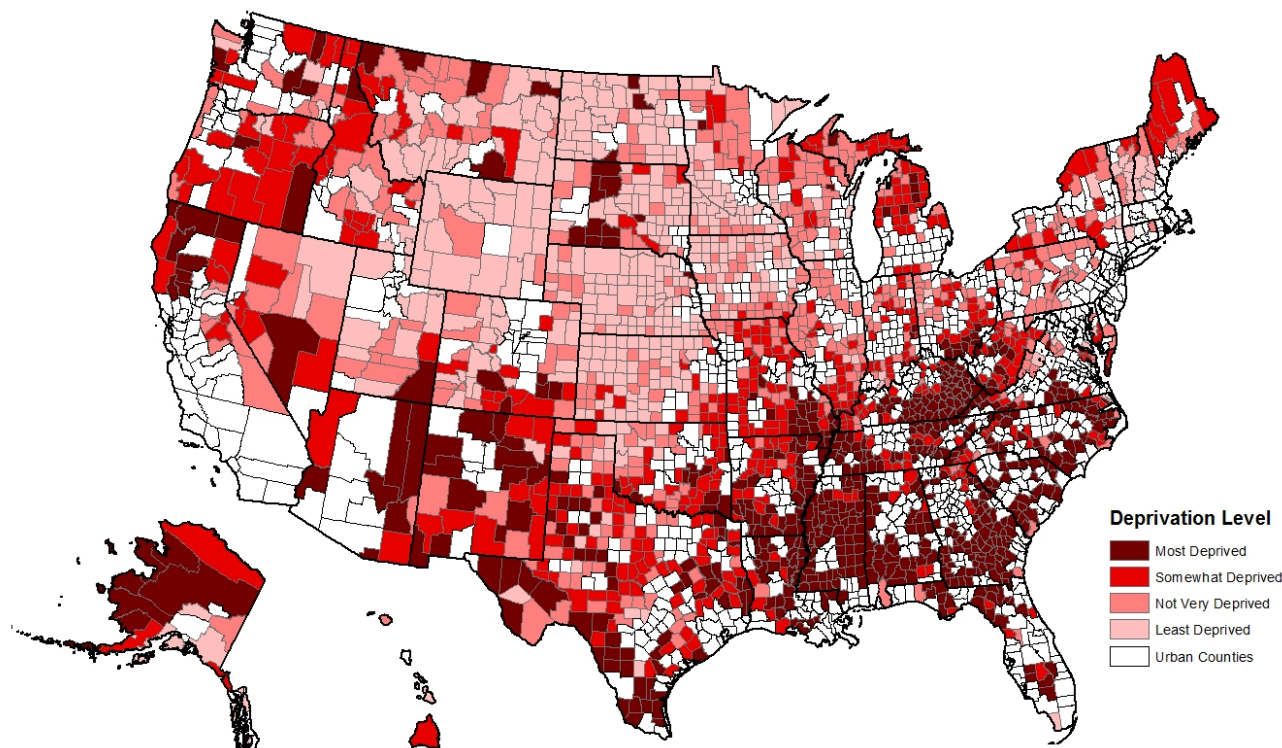


Distribution of Area Deprivation by Residence

Rural counties are disproportionately represented among the most deprived counties—but not all rural counties experience high levels of deprivation (Figure 1). Rural counties accounted for 57.7% of all counties in the lowest level of deprivation, yet account for 79.9% among the highest level of deprivation considered. Conversely, urban counties account for 42.3% of the least deprived counties, but 20.1% among the most deprived (Figures 2 & 3).

The geographic distribution of county-level deprivation is illustrated in Figures 2 and 3. Notably, both rural and urban counties are among those classified as “most deprived,” although a greater proportion of rural counties fall into this group. Both rural and urban high-deprivation counties are regionally clustered in the South, Southwest and West.

Figure 3: Level of Deprivation among Rural Counties (2011)



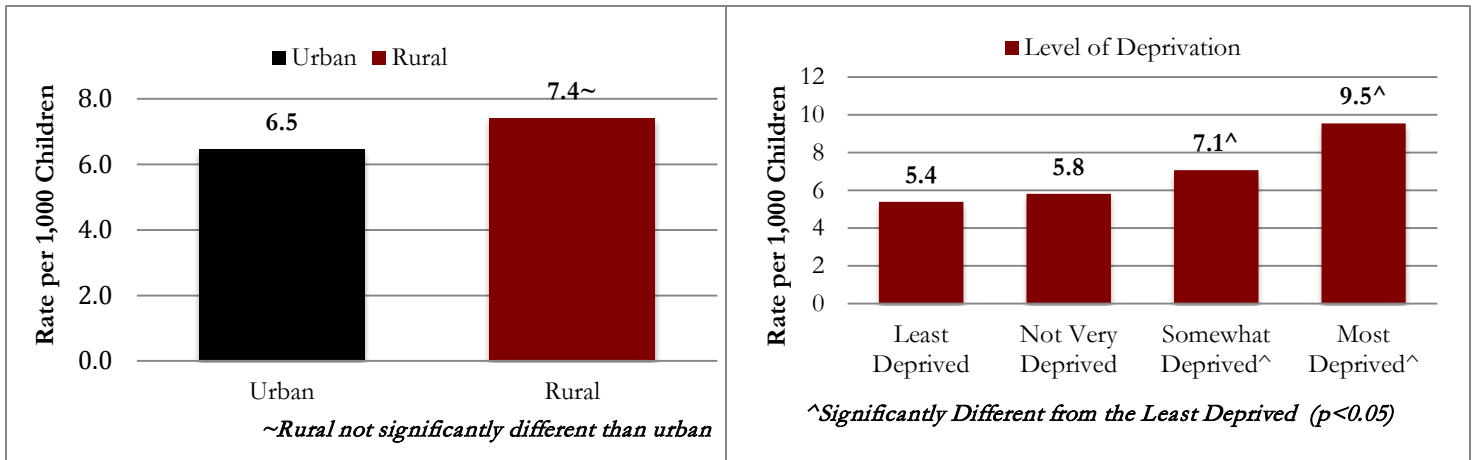
Area Deprivation & Ambulatory Care Sensitive Hospitalizations

We then used the area deprivation index to identify rural counties at high risk for poor health outcomes using a nine-state sample of inpatient hospitalizations among children. Within hospitalizations, we examined the relative frequency of hospitalization resulting from ACSC, or conditions deemed potentially avoidable in the presence of a strong primary care system. One state from each Census sub-region was selected for the sample (Arkansas, Colorado, Florida, Michigan, Mississippi, New York, South Dakota, Washington, and Vermont).

In each of these nine states, the county rate of hospitalizations from ACSC was calculated (552 counties). We then examined whether these rates differed based on rurality and level of deprivation. Across all types of counties, the rate of hospitalization from ACSC was similar among rural and urban children (7.4 per 1,000 versus 6.5 per 1,000, respectively) (Figure 4).

Figure 4: County Rate of Ambulatory Care Sensitive Conditions (ACSC) among Children by Urban and Rural (2011)

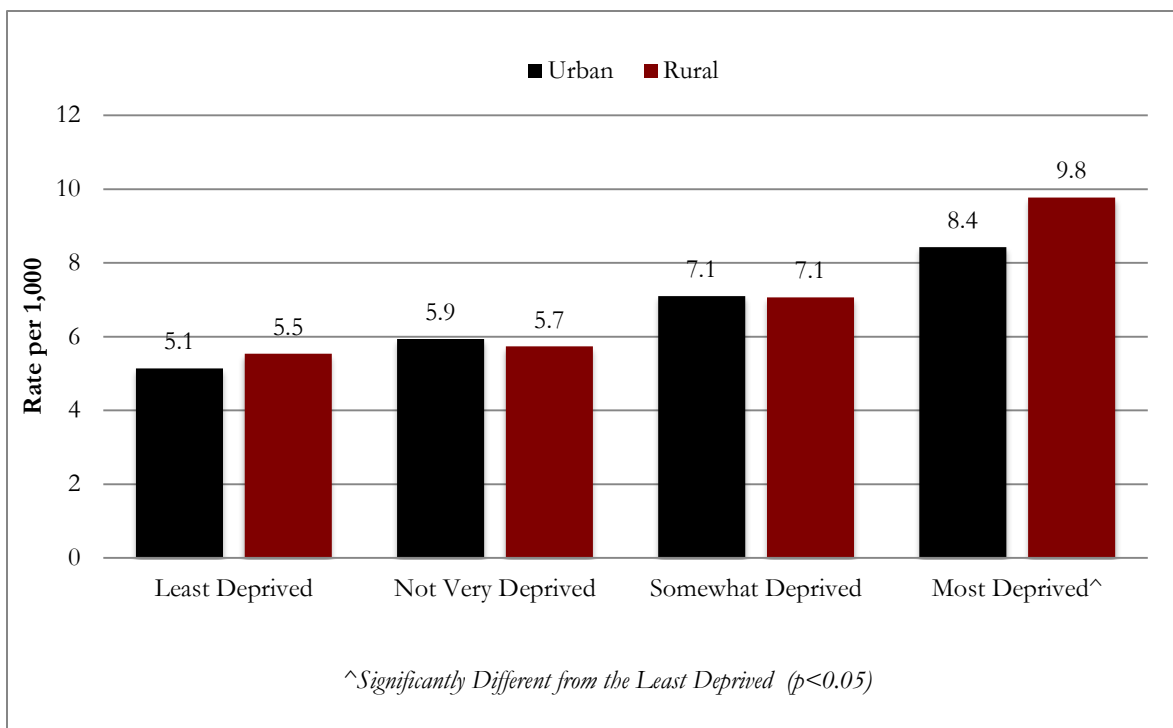
Figure 5: Rate of Hospitalizations from Ambulatory Care Sensitive Conditions (ACSC) by Level of Deprivation, Nine-State Sample



When ACSC hospitalizations are studied across levels of area deprivation alone, however, a pattern emerges. As the level of area deprivation increases, so does the rate of hospitalization from ACSC among children—particularly in counties that are among the most deprived

Considering the relationships between rurality and area deprivation, aggregate county-level findings suggest area deprivation is the stronger predictor of hospitalization from ACSC than rurality. As illustrated in Figure 6, within comparable levels of area deprivation, there do not appear to be notable differences in hospitalizations from ACSC among children residing in rural and urban counties. Our findings do suggest that ACSC hospitalization rates among the most deprived counties are significantly larger than those observed among the least deprived counties.

Figure 6: County Rate of Admissions from Ambulatory Care Sensitive Conditions (ACSC) among Children by Level of Deprivation^ and Rurality (2011)



Summary and Implications

The index presented in this brief provides a simple, straightforward means of characterizing the underlying vulnerabilities of counties using publically available data that can be easily linked with other datasets. When applying the area-level deprivation index across all counties in the United States we clearly see that differences in the social determinants contributing to poorer health outcomes are more prevalent in rural communities, but not in all rural communities. The reciprocal can be said of urban communities.

When examining aggregate county-level rates of ACSC hospitalizations among children, a slightly higher rate was noted among those residing in rural counties relative to their urban counterparts. Moreover, clear increases in hospitalizations from ACSC conditions as the level of area-deprivation worsened were noted. These findings suggest that examining rurality alone may under-represent the potential relationships between residence and selected outcomes when underlying levels of vulnerability are not well defined. Given ACSC hospitalization is a relatively rare event for children, these findings may be more evident with higher prevalence outcomes.

Disentangling the relationship between rurality and factors included in the area deprivation index, individually, can be challenging. Consolidating these determinants into a single measure that relates with rural residence allows for examining the effects of rural within comparable levels of county deprivation that could otherwise be missed when examining residence alone or in conjunction with multiple control variables of interest—particularly when examining rare event outcomes that warrant a parsimonious model. The use of this index in conjunction with residence allows for a more granular level of analysis that may be useful for rural health researchers and policy makers.

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