

# Regional Differences in Rural and Urban Mortality Trends

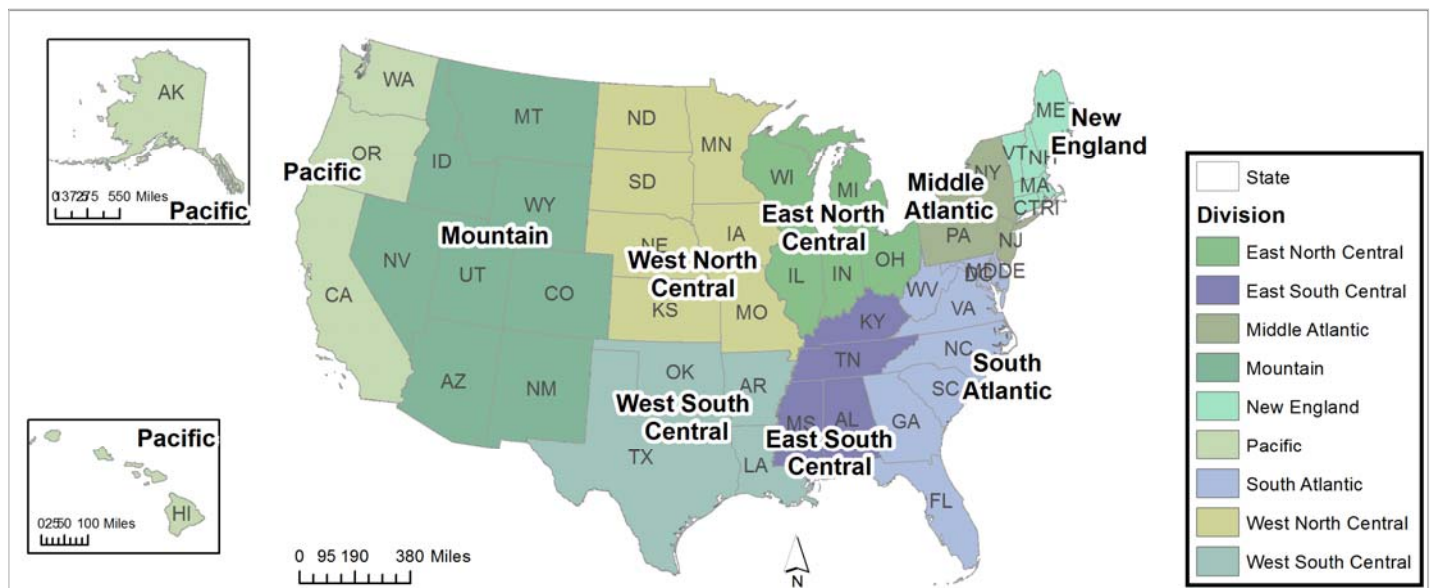
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## BACKGROUND

Previous research has established both that there is a gap in nationwide rural-urban mortality and that this gap is increasing over time.<sup>1,2</sup> By 2005-2009, rural (defined as non-metropolitan) counties had a 13 percent higher mortality rate than metropolitan counties on average, compared to a two percent difference in 1990-1992.<sup>1</sup> Existing and ongoing work has found that the rural-urban mortality gap may vary regionally. The Rural Health Reform Policy Research Center regularly releases information about rural-urban disparities across a diverse set of indicators; their data show considerable differences in all-cause mortality by rurality and region.<sup>3</sup>

This brief builds upon previous research and explores the differences in mortality trends between rural and urban locations by census division (shown in Figure 1) from 1999 to 2015. Using data from CDC WONDER’s Compressed Mortality File, we calculated rural and urban (defined by 2006 metropolitan status) all-cause mortality rates in each of the nine census divisions.

**Figure 1: U.S. Census Divisions**



Map Source: <https://www.census.gov/geo/reference/webatlas/divisions.html>

## KEY FINDINGS

- In the United States, the mortality rate is higher among people who live in rural areas compared to those who live in urban areas, and the disparity is growing. (Mortality rate is defined as the number of deaths per 100,000 people.)
- Differences between rural and urban mortality rates vary regionally, although disparities have grown throughout the country: the disparity after 2007 is larger than the disparity before 2007 in all nine divisions.
- Rural mortality rates and differences between rural and urban mortality rates are highest in the South Atlantic, East South Central, and West South Central census divisions – the three divisions comprising the South Census Region.
- Of note, the mortality rate in both metropolitan and non-metropolitan counties rose in 2015; it is not clear whether this is an aberration or a trend.

## FINDINGS

Consistent with previous studies, all-cause mortality is decreasing nationwide over time in both metro and non-metro areas. However, urban mortality is lower than rural mortality and is decreasing more rapidly. As depicted in Figure 2, this differential decrease has led to an accumulating disparity between rural and urban all-cause age-adjusted mortality. In rural areas, the mortality trend began decreasing less rapidly in 2009 and actually showed a small increase in both geographies in 2015. This recent increase is important to monitor.

**Figure 2: All-Cause U.S. Mortality Rate, 1999-2015**

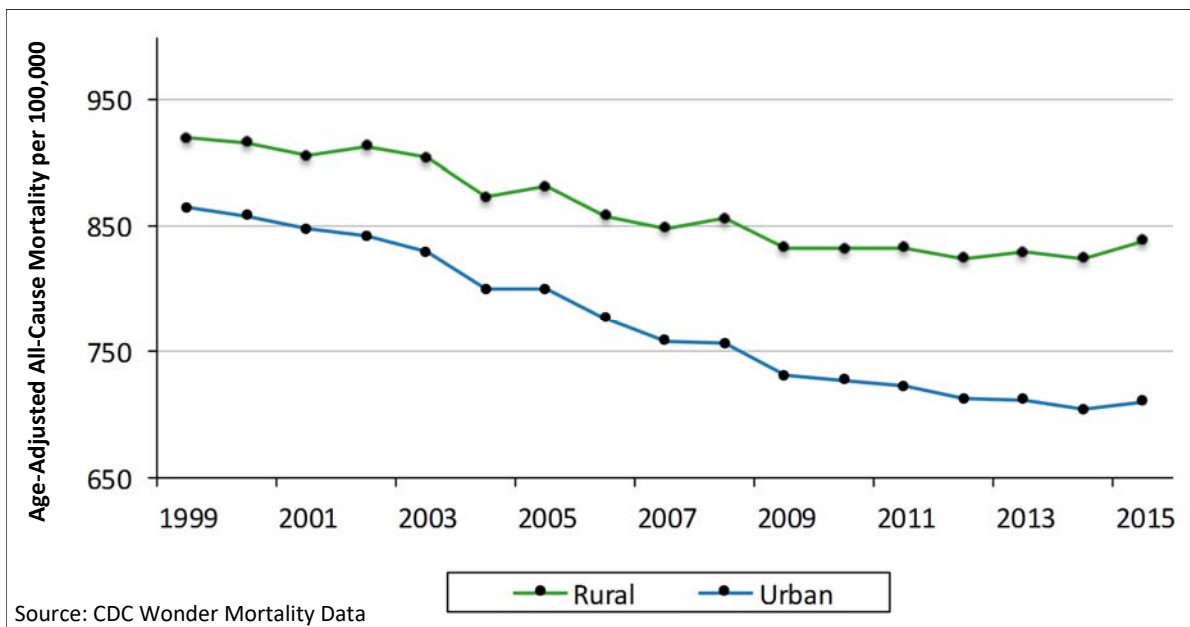
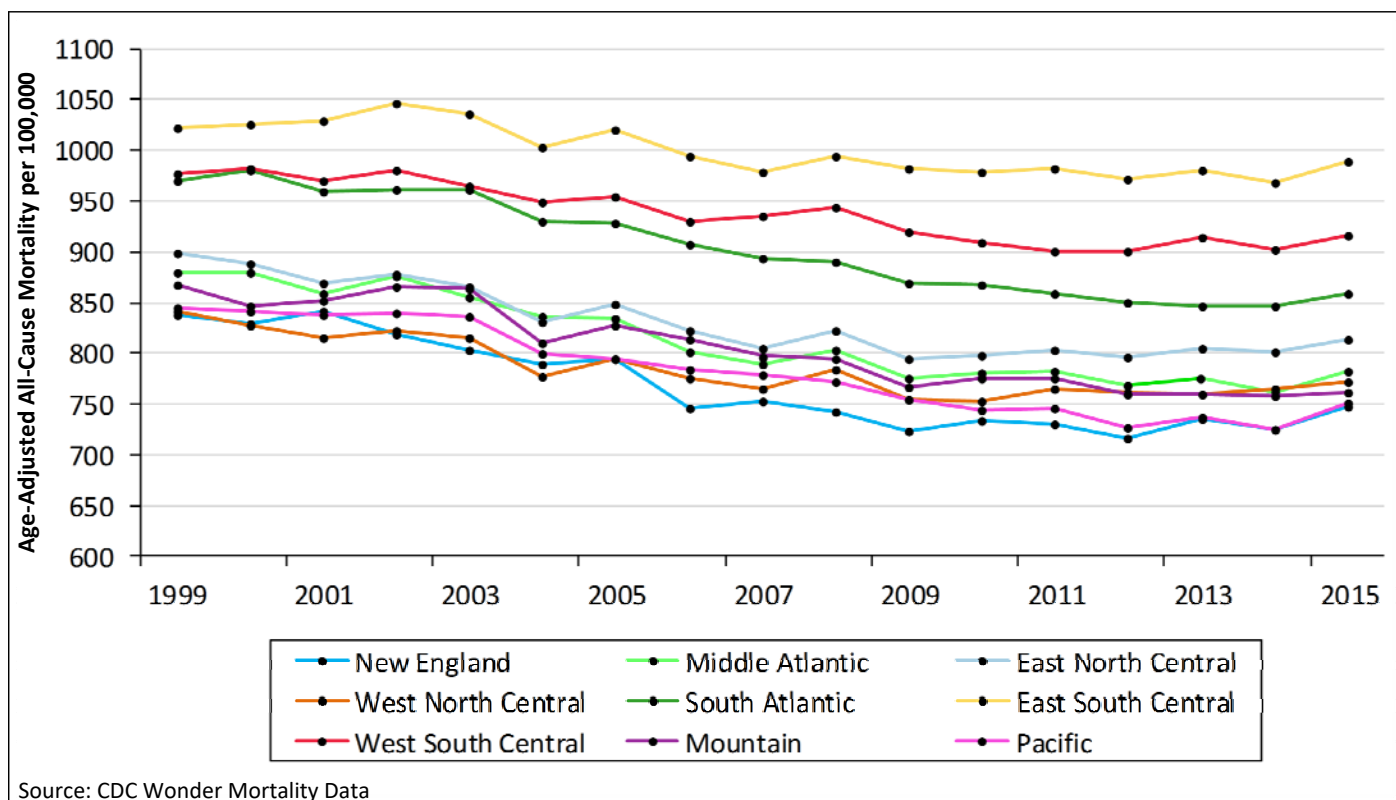


Figure 3 reveals some sharp regional differences in mortality and trend by region. Three divisions in the Southeast (South Atlantic, East and West South Central divisions) have the highest rural mortality rates. Rural mortality in the South Atlantic is decreasing the most sharply over time, with an average decrease of about nine deaths per 100,000 per year, compared to an average of six deaths per 100,000 across all rural. Rural areas in divisions across the rest of the nation exhibit relatively similar mortality over time.

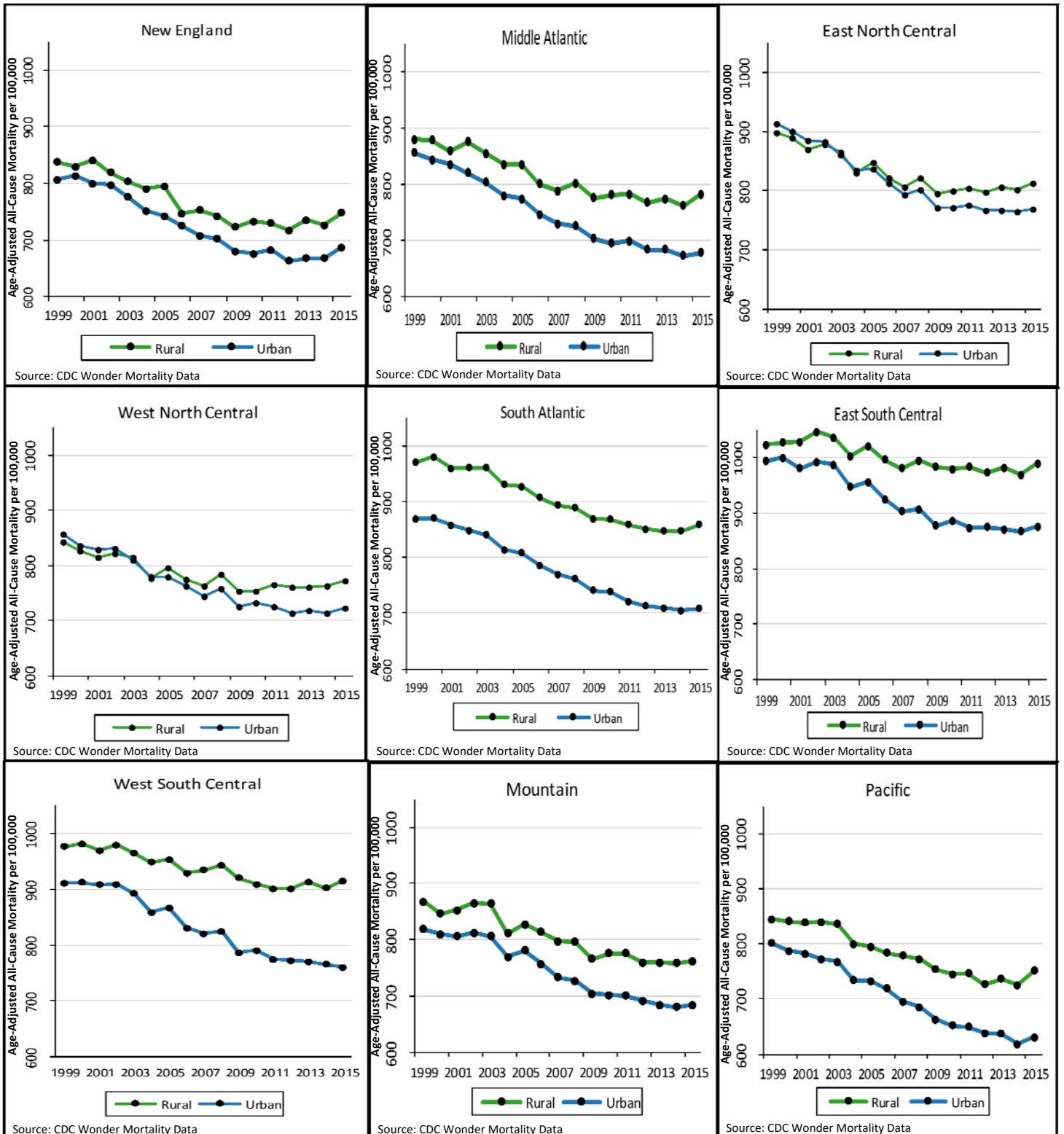
**Figure 3: All-Cause U.S. Mortality for Rural Counties by Census Division, 1999-2015**



Just as rural mortality is not uniform nationwide, the disparity in rural-urban mortality is not even across the country (Figure 4). Seven of the nine divisions exhibit a considerable rural-urban gap. Two exceptions include East North Central and West North Central. These areas encompass a swath of states ranging from Nebraska in the West to Ohio in the East and North Dakota in the North to Missouri in the South.

In every division, the rural-urban mortality gap is larger after 2007 than before that year, indicating that the disparity is growing over time in each census division. The gap is largest and growing in the three divisions comprising the South Census Region (South Atlantic, East South Central and West South Central). The Mountain, Middle Atlantic, and Pacific divisions all show clear rural-urban disparities that appear to be increasing over time, but the disparities are less dramatic than in the South. The gap is the smallest and most stable in the New England, East North Central, and West North Central divisions.

**Figure 4: All-Cause U.S. Mortality by Census Division, 1999-2015**



## DISCUSSION

Although the rural-urban mortality disparity is relatively well known, the regional variation in the disparity (and trend in the disparity) suggests that there are sub-trends that need further study. For example, one area may be more affected by the opioid crisis, while another has higher mortality rates due to obesity-related disease, while yet another has issues with economic conditions or changes in the health care infrastructure (such as hospital closures). A deeper understanding of the source of the variation could help policy makers tailor the appropriate solutions. Although recent work has highlighted mortality increases among certain subpopulations,<sup>5</sup> far less attention has been focused on rural populations and the special circumstances facing them. Future research should better deconstruct the county-level mortality trends to develop an understanding of the causes of this gap and policies that can help mitigate it.

## METHODS

CDC Wonder's Compressed Mortality File was the data source for mortality statistics from 1999-2015. The data were downloaded from the CDC website at the census division level by year and by rural-urban location. Urban and rural areas were defined according to 2006 Urbanization codes. Differences across groups, including between urban and rural locations and between the time periods before and after 2007 were examined using Cuzick's nonparametric test for trends across ordered groups and reported when statistically significant at  $p \leq 0.05$  level. Weighted least squares regression, with a population in the division metro/non-metro location and year weight, was used to estimate average decrease in mortality over time.

## REFERENCES AND NOTES

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