



## Geographic differences in recovery after the Great Recession<sup>☆</sup>

Kevin J. Bennett<sup>a,\*</sup>, Matthew Yuen<sup>b</sup>, Francisco Blanco-Silva<sup>c</sup>

<sup>a</sup> Department of Family and Preventive Medicine, USC School of Medicine, 3209 Colonial Drive, Columbia, SC 29203, USA

<sup>b</sup> Translational Technologies International, 4500 Black Rock Rd Suite 201, Hampstead, MD 21074, USA

<sup>c</sup> Department of Mathematics, USC School of Medicine, 3209 Colonial Drive, Columbia, SC 29203, USA



### ARTICLE INFO

#### Keywords:

Rural  
Uninsured  
Unemployment  
Poverty

### ABSTRACT

The Great Recession (officially December 2007–June 2009) had a significant impact upon employment, poverty, and uninsurance rates across the US. There is evidence to suggest this recession, and the subsequent recovery, affected rural areas differently. Using data from the Area Health Resource File and the Census Bureau, we examined growth in population, unemployment, poverty, and uninsurance across urban and rural areas. Findings indicate rural areas were affected differently and, in some cases, did not recover as well as urban areas. Cluster analysis clearly indicates differentials by geography and rurality that warrant further attention.

### 1. Introduction

The Great Recession (officially December 2007–June 2009) was one of the worst economic downturns in American history since the Great Depression (Hartman, Martin, Nuccio and Catlin, 2010; National Bureau of Economic Research; Shortt, 2014). This period was characterized by not only the widespread short-term economic impact on Americans but also the slow economic recovery (Shortt, 2014). At its peak, the Great Recession had an unemployment rate of 10%, making it the second-highest unemployment rate since the Bureau of Labor Statistics starting collecting unemployment data in 1948 (Bureau of Labor Statistics). It would take unemployment rates nearly 7 years to return to sub-6% levels (5.7% in October 2014) (Bureau of Labor Statistics).

Unfortunately, several factors led to a greater impact upon rural America (United States Department of Education, 2007). Rural America differs from urban in several demographic and economic areas. The rural population tends to be older, with a higher proportion of individuals age 65 and older than urban areas (U.S. Census Bureau, 2014). In addition, in 22.5% of rural counties, 20% or more of the population is over the age of 65, compared to only 2.9% of urban populations. This proportion is higher with increasing rurality, to a high of 40.4% among remote rural counties (Bennett et al., 2016). In addition, this proportion increased nearly eight percentage points from 2000 to 2010 (Bennett et al., 2016). Rural populations also tend to have lower educational attainment, with lower proportions with a college degree and higher proportions without a high school diploma (United States Department of Education, 2007; United States Department of

Agriculture, 2017a,b). In 2010, nearly 37% of rural counties had populations with low educational attainment (> 20% of adults without a high school diploma), compared to only 18.9% of urban counties (Bennett et al., 2016).

Beyond these demographic characteristics, the socioeconomic profile of rural America differs as well. Rural residents had higher unemployment rates and lower labor force participation rates than their urban counterparts before and after the Great Recession (United States Department of Agriculture, 2014; United States Department of Education, 2007). This resulted in a smaller economic base for local rural governments, which in turn affected their ability to provide services compared to urban locations. Rural residents are also more likely to experience job lock (i.e., being locked into a job because of insurance or other benefits), which further hampers employment and economic mobility (Mushinski et al., 2015). Because of the lack of available funds, rural local governments could not compete with urban areas by offering programs and tax credits to encourage more businesses to open in rural areas.

In addition, traditional blue collar jobs such as construction, manufacturing, and the like were hardest hit, as seen by the decline in GDP by manufacturing (8.6% in 2009) and construction (15.6% in 2009) (Pfeffer et al., 2013; Economic Policy Institute, 2015; United States Department of Commerce, 2010). These declines are particularly relevant for rural areas, as dependence upon manufacturing and construction led to higher job losses and slower recovery during and after the recession (United States Department of Agriculture, 2017a,b). Educational attainment also plays a substantial role in employment;

<sup>☆</sup> This work was completed to fulfill the requirements of cooperative agreement no. U1CRH03711 from the Federal Office of Rural Health Policy (FORHP), Health Resources and Services Administration, U.S. Department of Health and Human Services.

\* Corresponding author.

E-mail addresses: [kevin.bennett@sc.edu](mailto:kevin.bennett@sc.edu) (K.J. Bennett), [myuen@transtechint.com](mailto:myuen@transtechint.com) (M. Yuen), [blanco@math.sc.edu](mailto:blanco@math.sc.edu) (F. Blanco-Silva).

people who had less than a college degree and were middle aged were more likely to lose their job and also have a harder time finding a replacement job (Carnevale et al., 2015; Economic Policy Institute, 2015; Mattingly et al., 2011; Pfeffer et al., 2013). Others have confirmed that the types of industries available in a county have an impact upon employment growth as well (Gude et al., 2012).

The links between employment and other factors, such as insurance coverage and income, are apparent as well. Rural areas have long lagged behind urban areas in insurance coverage rates (Probst et al., 2004; Ziller et al., 2008). A greater proportion of rural counties have a high uninsurance burden (> 15% of the population uninsured) than urban counties; in 2010, 77.4% of all rural counties had such a burden, compared to 62.8% of urban counties (Bennett et al., 2016). This insurance disparity is exacerbated by the fact that rural residents tend to be employed either in sectors or by small/sole-proprietor businesses that do not offer insurance coverage (or options are unaffordable) (Coburn et al., 1998; Larson and Hill, 2005). Relatedly, rural areas have lower median household incomes and higher proportions living in poverty (Bishaw and Posey, 2016). More than twice as many rural counties (32%) have high poverty burdens (> 20% living in poverty) compared to urban counties (15%) (Bennett et al., 2016).

Even within rural America, there are major disparities by race and age. Older populations in rural America, which are characteristic of these areas, are more likely to be unemployed or underemployed than their younger counterparts (Slack and Jensen, 2008). Rural minorities have higher proportions of poverty and unemployment than their rural white counterparts (United States Department of Agriculture, 2017a,b; Probst et al., 2004; Probst et al., 2002). As rural minorities are also more likely to work in low-skill jobs, there is an increased possibility of rural minorities and their subsequent generations remaining in poverty (Probst et al., 2002). Because socioeconomic status is also related to health outcomes, the economic disadvantages faced by rural minorities have also translated into worse health outcomes than those experienced by their urban counterparts, as well as by their rural white counterparts (Anderson et al., 2015; Laditka et al., 2005; Mainous et al., 2004).

Because rural areas were economically vulnerable before the recession, it is important to understand how rural areas were affected by the recession. It is also important to examine rural counties in further detail, including size and rurality of the county and its demographic characteristics, to determine if there are rural areas that have been differentially affected by the economic downturn and subsequent recovery. These findings can then be utilized to further direct resources and interventions to rural areas to aid in their continued recovery.

## 2. Methods

Data for this analysis were drawn from two sources. The first, the Area Health Resource File (AHRF), is a national database that contains county-level healthcare and demographic data on an annual basis. In order to obtain data for the study time period (2000–2014), we utilized the 2002, 2005, 2008 and 2015 AHRF files. To supplement these data, we then obtained data from the US Census Bureau. Specifically, detailed information about race and ethnicity were obtained at the county level for the time period.<sup>1</sup>

The National Bureau of Economic Research defined the official recession timeframe as December 2007 to June 2009. Because most data obtained at the county level are annual, we set three time periods for this analysis. The first, from 2005 through 2007, we defined as the pre-recessionary period and serves as a baseline for growth in the selected areas. The recessionary period was set to include the years 2008 and 2009 so as to include all of the changes that occurred in 2008 and 2009. The recovery period, therefore, was set as 2010 through 2014. Because this analysis focuses on rates of change, having common start and end

points (e.g., 2008 and 2010) allows for an analysis of the differential rates up to and from those points.

This analysis was conducted on the county level. All counties in the United States were included in the analysis except for counties belonging to territories or colonies of the United States. The resulting sample comprised a total of 3148 counties for inclusion in the analysis.

The main variables of interest were population, percentage in poverty, unemployment rate among those over the age of 16, and uninsured percentage under the age of 65. Rurality was defined using Urban Influence Codes (UICs). These codes distinguish metropolitan counties based on the size of their population and nonmetropolitan counties by the size of the largest city or town and their proximity to metropolitan areas (United States Department of Agriculture, 2016). Based on the counties' UIC codes, a four-level categorical definition was utilized: urban (UIC 1, 2), micropolitan rural (UICs 3, 5, 8), small adjacent rural (UICs 4, 6, 7), and remote rural (UICs 9, 10, 11, 12).

We initially compared the rates of each outcome of interest, over time, by level of rurality. We next calculated the annualized growth rate for three time periods (2005–2007, 2008–2009, 2010–2014). We tested for significant differences by time period and rurality using analysis of variance for the three variables. In order to fully understand the differences in these outcomes, as well as the underlying patterns, we utilized spectral clustering analysis using data from 2014. Because the dimension is low (three outcomes of interest), we employed spectral clustering (a dimensionality reduction on the eigenvalues of the similarity matrix) in our analysis, with an initial imposition of 8 clusters. By further imposition of the bicriteria measure for assessing quality of clustering, we arrived at an improved classification of the data with 9 clusters (Kannan et al., 2004). We performed machine learning in Python with the aid of the Scikit-learn libraries. We performed statistical analysis in SAS v9.4 and in Python with the SciPy libraries (Pedregosa et al., 2011; Jones et al., 2001). The clustering analysis was performed for all counties and then subset to rural counties only. The University of South Carolina Institutional Review Board deemed this project as exempt.

## 3. Results

In order to more fully understand how poverty, unemployment, and uninsurance rates changed over the study time period, it is important to understand how the populations themselves changed during this time. Prior to the recession (i.e., from 2005 to 2008), rural populations were growing at an average annual rate of 0.2%, compared to 1.0% for urban populations (See Table 1). Smaller rural areas actually experienced population declines during this period, up to  $-0.5%$  in remote rural areas. During the recessionary period, rural populations grew at an average annual rate of 0.9%, compared to 0.7% for urban populations. During the recovery period (i.e., from 2010 to 2014), rural populations declined by an average annual rate of  $-0.05%$ , compared to an increase of 1.0% for urban populations. In micropolitan rural areas, average population growth was just above zero (0.1%), whereas population declines were seen for both small adjacent and remote rural areas.

The proportion living in poverty changed substantially for the entire US, increasing from 12.9% in 2005 to 15.1% in 2014. These proportions were higher for rural residents, with 17.2% of the rural population in poverty in 2014, which increased with rurality to a high of 17.8% among small adjacent and remote rural residents (See Fig. 1). The annual change in poverty varied widely across time periods, concurrent to the recession that occurred in 2008. From 2005 to 2008, the annual growth in the percentage in poverty was 0.1% among rural residents, compared to  $-0.1%$  for urban residents (See Table 1). This growth was higher among small adjacent rural residents and was lowest among remote rural residents ( $-0.4%$ ). The growth in the rural poverty rate accelerated to 5.3% from 2008 to 2010 (compared to 8.9% among urban residents). Once again, micropolitan residents had a higher

<sup>1</sup> <https://www.census.gov/popest/data/counties/asrh/2014/index.html>.

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