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## Identification of High-Need Rural Counties to Assist in Resource Location Planning for Primary Care

- This report demonstrates a simple selection process to sort counties by health and healthcare needs and identify areas that could benefit from additional primary care safety net providers.
- There was a total of 279 (14.1%) out of 1,975 rural counties that did not have access to either a Federally Qualified Health Center or Rural Health Clinic within their county boundaries.
- Of those 279 rural counties, 72 were geographically isolated from primary care safety net providers and faced significant health challenges. The majority of these 72 counties were in the South.

### BACKGROUND

In our brief entitled “Identification of High-Need Rural Counties to Assist in Resource Location Planning”, we demonstrated a simple selection process for identifying rural counties with the greatest health needs in the context of a nonexistent infrastructure of safety-net providers. The brief focused broadly on core safety net providers. However, the flexibility of this selection process can be demonstrated by applying the same methods to examine simultaneously areas with poor health outcomes and limited access to *primary care* safety net settings (e.g., Medicare-certified Rural Health Clinics [RHCs] and Federally Qualified Health Centers [FQHCs]). The combination of facility availability with health status indicators may help with identifying those areas in rural America that are in the greatest need of additional primary care resources.

#### Technical Notes

This analysis used Health Center Service Delivery Sites (HCSD) available from the Health Resources & Services Administration, supplemented by data from the US Census Bureau, *County Health Rankings*, and CDC WONDER mortality data. All analyses were performed at the county level.

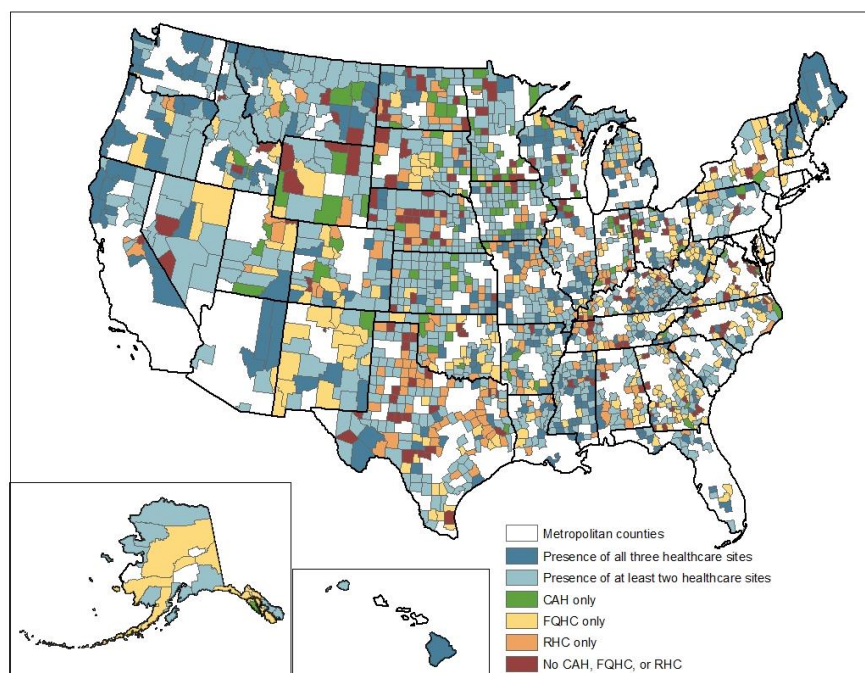
#### Geographic definitions

Our geographic analysis is based on the county of residence. Counties were characterized based on level of rurality using Urban Influence Codes (UIC) developed by the U.S. Department of Agriculture Economic Research Service: Urban (UICs 1, 2) and Rural (UICs 3 - 12).

## Rural Counties and Primary Care Safety Net Providers

Within rural counties, RHCs and FQHCs are considered key elements of the primary care safety net. Our work demonstrates that the location of core safety net providers is not uniformly distributed across rural counties (see Figure 1). Specifically, there were 279 rural counties (14.1% of all rural counties) that did not have access to either an RHC or an FQHC within their county boundaries (these counties are colored red and green in Figure 1). To demonstrate the flexibility of our previously developed selection process, we further explored these 279 rural counties in this supplemental brief to identify under-served areas.

**Figure 1. Distribution of Core Safety Net Providers in Rural Counties (n=1,975)**



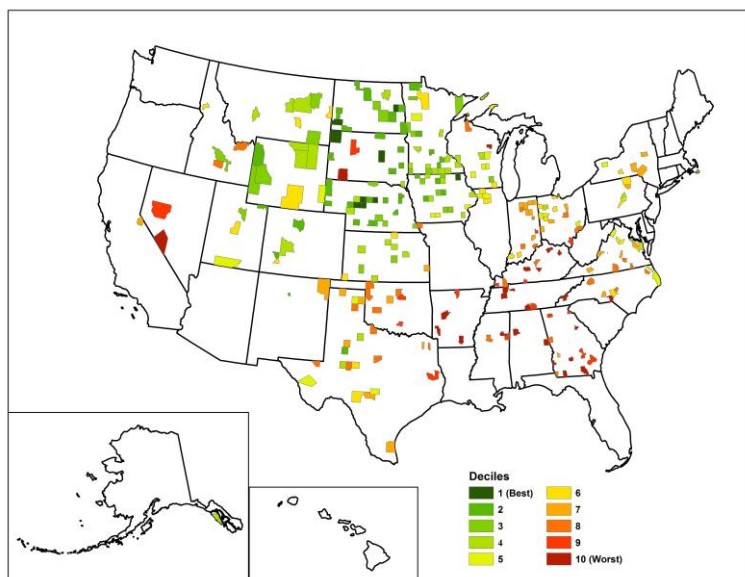
**Sources:** United States Department of Agriculture, Economic Research Service, 2013 Urban Influence Codes; Health Resources & Services Administration (HRSA) Data Warehouse; U.S. Census Bureau, 2010 TIGER/Line shapefiles.

**Note:** Healthcare sites include Critical Access Hospitals (CAH), Federally Qualified Health Centers (FQHC), and Rural Health Clinics (RHC)

The methods used in the selection process are available in more detail within the main brief. In short, publicly available data from *County Health Rankings* were used in our selection process. We selected variables that were available for all rural counties or we identified proxy measures to be used instead of those population health indicators with missing data. Due to the data having different units of measurement, we rescaled each variable by ranking the selected rural counties lacking primary care safety net providers from lowest to highest and grouped them into 10 equal intervals (deciles). A value from 1 to 10 was assigned to each county, with “10” representing the poorest of outcomes. Following this process, we averaged the individual measures into five domains: health outcomes, health behaviors, access to care, socioeconomic factors, and physical environment. Each variable received the same weight within its respective domain, and resulted in one overall score for each domain. We also calculated the drive times from the population-weighted centroid of each rural county to the nearest FQHC or RHC using Geographic Information Systems (GIS) software in order to measure geographic isolation. Results of the application of our selection process to the 279 counties lacking an RHC and an FQHC are shown in the following pages.

**Distribution of Population Health Indicators and Geographic Isolation across the U.S.**

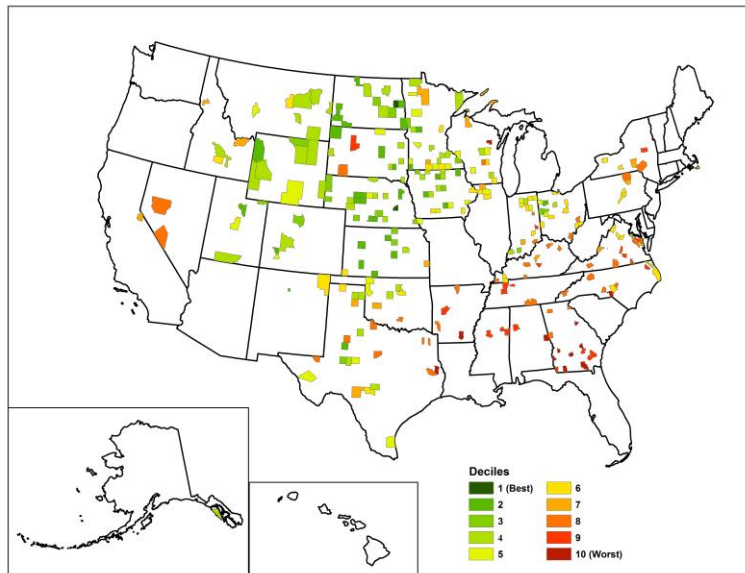
**Figure 2. Distribution of Average Decile Scores for Health Outcomes among Rural Counties without an RHC and an FQHC (n=279)**



Health Outcomes

Among the 279 rural counties without an RHC and an FQHC, there were 25 (9.0%) that fell into the poorest decile for health outcomes. An average score of 10 indicates that these counties consistently ranked in the worst decile for self-reported poor or fair health, self-reported number of poor physical and mental health days, and all-cause mortality. The majority of these counties were concentrated in the Southeast of the United States (see Figure 2). On the other hand, counties with average decile scores of 1 to 3, indicating better health outcomes, were located in the Midwest.

**Figure 3. Distribution of Average Decile Scores for Socioeconomic Characteristics among Rural Counties without an RHC and an FQHC (n=279)**



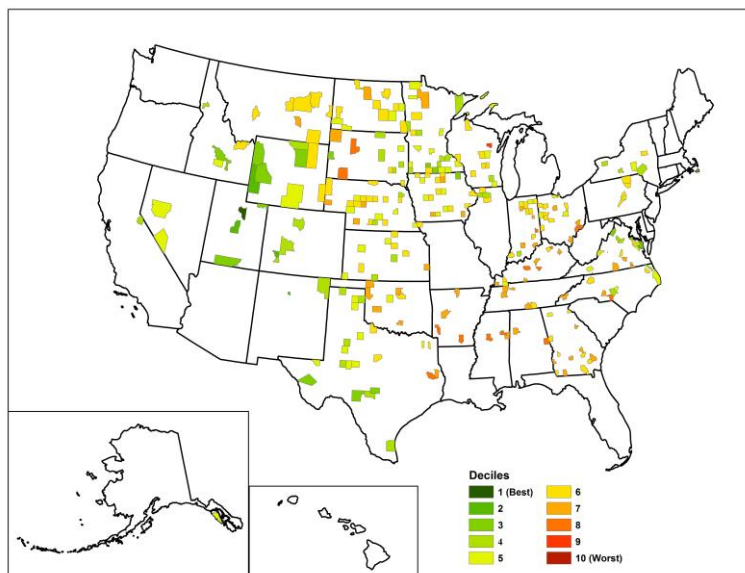
Socioeconomic Characteristics

There were a total of 77 (27.6%) rural counties without an RHC and FQHC that had an average decile score of 8 or higher for socioeconomic factors, with 13 of those falling into the poorest decile (average decile score = 10). These counties were located predominantly in the Southeast; while the Midwest had better scores for socioeconomic characteristics (see Figure 3).

**Sources:** United States Department of Agriculture, Economic Research Service, 2013 Urban Influence Codes; Health Resources & Services Administration (HRSA) Data Warehouse; U.S. Census Bureau, 2010 TIGER/Line shapefiles; 2017 *County Health Rankings*.

**Notes:** Health outcomes included poor to fair health, poor physical health days, poor mental health days, and all-cause mortality. Socioeconomic factors included poverty, unemployment, children in single parent households, and some college.

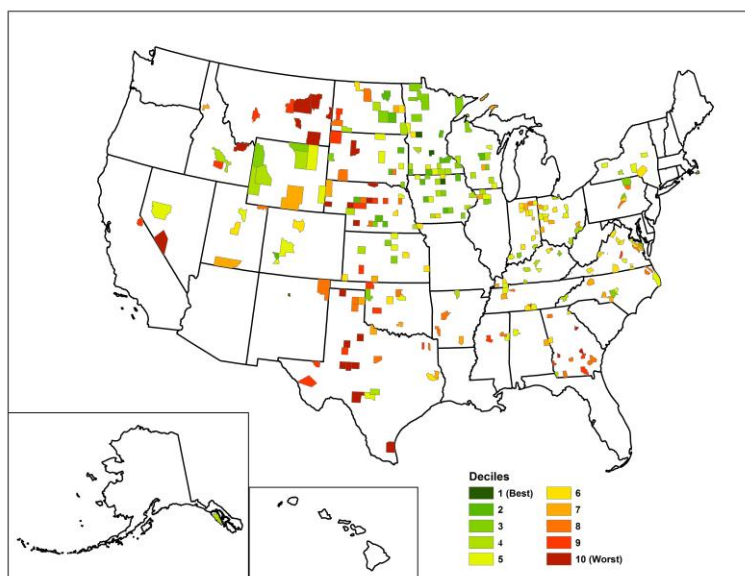
**Figure 4. Distribution of Average Decile Scores for Health Behaviors among Rural Counties without an RHC and an FQHC (n=279)**



### Health Behaviors

Among the rural counties without an RHC and an FQHC, there were no counties with an average decile score of 10. In general, the majority (69.2%) of the rural counties had an average health behavior score of 4 through 6 (see Figure 4). There were 15 rural counties with an average decile score of 8 to 9 which were scattered throughout the United States.

**Figure 5. Distribution of Average Decile Scores for Access to Health Care among Rural Counties without an RHC and an FQHC (n=279)**

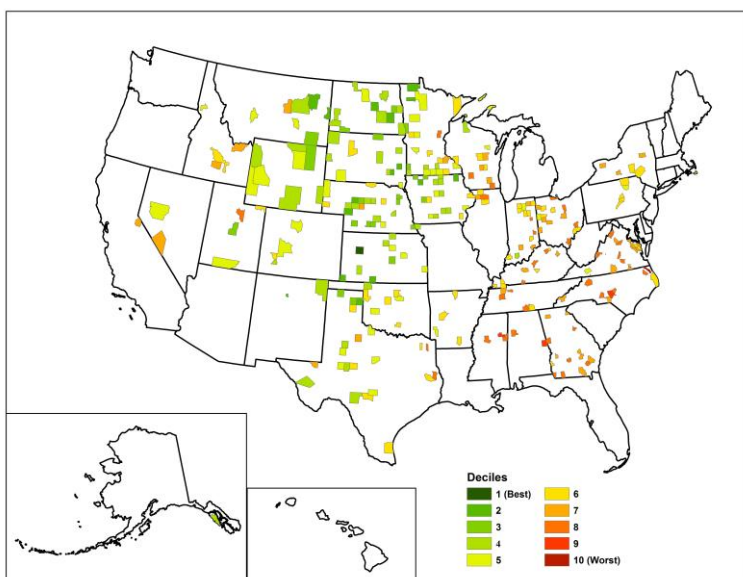


### Access to Health Care

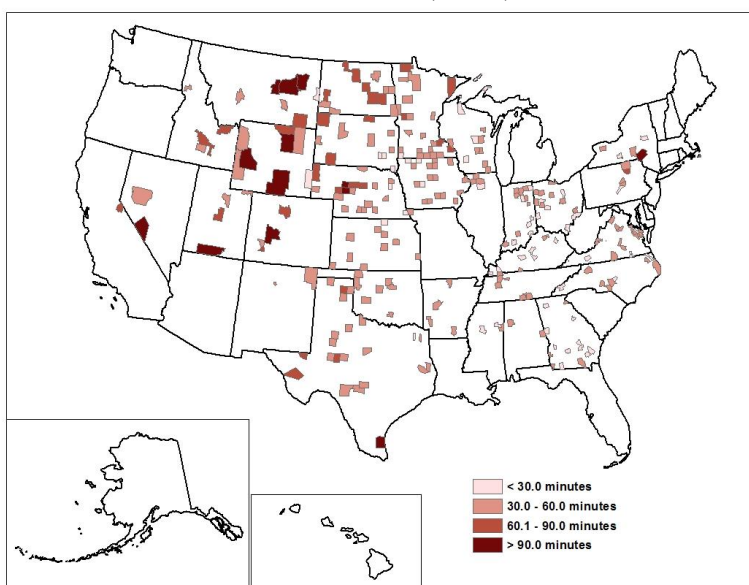
Rural counties lacking an RHC and an FQHC that had high levels of uninsurance and/or limited access to primary care and dentists, reflected by an average decile score of  $\geq 8$  for access to health care, were primarily located in the South and Midwest (see Figure 5). There were 24 rural counties that had the poorest access to health care (average decile score = 10) which were predominantly located in Texas (n = 8), Nebraska (n = 5), and Montana (n = 5).

**Sources:** United States Department of Agriculture, Economic Research Service, 2013 Urban Influence Codes; Health Resources & Services Administration (HRSA) Data Warehouse; U.S. Census Bureau, 2010 TIGER/Line shapefiles; 2017 *County Health Rankings*.  
**Notes:** Health behaviors included obesity, physical inactivity, smoking, and excessive drinking. Access to health care included uninsured, primary care physician rate, and dentist rate.

**Figure 6. Distribution of Average Decile Scores for Physical Environment among Rural Counties without an RHC and an FQHC (n=279)**



**Figure 7. Geographic Access (Travel Time) to Nearest Primary Care Safety Net Provider among Rural Counties without an RHC and an FQHC (n=279)**



**Sources:** United States Department of Agriculture, Economic Research Service, 2013 Urban Influence Codes; Health Resources & Services Administration (HRSA) Data Warehouse; U.S. Census Bureau, 2010 TIGER/Line shapefiles.

**Notes:** Physical environment included severe housing problems, drive alone to work, and long commute. Travel time was calculated from the population-weighted centroid of each rural county to nearest the RHC or FQHC using ArcMap 10.2 Network Analyst tool.

### Physical Environment

There were a total of 41 (14.7%) rural counties lacking an RHC and an FQHC with an average decile score of 8 or higher which were predominantly located east of the Mississippi River (see Figure 6), while those located in the Midwest and West were more likely to be in the lower deciles (colored green). Out of those 41 counties with poor scores for physical environment, there was only one rural county, located in North Carolina, with an average decile score of 10. Poor physical environment scores reflect severe housing problems, greater percentage of individuals who drive alone to work, and/or a greater percentage of individuals with long commutes to work.

### Geographic Isolation

The average travel time from the population weighted centroid (center) of these rural counties lacking an RHC and an FQHC to the nearest RHC or FQHC in a neighboring county was 46 minutes. There was a wide range of travel times, with some rural counties being located as close as five and half minutes to the nearest RHC or FQHC and others more than two and half hours. Counties with greater travel times to the nearest RHC or FQHC were primarily located in the west (see Figure 7).

### County Selection Process

Similar to our previous work, we used two different threshold criteria to identify which rural counties lacking an RHC and an FQHC had the greatest health needs. This was done by applying a selection criteria containing six different metrics to subset the number of rural counties to those that fare poorly on all metrics. Results are shown in Table 1 (below) and Figure 8 (next page).

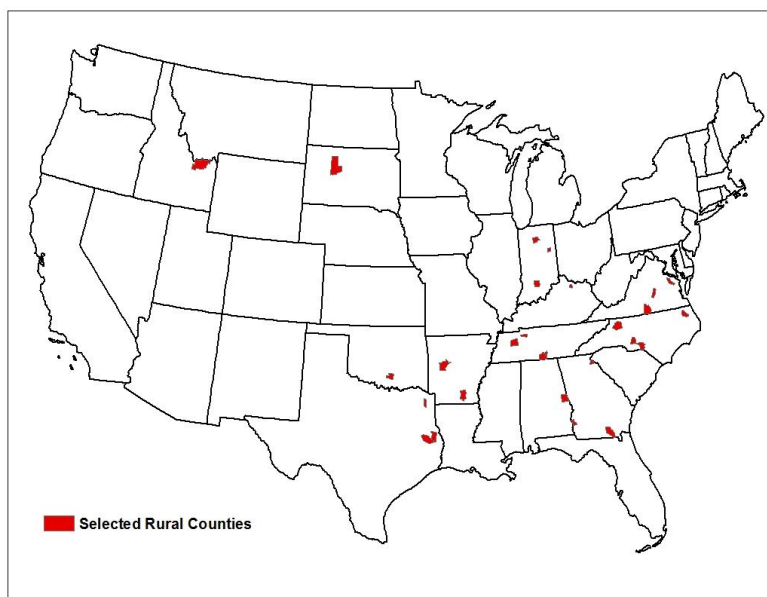
<b>Threshold Criteria</b>	<b>Number of Counties Threshold of <math>\geq 7</math></b>	<b>Number of Counties Threshold of <math>\geq 6</math></b>
1. Average decile score for health outcomes 2. Time to nearest primary care safety net provider > 30 minutes	72	93
1. Average decile score for health outcomes 2. Time to nearest primary care safety net provider > 30 minutes 3. Average decile score for socioeconomic factors	51	73
1. Average decile score for health outcomes 2. Time to nearest primary care safety net provider > 30 minutes 3. Average decile score for socioeconomic factors 4. Average decile score for health behaviors	28	48
1. Average decile score for health outcomes 2. Time to nearest primary care safety net provider > 30 minutes 3. Average decile score for socioeconomic factors 4. Average decile score for health behaviors 5. Average decile score for access to health care	16	34
1. Average decile score for health outcomes 2. Time to nearest primary care safety net provider > 30 minutes 3. Average decile score for socioeconomic factors 4. Average decile score for health behaviors 5. Average decile score for access to health care 6. Average decile score for physical environment	7	27

Note: Health outcomes included poor to fair health, poor physical health days, poor mental health days, and all-cause mortality. Socioeconomic factors included poverty, unemployment, children in single parent households, and some college. Health behaviors included obesity, physical inactivity, smoking, and excessive drinking. Access to health care included uninsured, primary care physician rate, and dentist rate. Physical environment included severe housing problems, drive alone to work, and long commute.

For the first example (more stringent cutoff of  $\geq 7$ ), there were a total of seven rural counties that had poor health outcomes and were more than 30 minutes to the nearest RHC or FQHC. All these counties were located in the Southeastern United States and have evidence of worse population health indicators in comparison to the national mean.

In the second example, we broadened the threshold criteria for health outcomes, socioeconomic factors, health behaviors, access to health care, and physical environment to greater than or equal to 6. Geographic isolation was maintained at greater than 30 minutes. The new set of criteria resulted in an additional 20 rural counties being identified as high need. Most of the counties identified were located in the South with the exception of five counties (one county in the West and four counties in the Midwest; see Figure 8 at right). Specific county characteristics can be requested from the authors of this brief.



**Figure 8. Rural Counties with Greatest Health Needs, Threshold Criteria of  $\geq 6$  (n=27)**



## CONCLUSION

Many of these rural counties lacking access to primary care safety net settings demonstrate clustering of multiple population health indicators that indicate low socioeconomic status, adverse health behaviors, limited access to health care, and poor environmental factors. In this supplemental brief, we performed a similar analysis to our previous work, but instead we used a different criterion for healthcare availability to subset rural counties to those with the greatest health needs. These modifications demonstrate the flexibility of our selection process in that it allows the user to change how the existing healthcare infrastructure is defined and the thresholds applied.

The geographic distribution of population health indicators across rural counties indicate the presence of disparities in health and access to primary health care. Identifying which rural counties are high-need in the context of a limited primary care infrastructure is vital in order to allocate resources to improve their population health indicators. This simple selection process can lead to a more in depth needs assessment of the rural counties identified so that policy initiatives, programs, or interventions can be tailored to meet the health care needs of those counties.

 <p><b>Rural Health Research &amp; Policy Centers</b> Funded by the Federal Office of Rural Health Policy <a href="http://www.ruralhealthresearch.org">www.ruralhealthresearch.org</a></p>  <p><b>RURAL &amp; MINORITY</b> Health Research Center</p>	<p>This project was supported by the Federal Office of Rural Health Policy (FORHP), Health Resources and Services Administration (HRSA), U.S. Department of Health and Human Services (HHS) under cooperative agreement #U1CRH30539. The information, conclusions, and opinions expressed in this document are those of the authors and no endorsement by FORHP, HRSA, or HHS is intended or should be inferred.</p> <p>For more information about the Rural and Minority Health Research Center, contact the Director Dr. Jan M. Eberth (<a href="mailto:jmeberth@mailbox.sc.edu">jmeberth@mailbox.sc.edu</a>) or Deputy Director Dr. Elizabeth C. Crouch (<a href="mailto:crouchel@mailbox.sc.edu">crouchel@mailbox.sc.edu</a>).</p>
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