

# MOVING BEYOND NONMETROPOLITAN AS A DEFINITION OF RURAL AMERICA

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## 1. INTRODUCTION

The concept of rural and its measurement are becoming increasingly important to health researchers and those concerned with health policy. Implicit in much of the research and legislative action is the assumption that there exists a "rural America" which is systematically different from its urban counterpart. However, "rural" is not an easily identified construct. Rural communities and populations differ on many dimensions including demographic composition, economic resources, employment patterns, and medical care availability. Several definitions of rural have been proposed to address this heterogeneity. While each has its strengths, it must be acknowledged that no single definition captures the spectrum of rurality in the United States.

## 2. BACKGROUND

The two most frequently used definitions of "rural" are those of the Census Bureau and of the Office of Management and Budget (OMB). In both instances, "rural" is that which remains after its "urban" counterpart has been defined.

The U.S. Bureau of the Census includes places with 2,500 or fewer residents and all other areas outside urbanized areas in its definition of rural (Department of Commerce, 1985). Urbanized areas consist of a central city (or cities) and the adjacent closely settled territory outside of the city's political boundaries that have a combined population of at least 50,000. As of 1989, about 27 percent of the population lived in rural areas as defined by the Census.

The U.S. Office of Management and Budget's designation of Metropolitan Statistical Areas (also referred to as MSAs or metropolitan areas) is often used to distinguish between urban and rural areas. An MSA is a county or group of

counties that make up an integrated area with a central city of 50,000 or more residents included in an urbanized area of 100,000 or more population (Department of Commerce, 1980). Counties that do not meet the specified levels of social and economic integration with metropolitan counties are non-MSA or nonmetropolitan areas and are considered rural. In 1989, approximately 22 percent of the U.S. population lived in nonmetropolitan counties as defined by the OMB. Only about 15 percent of the population was classified as "rural" by both the Census and the OMB definitions (Department of Commerce, 1990).

Because county boundaries are more stable and interpretable than boundaries of urbanized areas, the MSA/non-MSA typology is used most frequently in national surveys for defining Primary Sampling Units (PSUs) and for analyses of populations based on their place of residence. However, this dichotomous definition fails to reflect the heterogeneity of rural America in the same way that categorizing race as "white" and "all others" fails to reflect racial diversity.

An Office of Technology Assessment (OTA) staff paper by Maria Hewitt describes several alternatives to these dichotomous designations that can be useful in showing the diversity that exists within rural areas (Hewitt, 1989). These alternative definitions incorporate different attributes such as population size and density, urbanization, adjacency and relationship to an MSA and the principal economic activity. It is noted that the potential uses of these typologies are varied, and different measures may be more useful for some applications than for others. For example, to study the geographic variation of access to health care, a definition that includes population size, density and distance to large settlements is of interest. To study health personnel labor market areas, however, a typology based on economic areas, market areas, or worker commuting patterns might be preferable.

This paper examines the consequences of defining rural areas based on increasingly more

stringent criteria. A nonmetropolitan definition of rural is the base definition and is refined to further limit the size (second definition) and then, the proximity (third definition) of urban populations. Profiles which highlight the scarcity of selected health care providers and resources of the resulting areas are also provided. Then, data from the National Medical Expenditure Survey on use and expenditures for health care services are presented. These data are used to explore the differences in these measures which exist between residents of the three increasingly refined definitions of rural areas.

### 3. DATA AND DEFINITIONS

The data for this analysis come from the March 1992 Bureau of Health Manpower Area Resource File (ARF) and the 1987 National Medical Expenditure Survey (NMES 2). The ARF is a county-level database which contains information on health facilities, health professions, measures of resource scarcity, economic activity, and socioeconomic and environmental characteristics (Health Resources and Services Administration, 1992). This information is derived from over 75 existing data sources and is routinely expanded and updated.

The NMES 2, conducted by the Center for General Health Services Intramural Research of the Agency for Health Care Policy and Research in 1987, was designed to produce estimates of health care use and expenditures for the nation and for large domains including MSAs/non-MSAs and major subclasses of the population. NMES 2 provides measures of health status and estimates of insurance coverage and the use of services, expenditures, and sources of payment for the period from January 1 to December 31, 1987, for the civilian, noninstitutionalized population of the United States in the Household Survey.

The NMES 2 Household Survey sample is a national stratified multistage area probability sample of about 35,000 individuals in approximately 14,000 households (Cohen, DiGaetano, and Waksberg, 1991). The sample design specified that the household sample be spread over at least 100 separate areas to ensure sufficient geographic dispersion of the sample and

allow for separate regional estimates. The first stage involved the selection of primary sampling units (PSUs), which were counties or groups of contiguous counties. Thus, counties and their characteristics are the obvious building blocks for alternative definitions of "rural areas." The levels of refinement which can be achieved are constrained by the resulting sample sizes and desired levels of precision for the estimates.

To examine the effect of using a specific definition of rurality on estimates of use and expenditures for health care, three residence measures were identified using increasingly more stringent criteria. The first measure is the standard *Non-MSA* definition derived from the MSA/*Non-MSA* dichotomy. The second measure divides the nonmetropolitan counties into Urbanized non-MSA and *Rural Non-MSA*. If the urban population of the county is less than 20,000, it is included in the Rural category. The third measure takes into account the adjacency or nonadjacency of a Rural Non-MSA county to an MSA. If the county shares a boundary with an MSA and at least 2 percent of the county's labor force commutes to the central county(ies) of that MSA, the county is classified as *Contiguous Rural* and *Remote Rural* otherwise. The three italicized categories, which represent the most "rural" classification within each of the three definitions, are presented in the following findings and discussion. Small sample sizes in the Northeast and the West prevent including a Regional dimension beyond the Non-MSA level so this dimension, although desirable, is not presented.

The information used to classify counties and to characterize availability of providers by rural definition is population data. However, the information on socioeconomic characteristics and of use and expenditures for health care obtained from the NMES 2 is subject to sampling error. Estimates of the standard errors for these measures were obtained using the Taylor series linearization method which accounts for the complex survey design. Because each increasingly rural classification is composed of a subset of the previous observations, the following approach was taken to test the significance of differences seen across definitions. First, 95% confidence limits were placed around estimates from the Rural Non-MSA definition and the Remote Rural definition.

Only if the estimate obtained from the Non-MSA sample in its entirety fell outside of these limits, was a significant difference assumed for estimates from the restricted definitions. This strategy was used for this preliminary analysis because of its ease of implementation and its conservative results.

#### 4. FINDINGS

In 1990, about 56 million people lived in counties classified as Non-MSA (Table 1). The urban population restriction imposed to define Rural Non-MSA reduced the number of counties by almost 300 and the number of residents by about 35 percent. Only half of the Non-MSA counties and about one third of the Non-MSA population were Remote Rural.

The South contains the largest number of Non-MSA counties. However, the greatest share of Non-MSA territory is in the Midwest and West regions. Limiting these Non-MSA counties to those with relatively small urban populations, i.e. Rural Non-MSA, shows reductions mainly in rural areas in the Northeast region, the Pacific division and the southern states of the Mountain division. Although no region is without Remote Rural areas, defining rural in this way results in the highest concentrations of such areas being found in the western states of the Midwest region and the northern states of the Mountain division.

In the early 1980's, a number of "sandpile" and "trickle down" theories of the diffusion of medical manpower were postulated (Hicks, 1990). Basically, these theories maintained that as the relative number of physicians per population increased, competitive pressures would eventually force some of these physicians to locate in smaller and more remote communities. The mid to late 1980s did, indeed, see areas outside of MSAs gaining physicians as the overall supply of physicians expanded (Kindig and Movassaghi, 1989). However, it was mainly the larger non-MSA counties which were the beneficiaries of this physician diffusion. The smaller communities and those more remote from metropolitan areas continued to lose rather than gain physicians.

The percents of counties and residents having no doctors, having no general or family practitioners, lacking specialists, and without short-term general hospitals rise as the types of rural

areas considered were restricted (Table 1). In most cases, the increase in scarcity measures was incremental as the definition became more constrained. However, simply limiting the size of the urban population, i.e. considering only those counties which meet the definition of Rural Non-MSAs, dramatically reduced the availability of pediatricians, for example. The scarcity did not appear exacerbated by implementing the narrower definition of Remote Rural.

As measured in NMES 2, the characteristics of residents in the three increasingly constrained types of rural areas were remarkably coincident. Age and racial distributions were comparable for those in Non-MSA, Rural Non-MSA and Remote Rural areas. Adults had attained similar levels of education. In all three groups about one-fourth of the population lived in or near poverty. Within three age groups; under 18, 16 to 64, and 65 or over; the percents of the residents with any private insurance during 1987, only public insurance during that time period, and without any insurance at all during the year were essentially the same. About 85 percent of the population had a usual source of medical care, regardless of the rural definition used (data not shown). In all three types of rural areas, about 80 percent of those under 65 and about 45 percent of those 65 and over perceived their health as good or excellent (data not shown). Any differences in use of health care by type of rural residence, seemingly, could not be explained by differences in these population characteristics.

Total health care expenditures include expenses for inpatient hospital and physician services, ambulatory physician and nonphysician services, prescribed medicines, home health care services, dental services and medical equipment purchases and rentals. Within age group and across the three rural definitions, similar percents incurred expenses for health care in 1987 (Table 2). No significant differences were detected in the mean annual expenditures and percents of those expenditures paid out-of-pocket for adults, both those 18 to 64 years and those 65 and over. However, mean annual expenditures for persons under 18 were lower in both the Rural Non-MSA and Remote Rural areas than estimates for Non-MSA residents in this age group. In Remote Rural areas, a higher percent of these expenditures (36

percent) were paid for out-of-pocket.

The pattern observed in comparisons for total health care expenditures was also apparent in estimates for ambulatory care and hospitalizations; the majority of significant differences detected were for persons under 18 years of age. Ambulatory care may be provided in outpatient clinics emergency rooms, physician or nonphysician offices, other clinics, and during hospital stays of less than one night by physicians and nonphysicians. The mean per visit expense for ambulatory care provided by physicians to this age group was lower in Rural Non-MSA and Remote Rural areas than in Non-MSA areas as a whole. The average annual expenditure for this care was about 20 percent less in Remote Rural than across all Non-MSA areas. The use of nonphysician services for the under 18 population was less prevalent when rural was defined as Remote Rural areas than when defined as Non-MSA areas. Differences in expenditures, at both the per visit level and annual total, were significantly higher in Non-MSA areas taken in entirety than in either of the more strictly defined subsets.

Hospitalizations include all inpatient stays of 1 night or more. Stays for the newborn are attributed to the mother unless the baby is discharged at least 24 hours after the mother's discharge from the hospital. About 9 percent of rural residents under 18 experienced at least one inpatient hospitalization in 1987 regardless of the definition of rural implemented. However, mean lengths of stay were much shorter for those from Rural Non-MSA and Remote Rural areas. Average hospital expenditures, for both the facility and physician services, were less for those under 18 who had been hospitalized when either of these two Non-MSA subsets was considered, relative to the Non-MSA classification.

## 5. CONCLUSIONS

Highly aggregated measures of residence, such as the conventional MSA/Non-MSA classification, may mask relationships between the variables of interest and rural residence. The more disaggregated measures used in this analysis are only two among many possibilities.

The populations residing in the three increasingly constrained rural areas resembled each

other in terms of age and racial distributions. They were similar in their education and income levels and in health insurance status. None was more likely than the others to be in fair or poor health or to lack a usual source of medical care. Differences in utilization rates of ambulatory care and inpatient hospitalization were not significant. Most expenditure estimates were comparable.

The only group for which this apparent homogeneity did not hold was that of persons under the age of 18. Total health care expenditures for this age group were lower using the Rural Non-MSA classification and the Remote Rural classification than from a classification based solely on Non-MSA counties. Although utilization rates of ambulatory care were, in most instances, comparable, the expenditures for both physician and nonphysician care were lower for persons under 18 years in the two more strictly defined types of rural areas. Similarly, lengths of stay for inpatient hospitalizations were shorter and expenditures for both facility and physician services were less in these areas. The dramatic drop in availability of pediatricians in Rural Non-MSA and Remote Rural areas may provide some explanation for these differences.

The household sample for the National Medical Expenditure Survey had limitations which affected this analysis. First, the NMES 2 sample design did not augment or oversample rural residents. Consequently, the number of persons sampled from rural areas, using any of the three definitions, was consistent with what would be obtained in a random sample. The precision of the estimates by age for the two subsets of Non-MSA residents presented were adversely affected by sample size limitations.

Second, there was **no** representation in NMES 2 of frontier counties; that is, the approximately 375 counties in the continental United States with population densities of fewer than 6 persons per square mile. About one-fourth of Remote Rural counties are frontier counties. In 1990, 64 percent of counties with no physicians were frontier counties. Of the frontier counties with at least one practicing doctor, 43 percent had no physicians in general or family practice. Almost 90 percent of frontier counties had no pediatricians or ObGyn physicians. Of the 498 counties with no short-term general hospitals,

about one-third were frontier counties.

The views expressed in this paper are those of the authors and no official endorsement by the

Department of Health and Human Services and the Agency for Health Care Policy and Research is intended or should be inferred. Additional figures and tables as well as the references are available from the authors.

Table 1. Percent of residents and counties lacking selected health care providers/resources by three differing rural definitions, 1990.

Characteristic	Rural Definition					
	Non-MSA	Rural Non-MSA	Remote Rural			
Number of counties	2,358	2,073	1,294			
1990 Population (in thousands)	56,090	36,436	18,773			
	Percent					
	Non-MSA counties	Non-MSA population	Rural Non-MSA counties	Rural Non-MSA population	Remote Rural counties	Remote Rural population
No physicians	6.7	1.0	7.6	1.6	10.1	2.3
No GPs or FPs	8.9	1.7	10.2	2.6	13.0	3.4
Only GPs and/or FPs	25.1	7.9	28.5	12.1	32.2	13.6
No Pediatricians	64.5	34.8	73.0	52.3	74.7	52.9
No Ob/Gyns	64.6	34.7	73.1	52.4	75.2	54.0
No Dentists	9.8	1.9	11.1	2.9	13.8	3.6
No short-term general hospital	21.1	8.2	24.0	12.6	22.8	10.8

Source: Health Resources and Services Administration: March 1992 Area Resource File.

Table 2. Means of selected health care expenditures by age and three differing rural definitions, 1987.

	Rural Definition		
	Non-MSA	Rural Non-MSA	Remote Rural
	<b>Mean</b>		
Annual expenditures per person with expense by age			
Under 18 years	\$1061	\$ 660	\$ 534
18-64 years	1428	1343	1423
65 years and older	3915	4053	4261
Percent of annual expenditure paid out of pocket per person with expense by age			
Under 18 years	23%	29%	36%
18-64 years	28	28	26
65 years and older	21	21	22
Annual expenditure for ambulatory physician services per user by age			
Under 18 years	\$222	\$199	\$183
18-64 years	396	362	363
65 years and older	673	641	611
Expenditure per visit by age			
Under 18 years	\$60	\$51	\$51
18-64 years	81	76	74
65 years and older	93	88	86
Number of hospital nights per user by age			
Under 18 years	7.3	4.7	3.0
18-64 years	7.3	7.4	7.8
65 years and older	11.2	11.4	10.6
Annual expenditures for hospital facility services per user by age			
Under 18 years	\$4855	\$2321	\$1412
18-64 years	4979	4742	5044
65 years and older	8639	9193	8716
Annual expenditures for inpatient physician services per user by age			
Under 18 years	\$1281	\$ 465	\$ 399
18-64 years	997	952	897
65 years and older	1549	1566	1507

Source: Agency for Health Care Policy and Research: National Medical Expenditure Survey - Household Survey.