

5. UNDERSTANDING DIVERSITY WITHIN RURAL AREAS: URBAN/RURAL TOPOLOGIES

Dichotomous measures of urbanity/rurality not only obscure important differences between urban and rural areas but also wide variations within rural areas. Consequently, there have been recommendations to implement a standard rural typology that would capture the elements of rural diversity and improve use and comparison of data (14). In the absence of such standardized data, it is difficult to quantify rural health problems and to make informed policy decisions.

In this section, several county-based rural/urban topologies or classification schemes are described that incorporate one or more of the following measures:

- population size and density;
- proximity to and relationship with urban areas;
- degree of urbanization; and
- principal economic activity.

Only county-based topologies are considered here, because the county is generally the smallest geographic unit for which data are available nationally. Counties also have several other characteristics that make them useful units of analysis: county boundaries are generally stable; counties can be aggregated up to the State level; and counties are important administrative units for health and other programs. For small-area analyses and for research purposes, ZIPCodes may be useful units of analysis. However, ZIPCodes boundaries are not stable and sometimes cross county lines.

Topologies Used To Describe Nonmetropolitan Areas

Several topologies have been developed to classify nonmetropolitan counties. Nine county-based topologies are described below.¹ These topologies are generally used for re-

search purposes and have not yet been used by Federal agencies to implement health policies or to present vital and health statistics. Before discussing specific topologies, four geographic/demographic measures common to most of the topologies are briefly described: 1) population size, 2) population density, 3) adjacency to metropolitan area, and 4) urbanization.

Population Size.--Population size can refer to the total population of the county or to the largest settlement in the county. Presentation of an area's population by settlement size helps to illustrate how the population is distributed. In 1980, 43 percent of the U.S. population lived in places of less than 10,000 population or the open countryside (see table 1). The Census Bureau's urban definition depends in part on population size (i.e., those living in places of 2,500 or more outside of urbanized areas).

Population Density.--Population density is calculated by dividing the resident population of a geographic unit by its land area measured in square miles or square kilometers. In 1980, half of the U.S. population (excluding Alaska and Hawaii) lived in counties with less than 383 persons per square mile (21). Population density ranges from 64,395 persons per square mile in New York County, New York (Manhattan) to 0.1 per square mile in Dillingham Census Division,² Alaska. Figure 5 shows how the U.S. population is distributed. Urbanized areas are defined primarily by population density (i.e., territory with at least 1,000 residents per square mile). One drawback of population density is that it doesn't describe how the population is distributed within an area. For example, a spatially large county that includes both small, densely settled urban areas and large, sparsely populated areas would have a population density that masks such extremes.

¹ Not all rural topologies that have been proposed are described in this section. Excluded from discussion are several economic indices developed in the 1960s that associated economic underdevelopment with rurality.

² There are no counties in Alaska. The county equivalents are the organized boroughs and "census areas" (U. S. Dept. of Commerce, 1980 Census of Population, Volume 1, 1981).

Figure 5.--1980 Population: Distribution (United States)



SOURCE: U.S. Department of Commerce, Bureau of the Census, "Population Distribution in the United States: 1980 (GE-70 No. 4) Washington, DC, 1984.

Adjacency to Metropolitan Area. --A county's adjacency to a metropolitan area can be measured geographically (e.g., sharing a boundary) or functionally (e.g., proportion of residents commuting to an MSA for work). Many residents of these adjacent counties, however, live some distance from an urban center, particularly in large counties in the West. Furthermore, natural geographic barriers or an absence of roads may impede access to metropolitan areas.

Urbanization ---Some topologies use various measures of the level of urbanization to differentiate nonmetropolitan counties. Sometimes, urbanization is measured by the absolute or relative size of the Census-defined urban population. For nonmetropolitan counties this generally means the population living in places with 2,500 or more residents or proportion of the county's population that is urban. In other topologies, an urbanized county is defined by the size of the county's total population (e.g., counties with 25,000 or more residents).

Urbanization/Adjacency to Metropolitan areas

Analysts at the U.S. Department of Agriculture (USDA) have classified nonmetropolitan counties on two dimensions: 1) the aggregate size of their urban population and 2) proximity/adjacency to metropolitan counties (see table 8) (22).³ The urban population follows the Census Bureau's definition. Urbanized counties are distinguished from less urbanized counties by the size of the urban population (i.e., urbanized counties have at least 20,000 urban residents and less urbanized counties have 2,500 to 19,999 urban residents). A nonmetropolitan county's adjacency to an MSA is defined both by shared boundaries (i.e., touching an MSA at more

³ This classification also includes three types of metropolitan counties based on MSA total population: small (under 250,000 population), medium (250,000 to 999,999), and large (1 million or more).

Table 8---Classification of Nonmetropolitan Counties by Urbanization and Proximity to Metropolitan Areas (2,490 counties as of 1970)^a

Urbanized adjacent (173 counties)

- Counties with an urban population of at least 20,000 which are adjacent to a metropolitan county.

Urbanized nonadjacent (154 counties)

- Counties with an urban population of at least 20,000 which are not adjacent to a metropolitan county.

Less urbanized adjacent (565 counties)

- Counties with an urban population of 2,500 to 19,999 which are adjacent to a metropolitan county.

Less urbanized nonadjacent (734 counties)

- Counties with an urban population of 2,500 to 19,999 which are not adjacent to a metropolitan county.

Rural adjacent (241 counties)

- Counties with no places of 2,500 or more population which are adjacent to a metropolitan county.

Rural nonadjacent (623 counties)

- Counties with no places of 2,500 or more population which are not adjacent to a metropolitan county.

^aClassification of nonmetropolitan areas using 1980 Census data is forthcoming from the Department of Agriculture (McGranahan, personal communication, 1989).

SOURCE: McGranahan et al., 1986, "Social and Economic Characteristics of the Population in Metro and Nonmetro Counties, 1970-1980."

than a single point) and by commuting patterns (i.e., at least 1 percent of the county's labor force commutes to the central county(ies) of the MSA).⁴ Nearly 40 percent of the nonmetropolitan counties are adjacent to MSAs, and just over one-half of the nonmetropolitan population resides in these adjacent counties (see table 9).

⁴ The classification scheme was introduced in 1975 by Hines, Brown, and Zimmer of USDA. Calvin Beale and David Brown, also at USDA, later modified the classification to include the 1 percent commuting requirement for adjacent counties (13). A 2 percent commuting level is used in a more recent version of the typology (5).

This typology still masks differences among nonMSA counties. For example, both a county with one town of 20,000 and a county with eight towns of 2,500 would be considered urbanized under this typology. The county with several small towns is unlikely to have the level of services of a county with its population concentrated into larger towns.

Adjacency to Metropolitan Areas/Largest Settlement Size

Another county typology groups non-metropolitan counties by adjacency to MSAs and by size of the largest settlement (21) (table 10). Size of largest settlement is a useful parameter to include when analyzing health services since large settlements are more likely to have hospitals and specialized health care providers. However, the presence

of a large town or city does not guarantee easy access to facilities for all residents of a spatially large county.

Population Density: Incorporation of the Frontier Concept

The National Rural Health Association (NRHA) has proposed a classification system that includes four types of rural areas (27)

- adjacent rural areas--counties contiguous to or within MSAs which are very similar to their urban neighbors;
- urbanized rural areas--counties with 25,000 or more residents but distant from an MSA;
- frontier areas--counties with population densities of less than 6 persons per square mile, which are the most remote areas;

Table 9-- Nonmetropolitan County Population Distribution by Degree of Urbanization and Adjacency to an MSA (1980)

	Population ^a (1,000s)	Percent ^b of nonMSA
U.S. total	226,546	
<u>MSA counties</u>	163,526	
<u>NonMSA counties</u>	63,020	100.0%
Urbanized		
Adjacent to MSA	14,802	23.5
Not adjacent to MSA	9,594	15.2
Less urbanized		
Adjacent to MSA	15,350	24.4
Not adjacent to MSA	15,529	24.6
Totally rural		
Adjacent to MSA	2,737	4.3
Not adjacent to MSA	5,008	7.9

^aTotal MSA/nonMSA populations differ from those in table 7 because this **typology** relies on 1970 MSA designations.

^bPercent does not sum to 100 due to rounding.

SOURCE: D. A., McGranahan, et al., "Social and Economic Characteristics of the Population in Metro and Nonmetro Counties, 1970-1980.11

Table 10--- U.S. Population by County's Largest Settlement and Adjacency to an MSA (1980)

	Population (1,000s)	Percent of U.S.
U.S. total	226,505	100.0
<u>NonMSA counties</u>	60,512	26.7
Counties not adjacent to an MSA		
Largest settlement		
Under 2,500	4,543	2.0
2,500 to 9,999	10,255	4.5
10,000 to 24,999	7,120	3.1
25,000 or more	4,124	1.8
Counties adjacent to an MSA		
Largest settlement		
Under 2,500	3,157	1.4
2,500 to 9,999	13,236	5.8
10,000 to 24,999	12,467	5.5
25,000 or more	5,610	2.5
<u>MSA counties</u>	165,994	73.3
Largest settlement		
Under 100,000	3,611	1.6
100,000 to 249,999	18,461	8.2
250,000 to 499,999	24,883	11.0
500,000 to 999,999	28,640	12.6
1,000,000 to 2,999,999	50,524	22.3
3,000,000 or more	39,875	17.6

SOURCE: Adapted from L., Long, and D., DeAre, "Repopulating the countryside: A 1980 Census Trend," Science, vol. 217, Sept. 17, 1982, pp. 111-116.

- countryside rural areas--the remainder of the country not covered by other rural designations.

This typology includes some important concepts not covered by other topologies, such as the concept of the "frontier" area. This typology also differs from other topologies because it includes some counties within MSAs (i.e., in the adjacent rural area category). Since the categories are not mutually exclusive, however, some counties will fall into more than one group. For example, under this typology 3 of 14 counties in Arizona would be both "urbanized rural areas" and "frontier areas" because the counties' populations exceed 25,000 residents and the population density is less than 6 persons per square mile.⁵ County population size is a poor indicator in the West because many counties there are much larger than elsewhere.

Urbanization/Population Density

Two other rural topologies incorporate population density and urbanization. The first is a classification developed by Bluestone⁶ and the second is a modification by Clifton of that classification (see table 11).⁷ Urbanization is defined in terms of the proportion of the county that is urban (i.e., lives in towns of 2,500 or more). An advantage of using the percent of a county's population that is urban is that it is not influenced much by the size of the county, or by a county's including a large stretch of unpopulated territory. Density is heavily affected by these conditions. Combining mea-

⁵ The three Arizona counties are Apache, Coconino, and Mohave.

⁶ Herman Bluestone, "Focus for Area Development Analysis: Urban Orientation of Counties," Economic Development Division, Economic Research Service, USDA as cited in Sinclair and Manderscheid.

⁷ Ivery Clifton, Agricultural Economist, Economic Research Service, USDA, unpublished manuscript as cited by Sinclair and Manderscheid.

Table 11--Bluestone and Clifton County Classifications Based on Urbanization and Population Density

	Percent urban	Population per square mile
Bluestone classification		
Metropolitan	GT 85 percent	GT 100
	GT 50 percent	GT 500
Urban	LT 85 percent	100-500
Semi - isolated urban	GT 50 percent	LT 100
Densely settled rural	LT 50 percent	50-100
Sparsely settled rural with some urban population	LT 50 percent	LT 50
Sparsely settled rural with no urban population	0 percent	LT 50
Clifton's classification		
Urban	GE 50 percent	GE 200
Semi - urban	GE 50 percent	30-200
Densely settled rural	LT 50 percent	GT 30
Rural	LT 100	LT 30

ABBREVIATIONS: GT=greater than; GE=greater than or equal to; LT=less than.

SOURCE: B., Sinclair, and L., Manderscheid, "A Comparative Evaluation of Indexes of Rurality--Their Policy Implications and Distributional Impacts," contract report, Department of Agricultural Economics.

asures of urbanization and density provides some indication of the degree of population concentration or dispersion. However, as with the USDA typology, a county with one town of 20,000 and a county with eight towns of 2,500 may not be distinguished under this scheme.

Distance From an MSA or Population Center

Two rural indexes⁸ are based on distance from an MSA or population center. Hathaway et al., developed a size-distance index that

⁸ These rural indexes are different from topologies in that they are continuous (e. g., a scale from 1 to 100) rather than categorical measures.

includes two measures: miles from an MSA and the population of that MSA (39). Smith and Parvin considered three county characteristics in their rural index: population-proximity; population density; and employment in agriculture, forestry, or fisheries (40,43). A county's population-proximity indicates the relative access to adjacent counties' populations.

Population-proximity is measured as the county population plus the size-distance ratio of surrounding counties.⁹ To illustrate, the population-proximity for County A of size 20,000 surrounded by four counties B through E is as follows:

Table 12---Population-Proximity: A Measure of a County's Relative Access to Adjacent Counties' Populations

county	Distance between County A and the indicated county population	Ratio of population to distance (miles) ^a	(pop./mile)
A	20,000		
B	15,000	30	50:
C	60,000		1,500
D	250,000	100	2,500
E	100,000	10	10,000
Sun of ratios.....			14,500
Add population of County A.....			20,000
Population-proximity for County A....			34,500

aDistance is the number of miles between the county seat of County A and the county seat of the indicated county.

SOURCE: Adapted from Select Committee on Aging, 1983 "Status of the Rural Elderly."

The combination of distance to adjacent population centers and size of that population in a typology is attractive because distance is

a good access indicator and population size indicates service availability. The topologies incorporating these measures may be most informative for geographically small counties. For large counties, however, the distance from one county seat to the next is unlikely to be applicable to those living at a distance from the county seat.

Commuting-Employment Patterns

A relatively new county classification system incorporates measures of population size, urbanization, commuting patterns of workers, and the relationships between workplace and place of residence (28). The classification criteria are shown in table 13 and the distribution of U.S. counties according to this typology is shown in table 14. The inclusion of employment and commuting measures may allow this typology to identify groups of counties that are economically related such as service and labor market areas.

Economic and Socio-Demographic Characteristics

Nonmetropolitan counties have also been classified according to their major economic bases, land uses, or population characteristics (table 15) (7).¹⁰ Fifteen percent of nonmetropolitan counties (370 of 2,443 counties in the 48 conterminous States) remain unclassified using this approach. Among the counties that are classified, 70 percent fall into only one of the seven categories; the remaining 30 percent fall into two or more categories (37).

Some of the data used to develop this classification are now a decade old (e.g., farm employment), and it is likely that with continued diversification of the rural economy

⁹ The population-proximity is "the sum of the total population in the reference county and the sum of the ratios of the number of persons in all counties within 125 miles of the reference county divided by the distance in miles between the county seat in the reference county and the county seat in each county within the specified distance (43)."

¹⁰ These represent the nonmetropolitan counties as defined in 1974.

Table 3.--County Typology Based on Employment, Commuting, and Population Characteristics

Key to Nonmetropolitan Types				
County type	E/R ratio ^a	percent of workers working outside county	Urban population	percent of population that is urban
Nonmetro centers				
	(a) .98 or higher OR (b) 85 or higher	less than 30%	(Place or cluster 10,000 or more (Place or cluster 10,000 or more	25% or more
Nonmetro satellites Does not qualify for nonmetro center AND	.70 or higher	less than 30% and at least 15%	5,000 or more	10,000 or more
Nonmetro commuting with center Would qualify for nonmetro center, nonmetro satellite or nonmetro small center but has more outcommuting	30% or more			10,000 or more
Nonmetro small centers Does not qualify for nonmetro center, nonmetro satellite or nonmetro commuting with center AND	(a) 1.20 or higher OR (b) 98 or higher OR (c) between .85 and .97 inclusive	less than 30%	2,000 or more If less than 3,500 must have ----->	2,000 or more
Rural commuting counties Does not qualify for nonmetro center, nonmetro satellite or nonmetro small center, but has more outcommuting than nonmetro rural.	30% or more			
Nonmetro rural counties Does not qualify for any of the other nonmetro categories				

Key to Metropolitan Types		
County type	E/R ratio	percent of workers working outside county
Metro centers	0.98 or higher	less than 30%
Metro satellites	between 0.70 and 0.97, inclusive	less than 30%
Metro commuting satellites	0.70 or higher	30% or more
Metro suburban	between 0.50 and 0.69, inclusive	
Metro dormitory	lower than 0.50	

^aE/R ratio represents the number of workers working in the county divided by the number of workers residing in the county.
SOURCE: J. Pickard, "A New County Classification System," *Appalachia* 2:(3), summer 1988, pp. 19-24.

Table 14--- Distribution of U.S. Counties by Typology Based on Employment, Commuting, and Population Characteristics (1986)

	Number of counties	Percent of U.S.
Nonmetropolitan county types	2393	23.2
Centers	543	11.1
Satellites	212	2.4
commuting counties with center	239	2.7
Small centers	565	3.7
Rural commuting counties	333	1.7
Rural counties	501	1.6
Metropolitan county type	745	76.8
Metro centers	295	44.7
Metro satellites	91	10.0
Metro commuting satellites	193	15.0
Metro suburban	133	6.6
Metro dormitory	33 less than 1	

SOURCE: J., Pickard, "An Economic Development County Classification for the United States and its Appalachian County Types," Appalachian Regional Commission, Washington, DC June 1988.

since the late 1970s, even fewer counties¹¹ would be classified into one of these groups. On the other hand, many rural economies remain small and dependent on a single industry or occupation despite the economic diversification(7).

Conclusion

In summary, several topologies for non-metropolitan counties have been developed incorporating measures of population size and density, urbanization, adjacency and relationship to MSA, and principal economic activity (see table 16). While it is desirable to have a standardized typology to portray the diversity of rural areas, the potential uses of

topologies are varied and require inclusion of different measures. For example, to study the geographic variation of access to health care, a typology 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 is preferable. On the other hand, rural economists or sociologists may be more interested in identifying counties with economies dependent on farming, mining, or forestry.

While no one typology meets all potential needs, there are several desirable features of any typology. For example, for many purposes it is helpful to have topologies with mutually exclusive (i.e., nonoverlapping) categories. The National Rural Health Association's typology includes frontier (less than 6 persons per square mile) and urbanized rural counties (population of 25,000 or more and not adjacent to an MSA). Yet it is possible for counties to meet both criteria.

The concept of urbanization is incorporated into several of the topologies. In some cases, urbanization is determined by the absolute or relative size of a county's urban population and in others, by the size of a county's largest settlement. When the size of the urban population is used, a county with one large city with the balance of the county sparsely populated, would be indistinguishable from a county with several smaller towns. As level of resources are likely to be city-size dependent, topologies using this measure of urbanization may not discriminate well for some applications. On the other hand, while largest settlement size might be indicative of level of services available in the county, it is not informative of how remote those services might be for all county residents. In geographically small counties, large settlements are likely to be accessible to all county residents. In the West, however, counties can be as large as some Eastern States, and some measure of proximity would be useful to indicate physical access. Measures of how

11 If the classification scheme were updated, the proportion of nonmetropolitan counties either not classified or falling into more than one group would likely be greater than the present 43 percent.

Table 15.--Classification of Nonmetropolitan Counties by Economic and Socio-Demographic Characteristics^a

- **Farming-dependent counties**
702 counties concentrated largely in the Plains portion of the North Central region.
Farming contributed a weighted annual average of 20 percent or more of total labor and proprietor income over the five years from 1975 to 1979.
- **Manufacturing-dependent counties**
678 counties concentrated in the Southeast.
Manufacturing contributed 30 percent or more of total labor and proprietor income in 1979.
- **Mining-dependent counties**
200 counties concentrated in the West and in Appalachia.
Mining contributed 20 percent or more to total labor and proprietor income in 1979.
- **Specialized government counties**
315 counties scattered throughout the country.
Government activities contributed 25 percent or more to total labor and proprietor income in 1979.
- **Persistent poverty counties**
242 counties concentrated in the South, especially along the Mississippi Delta and in parts of Appalachia.
Per capita family income in the county was in the lowest quintile in each of the years 1950, 1959, 1969, and 1979.
- **Federal Lands counties**
247 counties concentrated in the West.
Federal land was 33 percent or more of the land area in a county in 1977.
- **Destination retirement counties**
515 counties concentrated in several northern Lake States as well as in the South and Southwest.
For the 1970 to 1980 period, net immigration rates of people aged 60 and over were 15 percent or more of the expected 1980 population aged 60 and over. Retirement counties are disproportionately affected by entitlement programs benefiting the aged.

^aThe number of nonmetropolitan counties does not add to the total number (2,443), because the categories are not mutually exclusive and 370 counties do not fit any of the categories.

SOURCE: Bender, L.D., Green, B.L., Hady, T.F., et al., Economic Research Service, U.S. Department of Agriculture, *The Diverse Social and Economic Structure of Nonmetropolitan America*, Rural Development Research Report No. 49 (Washington, DC: U.S. Government Printing Office, September 1985).

Table 16---Features of the Nine County-Based Topologies

Typology	Measures					
	Population size	Density	Urbanization	Adjacency	Distance	Economy
USDA-1 ^a	..	..		■	..	..
Long and DeAre ^b	■	..	..	■	..	..
NRHA ^c	■	■	..	■	..	..
Bluestone ^d	..	■	■	..	..	..
Clifton ^e	..	■	■	..	..	..
Parvin and Smith ^f	■	..	..	..	■	..
Hathaway ^g	■	..	..	..	■	..
Pickard ^h	■	..	■	..	..	■
USDA-2 ⁱ	..	..	..	..	..	■

^aMcGranahan, D.A. et al., USDA, 1986.

^bLong, L. and DeAre, D., 1982.

^cNational Rural Health Association, as cited in Sinclair, B., and Manderscheid, L.V., 1989.

^dBluestone, H. as cited in Sinclair, B., and Manderscheid, L.V., 1974.

^eClifton, I. as cited in Sinclair, B., and Manderscheid, L.V., 1974.

^fParvin, D.W. and Smith, B.J. as cited in U.S. Congress, House of Representatives, Task on the Rural Elderly of the Select Committee on Aging, 1983.

^gHathaway, D.E. as cited in Sinclair, B., and Manderscheid, L.V., 1974.

^hPickard, J., *Appalachia* 21(3):19-24, Sumner, 1988.

ⁱBender, L.D. et al., USDA, 1985.

SOURCE: Office of Technology Assessment, 1989.

evenly the population is distributed might also be useful for large counties.¹² Several of the topologies incorporate an adjacent-to-MSA measure, which is an indicator of access to level of services. The proportion of a county’s population that is urban is a useful measure in large Western counties because unlike population density, it is a measure that is not influenced much by size of county or by population distribution.

Nonmetropolitan county data can also be disaggregate regionally by State or groups of States (e.g., the four Census regions or nine Census divisions), or by economic areas (e.g., Bureau of Economic Analysis Areas or BEAs). The Bureau of the Census defines “county groups” that are usually contiguous counties that combined have a population of 100,000 or more.¹³ These counties are generally grouped according to meaningful State regions such as planning districts (50).

A new category of nonmetropolitan area called “micropolitan area” has recently been described (42a). While not a typology, the new category does distinguish nonmetropolitan areas that exert similar social and economic influences on their regions as metropolitan areas do on a larger scale. Most micropolitan areas are single counties but a few span two counties or are independent cities. Micropolitan counties are relatively large (40,000 or more residents) and include a central “core city” with at least 15,000 residents.^{14,15} Many micropolitan areas are COLlege towns, sites of military bases, and retirement areas. More than 15 million people or about one-quarter of nonmetropolitan residents live in the 219 identified micropolitan¹⁶ areas.

12 The Hoover index is a measure of population concentration or dispersion. The index ranges from zero, which indicates a perfectly uniform distribution in which each subarea has the same proportion of total population as it does of land area, to 100, which represents the concentration of all the population into a single subarea (21). To estimate county population dispersion, subcounty geographic areas would be used. Other methods to measure population concentration or dispersion include the nearest-neighbor statistic or the quadrant technique, but both require a geographic information system incorporating longitude and latitude measures (9, 17,24) .

13 These county groups are only defined in public use data files.

14 If a nonmetropolitan city of 15,000 or more residents has at least 40 percent of its population in each of two counties, the micropolitan area includes both counties.

15 In four States (Maryland, Missouri, Nevada, and Virginia) some cities (called independent cities) have the same status as counties and are considered micropolitan if they have 15,000 or more residents and are larger than 15 square miles. If the city is areally smaller, it is joined with the adjacent county to form the area.

16 A list of micropolitan areas is available from Niagara Concepts, P.O. Box 296, Tonawanda, New York 14151-0296.