# What is "Rural" and How to Measure "Rurality" A Focus on Health Care Delivery and Health Policy


*Thomas C. Ricketts, Ph.D.*

*Karen D. Johnson-Webb, M.A.*

**North Carolina Rural Health Research and Policy Analysis Center**

*725 Airport Road CB 7590*
*Chapel Hill, NC 27599-7590*
*Tel. 919-966-5541 Fax 919-966-5764*
*Internet: http://www.shepscenter.unc.edu/research_programs/Rural_Program/rhp.html*



*A Technical Issues Paper prepared for the*

**Federal Office of Rural Health Policy**

*Health Resources and Services Administration*

*US DHHS*

*Prepared under Contract Number HRSA 93-857(P)*
*From the Federal Office of Rural Health Policy*
*to the North Carolina Rural Health Research Program*
*Cecil G. Sheps Center for Health Services Research*
*University of North Carolina at Chapel Hill*
*Chapel Hill, NC 27599-7590*

*December, 1996*

# *Quick Guide*
# *If you want to know:*

Formal definitions of rural used by the Federal Government, go to: Chapter 3, section A., *"Federal Definitions of Rural and Urban,"* page 15.

Definitions of rural and urban used by states, go to Chapter 3, section B., *"State Definitions of Rural and Urban,"* page 41.

A general discussion of rurality and how definitions of rurality affect health policies, go to Chapter 2, *"What is Rural?"* page 6.

The appropriate unit of analysis? Is it the county? ZIP code areas? Other jurisdictions? go to Chapter 4, *"Place Size and Rurality, How do You Choose?"* page 45.

# CHAPTER 1—INTRODUCTION

*"...the perceived magnitude of rural health care problems and the impact of any change in public policy depend on how 'rural' is defined."*—Maria Hewitt (1992)

Rural America presents a unique set of conditions for health care delivery. These conditions have been explored in substantial depth in the health services and health policy literature in the recent past. As part of this process of exploration, researchers and analysts have had to use existing indicators and definitions to classify places and people as either rural or urban or some degree of either. Much of the work that has been done contrasting rural to urban or focusing on rural health status or health care delivery has made use of one of two, generally accepted, national classification systems: the Census Bureau's "urbanized areas" and "rural and other" classifications for persons; or the Office of Management and Budget's Metropolitan Area definition which is applied to counties.

The choice of an operational definition of rurality is often driven by the realities of the data or the dimensions of the policy or research issue. Most population and health data are reported at the county or county-equivalent level. This makes it easy to characterize and compare the general situation for populations in a meaningful way for both the analyst who sees many data points with wide variation and for the policy maker who sees local specificity and applicability at a level that accommodates both local and national decision making. However, definitions or typologies of rural that rest on county or even sub-county systems do not always provide the best possible picture of the data to answer questions concerning health services delivery. Often, the policy maker, analyst or researcher accepts an existing system of classification not realizing that there are other options and that the choice of one or another definition can have important consequences for the conclusions of a study or a policy analysis.

This document describes various definitions of "rural" available for use by researchers, analysts, and government officials at the federal, state, and local level, describes their strengths and weaknesses, and gives advice on how best to make use of these definitions for policy or analytic purposes. This report is not intended to be a complete description of the theory and concepts related to "rurality", that is the subject

of the fields of geography and rural sociology. The focus here is on definitions for analysis of health care and health services problems.

This report was commissioned by the Federal Office of Rural Health Policy as part of its continuing efforts to support policy-relevant rural health services research. Definitions of rurality are central to the application of policy for underserved areas and this was a key motivator for this report. We hope it will help illuminate the options available to policy makers as well as the analysts and researchers who use it.

*"Until the population is uniformly defined, it is very difficult to address...problems in an unambiguous manner from secondary data sources"*—Vernon Briggs, Jr. (1981)

# CHAPTER 2—WHAT IS RURAL?

This is a common question posed to any researcher who claims special knowledge of rural health care delivery. The answer should be, "it depends." Indeed, it does depend upon the substantive question at hand because most policy makers or investigators are not concerned with a strict understanding of rurality. Policy makers more often have questions about the degree to which the health status of the people in one jurisdiction is better than that of those living in another place, or, if there are any differences in use of services or measures of access to services, especially if those services are paid for by the government. Because of the perception that rural populations are potentially disadvantaged because of isolation, distance to care, or other socioeconomic characteristics common to sparsely populated areas, comparisons of rural versus urban populations are common.

The choice of a definition for rural depends both on the unit of analysis and the policy concern. Both the units of analysis and the policy issues can be based on groups or individuals. For example, when exploring how best to provide access to a tertiary care service, coronary artery bypass surgery, the problem of lack of access may be identified by a difference in group rates of surgery, but the interventions may require policies that are directed toward individuals. A definition of rurality that would yield useful policy prescriptions should concern itself with the most relevant aspects of access for individuals including distance to care, socio-economic status, insurance coverage or employment. But, the ability to efficiently identify those persons who have *potential* access problems may best be done through the identification of problems common to groups or jurisdictions, like counties, or sub-county areas. This would then guide the development of policies directed to certain types of people (the elderly, females) situated in certain places (isolated communities, communities near rivers). Another example of where individual-level definitions and policy solutions overlap with population-based policies and analysis is in occupational studies. Agricultural work is sufficiently different in its structure to have unique health-related problems. Agricultural work is most often, but not always done in rural places, and certainly not all rural places are used for agricultural production. The analysis of a health services issue in agricultural occupations would make use of an individual-level definition—someone working in agriculture—that would significantly overlap a group definition: rural-farm counties, but the two would not completely overlap. The contrast between individual or person level concerns and population issues and the implications they have for analysis make the first task for a researcher or analyst, prior to deciding who or what is rural, the careful exploration of the focal policy issue. The

final definition or approach should best meet the needs of the issue.

This paper will describe several definitions of rurality including those most commonly used for policy applications and policy analyses and special alternatives that have applications in the health services field. If you are interested only in specific definitions and not the general concept of rurality, you may want to skip ahead to Chapter 2, "Definitions of Rural."

### A. Rurality as Concept

Often the concept of "rural" is contrasted with "urban"; this is a natural response when confronting a geographic analysis in health care because it seems what is rural can often be best described as something that is not urban. This is useful at initial stages and captures the general idea of relative differences. However, as an issue is explored using real data it is easy to see finer and finer gradations within both the rural and urban places one examines. Looking closer, the two can eventually merge into a spectrum or continuum with rural at one end and urban at the other. The idea of a continuum is useful for theoretical approaches and for conceptual treatments; its basis rests, eventually, on ideals of what rurality is and the relative degree to which a specific situation is more or less rural is not clear in an objective sense but more of something that is "in the eye of the beholder" than is quantifiable or scaleable. Yet the notion of developing scales of rurality and examining variations in resource use or service availability across a continuum is a powerful tool for the investigator with a policy focus. The degree to which places or people can be divided along a rural-urban continuum will be discussed in much greater detail later in this paper but first we should examine more closely what this ideal of rurality is.

There are many conceptions of what rural America is like or what the ideal notion of "rural" represents (Bealer, Willits and Kuvlesky, 1965; Bosak and Perlman, 1982; Falk and Pinhey, 1978; Willits and Bealer, 1967). However, it is more common for people to use the term "rural" without any formal definition attached. Bosak and Perlman (1982) review 178 rural mental health and sociology papers and found that 43% did not use any formal definition of the term. This indicates that there is a high degree of informal acceptance of "rural" as a shared conceptualization, which does not need specific definition.

Still, it is useful to look at how we think about "rural" and determine how that might relate to health care delivery policy. According to Miller and Luldff (1981), popular images of rural America can be distilled into five categories:

1. Positive images—"Rural life is friendly and neighborly."
2. Negative images—"Rural life is monotonous and boring or provincial and

narrow-minded."

3. Anti-urban sentiment—"Urban living is too fast or impersonal and uncaring."

4. Agrarian values—"Agriculture is natural and the family farm is the backbone of American democracy."

5. Wilderness values—"Open areas are good and healthy places, and solitude contributes to health."

These generalizations help us to frame rurality in our minds and associate aspects of living with location or perception but they do not help us much with the determination of how we ought to best classify places or people according to whether they are rural.

To focus on health services, a classification scheme devised by Wibberly (1972) and supported by Miller and Luloff (1981) relates some of these fundamental characteristics of rural populations to health services. A modified version of Wibberly's rural structure and contrasting concepts presented in Table 1, below, adds a column that relates the rural characterization with health services. These fundamental characteristics of rural populations have implications for health services, but are used more often to explain observed phenomena, rather than to propose hypotheses to understand rural health. This systematic interpretation of rural characteristics can help us when we examine problems in health services delivery. For example, we can imagine that an issue of access to technology for a rural population would combine problems of distance that contributed to late adoption of newer treatments and that lack of a sizable, concentrated population would make it difficult to make optimal use of a complex service or provide the means to support its existence in a rural context.

**Table 1. Characterizations of Rural and Health Services Applications**

| Rural Characterization | Health Services Implication | Contrast Concept |
|---|---|---|
| 1. Use of the land | Agricultural injuries, occupational injury rates. | Little dependence upon the land in occupational illness. |
| 2. Delimited area | Service areas, market areas dependent upon urban and central places; issues of carrying capacity of population for hierarchy of professionals and technologies. | No boundaries; areas are defined by other characteristics, e.g. race, age. |
| 3. Small population | Occurrence of disease is masked by small numbers, calculation of rates is difficult. Limited financial base to support resources, need for regionalization. | Large populations allow for understanding rates and identifying problems. No problems with financial support. |
| 4. Dispersed population | Travel time to services, travel time to patients, communications needs. | Concentrated population. |
| 5. Identity as countryside | Rural attitudes toward medicine and health care, independence, neighborliness, structure of health problems related to social and economic characteristics. | No unifying identity (suburbs) or urban identity. |
| 6. Isolation from technology | Late innovation, greater travel time to technology, provider isolation. | Closely linked to technology transfer, no lag in innovation. |

(Adapted from Wibberly, G.P, *Town and Country Planning* 40:259-64, 1972)

### B. The Current Reality of Rural America

Historically rural areas have been thought of as having small populations, a dependence on farming, larger family size, and more conservative lifestyles and politics (Gilford, et al., 1981). The populations of rural places remain smaller but farming is clearly no longer a defining characteristic. Less than 7 percent of the rural population is now engaged in farming and that proportion will fall to below 5 percent by the end of the century. Rural places may continue to be more conservative and, on balance, include larger families but this is not consistent enough across all rural places to allow those generalizations to define what is rural., Agriculture, fishing, mining, and forestry, however, are still predominantly rural occupations, and the consequences of those types of employment have strong implications for the structure of health care needs for rural places.

In 1993, 2,228 counties out of a total of 3,141 counties (or county equivalents) for the nation as a whole, containing 83 percent of the nation's land and 21 percent (51 million) of its people, were classified as nonmetropolitan. In 1992, nonmetropolitan counties accounted for 18 percent of US jobs and 14 percent of earnings. , Rural America is larger in size than all but five of the world's nations and holds a population larger than that of South Africa, Canada and Australia combined and almost as many people as France. But the fact that rural America is a minority part of the nation's

economy, although a key minority, means that sometimes policies crafted in the urban political centers are less than appropriate or have unanticipated negative effects on rural places.

## C. Rural Characteristics and Health Services Implications

### 1. *Relative Need for Health Care*

The patterns of rural land use, occupations and recreational choices create a picture of health care needs that varies from urban places, independent of the age and sex structure of communities. Trauma from use of farm and garden equipment is much more likely in rural areas; chronic diseases related to pesticide and herbicide exposure more prevalent; and trauma from snowmobile, off-road vehicle and boating crashes are far more common in rural than urban places. The severity of automobile crash injuries is greater in rural places due to higher speeds and poorer roads (Schneider and Greenberg, 1992).

The mortality and morbidity patterns of rural America, when compared to urban, do not show a distinctive and consistent disadvantage for rural (Miller, Farmer and Clarke, 1994). But these general comparisons are plagued by the same classification problems discussed in this paper—the aggregation of widely divergent populations and communities into large, gross classifications that are meant, primarily, to be consistent across the nation. There are, however, clear regional patterns of rural disadvantage—much higher infant mortality in the rural southeast, for example, and those conditions are clearly related to the income and education differences between those rural regions and other parts of the nation.

It is also clear that there are some difficulties inherent to rural America that make it difficult to clearly understand rural morbidity and mortality patterns. With jurisdictions that have small populations there is the potential for masking of disease occurrence since rates will not be stable and analysts may tend to ignore or not account for the very high fluctuation. Smaller populations also limit the capacity of health service and public health agencies to compile adequate statistics to characterize the health pattern of smaller places.

Nonmetropolitan residents are slightly less likely than metropolitan residents to be insured for their health care costs, particularly by private insurance (Frenzen, 1992; 1993). Health insurance coverage fell for metropolitan and nonmetropolitan residents between 1987 and 1991 but at a slower rate for nonmetropolitan. The proportion of metropolitan (84.2%) and nonmetropolitan (83.4%) residents with coverage in 1991 was not substantially different. For those who lost health insurance

during the 28-month period, January 1992 through April 1994, the nonmetropolitan population had the longest spells without health insurance, 7.2 months, compared to 4.9 months for people in suburbs (Bureau of Census, 1996).

Rural residents have two strikes against them as far as risk factors for acute illness and trauma: poverty and increased personal risk-taking behaviors. These factors are also highly correlated with educational level. Rural residents who finish high school and go on to college are likely to move to urban areas permanently, leaving lower average education levels in rural areas. These lower education levels result in higher levels of unemployment. For example, the 1986 poverty rate in rural areas for workers who dropped out of high school was 24 percent, while it was 20 percent in urban areas (O'Hare, 1988). In addition, traditionally more rural states in the south and west, often have more restrictive welfare eligibility rules and fewer benefits. Families that stay together are ineligible for the major welfare program, Aid to Families with Dependent Children (AFDC), in nearly half the states. Those living on family farms often exceed the "assets test" because of the appraised value of farmland or nonproductive property despite having very low incomes and are ineligible for benefits. Rural inhabitants, therefore, are in general more likely than urban inhabitants to have low educational achievement, higher unemployment, and live in poverty. They are also more likely to be ineligible for welfare benefits and more likely to engage in recreational (snowmobiling, hunting, boating) and occupational (mining, agriculture, timbering) activities that put them at higher than average risk for injury. Many of the rural poor do not receive public assistance, do not live in public housing, do not receive food stamps, are not covered by Medicaid, and do not have access to medical care (Rowland and Lyons, 1989). This cycle holds the potential to negatively affect the health of rural Americans, particularly poor rural Americans.

The trends affecting the rural portions of the nation ebb and flow. There have been periods of in-migration (1970s), out-migration (1980s), and apparent revival (1990s); but these overall changes cannot be applied to all rural communities or regions. In the last 20 years the proportion of the rural workforce employed in farming has decreased from 14.4 percent in 1969 to 7.6 percent in 1992. The largest share of rural jobs and employment growth today comes from the services sector, which employs more than half of all rural workers. Manufacturing is also a big provider of rural jobs, employing 16.9 percent of the rural workforce, but this proportion is down from 20.4 percent in 1969 (Economic Research Service, 1995). Communications technologies offer new opportunities to rural places. The timeless appeal of pastoral surroundings combined with advanced telecommunications technologies and an increase in "virtual offices" is reversing decades of migration to the cities. Since 1988, job growth

in nonmetropolitan areas has outpaced urban areas, 2.2 percent compared with 1.3 percent between 1990-94, particularly in communities with a strong technological infrastructure. The population in rural counties has increased overall at a one percent annual growth rate, triple the rate of the 1980s. With more people comes more money, and the income for rural residents has grown an average of 5.1 percent annually since 1990, reversing a 20-year trend of negative wage growth. The numbers of telecommuters have grown from 2 million in 1988 to some 11 million today (Business Week, 1995).

2. *The Supply of Professionals*

It is widely accepted that there is a maldistribution of health care professionals in the United States with rural areas faring far worse than urban places (Ricketts, 1994). This fact of distribution has stimulated much of the policy analysis and subsequent policy decisions that are meant to improve access to care in rural America. A range of state and federal programs attempt to address this imbalance but the rules which govern them rest upon broadly applicable definitions of rural and urban. Those definitions are discussed in detail in the section that follows. What is most troublesome in the mid 1990s is the growing acceptance that there is a costly oversupply of physicians and how that will affect the programs that are meant to redistribute professionals to meet the needs of rural areas (Institute of Medicine, 1996; Pew Commission, 1995). Two major reports that have made this point and recommended brakes on the production of physicians, one by the Institute of Medicine (IOM) and the other by the Pew Health Professions Commission, have given very little attention to the problems of rural places in their recommendations, although they recognize that this is one of the key problems facing the health care system. In these analyses, only gross rural-urban classification categories have been included although the Council on Graduate Medical Education (COGME) examined distribution issues in detail and made its work available to the IOM (COGME, 1996).

In contrast to how policy makers see the distribution of health professionals by geographic category, it might be of use to consider the thresholds that professionals themselves identify as delineating rural from urban. Hartlaub and Gordon (1993) tried to determine what a group of physicians might call "rural" and what they might call "urban." The research found that the doctors would most often agree that "rural" was "a non-urban population center of less than 25,000." This perceptual definition is in strong contrast to the official definitions offered in the section that follows.

Other researchers and professional groups have looked at the distribution of clinicians other than physicians. The studies that report their distribution tend to

include places that more commonly accepted definitions would classify as urban. The only national data set available to describe the national distribution of nurses has been a sample survey where the sole geographic identifier has been size of community or county and the gradations have been very broad. A well-known analysis of the distribution of nurses included counties of less than 50,000 as "rural" (Moses, 1990). These comparisons which use non-standard definitions of rural usually are due to the nature of the data base used for the analysis. The same situation holds for physicians assistants and nurse practitioners; there is no single national data base that locates these practitioners by address, thus national analyses of urban and rural distributions have been difficult to complete.

# CHAPTER 3—DEFINITIONS OF RURALITY

There are many definitions of what constitutes rural and urban. These definitions were created for many different reasons. The set of definitions we are concerned with here contains those that affect either governmental policies in health care financing and delivery or those that affect the structure and organization of health care delivery in rural places. In this vein, the comprehensive reviews of rural typologies by Maria Hewitt (1989; 1992) would be hard to improve upon for guidance in the policy field. Hewitt observed that typologies rested on four fundamental clusters of characteristics of places:

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

The first two of these clusters are very familiar and several variants could be constructed to describe rural places. Population threshold sizes for settlement or density thresholds for jurisdictions can be easily constructed using existing data sets and are often used for classifications of rural places. These basic criteria are used separately or combined with others. For example, rural could be defined as places with 2,500 or fewer people which are within 30 miles of a city of 50,000 or more—a combination of population size and proximity—part of the first and the second cluster. The notion of "degree of urbanization" in the third cluster is not as easily described but is based on the notion of "city-ness" defined in ways that may eventually rest upon density and size but also may include social and economic aspects of places, such as the presence of certain "urban" activities, like a stock exchange or the presence of concentrated communications and media activities. The notion of "principal economic activity" cuts to the core of what a definition of rural might wrestle with: if rural places are defined as agricultural (their dominant economic activity) then farms within large city borders would qualify but sparsely populated areas far from a large city or metropolitan center with the workforce engaged in light industry would not.

Any criteria used for rural-urban typologies can invite close scrutiny and criticism on conceptual or cultural grounds. But the central task for this paper is the identification of useful or operational systems of classification. This will be done by first reviewing current policy definitions then suggesting appropriate applications or useful alternatives. The following section covers current policy definitions and is divided into three sections: the first describes federal definitions of rurality, the second, state definitions of rurality, and the third, health-related definitions of rurality.

## A. Federal Definitions of Rurality

The federal government has been involved in the classification of areas and populations for statistical purposes since the beginnings of the Republic; these classifications were designed for statistical purposes and to target programs and funds. The current classifications of urban and rural places and people on a national basis date back to the first decade of this century. We have already used the formal terms "rural" and "nonmetropolitan" in this paper. This section provides details of those definitions.

In general, "rural" is a term used by the Census Bureau to classify people who live in places of a maximum size or type. Nonmetropolitan is used by the US Office of Management and Budget (OMB) and classifies counties which are of a minimum size and include or relate to urban places. The OMB classification deals with counties, governmental jurisdictions which have traditionally been used to report health as well as population data. This is one reason why it is often easier to classify many populations or groups on the basis of the metropolitan designation since most national health data are reported at the county level.

The Census Bureau's definition of "urban" rests on the concept of "urbanized areas" rather than on definitions of urban or rural people. The Office of Management and Budget's designation of metropolitan areas is based, in large part, on the size of the urbanized areas. Given that urbanized areas are defined by the Census Bureau, their definition can be considered controlling the OMB definition of metropolitan and nonmetropolitan areas. However, the Census does not define rural places in any detailed way, therefore, to understand rural we have to focus on the definition of urbanized areas as a way to understand rural places. Other agencies have created definitions for their own programs but those definitions usually depend upon a combination of the OMB and Census criteria. For example, the rules guiding federal grants for solid waste disposal projects for rural communities specify that those grants can be made to "municipalities with a population of five thousand or less, or counties with a population of ten thousand or less or less than twenty persons per square mile and not within a metropolitan area (42 U.S.C. Ch. 82 Sec. IV § 6949).

### 1. *Urbanized Areas and the Census Definition of Rural*

Rural was first used by the Census Bureau in 1874 when it was defined as the population of a county living outside cities or towns with 8,000 or more inhabitants (Whittaker, 1982). The US Bureau of the Census now defines "urban" as comprising all territory, population, and housing in urbanized areas and in "places" of 2,500 or

more persons outside urbanized areas. "Rural" areas are all others, e.g., incorporated cities, boroughs, towns, and villages, as well as towns that are not incorporated but have a population of at least 1,000. This model is an attrition-based one, much like the OMB classification, after defining one half of the rural-urban pair, the part that doesn't apply is covered by the other half. An "urbanized area" (UA) is defined as a central place and its "urban fringe," or surrounding territory, that is populated by at least 50,000 people. Urbanized Area boundaries are not limited to county or state boundaries; they often follow the boundaries of small census-defined geographic units such as census tracts and enumeration districts. Many UAs cross county and/or state lines. The densely settled urban fringe generally reflects an area of continuous residential development with an overall population density of at least 1,000 persons per square mile. The urban fringe can include two types of areas: incorporated places, which are concentrations of populations that have legally prescribed boundaries, powers, and functions, and census-designated places (CDP), which are densely populated areas that have no legally defined boundaries. There were 373 urbanized areas identified in the 1980 census. A total of 405 areas qualified as UAs in the US and Puerto Rico in the 1990 census (396 in the US and 9 in Puerto Rico). It is possible for an area to be designated an urbanized area between censuses on the basis of a special enumeration or census estimate.

The Census Bureau definition of urban can make it difficult for some areas to receive funding that have geographic eligibility restrictions. For example, the population within a city's statutory boundaries may be less than the 50,000 minimum, but with the suburbs included, the population might surpass that. These places are not generally considered metropolitan, and could encounter difficulties in obtaining federal funding for specifically designated urban programs. This has created pressure from some cities to be designated and the Office of Management and Budget has responded to create designated counties as metropolitan when they do not completely meet the qualifying criteria.

Places that meet the criteria for qualification as an urbanized area generally are included in their entirety. An exception is extended cities, within which the Census Bureau defines both urban and rural territory. An incorporated place is an extended city if it contains one or more sparsely settled areas, each consisting of contiguous census blocks that together total at least five square miles in land area and have a population density of less than 100 persons per square mile. The sparsely settled area(s) must total at least 25 percent of the land area of the incorporated place or encompass at least 25 square miles. For instance, Kansas City, MO is defined as an extended city. As a result, the densely settled portion of the city is within the Kansas

City urbanized area; the sparsely settled portions are excluded from the urbanized area. The 1990 census identified 280 incorporated places as extended cities nationwide.

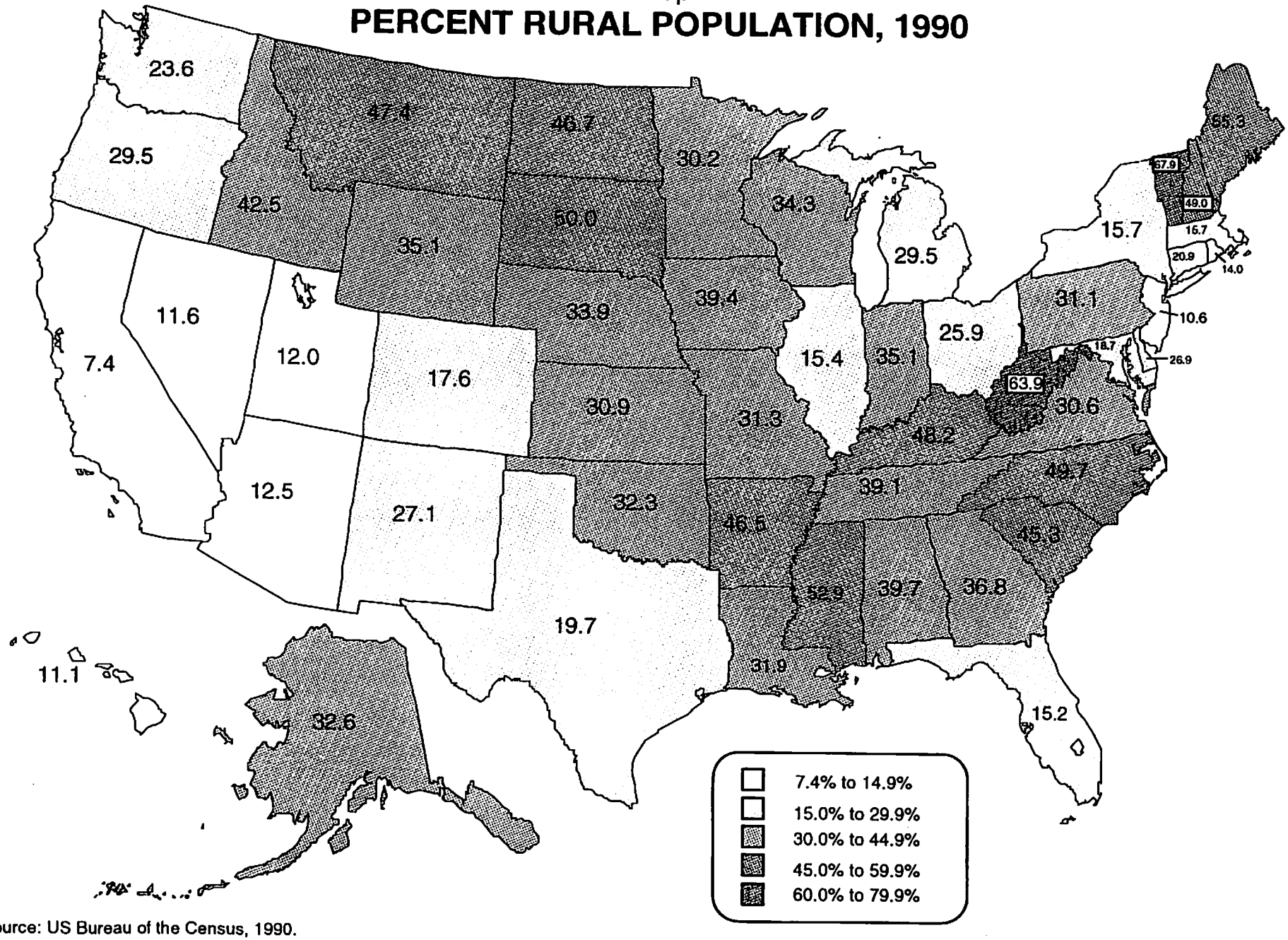
Prior to 1900 the lower population limit for a place to be considered urban was 8,000. This limit was lowered to 2,500 in 1900 and the census of 1910 listed named places as urban using this as the lower bound. In 1950, to accommodate the increasing growth of suburbs, incorporated areas with more than 1,000 persons per square mile were counted as urban instead of rural. This change led to a drop in the official rural population from 1940 to 1950 from 62 million to 54 million, almost a 13% decrease.

Rural population is currently divided into farm and non-farm classifications and populations were enumerated in these categories by the census as early as 1960. Farm population, under current census definitions, includes people living in rural areas on properties of one acre of land or more where $1,000 or more of agricultural products were sold (or would have been sold) in the past 12 months. In 1860 the farm population was 48.1 percent of the total, and in 1920, 30 percent. In the 1990 census the rural-farm population was 1.9 percent of total population; in 1996, the Census Bureau announced plans to curtail reporting of this classification.

Map 1 displays the proportion of each state's population classified as rural by the 1990 census and Table 2, the number and proportion of people classified as rural by the census by state. In the table it is possible to see that the "most rural" states according to the numbers of rural people, are Pennsylvania, Texas, and North Carolina. According to proportion of population classed as rural, Vermont, West Virginia and Maine are the top three. The table reveals some anomalies; for example, Delaware has more rural people than Nevada or Wyoming and New Jersey has more rural people than North and South Dakota combined.

Map 1

# PERCENT RURAL POPULATION, 1990




Source: US Bureau of the Census, 1990.

Produced by: North Carolina Rural Health Research Program, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill.

## Table 2. US Bureau of the Census, State Rural Populations, 1990

| State | Total Population | Rural Population | Percentage Pop. Rural |
|---|---|---|---|
| ALABAMA | 4,040,587 | 1,603,072 | 39.7 |
| ALASKA | 550,043 | 178,808 | 32.6 |
| ARIZONA | 3,665,228 | 458,255 | 12.5 |
| ARKANSAS | 2,350,725 | 1,092,704 | 46.5 |
| CALIFORNIA | 29,760,021 | 2,217,370 | 7.4 |
| COLORADO | 3,294,394 | 578,850 | 17.6 |
| CONNECTICUT | 3,287,116 | 686,512 | 20.9 |
| DELAWARE | 666,168 | 179,011 | 26.9 |
| DC | 606,900 | 0 | 0.0 |
| FLORIDA | 12,937,926 | 1,968,819 | 15.2 |
| GEORGIA | 6,478,216 | 2,381,672 | 36.8 |
| HAWAII | 1,108,229 | 122,711 | 11.1 |
| IDAHO | 1,006,749 | 428,271 | 42.5 |
| ILLINOIS | 11,430,602 | 1,760,316 | 15.4 |
| INDIANA | 5,544,159 | 1,947,953 | 35.1 |
| IOWA | 2,776,755 | 1,093,693 | 39.4 |
| KANSAS | 2,477,574 | 764,726 | 30.9 |
| KENTUCKY | 3,685,296 | 1,775,417 | 48.2 |
| LOUISIANA | 4,219,973 | 1,347,848 | 31.9 |
| MAINE | 1,227,928 | 679,572 | 55.3 |
| MARYLAND | 4,781,468 | 893,402 | 18.7 |
| MASSACHUSETTS | 6,016,425 | 946,798 | 15.7 |
| MICHIGAN | 9,295,297 | 2,740,098 | 29.5 |
| MINNESOTA | 4,375,099 | 1,319,082 | 30.2 |
| MISSISSIPPI | 2,573,216 | 1,362,110 | 52.9 |
| MISSOURI | 5,117,073 | 1,601,108 | 31.3 |
| MONTANA | 799,065 | 378,998 | 47.4 |
| NEBRASKA | 1,578,385 | 534,427 | 33.9 |
| NEVADA | 1,201,833 | 139,986 | 11.6 |
| NEW HAMPSHIRE | 1,109,252 | 543,644 | 49.0 |
| NEW JERSEY | 7,730,188 | 819,867 | 10.6 |
| NEW MEXICO | 1,515,069 | 410,443 | 27.1 |
| NEW YORK | 17,990,455 | 2,827,903 | 15.7 |
| NORTH CAROLINA | 6,628,637 | 3,293,044 | 49.7 |
| NORTH DAKOTA | 638,800 | 298,146 | 46.7 |
| OHIO | 10,847,115 | 2,809,558 | 25.9 |
| OKLAHOMA | 3,145,585 | 1,015,777 | 32.3 |
| OREGON | 2,842,321 | 839,123 | 29.5 |
| PENNSYLVANIA | 11,881,643 | 3,690,922 | 31.1 |
| RHODE ISLAND | 1,003,464 | 140,324 | 14 .0 |
| SOUTH CAROLINA | 3,486,703 | 1,581,345 | 45.3 |
| SOUTH DAKOTA | 696,004 | 348,271 | 50.0 |
| TENNESSEE | 4,877,185 | 1,908,212 | 39.1 |
| TEXAS | 16,986,510 | 3,348,809 | 19.7 |
| UTAH | 1,722,850 | 222,989 | 12.0 |
| VERMONT | 562,758 | 381,797 | 67.9 |
| VIRGINIA | 6,187,358 | 1,893,128 | 30.6 |
| WASHINGTON | 4,866,692 | 1,149,173 | 23.6 |
| WEST VIRGINIA | 1,793,477 | 1,145,608 | 63.9 |
| WISCONSIN | 4,891,769 | 1,680,037 | 34.3 |
| WYOMING | 453,588 | 159,042 | 35.1 |

## 2. *US Office of Management and Budget Metro-Nonmetropolitan System*

### a) Metropolitan Area Concepts and Standards

The US Office of Management and Budget defines Metropolitan Areas (MA) according to published standards that are applied to Census Bureau data. Map 2 highlights the counties in the United States ***not*** classified as metropolitan as of June 1995. Alaska and Hawaii have slightly different treatments with Alaska classified into boroughs and one county, Anchorage, which, due to its urban nature, is classified as metropolitan. The boroughs are easily considered county-equivalents, and all of Alaska except Anchorage is considered rural by states and most federal health programs. The major islands of Hawaii are county equivalent units and Oahu is classified as metropolitan with the other islands classed nonmetropolitan.

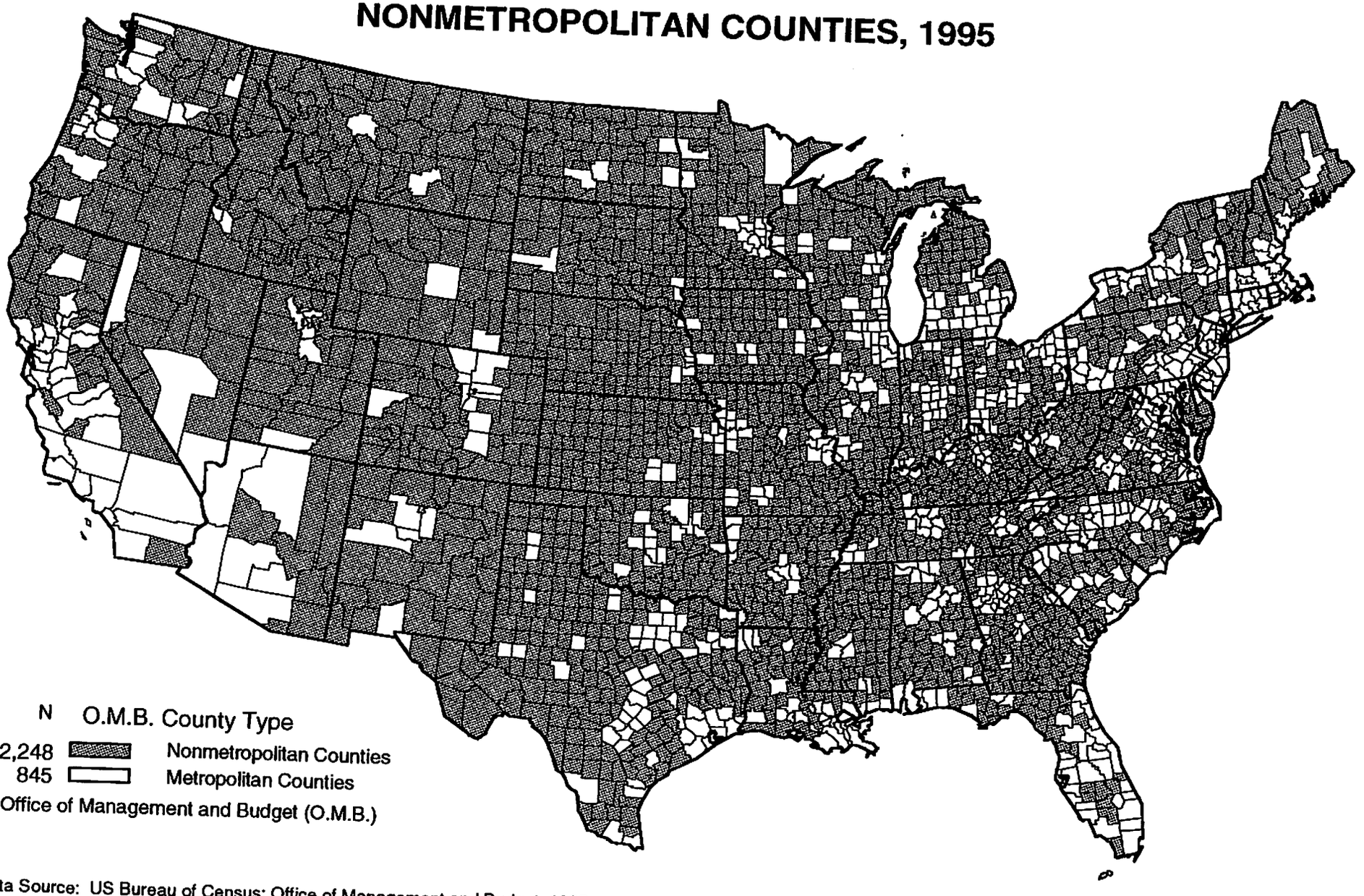
The general concept of an MA is that of a core area containing a large population nucleus, together with adjacent communities having a high degree of economic and social integration with that core. Currently defined MAs are based on the application of 1990 standards (which appeared in the Federal Register on March 30, 1990) to 1990 decennial census data. These MA definitions were announced by OMB effective June 30, 1993.

Standard definitions of metropolitan areas were first issued in 1949 by the then Bureau of the Budget (predecessor of OMB), under the designation "standard metropolitan area" (SMA). The term was changed to "standard metropolitan statistical area" (SMSA) in 1959, and to "metropolitan statistical area" (MSA) in 1983. The current collective term "metropolitan area" (MA) became effective in 1990. OMB has been responsible for the official metropolitan areas since they were first defined, except for the period 1977 to 1981, when they were the responsibility of the Office of Federal Statistical Policy and Standards in the US Department of Commerce. The standards for defining metropolitan areas were modified in 1958, 1971, 1975, 1980, and 1990.

Metropolitan counties are not synonymous with wholly urban counties; metropolitan counties contain significant rural populations (as defined by the Census) and nonmetropolitan counties have significant urban populations. Map 3 displays the proportion of the population of 1994 nonmetropolitan counties classified as urban in the 1990 Census.

Map 2

# NONMETROPOLITAN COUNTIES, 1995

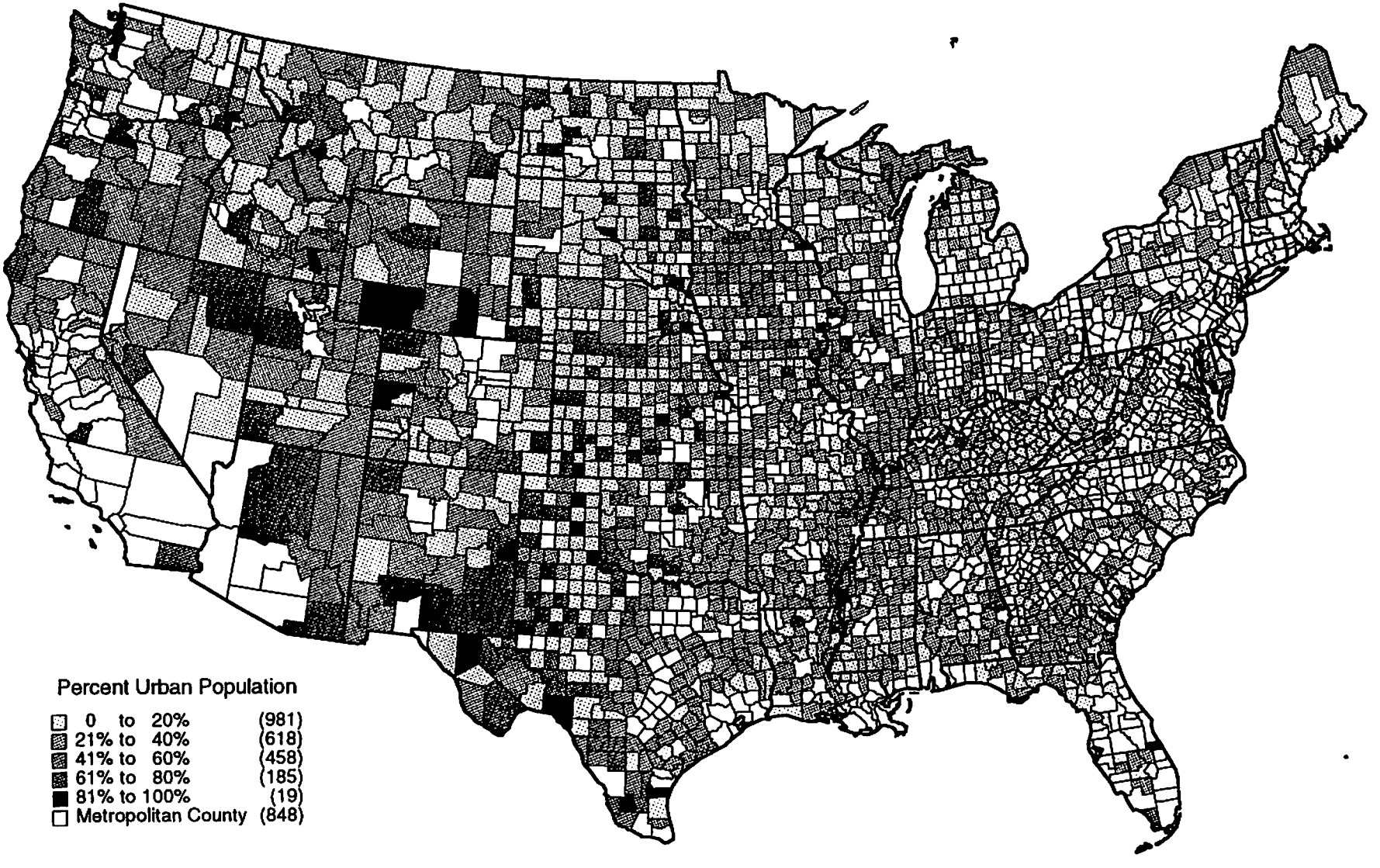



)ata Source: US Bureau of Census; Office of Management and Budget, 1995.
'roduced by: NC Rural Health Research Program, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill.

Map 3

# NONMETROPOLITAN COUNTIES, 1994

## PERCENT URBAN POPULATION




**Note: The number of metropolitan counties depicted here excludes 10 independent city FIPS codes in VA.**

Source: US Bureau of Census, Office of Management and Budget, 1994.
Produced by: North Carolina Rural Health Research Program, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill.

Table 3. Rural, Urban, Metropolitan and Nonmetropolitan Population of the United States, 1990

| | Metropolitan | Nonmetropolitan | Total |
|---|---|---|---|
| Rural | 26,525,155<br>13.8% of Metro | 35,133,175<br>62.7% of Nonmetropolitan | 61,658,330<br>(24.8% of total) |
| Urban | 166,201,175<br>86.2% of Metro | 20,850,368<br>37.3% of Nonmetropolitan | 187,051,543<br>(63.2% of total) |
| Total | 192,726,330<br>(77.5% of total) | 55,983,543<br>(22.5% of total) | 248,709,873<br>100% |

b) Defining MSAs, CMSAs, and PMSAs.

The Metropolitan Area classification system divides Metropolitan Statistical Areas into four types: metropolitan counties, which are often referred to as MSAs but they may be part of consolidated metropolitan statistical areas (CMSAs), primary metropolitan statistical areas (PMSAs) and New England county metropolitan areas (NECMAs). An MSA may be made up of one county but most MSAs are made up of multiple counties. Multiple MSAs may be joined into a CMSA and portions of an MSA or CMSA may make up the PMSA. The current standards provide that each MSA must include at least:

(a) One city with 50,000 or more inhabitants, or

(b) A Census Bureau-defined urbanized area (of at least 50,000 inhabitants) and a total metropolitan population of at least 100,000 (75,000 in New England).

Under these standards the county (or counties) that contain(s) the largest city becomes the central county (counties), along with any adjacent counties that have at least fifty percent of their population in the urbanized area surrounding the largest city. Additional "outlying counties" are included in the MSA if they meet specified requirements of commuting to the central counties and other selected requirements of metropolitan character (such as population density and percent urban). In New England, the MSAs are defined in terms of cities and towns and townships rather than counties.

An area that meets these requirements for recognition as an MSA and also has a population of one million or more may be recognized as a CMSA if: 1) separate component areas can be identified within the entire area by meeting statistical criteria specified in the standards, and 2) local opinion indicates there is support for the component areas. If recognized, the component areas are designated PMSAs, and the entire area becomes a CMSA. The PMSAs, like the CMSAs that contain them, are composed of individual or groups of counties outside New England, and cities and towns within New England. If no PMSAs are recognized, the entire area is designated

as an MSA. As of the June, 1993 OMB announcement, there were 250 MSAs, and 18 CMSAs comprising 73 PMSAs in the US (In addition, there were 3 MSAs, 1 CMSA, and 3 PMSAs in Puerto Rico; MAs in Puerto Rico do not appear in these tables.) The largest city in each MSA/CMSA is designated a "central city," and additional cities qualify if specified requirements are met concerning population size and commuting patterns. The title of each MSA consists of the names of up to three of its central cities and the name of each State into which the MSA extends. However, a central city with less than one-third the population of the area's largest city is not included in an MSA title unless local opinion desires its inclusion. Titles of PMSAs also typically are based on central city names but in certain cases consist of county names. Generally, titles of CMSAs are based on the names of their component PMSAs.

c) Defining NECMAs.

The OMB defines NECMAs as a county-based alternative for the city- and town-based New England MSAs and CMSAs. The NECMA for an MSA or CMSA includes:

1) the county containing the first-named city in that MSA/CMSA title (this county may include the first-named cities of other MSAs/CMSAs as well), and 2) each additional county having at least half its population in the MSAs/CMSAs whose first-named cities are in the previously identified county. NECMAs are not identified for individual PMSAs. There are twelve NECMAs, including one for the Boston-Worcester-Lawrence CMSA and one for the portion of the New York-Northern New Jersey-Long Island CMSA in Connecticut. Central cities of a NECMA are those cities in the NECMA that qualify as central cities of an MSA or a CMSA. NECMA titles derive from names of central cities of MSAs/CMSAs.

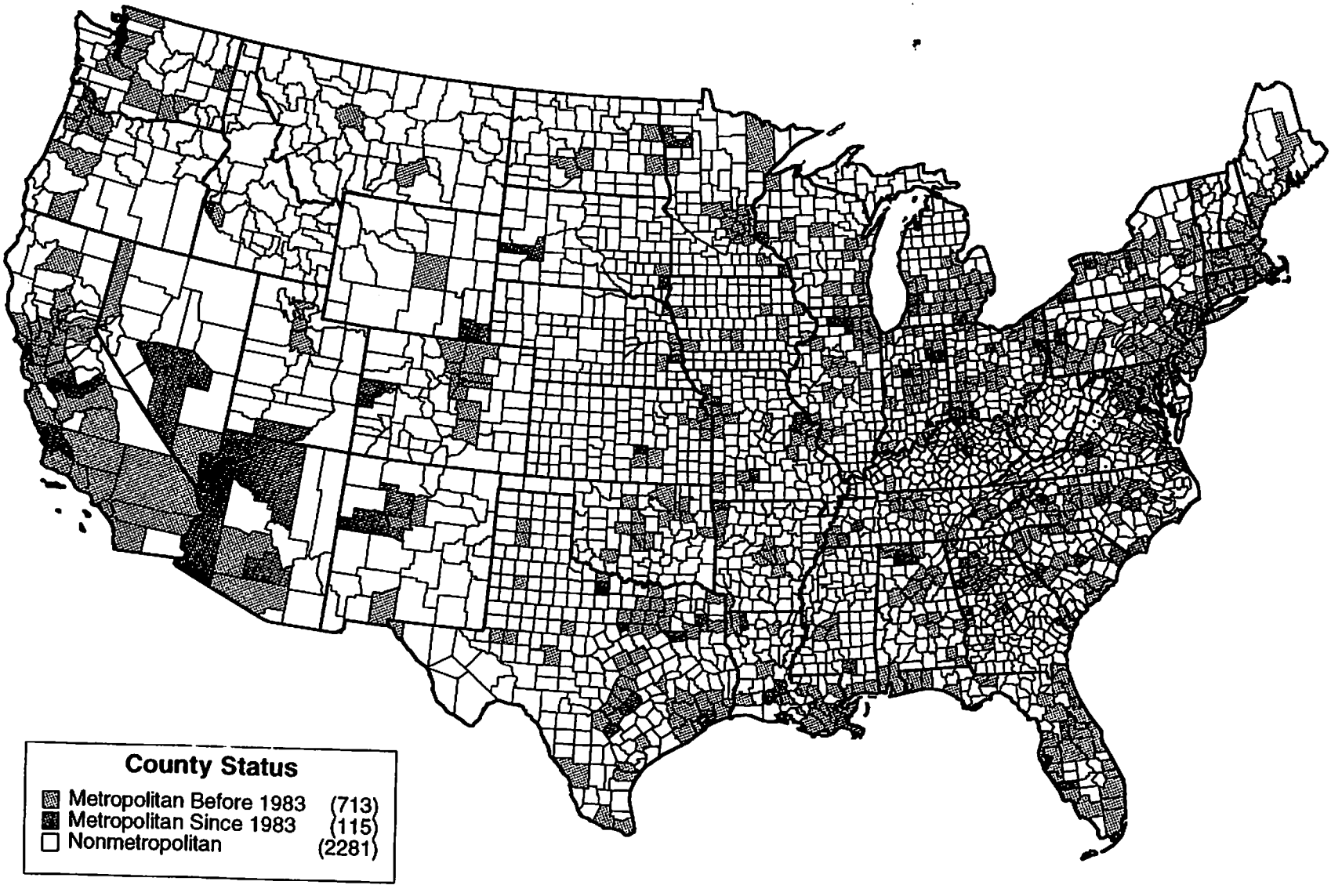
d) Changes in MA Definitions Over Time.

Changes in the definitions of MAs since the 1950 census have consisted chiefly of (1) the recognition of new areas as they reached the minimum required city or area population; and (2) the addition of counties or New England cities and towns to existing areas as new census data showed them to qualify. Also, former separate MAs have been merged with other areas, and occasionally territory has been transferred from one MA to another or from an MA to nonmetropolitan territory. Map 4 depicts the counties that have changed status from nonmetropolitan to metropolitan since 1983; 118 counties have been redesignated since June 30, 1983, this includes three redesignated between June 30, 1994 and June 30, 1995.

The large majority of changes have taken place on the basis of analysis of decennial census data, although the MA standards specify the bases for intercensal

Map 4

# COUNTIES DESIGNATED METROPOLITAN SINCE 1983




Source: Area Resource File, selected years; US Bureau of Census, 1995.
Produced by: North Carolina Rural Health Research Program, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill.

updates. Because of these changes in definition, users must be cautious in comparing metropolitan area data for different years. For some purposes, comparisons of data for MSAs as defined at given dates may be appropriate. In 1983, there were 275 designated MSAs, which included about 76.6 percent of the US population; that proportion has increased slightly by 1990 to 77.5 percent. In 1993, nonmetropolitan counties make up 77 percent of all counties, or 2,522 out of 3,139 counties or county-equivalent units.

MSAs often include more than one county in their designation. Outlying counties must meet specified levels of commuting to the central county and must also comply with standards regarding population density in order to be included in the MSA. Problems arise, though infrequently, when MSA county lines do not conform to urban or suburban development. For example, in the west, large unpopulated areas are included in MSAs due to the presence of an urban area. Alternatively, an MSA may exclude suburban areas that are just outside of the county line.

MSAs are used by federal agencies for collecting, analyzing, and publishing data and for implementing programs and resource allocation (though the criteria are not specifically designed for this). One example is the use of MSA status for the categorization of hospitals as either rural or urban for purposes of Medicare reimbursement. The business community utilizes MSAs in investment decisions and market feasibility studies; the data, however, are not intended for this use and OMB will not alter them, nor provide support for non-statistical uses.

### 3. *Classifications of Rurality Within Federal Designations*

#### a) Rural-Urban Continuum Codes for Metropolitan and Nonmetropolitan Counties.

Rural-urban continuum codes provide a one-digit code for each of 10 classifications for all US counties. The classification scheme groups metropolitan counties into four categories by size, and nonmetropolitan counties into six categories by degree of urbanization and nearness to a metropolitan area. The codes were originally developed in 1975, and were updated in 1983 and slightly revised in 1988. They are sometimes called "Beale Codes" after Calvin Beale who contributed to their development. These codes allow researchers to break county data into sub-groups beyond the basic metropolitan–nonmetropolitan classification. This is especially useful for the analysis of factors or characteristics of nonmetropolitan areas that are related to population density and metropolitan influence. Within this scheme, all US counties and county equivalents are grouped according to the US Office of Management and Budget (OMB) metropolitan-nonmetropolitan classification using

the Metropolitan Area system. Metropolitan counties are further classified by the population size of the entire MSA of which they are a part; then counties in MSAs of one million or more are assigned a code by whether they are central or more peripheral counties. For those counties classified as nonmetropolitan, counties adjacent to an MSA are identified. Adjacent counties 1) are physically adjacent to one or more MSAs and 2) have at least two percent of the employed labor force in the nonmetropolitan county commuting to central metropolitan counties. Metropolitan counties are classified according to the aggregate size of their urban populations. Finally, nonmetropolitan counties not meeting the above criteria for adjacency are classified as "not adjacent." (See Table 4)

**Table 4. USDA, ERS Rural-Urban Continuum Codes**

| Code | Metropolitan Counties: |
|---|---|
| 0 | Central counties of metropolitan areas of 1 million population or more |
| 1 | Fringe counties of metropolitan areas of 1 million population or more |
| 2 | Counties in metropolitan areas of 250,000 to 1 million population |
| 3 | Counties in metropolitan areas of fewer than 250,000 population |
| **Code** | **Nonmetropolitan Counties:** |
| 4 | Urban population of 20,000 or more, adjacent to a metropolitan area |
| 5 | Urban population of 20,000 or more, not adjacent to a metropolitan area |
| 6 | Urban population of 2,500 to 19,999, adjacent to a metropolitan area |
| 7 | Urban population of 2,500 to 19,999, not adjacent to a metropolitan area |
| 8 | Completely rural or less than 2,500 urban population, adjacent to a metropolitan area |
| 9 | Completely rural or less than 2,500 urban population, not adjacent to a metropolitan area |

(Source: Butler and Beale, 1994)

Map 5 depicts the counties by the Rural-Urban Continuum Code designations as of 1994.

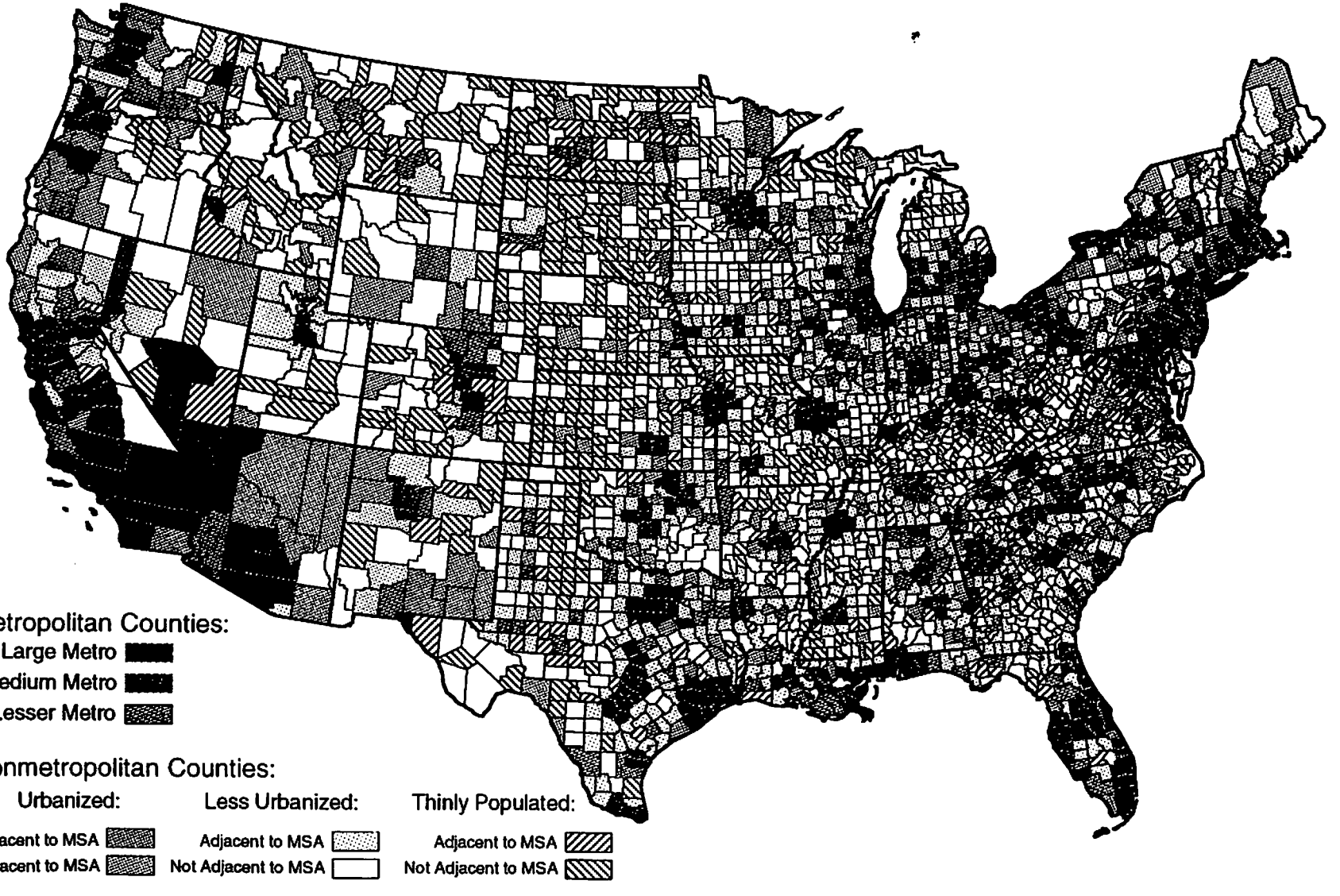
b) Urban Influence Codes (Parker-Ghelfi codes)

The US Department of Agriculture has worked with county-level data systems and developed several variants over the years; the work of Calvin Beale and Glenn Fuguitt cover many of these variations (Beale and Johnson, 1995; Butler and Beale, 1994; Fuguitt, 1975). In 1980, the USDA circulated a classification scheme which

Map 5

# RURAL-URBAN CONTINUUM CODES, 1994

Metropolitan and Nonmetropolitan Counties




Source: Rural Economy Division, Economic Research Service, US Department of Agriculture, 1995.
Produced by: North Carolina Rural Health Research Program, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill.

described nonmetropolitan counties according to their "accessibility to metropolitan centers and small cities" (Deavers and Brown, 1980). The problem of intercounty relationships has been one that has challenged analysts for some time. Responding to the need to consider intercounty flows outside metropolitan areas, Linda Ghelfi and Timothy Parker of the Economic Research Service in the USDA proposed a series of "Urban Influence" codes to help with the categorization of places in such a way as to reflect their economic fundamentals as opposed to their geographical centrality. The new system proposed by Parker and Ghelfi is based on the theory that access to larger metropolitan economies, such as centers of information, communication, trade, and finance, provides an economic development advantage for smaller nonmetropolitan economies (Ghelfi and Parker, 1995).

The research by Ghelfi and Parker is undergirded by central place theory, a group of theories originated by two economist-geographers, Christaller and Losch (Johnston, 1983). The central premise of central place theory is that the size, spacing and function of places is related to the goods and services they provide for their hinterlands. These three characteristics are said to be directly related to the number and order of services provided within the settlement in question. Higher order places market a wide range of goods and services and lower order places market fewer goods and services. The threshold of a good or service is the minimum population required to support that good or service. Centers with large populations can support a wide range of goods and services, while those with small populations cannot.

A featureless, barrier-free plain is assumed, along with equally distributed population and resources, in order to control for any other than economic forces. Based on these characteristics, central place theory postulates that cities will develop a pattern of heavily-populated central places and less-populated peripheral places. Entrepreneurs place their services in order to maximize profit and minimize costs. In this way a hierarchy of settlements is established.

In reality, central places have non-uniform market areas for goods and services. Higher population densities make certain trade centers' market areas smaller than those in outlying areas. Agglomeration economies also may add an additional factor that Losch and Christaller failed to consider. In agglomeration economies, firms and factories in related industries often locate together in order to minimize costs. This process puts smaller places, which may not be able to utilize this type of adjustment, at a distinct disadvantage as far as size of service area. Also, if transportation of goods is easier or more difficult for various reasons, market or service areas will be either lengthened or shortened accordingly. With this in mind, it should become clear that rural areas, more than others, will face differing levels of economic opportunity

depending on the density of their settlements, their location relative to resources needed by various industries, and their proximity to larger communities.

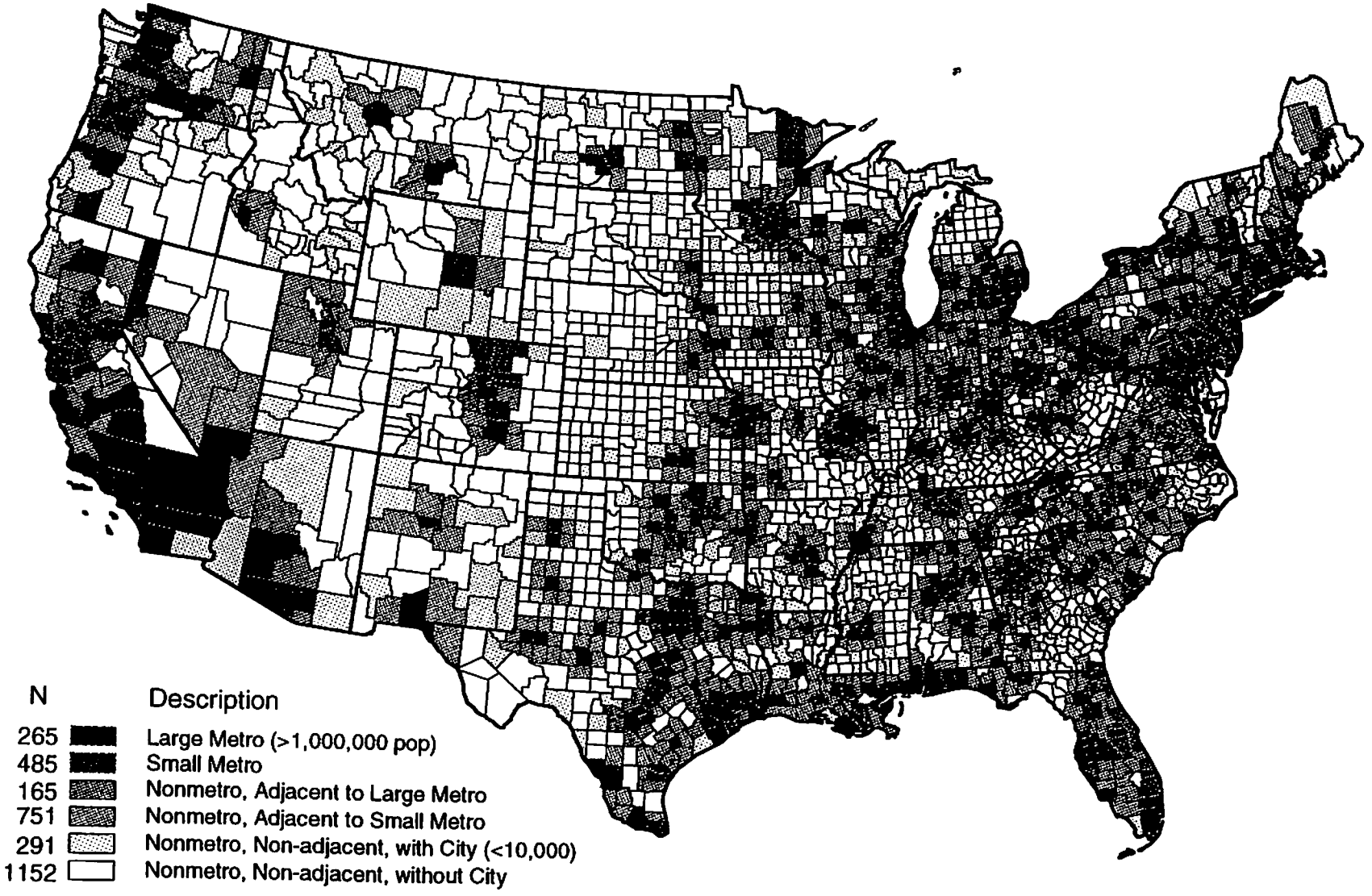
Urban Influence codes take into account two of these factors: the region's largest city and proximity to other, larger communities. The codes divide the 3,141 counties and independent cities in the United States into 8 groups. Metropolitan counties are classified by the size of the metropolitan area—populations of more than one million and those with less. Nonmetropolitan counties are classified by their adjacency to these metropolitan areas—adjacent to a large metropolitan area, adjacent to a small metropolitan area, and not adjacent to a metropolitan area. Within each of these categories, nonmetropolitan counties are further classified by the size of their own largest city—those containing all or part of a city of 10,000 or more and those containing no part of a city that large.

While Urban Influence codes break metropolitan areas only into large and small, the continuum codes differentiate central and fringe counties within the large category and two sizes of metropolitan areas within the small category. The size classes in the small metropolitan category were not incorporated into urban influence codes as an analysis of population and employment growth in nonmetropolitan counties adjacent to the two sizes of metropolitan areas showed little difference in the effect from each.

It is in the groupings of nonmetropolitan counties that the two classifications differ substantially. As one would expect, the *urbanized* continuum counties mostly fall into the *with own city* urban influence category. However, many of the *less urbanized* continuum counties also have their *own city*. Map 6 depicts the Urban Influence or Urbanicity codes as originally proposed by Parker and Ghelfi when applied to 1980 data and Map 7 shows the same codes when applied to 1990 data. The system has since been revised twice, creating 8 then nine categories of counties. The nine-level map is included as Map 8.

Map 6

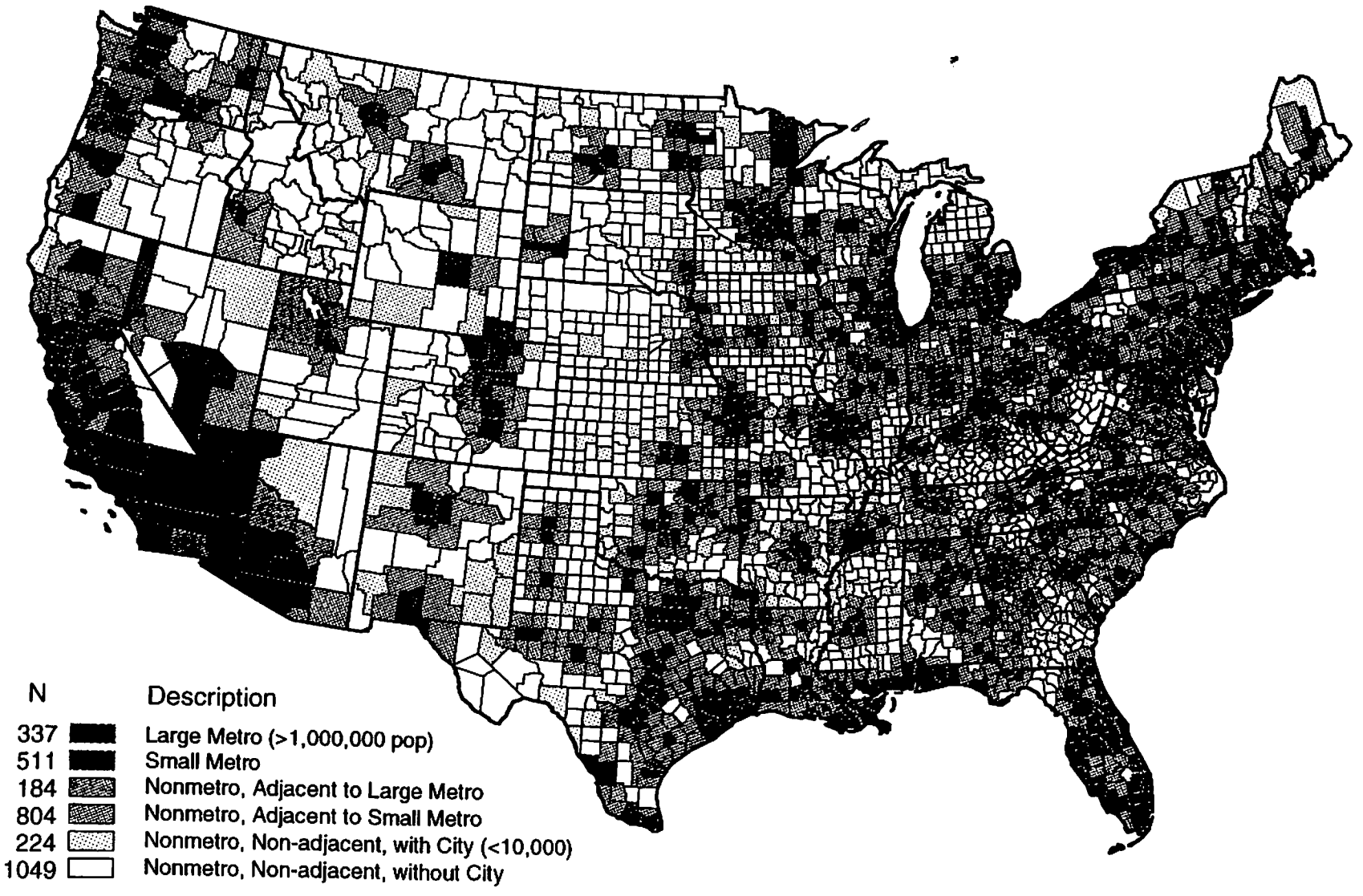
# URBAN INFLUENCE CODES, 1980




Source: Rural Economy Division, Economic Research Service, US Department of Agriculture, 1995.
Produced by: North Carolina Rural Health Research Program, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill.

Map 7

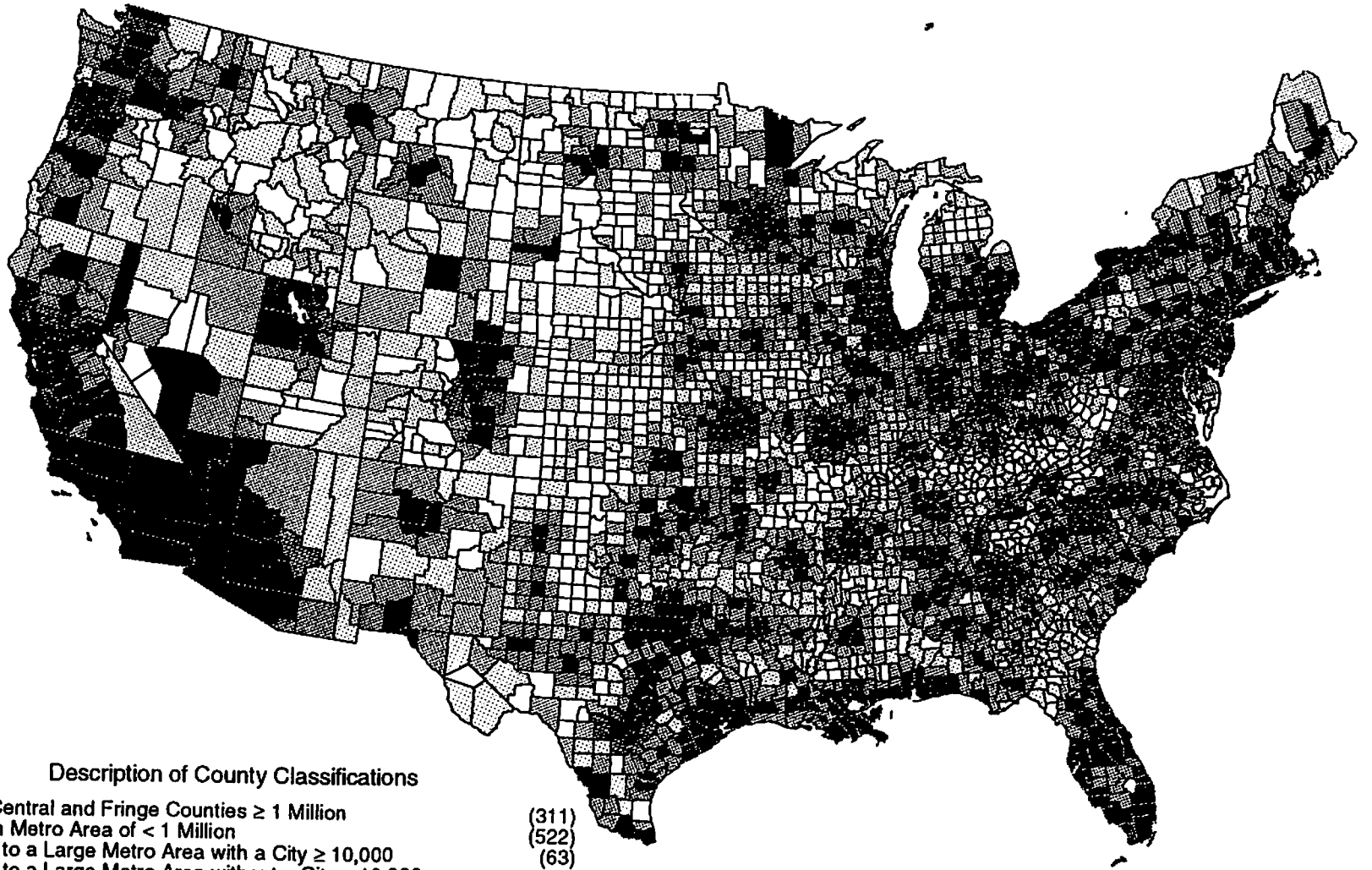
# URBAN INFLUENCE CODES, 1990




Source: Rural Economy Division, Economic Research Service, US Department of Agriculture, 1995.
Produced by: North Carolina Rural Health Research Program, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill.

Map 8

# URBAN INFLUENCE CODES, 1993



Description of County Classifications

| | |
|---|---|
| Large - Central and Fringe Counties ≥ 1 Million | (311) |
| Small - In Metro Area of < 1 Million | (522) |
| Adjacent to a Large Metro Area with a City ≥ 10,000 | (63) |
| Adjacent to a Large Metro Area without a City ≥ 10,000 | (123) |
| Adjacent to a Small Metro Area with a City ≥ 10,000 | (185) |
| Adjacent to a Small Metro Area without a City ≥ 10,000 | (629) |
| Not Adjacent to a Metro Area and with a City ≥ 10,000 | (226) |
| Not Adjacent to a Metro Area and with a City 2,500 - 9,999 | (527) |
| Not Adjacent to a Metro Area and without a City or a City < 2,500 | (523) |

Source: Rural Economy Division,
Economic Research Service,
US Department of Agriculture, 1996.
Produced by: North Carolina Rural Health Research Program,
Cecil G. Sheps Center for Health Services Research,
University of North Carolina at Chapel Hill.

Table 5. USDA Urban Influence Codes

| Code | 6-level System | 9-level System |
|---|---|---|
| 0 | Large metropolitan (>1 million) | |
| 1 | Small metro | Large—Central and fringe counties of metropolitan areas of 1 million population or more |
| 2 | Nonmetropolitan, adjacent to large metro | Small - Counties in metropolitan areas of fewer than 1 million population |
| 3 | Nonmetropolitan, adjacent to small metro | Adjacent to a large metropolitan area with a city of 10,000 or more |
| 4 | Nonmetropolitan, nonadjacent with city >10,000 | Adjacent to a large metropolitan area without a city of at least 10,000 |
| 5 | Nonmetropolitan, nonadjacent, without city | Adjacent to a small metropolitan area with a city of 10,000 or more |
| 6 | | Adjacent to a small metropolitan area without a city of at least 10,000 |
| 7 | | Not adjacent to a metropolitan area and with a city of 10,000 or more |
| 8 | | Not adjacent to a metropolitan area and with a city of 2,500 to 9,999 population |
| 9 | | Not adjacent to a metropolitan area and with no city or a city with a population less than 2,500 |

Note: Adjacent counties are physically adjacent to one or more MSAs and have at least 2 percent or more of the employed labor force in the nonmetropolitan county commuting to central metropolitan counties. The metro-nonmetropolitan definition is based on Office of Management and Budget definition as of June 1, 1993.

c) ERS Typology (Primary Economic Activity)

The Economic Research Service (ERS) of the US Department of Agriculture (USDA) has developed a rural typology that provides a way to identify groups of US nonmetropolitan counties sharing important economic and policy traits. Through this typology, the ERS provides a way to geographically identify groups of nonmetropolitan counties sharing important economic and policy-relevant traits and information about economic and sociodemographic conditions that differentiate the county groups. The original typology summarized the diversity of rural economic and social conditions among nonmetropolitan counties in 1979 as seven major overlapping themes or types. Four county types reflected dependence on a particular economic specialization: farming, manufacturing, mining, and government. Three county types—persistent poverty, federal lands, and retirement-destination—reflected other special policy-relevant themes. A residual type, labeled unclassified counties, included those counties that met the criteria for none of the types. An update of the typology, using the same concepts and definitions updated to 1986 (where possible), was created to show how the economic and social structure of nonmetropolitan areas changed from 1979. A substantial increase in the number of unclassified counties in the 1986 update emphasized the need to consider both conceptual and methodological

changes in the typology that would maximize its utility during the 1990s. As a result, the third version of the ERS typology, updated in 1993, has been revised and expanded (Cook and Mizer, 1994).

The typology classified counties designated as nonmetropolitan in 1993 into one of six *non*-overlapping economic types: farming-dependent, mining-dependent, manufacturing-dependent, government-dependent, services-dependent, and non-specialized. Where appropriate, counties were also classified into five potentially overlapping policy types: retirement-destination, federal lands, commuting, persistent poverty, and transfers-dependent. The overlaps occur infrequently and usually overlaps occur between only two types. In West Virginia, 12 of the 43 counties have two classifications and three have three. The counties with three overlaps are all commuting, persistent poverty and transfer dependent. More detail on each economic type and policy type is provided below. Map 9 illustrates the distribution of the ERS typology for Persistent Poverty and Farming Dependent classifications.

Counties are grouped according to the economic and policy traits they have in common with 6 different economic activities and five policy areas.

**Table 6. Classification for USDA ERS System**

| Six Economic Activities | Five Policy Areas |
|---|---|
| 1. Farming-Dependent | 1. Retirement-Destination |
| 2. Mining-Dependent | 2. Federal Lands |
| 3. Manufacturing-Dependent | 3. Commuting |
| 4. Government-Dependent | 4. Persistent Poverty |
| 5. Services-Dependent | 5. Transfers-Dependent |
| 6. Non-Specialized | |

The economic activities do not overlap in determining the main activity of the area; the policy areas do. For instance, a county can be considered a heavily settled retirement area as well as have a majority of residents that commute outside their county for employment purposes. The ERS methodology is based on the premise that understanding specific economic activities and the sociodemographic attributes of counties will assist in making the best policy decisions for that county. Brief descriptions of each of the criteria are included below:

***ECONOMIC***

**Farming-dependent (556 counties)**

Counties in which farming contributed an annual average of at least 20 percent of total labor and proprietor income between the years of 1987 to 1989. Mostly located in mid-west; population and farming activity decreased in mid-80s due to high outmigration of adults.

**Mining-dependent (146)**

Mining contributed an annual average of at least 30 percent of total labor and proprietor income between years 1987 to 1989. Mostly in south or west. Many lost population and declined economically in 1980s.

**Manufacturing-dependent (506)**

Manufacturing was responsible for at least 30 percent of total labor and proprietor income between 1987 and 1989. Accounts for 31 percent of nonmetropolitan population. These counties are typically closer to metropolitan areas; have more population density. Three-fifths of these counties are located in southeast.

**Government-dependent (244)**

Government activities contributed at least 25 percent of annual average total labor and proprietor income between 1978 to 1989. Counties which depended on local, state and federal government jobs. 75 percent of earnings stemmed from state and local jobs, thus leaving 25 percent from federal jobs. These counties are scattered throughout the United States and there was an increase of 433,000 new jobs during the 80s.

**Services-dependent (323)**

Service activities, defined as private and personal services, agricultural services, wholesale and retail trade, finance and insurance, transportation and public utilities, accounted for at least 50 percent of the annual average total labor and proprietor income over the years 1987 to 1989. These counties experienced a 24 percent growth in the 1980s; are scattered throughout United States. The counties' degree of closeness to a metropolitan area is related to what service the county performed (i.e. tourist activities, service centers for residential areas, etc.).

**Non-specialized (484)**

Counties which do not fall into any of the other economic categories and are thus classified as non-specialized between 1987 and 1989. Majority appear in the south, though fairly evenly dispersed throughout the United States. Two-thirds of these counties experienced job growth during the 1980s.

***POLICY TYPES***

**Retirement-destination (190 counties)**

There was an increase by at least 15 percent of the population aged 60 and over during 1980 to 1990 due to an in-migration of people. More than 80 percent of these counties are located in the south or west. These counties also have recreational areas, thus attracting younger crowds as well. They experienced the highest growth of any type.

**Federal lands (270)**

Counties in which at least 30 percent of the land was federally owned in 1987; 76 percent of these counties are located in the west. Have larger land area and less population than any other type. Seventy percent of jobs in federal land counties were in the services or government sector, thus there was growth in the 1980s.

**Commuting counties (381)**

At least 40 percent of workers aged 16 or older commuted to employment outside their county of residence. 65 percent of these are in the south, 28 percent in midwest. Are more likely to share borders with metropolitan counties. The population includes a higher than average amount of economically at-risk people.

**Persistent poverty (535)**

Counties in which at least 20 percent of the population had poverty-level income in the four years: 1960, 1970, 1980, and 1990. Almost 83 percent are in the south. The main distinguishing features of these counties are the disproportionate share of economically at-risk people including minorities, female headed households, high school drop-outs and people with disabilities. Income in these counties was much lower and unemployment much higher than in all other nonmetropolitan counties.

**Transfers-dependent (381)**

Counties in which income from transfer payments (meaning federal, state and local entitlements) constituted at least an annual average of 25 percent of total personal income between the years 1987 to 1989. Most unearned income originated from social security, unemployment insurance, Medicare and Medicaid, food stamps, AFDC and government benefits/pensions. These counties are concentrated in the south, but are also located in the midwest. Three-fourths of these counties fall under the category of persistent poverty as well, thus they share many of the same sociodemographic features, but with an increasing amount of elderly. Job growth in these counties is slow.

d) Pickard Codes (Appalachian Regional Commission)

The Pickard Codes describe a county classification system that divides counties into 11 groups, a compromise that seeks to maintain relative simplicity while being more accurate descriptively. The system was developed by Dr. Jerome Pickard of the Appalachian Regional Commission (ARC). The basic goal is to apply a system to both metropolitan and nonmetropolitan county areas that reflects the development character within each area. The county type is determined separately from the county's dominant economic sector or industry, and important measures within the system are based on data from the 1980 census: population size, urbanization, commuting patterns of all workers and relationships between workplace and place of residence (Pickard, 1988).

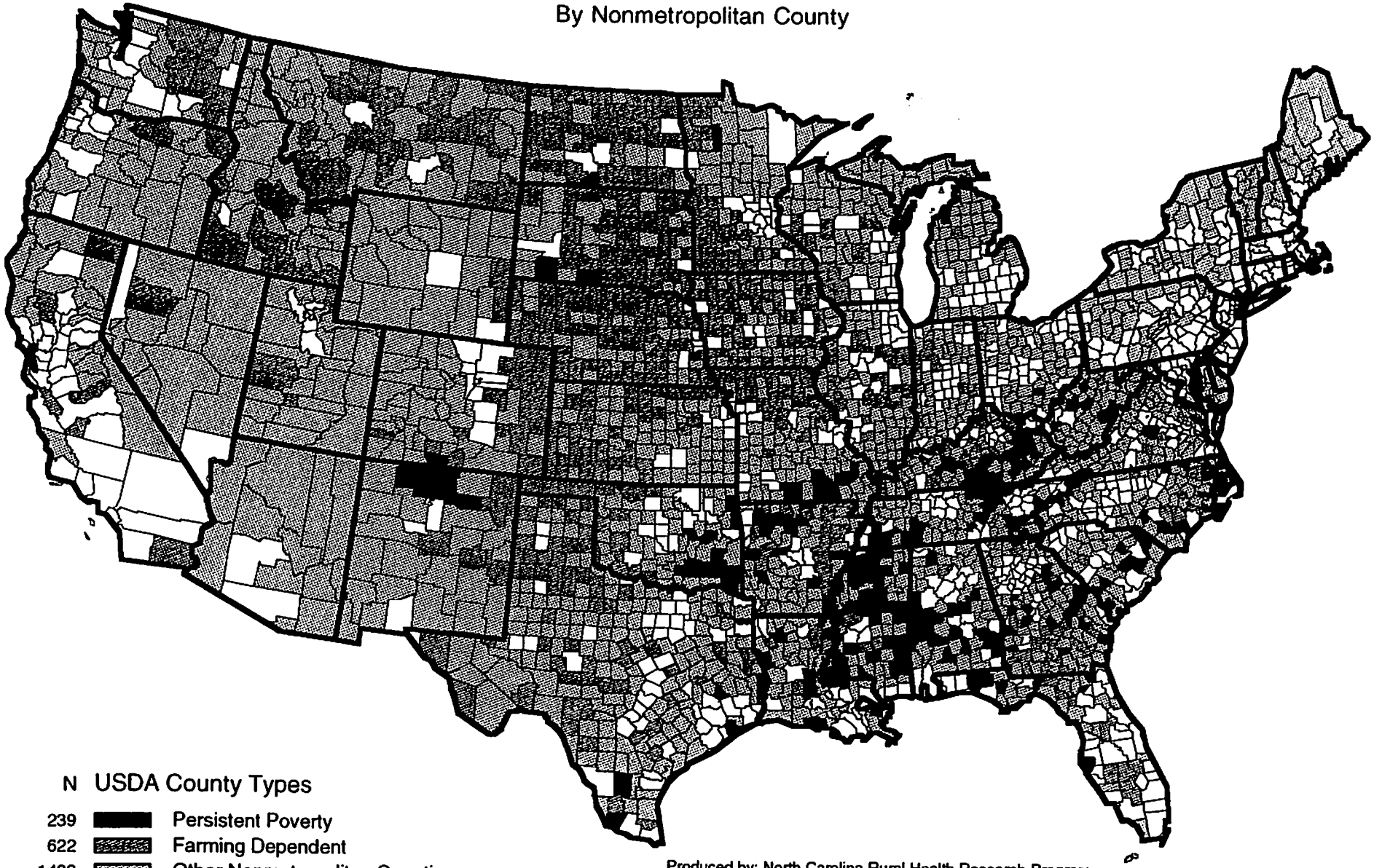
The official OMB classification of counties into metropolitan and nonmetropolitan groups can be useful for some purposes, but is so broad as to be misleading in some cases. For example, the metropolitan/nonmetropolitan classification system places Alleghany County, Pennsylvania, home of Pittsburgh, and Scott County, Virginia, home of Gate City, in the same metropolitan category. Yet Pittsburgh is clearly a metropolis, while Gate City is not. Map 10 illustrates the distribution of the Pickard codes among nonmetropolitan counties for the Nonmetropolitan Rural Commuting with Center and the Nonmetropolitan Rural County classifications.

In the Pickard system, metropolitan counties are separated into five categories, based on the employment/resident worker ratio (E/R Ratio)—the number of workers working in the county divided by the number of workers residing in the county—and outcommuting statistics. The five categories are: centers, satellites, commuting satellites, suburban counties, and dormitory counties. Centers, satellites, and commuting satellites are more urbanized, offer more jobs, and have less outcommuting than suburban and dormitory counties. Centers and satellites have less than 30 percent of their workers working outside the county, while commuting satellites, suburban, and dormitory have 30 percent or more of their workers working outside the county.

Map 9

# USDA COUNTY TYPES: PERSISTENT POVERTY AND FARMING DEPENDENT

By Nonmetropolitan County



N USDA County Types

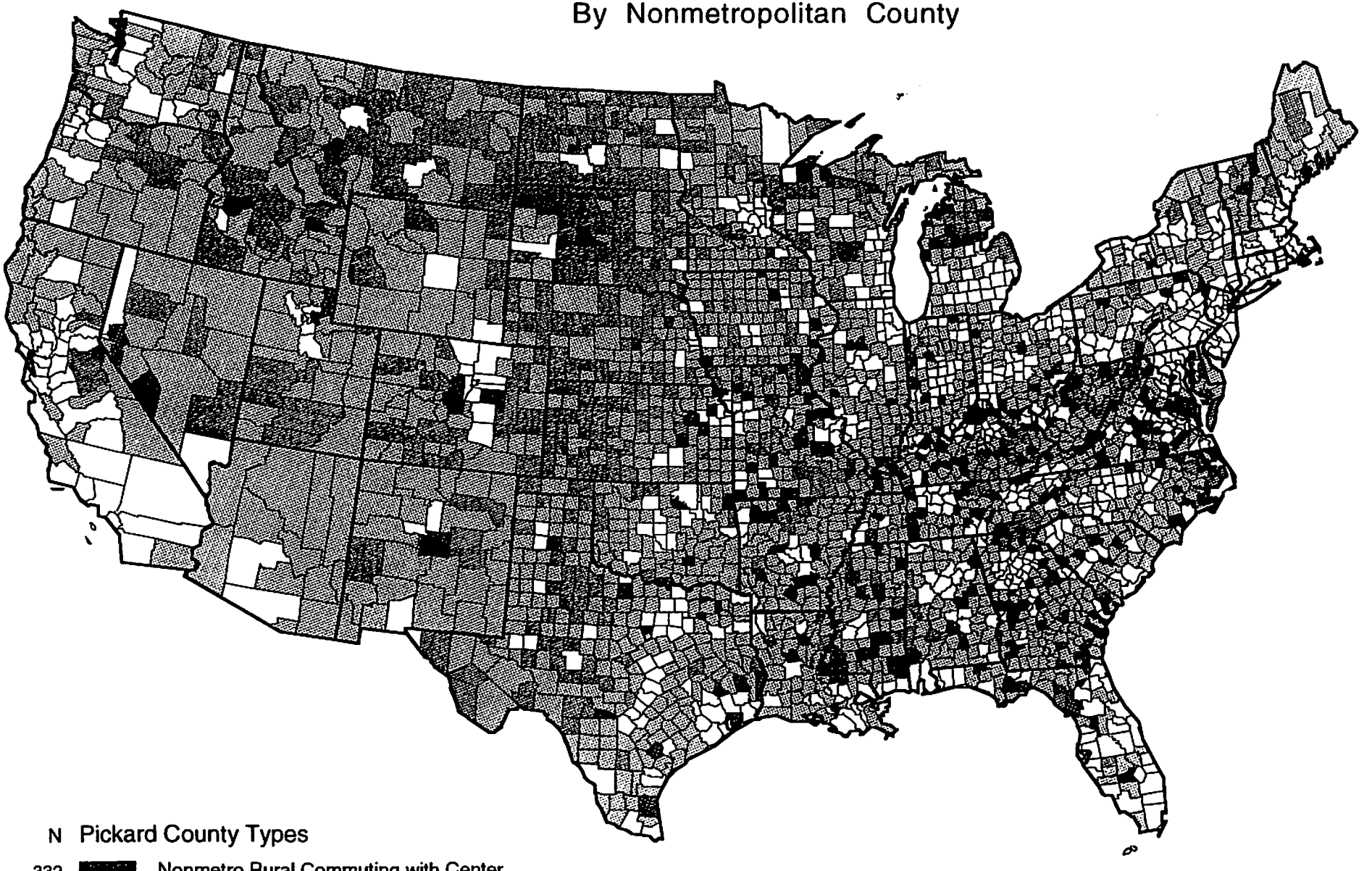
| | |
|---|---|
| 239 | Persistent Poverty |
| 622 | Farming Dependent |
| 1483 | Other Nonmetropolitan Counties |
| | Metropolitan Counties |

Produced by: North Carolina Rural Health Research Program,
Cecil G. Sheps Center for Health Services Research,
The University of North Carolina at Chapel Hill.
Data Source: Area Resource File, ODAM, BHPr, HRSA, PHS,
DHHS, March 1990.

Map 10

# SELECTED PICKARD COUNTY TYPES

By Nonmetropolitan County



N Pickard County Types

| | | |
|---|---|---|
| 332 | | Nonmetro Rural Commuting with Center |
| 491 | | Nonmetro Rural County |
| 1521 | | Other Nonmetropolitan Counties |
| | | Metropolitan Counties |

Produced by: North Carolina Rural Health Research Program,
Cecil G. Sheps Center for Health Services Research,
University of North Carolina at Chapel Hill.
Source: Appalachian Resource Commission.

In 1986, "Metropolitan Centers" in the Pickard system had the largest average population of all county types. These counties also had a net commuting inflow or a balance of commuters, with an average of 91 percent of the resident workers employed in the same county where they lived, the highest proportion of any county type. Metropolitan satellites are usually adjacent to metropolitan centers. An average of 20 percent of their total resident workers commuted outside the county to work. Metropolitan commuting satellites are similar to satellite counties, but an average of 41 percent of their resident workers commuted outside the county to work. These counties represent a transition between counties classified as metropolitan centers and metropolitan suburban. Metropolitan-suburban counties are less developed as employment centers than the preceding types, and have even more outcommuters, averaging 57 percent. Finally, metropolitan-dormitory counties are commuting-dependent, with a commuting outflow of more than 69 percent of resident workers.

Nonmetropolitan counties are divided into six categories, based on the employment/resident worker ratio, population, and outcommuting statistics. These categories are centers, satellites, commuting counties with center, small centers, rural commuting counties, and rural counties. Centers are the most urbanized and centralized counties, followed by satellites and commuting counties with centers (which include some counties with larger centers and a larger number with smaller centers). Small centers have smaller employment centers, but an employment/resident worker ratio of 85 percent or more, and less outcommuting than the two commuting types. Rural commuting counties and nonmetropolitan rural counties lack significant urban centers, but rural commuting counties have more commuters.

Nonmetropolitan centers had a minimum county population of 10,000 and an urban center or cluster of 10,000 population or larger within the county in 1980. The average proportion of resident workers who commuted outside the county to work was 14 percent. Nonmetropolitan satellites are similar to nonmetropolitan centers, but an average of 23 percent of the resident workers commuted outside the county to work. These workers may commute to either nonmetropolitan or metropolitan areas or both. Nonmetropolitan commuting counties with centers have an average of 37 percent of their resident workers commuting out of the county to work. These counties ranged from well-populated counties, with urban centers comparable to those in nonmetropolitan centers, to counties with small centers but with some urban population or employment concentrations. Nonmetropolitan small centers either had concentrations of employment or small urban centers. An average of only 13 percent of the resident workers commuted out of these counties to work elsewhere.

Nonmetropolitan rural commuting counties are basically rural counties, with about 10 percent having a small urban place inside their boundaries. An average of 43 percent of the employed residents commuted out of the county to work in 1980, a rate more than three times higher than that of nonmetropolitan small centers. The commuters from these counties went to metropolitan and nonmetropolitan areas to work. The last category of nonmetropolitan county, nonmetropolitan rural counties, had relatively small populations. Resident workers who commuted outside the county averaged only 16.7 percent in 1980.

## Table 7. The Pickard ARC Classification System

| County type | E/R ratio | Percent of workers working out of county | Urban population | Percent of population urban | Total population |
|---|---|---|---|---|---|
| Metropolitan centers | .98 or higher | < 30% | | | |
| Metropolitan satellites | ≥ .70 and ≤ .97 | < 30% | | | |
| Metropolitan commuting satellites | .70 or higher | ≥ 30% | | | |
| Metropolitan suburban | ≥ .50 and ≤ .69 | | | | |
| Metropolitan dormitory | < .50 | | | | |
| Nonmetropolitan centers | .98 or higher OR .85 or higher | less than 30% | Place of 10,000 or more | 25% or more | 25,000 or more<br>10,000 or more |
| Nonmetropolitan satellites: Does not qualify for nonmetropolitan center AND Nonmetropolitan commuting with center: would qualify as nonmetropolitan center, nonmetropolitan satellite or nonmetropolitan small center but has more outcommuting | .70 or higher | less than 30% and at least 15%<br>30% or more | 5,000 or more | | 10,000 or more |
| Nonmetropolitan small centers: does not qualify for above | ≥1.20 OR ≥ .98 OR ≥ 0.85 and ≤ 0.97 | less than 30% | 2,000 or more If less than 3,500 must have -----> | 20% or higher | 2,000 or more |
| Rural commuting counties: Does not qualify for above but has more outcommuting than nonmetropolitan rural | | 30% or more | | | |
| Nonmetropolitan rural: does not qualify for any other nonmetropolitan categories | | | | | |

Source: Pickard, Jerome. "A new county classification system." Appalachia, 21(3): 19-24, Summer 1988.

### 4. *Special General Systems to Classify Rural Places and People*

#### a) Large Metropolitan Counties and Rural Populations.

Residents of metropolitan counties are generally thought to have easy access to the relatively concentrated health services of the county's central areas. However, some metropolitan areas are so large that they contain small towns and rural, sparsely populated areas that are isolated from these central clusters and their corresponding

health services by physical barriers. Using 1980 census data, Harold Goldsmith, Dena Puskin, and Dianne Stiles (1992) developed a methodology to identify small towns and rural areas within large metropolitan counties (LMCs) that that were isolated from by distance or other physical features central areas. The process involves first identifying the LMCs, defined as metropolitan counties having at least 1,225 square miles, and then the rural parts of the LMCs. This second step involves identifying census tracts within the LMCs that meet the criteria of being comparatively homogeneous subcounty areas with populations of 3,000 to 4,000. These are identified as "rural neighborhoods." After the exclusion of rural tracts having a large institutional population, the analysis next identifies "isolated rural census tracts." These tracts are identified as having a low percentage of the work force commuting to jobs in the central areas of the county. However, the analysis goes deeper than this: because few employment opportunities exist in rural communities, it is possible that a large portion of the workforce would be willing to spend a significant amount of time commuting to central areas. Therefore, Goldsmith and colleagues determined that if a high percentage (15 percent or more) of the labor force of a tract commuted to work in central areas, and commuting time was high (i.e., more than 40 percent of the labor force commuted 30 minutes or more), then the tract was a *likely* candidate to be designated an "isolated rural census tract." An additional criterion was employed as well. The tract had to be outside the Ranally (Rand MacNally) Metropolitan Areas (RMAs), which are based on subcounty units such as minor civil divisions. This additional step provides that the population of rural tracts with a large volume of their labor force commuting for long periods of time to central areas actually did have limited geographical access to those central areas.

Results of the analysis of Goldsmith et al., using 1980 census data, revealed that just over 32 million people live in LMCs in the 20 states with at least one such county, and that 6.2 percent of the population of LMCs resided in isolated rural areas. This represents a 4 percent increase in the number of persons considered to reside in areas eligible for federal outreach grants to develop health services for rural communities. The state with the largest number of isolated rural populations within LMCs was California, with nearly one million such residents, and the state with the smallest number was Wyoming, with about 3,000.

b) Using Census Data with the USDA Urban-Rural Continuum.

Cromartie and Swanson (1995) of the Economic Research Service in the US Department of Agriculture have been working on the development of a way to classify what they term as "settlement" to more precisely delineate populations along the

urban-rural continuum. Their system, tested in three states so far, replaces counties with sub-county census areas but retains the essence of the original continuum system. The analysis uses census tracts and commuting data from the census. As of late 1996, the classification system has not yet been defined completely.

c) MSU Rurality Index

Defining and measuring rurality have been stumbling blocks to researchers. Definitions seem to be chosen to meet the needs of the particular study being done. The two most common typologies are the urban/rural definition of the US Census Bureau and the metropolitan/nonmetropolitan definition of the Office of Management and Budget (OMB). Both typologies oversimplify the urban/rural continuum; in particular, they fail to capture sufficient detail within and among rural areas.

The Montana Family Cancer Project research team at Montana State University recognized three general problems arising when research is based on these common typologies (Weinert and Boik, 1995). First, much variability in the urban-rural continuum is missed by these typologies. Second, most of the definitions are county-based, which over-generalizes those large counties containing areas that are apparently urban and those that appear more rural. And third, these definitions and typologies are typically geared toward the national population, which results in failing to indicate the degree of rurality of a study participant compared to another participant. The MSU Rurality Index is an attempt to surmount these three problems in the following ways: 1) it is a quantitative index that assigns a value (degree of rurality) to each family on the urban-rural continuum and avoids artificial categorization; 2) it is a family-based rather than a county-based measure; and 3) it is locally normed with respect to the subset of population under study.

To develop the MSU Rurality Index, the researchers selected two key variables, one at the county level and one at the resident level. The variables were population of the county of residence (as reported in the census) and distance to emergency care as indicated by self-report of study participants. The first was a proxy for diversity, emphasized by Lee (1991) as important when defining rurality. In particular, county population reflects the availability of various types of health care services. Total population is also strongly associated with population density, identified as a critical dimension for measuring rurality (Cordes, 1985; Hewitt, 1992; Weinert and Long, 1990). Access to various types of care and treatment, however, will vary for people living in the same county. Therefore, there is a need to differentiate among residents within the same county as well as across counties. The MSU Rurality Index employs the second variable, distance to emergency care, to achieve this differentiation. Distance to

emergency care is a proxy for proximity to urban areas. Proximity to (and relationship with) urban areas was one of the dimensions noted by Hewitt (1992) to be useful for developing urban/rural typologies. Distance to emergency care was selected over distance to other health care services because in an emergency an individual tends to seek out the nearest source of assistance. For nonemergency conditions, rural residents are frequently known to by-pass the local hospital or health care provider and to seek help in a larger or more specialized facility, though the travel distance may be greater.

The procedures underlying the MSU Rurality Index were designed to yield a quantitative index that is reliable, valid, and approximately normal in distribution regardless of the age of the group under study. Normality ensures a good separation of cases for an independent variable and is required when the index is used as a dependent variable, in order to make valid statistical inferences. Normality was built in to facilitate the use of the MSU Rurality Index as a research tool, to be used in subsequent analyses as either a dependent or independent variable.

The numerical value of the MSU Rurality Index increases with the degree of rurality. For residents within a single county, the index value increases (greater rurality) as distance from emergency care increases. Also, for individuals from different counties who live equidistant from emergency care, the index value increases as county population decreases. A score of zero reflects average rurality for the group under study. Positive scores reflect a rural residence and negative scores reflect an urban residence, relative to the group under study. The MSU Rurality Index can be rescaled to have a mean other than zero and/or a standard deviation other than 1, but the suggested standardization puts the index on the familiar Z-distribution, a statistical term that describes the normal or bell-shaped distribution of most naturally occurring characteristics. Thus, a family having an index score equal to 1 is one standard deviation above the mean and a family having an index score equal to -1 is one standard deviation below the mean.

d) Cleland Rurality Index

The search continues for a measure that describes the nature of rural living with a single number. Such a classification system would be able, ideally, to provide some indication of the ruralness of the locality. One possible approach, developed by Charles L. Cleland of the University of Tennessee (1995), is the Rurality Index Score. This index is based on the theoretical notion that a meaningful distinction exists between rural and urban areas in a developed society and that this, fundamentally, has to do with how the relative isolation of the residents in a given area can be expressed in relational terms. Residents of a given place have linkages with individuals, companies, agencies,

and organizations outside their particular county. The term "connectedness" characterizes these linkages, and means having ties to people in positions of responsibility over resources needed to conduct one's activities most effectively for the benefit of self, family, and community. Connectedness is closely related to the sociological term "linkages," which refers to membership in organizations that go beyond community boundaries. In the case of the Rurality Index, a regional research committee attempted to create such an indicator as part of its study of the organization of southern nonmetropolitan counties for the delivery of services. For purposes of constructing an index, the research committee set out to list what might be considered the essential areas of life that influence the quality of living. Maslow's hierarchy was considered as one guide to what should be included, but the list included many detailed items that were difficult to place in that particular scheme. From the lengthy list that was developed, 10 were selected, which fit into seven somewhat broader categories: physical, institutional, political, financial, informational, and a general feeling of adequate access to needed resources. One additional measure, population density, was added later, for a total of 11. These 11 measures were as follows:

1. Access to metropolitan area via interstate–physical access to metropolitan centers and the organizational resources located there
2. Population density
3. High/low education ratio–the ratio of the number of people over 25 years of age in the county who have completed four or more years of college to the number completing fewer than nine years of formal education
4. Percent employed in retail services–the percentage of those in the labor force employed in jobs selling goods and services to the public
5. Percent employed in professional services–the percentage of the labor force employed in occupations listed as professional by the Bureau of the Census
6. Percent employed in public administration–the percentage of the labor force employed in public services
7. Median family income
8. Persistent poverty–counties that "had per capita incomes in the bottom quintile of all US counties in 1950, 1959, 1969, and 1979"
9. Newspapers–the presence of one or more locally published newspapers
10. Population change, 1980-1990

11. Retirement-dependent; a classification developed by the Economic Research Service of USDA to represent the extent to which the local economy is dependent on the income of retirees.

The Rurality Index was calculated by assigning counties into thirds for each measure, with each third representing high, low and middle levels of connectedness. A score of "2" was assigned to counties in the low or limited connections third, representing relative isolation; a "0" to those counties in the high or good connections third; and a "1" for those in the middle. The index value is the sum of the values for each element plus 10, for a possible range of 0 to 20 for the eleven items. While the index was developed using data from the nonmetropolitan counties, the scoring was applied to the metropolitan counties as well, for comparative purposes. The metropolitan counties distribution was heavily skewed to the least rural end of the scale as anticipated, but there was considerable overlap. The Rurality Index is not illustrated here but copies of a large size map of US counties and the index can be obtained from The University of Tennessee Agricultural Experiment Station in Knoxville, Tennessee.

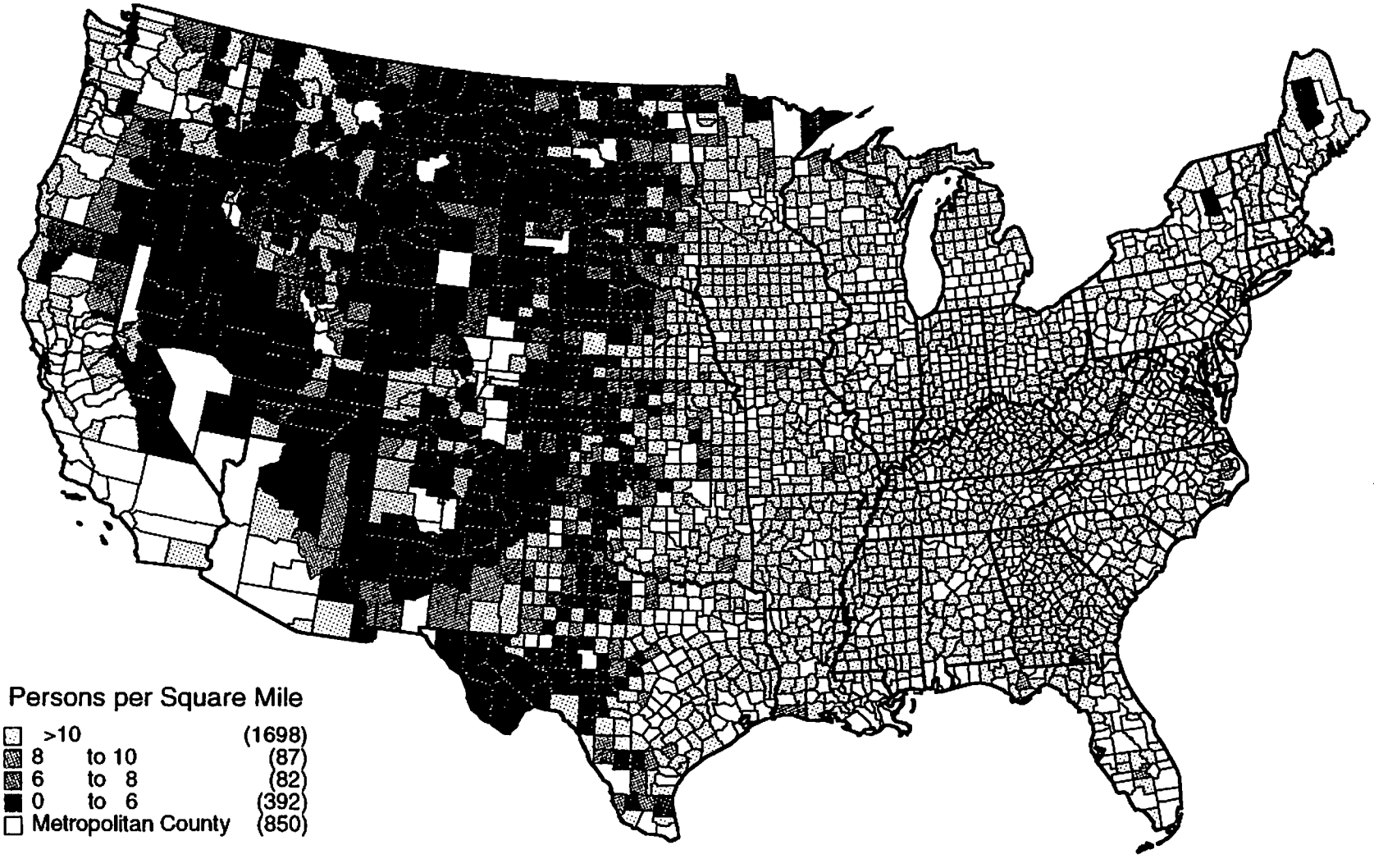
e) The Concept of Frontier

There exist various typologies for characterizing a county in terms of its population concentration; examples of classification schemas are the urban versus rural contrast of the US Bureau of the Census, or the metropolitan versus nonmetropolitan scheme of the Office of Management and Budget. These classifications are used to guide decisions about policies, placement of health care facilities and providers, and in planning for potential health infrastructure needs. Population density, a measure of population concentration, is one component of the basis for rural/urban classifications, and is usually used in conjunction with population size, adjacency to metropolitan areas, and urbanization (Hewitt, 1992). Population density can be defined as the number of people per unit area in a society, region, or country, and is a measure of the intensity of settlement of a region (Austin et al., 1987). Population density is determined by dividing the resident population of a geographic unit by the land area it occupies, usually expressed in the US as square miles and densities of counties can range from 0.15 persons per square mile in Loving County, Texas to 67,613 persons per square mile in New York County, New York (HRSA, 1992). The most sparsely populated areas are often called "frontier" areas. In 1990, two percent of the US population was living in counties with ten or fewer persons per square mile. Map 11 illustrates the distribution of counties considered "frontier" by categorizations of 6, 8 and 10 persons per square mile. Map 12 describes the least dense nonmetropolitan counties by their "urban influence" category (5-

Map 11

# FRONTIER COUNTIES, 1992

By Nonmetropolitan County

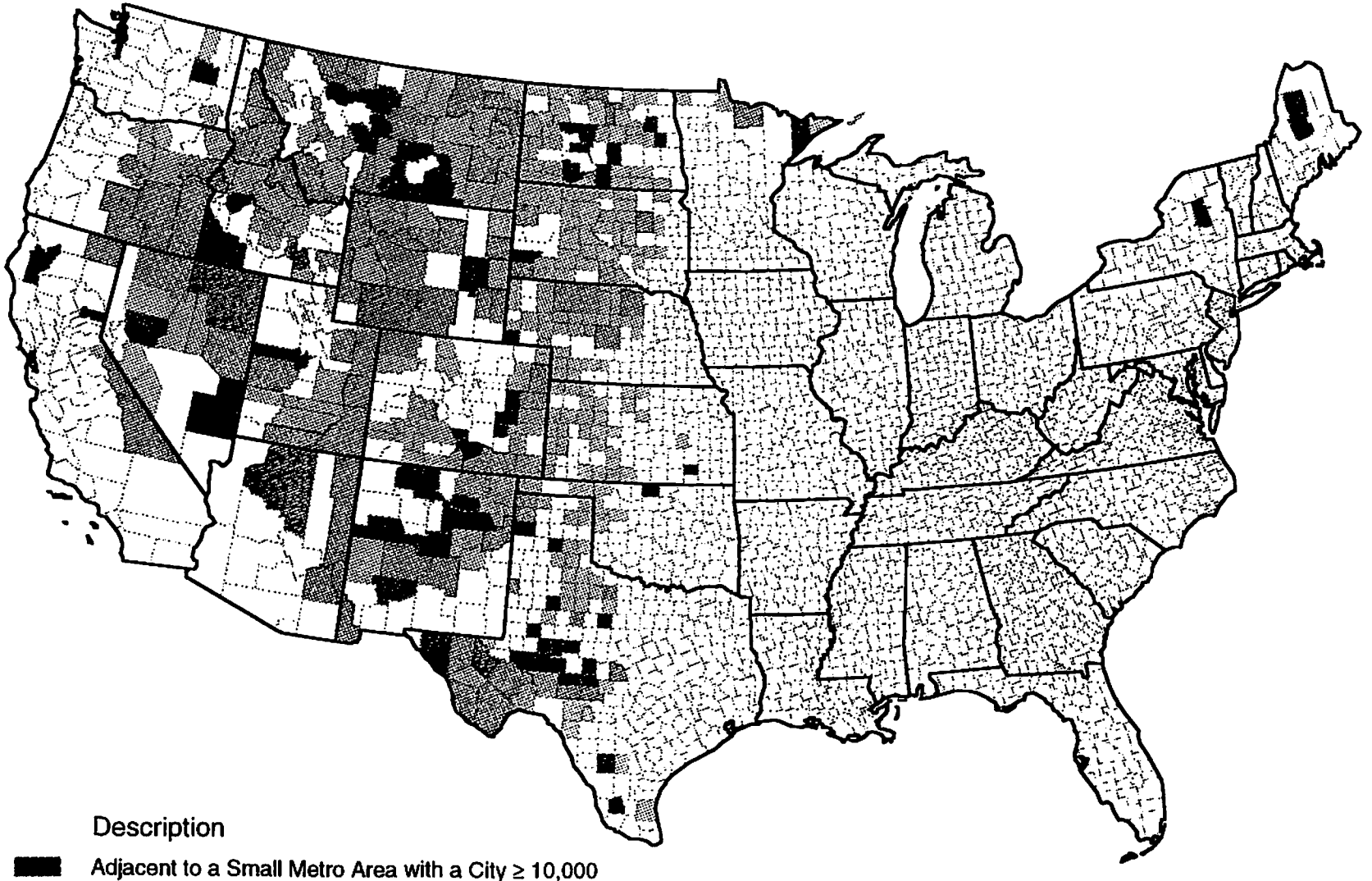



Source: Area Resource File, OHPAR, BHPr, HRSA, PHS, US DHHS, February 1995.
Produced by: North Carolina Rural Health Research Program, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill.

Map 12

# URBAN INFLUENCE CODES, 1993

## Counties with 1992 Population Density ≤ 6 Persons Per Square Mile



| N | Description |
|---|---|
| 2 | Adjacent to a Small Metro Area with a City ≥ 10,000 |
| 59 | Adjacent to a Small Metro Area without a City ≥ 10,000 |
| 5 | Not Adjacent to a Metro Area and with a City ≥ 10,000 |
| 83 | Not Adjacent to a Metro Area and with a City of 2,500 to 9,999 |
| 235 | Not Adjacent to a Metro Area and without a city or a city of < 2,500 |
| 2725 | 1992 Population Density > 6 Persons per Sq. Mi. |

Source: Rural Economy Division,
Economic Research Service,
US Department of Agriculture, 1996.
Produced by: North Carolina Rural Health Research Program,
Cecil G. Sheps Center for Health Services Research,
University of North Carolina at Chapel Hill.

categories of nonmetropolitan). From this map it is apparent that very sparsely populated areas can be quite close to urbanized places and may appear higher on a scale of "urbanicity" than would be expected from their population structure. However, these counties usually have populations clustered in a few towns rather than spread evenly across the geography of the counties. Map 13 shows where county population density has dropped in recent years to levels that qualify them as "frontier."

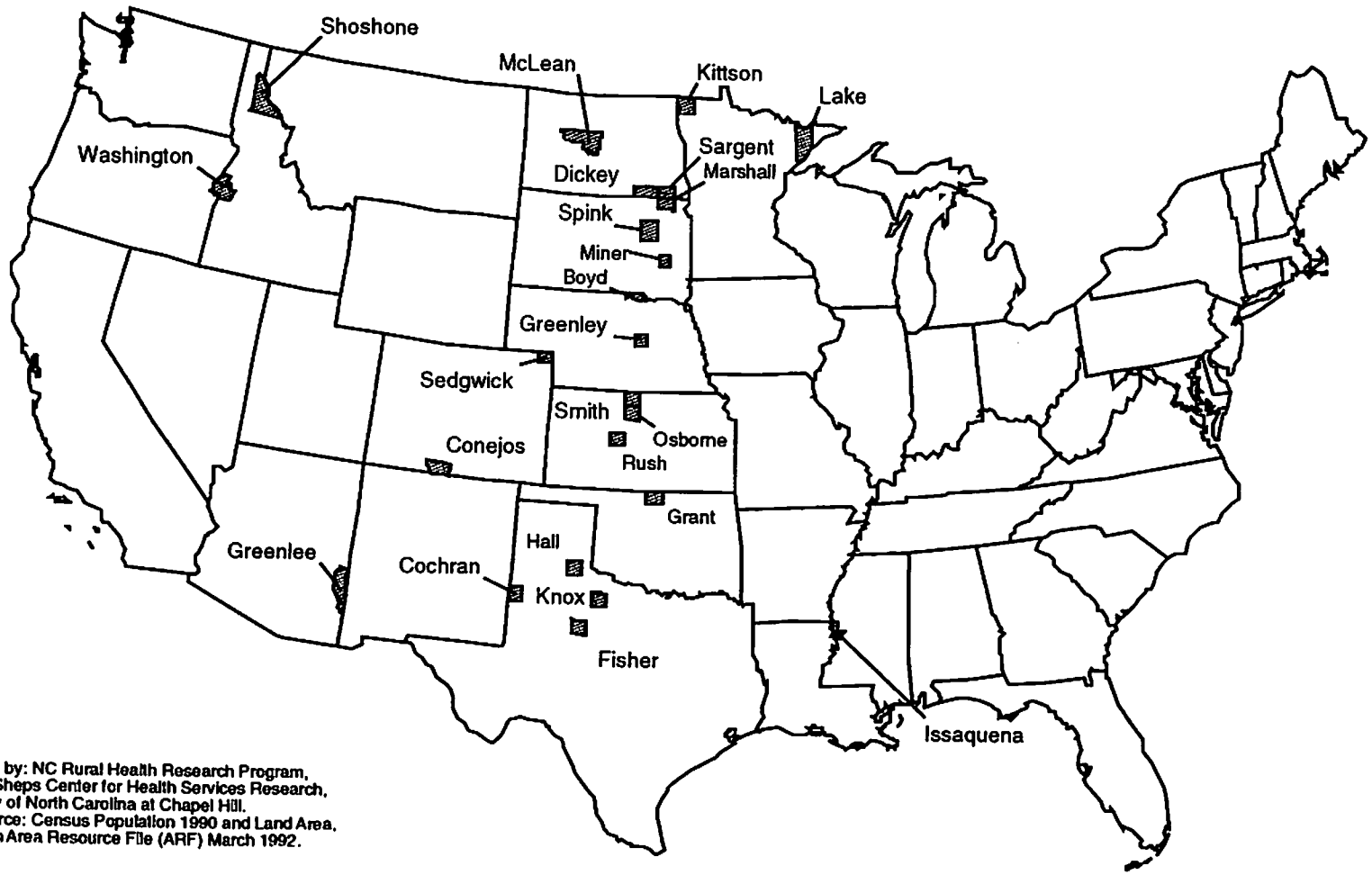
However, population density is limited as a descriptor in that it does not give any indication of how population is distributed within the area being examined. For example, a county that is large in area, as is common in the western United States, may contain a densely urbanized area as well as large areas that are sparsely populated. Population density measured at the county level would tend to mask these extremes. The determination of appropriate levels of health care services available in a given region is generally based on the size of the service area and the number of individuals it is anticipated will be using the services. Although there are many variables involved in who will obtain what health services in what location, clearly size of service area and the population it contains are inextricably related. A facility serving a square mile in a city with a population density of greater than 10,000 people will have different priorities and needs in terms of staffing and services provided than will a facility serving a large western county with a population density of six to ten persons per square mile. Different service levels are or are not sustainable at differing population densities. Determining the most efficient means of making available an appropriate level of care in a specific location requires closer examination to discern where the most and least densely populated areas are located within the area of study.

In modern day discussions of health care provision, "frontier" is applied at the county level, and can denote from six to ten persons per square mile; in most cases frontier is defined as six or fewer persons per square mile. Demographer Frank Popper found that as late as 1984, using a definition of six or fewer persons per square mile, there were 394 counties, constituting 45% of the US land area, that would meet the standard (Elison, 1986). Given this notion of frontier as defined by population density, the nation's frontier is expanding. From 1980 through 1990, 24 counties fell below the 6 persons per square mile criterion for classification as "frontier". Map 13 locates those counties, all of which are in the central plains area of the nation, a region which was characterized by significant population losses during the last decade.

Interest in frontier areas as a policy classification for counties emerged in 1985. At this time rural providers, public health planners, and US Department of Health and Human Services staff agreed that frontier areas constituted a unique setting in terms of service delivery and should be considered accordingly under different criteria than

Map 13

# COUNTIES GAINING FRONTIER STATUS, 1980-1990




Produced by: NC Rural Health Research Program,
Cecil G. Sheps Center for Health Services Research,
University of North Carolina at Chapel Hill.
Data Source: Census Population 1990 and Land Area,
1980 from Area Resource File (ARF) March 1992.

those used for urban or rural service areas (Elison, 1986). A Frontier Health Care Task Force was convened, under sponsorship of US DHHS Regions VII and VIII, to look at health issues as they applied to frontier areas and try to identify those characteristics distinguishing urban, rural and frontier settings in terms of access to health care services. The work of this task force, in conjunction with the National Rural Health Association, led to modified guidelines for the approval of federal assistance to community health centers in frontier areas. Their guidelines included these alternative definitions (Elison, 1986):

> Service Area: a rational area in the frontier will have at least 500 residents within a 25-mile radius of the health service delivery site or within a logical trade area. Most areas will have between 500-3,000 residents and cover large geographic areas.
>
> Population Density: the service area will have six or fewer persons per square mile.
>
> Distance: the service area will be such that the distance from the primary care site to the next level of care will be more than 45 miles and/or 60 minutes.

For frontier areas, the primary service delivery issue is how best to overcome geographic distance and spatial isolation (Cordes, 1985). In many large western counties the nearest health care facility, a rural hospital, is more than 100 miles away. After receiving initial emergency treatment there, a patient may be referred to a tertiary care center another 100-200 miles away. In many instances, distances of this length can cause significant problems of access, such as for a pregnant woman requiring a series of prenatal visits and eventually delivery. In general, "low population density means that the scale of operation of the medical system in rural areas will be noticeably smaller and different than in urban areas. Indeed, ... it is this characteristic that often leads to fundamental and intrinsic differences in the way health services are delivered, including the use of airborne ambulances, telecommunication linkages between remote outposts and secondary care centers, and satellite care centers staffed with physician assistants and nurse practitioners" (HRSA, 1992).

Distance to care must be considered in terms of travel time required, as well as availability of transportation. Accordingly, many believe that the unique delivery problems of frontier areas require solutions different from those that may be successful in urban or rural areas. Low population density can affect health care needs as well as delivery. Some research suggests that high rates of alcohol abuse and suicide in very rural areas may be related to the large physical distances separating people which "make social networking and the formation of psychological support groups difficult

to establish and maintain" (HRSA, 1992).

Population density has statistical implications as well. A yearly infant mortality rate has very limited meaning in a rural location where there are only a few births per year. Because of low volume, facilities located in these sparsely populated areas may not be able to absorb catastrophic financial losses for even a single incident of high-cost uncompensated care. While it may not be feasible to keep all rural hospitals open with a full spectrum of care available, provisions must be made such that primary care and emergency services remain accessible.

Identifying what is the most efficient type of health care facility in these areas, how to procure staff for that facility, and how to induce those staff to stay are enduring problems for rural areas, and especially frontier areas, where small centers of population are separated by large distances. Many frontier areas will require a financial subsidy to be able to support even a single physician, and in some settings nurse practitioners, physician assistants and/or certified nurse midwives may be more appropriate providers of care. In a study in Nevada looking at alternative care settings, the authors noted that the models that showed promise usually were "developed indigenously on the basis of what seems to work locally, rather than according to any ideal model or concept of rural health care" (Baldwin and Rowley, 1990). Policy makers attempting to tackle the problem of providing an adequate level of health services to frontier populations may find it useful to develop more flexible approaches that incorporate multiple and innovative configurations of facilities and providers.

5. *Other Federal Systems for Classification*

There are many other systems of classification used by the many federal agencies. Although this report does not deal with all of these definitions, it is instructional to read some of these classification systems in order to see how specific and detailed they may become when they attempt to accommodate the many variations and combinations encountered in the structure of the US. An example of a rural definition used by the US Department of Housing and Urban Development (HUD) is included below as an example:

* UNITED STATES CODE TITLE 42 - THE PUBLIC HEALTH AND WELFARE. CHAPTER 8A - SLUM CLEARANCE, URBAN RENEWAL, AND FARM HOUSING. SUBCHAPTER III - FARM HOUSING § 1490. "Rural" and "rural area" defined

As used in this subchapter, the terms "rural" and "rural area" mean any open country, or any place, town, village, or city which is not (except in the cases of Pajaro, in the State of California, and Guadalupe, in the State of Arizona) part of or associated with an urban area and which (1) has a population not in excess of 2,500 inhabitants, or (2) has a population in excess of 2,500 but not in excess of 10,000 if it is rural in character, or (3) has a population in excess of 10,000 but not in excess of 20,000, and (A) is not contained within a standard metropolitan statistical area, and (B) has a serious lack of

mortgage credit for lower and moderate-income families, as determined by the Secretary and the Secretary of Housing and Urban Development. For purposes of this subchapter, any area classified as "rural" or a "rural area" prior to October 1, 1990, and determined not to be "rural" or a "rural area" as a result of data received from or after the 1990 decennial census shall continue to be so classified until the receipt of data from the decennial census in the year 2000, if such area has a population in excess of 10,000 but not in excess of 25,000, is rural in character, and has a serious lack of mortgage credit for lower and moderate-income families. Notwithstanding any other provision of this section, the city of Plainview, Texas, shall be considered a rural area for purposes of this subchapter.

### B. State Definitions of Rurality

A number of states or state-level agencies have developed their own classification system to help them direct the allocation of resources and to apply general policy directives to specific communities. Often, regionalization systems for the delivery of services are structured in such a way that the rural parts of certain states are clustered together. Comparing upstate to downstate Illinois might illustrate this division, or metropolitan Minnesota versus the remainder of the state.

An example of a policy-oriented system is the one developed for New York State by Eberts and Khawaja (1988) which identified a four-fold typology of rural counties. The system was based on the proportion of workers who commuted out of their county of residence and the size of the largest place in the county. The system divided the 44 rural counties in the state according to Table 8.

**Table 8. A Typology of New York State Rural Counties Based on Work Force Commuting and Size of County's Largest Place**

| | | Size of Largest Place in County | |
|---|---|---|---|
| | | Higher than 10,000 | Lower than 10,000 |
| Percentage of Work Force Which Commutes Outside County of Residence for Employment | Higher (20% or more) | Urban-Suburban N=12 | Rural Suburban N=12 |
| | Lower (19.9% or less) | Urban-Rural N=12 | Rural-Rural N=8 |

This system is supplemented by two urban categories and the 62 counties of the state are classified into 6 different classes. This system recognizes the unique nature of the human and economic geography of the state where the New York City metropolitan area is so large relative to other parts of the state but is located at one geographic extreme from the remainder of the state. It was used by the New York State Legislative Commission on Rural Resources (1990) as a mechanism to help plan for health professional and healthcare resources needs.

**Classifications of New York Counties**

- Downstate Metropolitan—New York City, adjacent counties and Long Island
- Upstate Metropolitan—Albany, Rochester, Buffalo, Utica, Syracuse, Binghamton and five counties north of New York City
- Rural With Extensive Urban Influence—Counties adjacent to the central urban areas from Buffalo to Albany
- Rural With Considerable Urban Influence—counties not adjacent to the urban areas but one county removed
- Rural With Moderate Urban Influence, and
- Rural With Limited Urban Influence—counties which are to some degree isolated and which have their own market and trade centers, in the Catskills and Adirondacks.

In California, as part of the process for identifying health professional shortage areas to implement both federal and state policies, the Office of State Health Planning created 249 geographic regions called Medical Service Study Areas (MSSAs). These areas were calculated using distance and travel criteria and included utilization patterns. An MSSA was considered rural if it had a population density of 250 people per square mile and contained no incorporated community with a population of more than 20,000 (Smeloff, Burnett and Kelzer, 1981). The California definition for MSSAs is not the only definition of rural applicable to medical care; section 1188.855 of the California Code includes a program to support "small and rural hospitals." The hospitals are classified by peer group size and must be "located in an incorporated place or census designated place of 15,000 or less population according to the 1980 federal census." This definition is very specific to the hospital program and, in general, according to Fred Johnson of the California Office of State Planning, rural areas in California are generally defined as areas that are "30 miles or 30 minutes from a city with a population of 150,000 or more." (Johnson, 1995) However, in the same California statute, "small and rural hospital" is defined as a hospital "which meets either of the following criteria: (a) Meets the criteria for designation within peer group six or eight, as defined in the report entitled Hospital Peer Grouping for Efficiency Comparison, dated December 20, 1982. (b) Meets the criteria for designation within peer group five or seven and has no more than 76 acute care beds and is located in an incorporated place or census designated place of 15,000 or less population according to the 1980 federal census." From this example, it is apparent that there are variations of definitions within states as well across states and within the federal government's regulations.

Other states use systems that reflect policy needs and the physical realities of their states. South Dakota, for example, describes all of its communities as rural. This is consistent with the settlement of South Dakota and its overwhelming rural

character even in its few cities. North Carolina, on the other hand, a state with a large rural population distributed relatively evenly throughout the state, defines only the core metropolitan counties as urban and the remaining counties as rural. If the US OMB MSA definition were used, North Carolina would have 36 urban and 64 rural counties; using the State's Office of Rural Health definition, there are only 13 urban and 87 rural counties.

### C. Health Related Definitions of Rurality in Federal Law and Regulation

The definition of rural that is most relevant to health care delivery is probably the definition used in most Medicare and Medicaid legislation, rules and regulations. That definition is located in subsection 42 CFR 1395ww(d)(2)(D) and is included as part of the description of the rules for determining payments under the Medicare program. The definition is as follows:

> ...the term "urban area" means an area within a Metropolitan Statistical Area (as defined by the Office of Management and Budget) or within such similar area as the Secretary has recognized under subsection (a) of this section by regulation; the term "large urban area" means, with respect to a fiscal year, such an urban area which the Secretary determines (in the publications described in subsection (e)(5) of this section before the fiscal year) has a population of more than 1,000,000 (as determined by the Secretary based on the most recent available population data published by the Bureau of the Census); and the term "rural area" means any area outside such an area or similar area. A hospital located in a Metropolitan Statistical Area shall be deemed to be located in the region in which the largest number of the hospitals in the same Metropolitan Statistical Area are located, or, at the option of the Secretary, the region in which the majority of the inpatient discharges (with respect to which payments are made under this subchapter) from hospitals in the same Metropolitan Statistical Area are made.

By contrast, 42 CFR 491.2 contains the following definition: "Rural area means an area that is not delineated as an urbanized area by the Bureau of the Census." However, later in the same section 42 CFR 491.5(c)(2) reads as follows:

"Excluded from the rural area classification are:

(i) Central cities of 50,000 inhabitants or more;

(ii) Cities with at least 25,000 inhabitants which, together with contiguous

areas having stipulated population density, have combined populations of 50,000 and constitute for general economic and social purposes, single communities;

(iii) Closely settled territories surrounding cities and specifically designated by the Census Bureau as urban."

There are other exceptions. Section 301 of the Public Health Service Act authorized certain telemedicine grant programs to be administered by the Federal Office of Rural Health Policy (ORHP). When the Senate Report accompanying the appropriations bill for the program failed to define "rural western Nebraska" which was mentioned specifically in the bill, the Health Resources and Services Administration declared in its announcement of the availability of funds for the program that "[i]n the absence of such a definition, the Department considers all applicants in counties that are geographically located in the western third of the state to be eligible for this competition." (Federal Register, 1995).

The distribution of substantial resources depends upon the definitions of rural that are used. In the Medicare program substantial controversy surrounded the institution of a geographic differential in the payment levels for physician and hospital services. However, there has not been a close examination of the degree to which other resources are distributed within rural areas. In an examination of the Farmers Home Administration, Ilvento, Fendley and Christenson (1988) found that more urban nonmetropolitan counties received higher per capita funding from the FHA than did the more isolated counties.

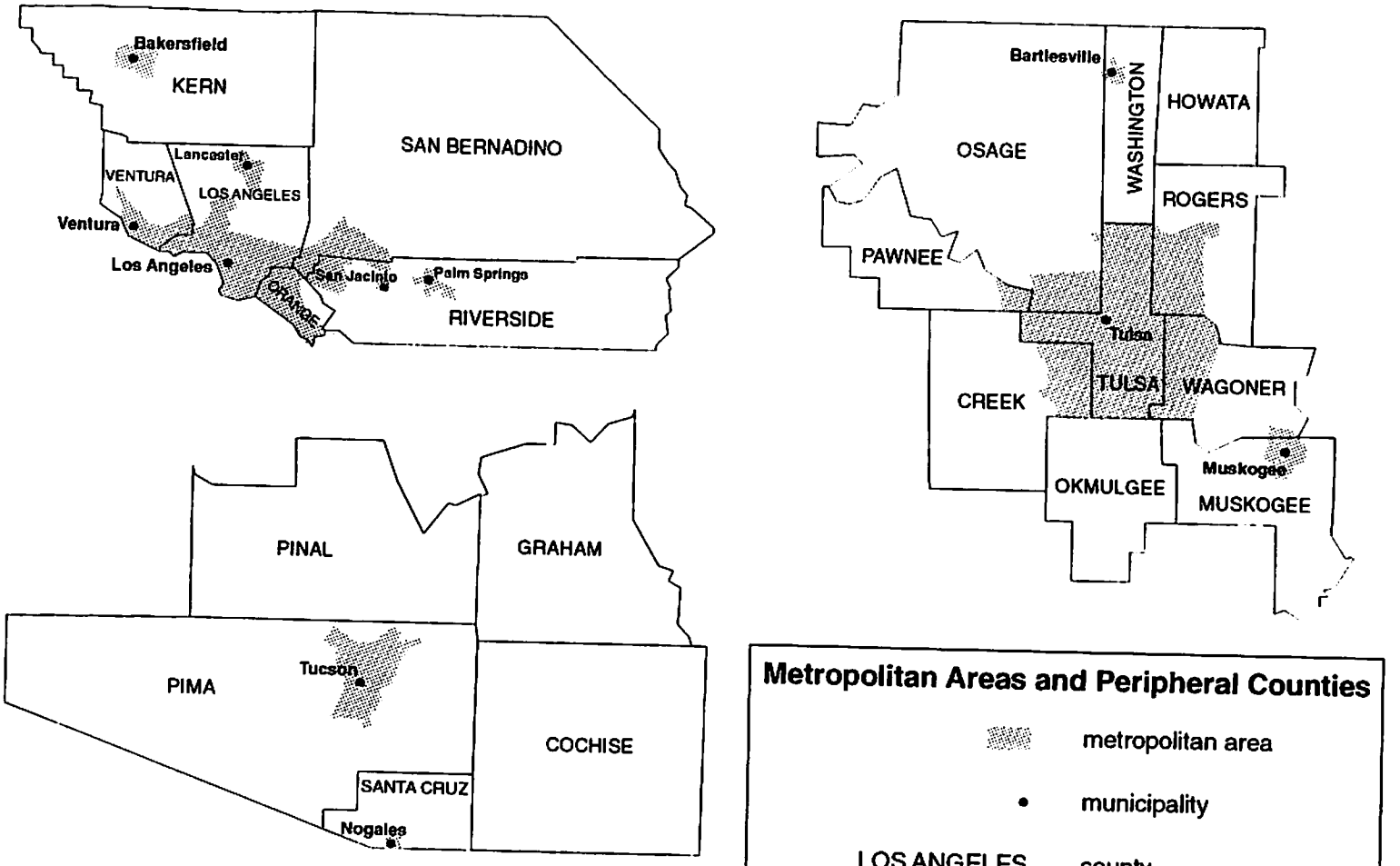
# CHAPTER 4—PLACE SIZE AND RURALITY: HOW DO YOU CHOOSE?

One key question the analyst or policy maker has when confronting the issue of categorizing areas as rural or otherwise is: which basic geographic unit to use. In the United States, there are many geographic jurisdictions which report data or to which data can be attributed. There are also individual and group characterizations that are of use in health policy analysis. Enrollees in a particular insurance plan, for example, may not be aggregated by any geographic grouping and their only address locator may be an employer.

We are most concerned with geographic aggregations. These may be as gross as states or even regions. South Dakota, Idaho, Wyoming, New Hampshire, and Montana could be classified as rural based on the proportion of their population classified rural by the Census Bureau with other states classified as urban or mixed. Regions, such as the counties making up the Appalachian Regional Commission area, could also be considered rural when compared with the mid-Atlantic states; New England could be considered a mixed region and comparisons could be made of data aggregated at that level. However, the most common problem is to identify communities which are more or less rural or urban. The community of interest is usually that area that makes up a medical care market for hospitalization or primary care or some other health care service; the problem is to make some comparison between rural and urban or among similar rural communities in outcomes or access or characteristics. However, since "community" is not a standard definition the first task is often to find the right proxy for community. In the rural context, for the Eastern half of the United States, the county is frequently the most useful unit to analyze health services data. Counties often represent a market area with a central place and a population that thins as you move from the center to the edge of the county. This type of structure exists in perhaps a majority of nonmetropolitan counties east of 98 degrees of longitude. West of that line the size of the counties become much greater and the counties become less and less of a proxy for markets. The extreme examples are in the far western states where very large counties contain dense metropolitan cities along with thinly populated, even isolated rural areas. The maps of counties in California, Arizona and Oklahoma are examples and are illustrated in Map 14.

The methods proposed by Goldsmith, Puskin and Stiles (1992) and Cromartie and Swanson (1995) described in the section "Special General Systems to Classify

# METROPOLITAN AREAS AND PERIPHERAL COUNTIES FOR LOS ANGELES, TUCSON, AND TULSA




Produced by: NC Rural Health Research Program,
Cecil G. Sheps Center for Health Services Research,
University of North Carolina at Chapel Hill.
Data Source: 1991 Commercial Atlas & Marketing Guide, 122nd edition, Rand McNally & Company.
Note: The base maps are shown at different scales. Furthermore, metropolitan areas are shown only as an approximation of actual extent.

Rural Places and People" above, gives some guidance over how to avoid the problems caused by classifications based on counties.

The Goldsmith approach is useful for classifications designed to identify rural communities in larger counties and allows for a national system of identification of rural places for policy purposes, but the county scale and the sub-county areas for selected counties may still be too large for the analysis of data to examine rural versus urban residents within and across counties. Researchers often consider subcounty areas based on census geography. These subcounty areas, used for the organization of data collection and for reporting of census data range from census blocks to census tracts.

### A. Census Geography

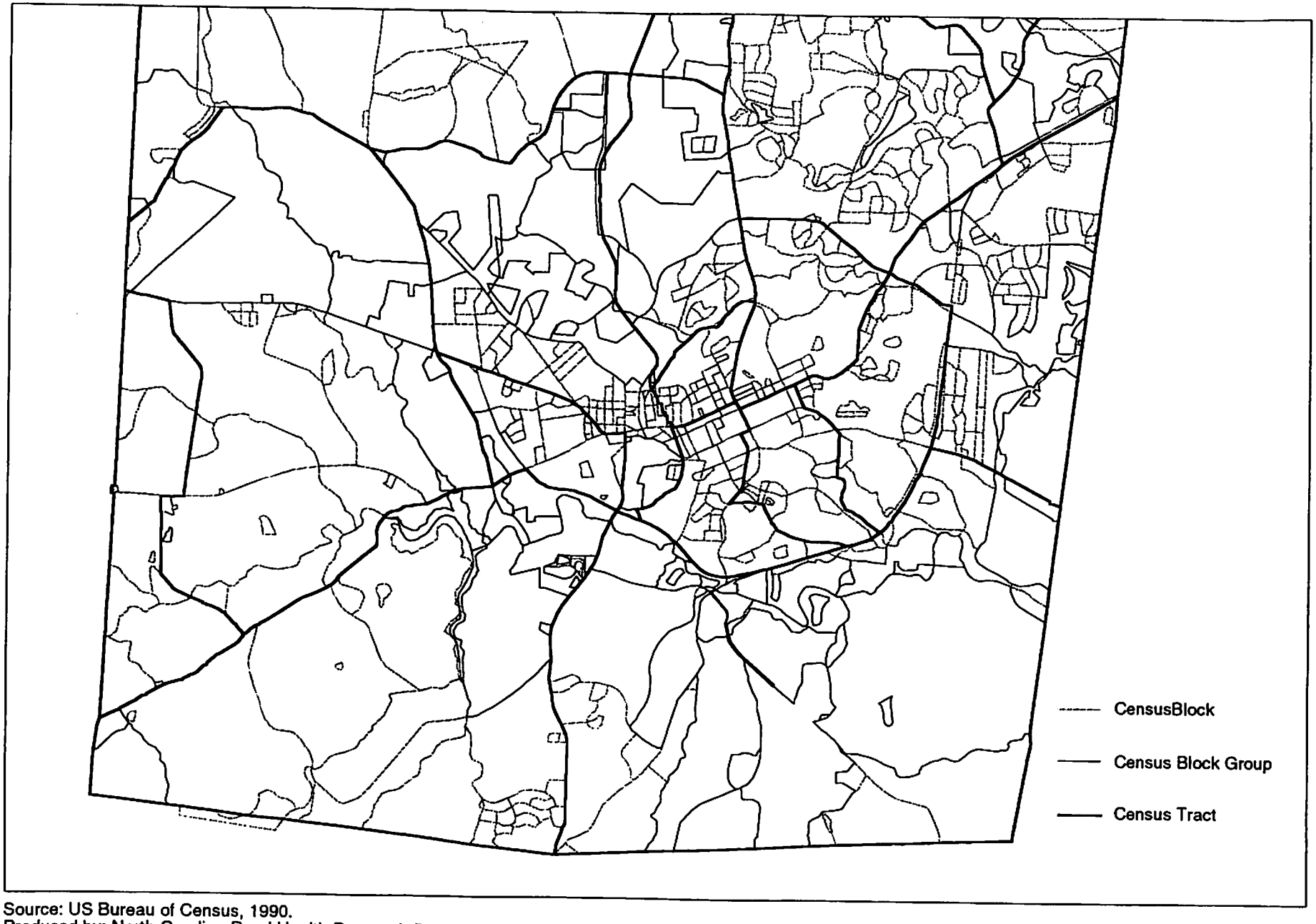
The basic unit for the census is the household and individuals are related to a household and then households are aggregated up to higher levels. The Census Bureau distributes questionnaires to every household in the nation and an individual responds to questions for all the members of the household. Most households filled out a relatively short questionnaire requesting a limited amount of demographic information. This information was the basis for the 100% Count or enumeration. A minority of households (15% to 50%), depending upon the questions, are given a longer questionnaire and provided more detailed demographic information. The Census Bureau uses this information to estimate detailed demographic characteristics for the entire population. These estimates are published in the Sample Count and form the basis for detailed statistics about blocks, block groups, tracts and counties up to the nation based upon weighted extrapolation of the individual's responses. The Census Bureau does not report data on individual households but does report on areas and aggregates based on its 1 percent and 5 percent samples of in-depth surveys. Analysis of individual household data is reserved for governmental studies. Map 15 illustrates the several levels of census geography.

The Bureau of the Census releases demographic details down to the census block level which are combinations of households aggregated into logical areas. Census blocks are usually small areas bounded on all sides by visible features such as streets, roads, streams, and railroad tracks, and by invisible boundaries such as property lines, legal limits, and short imaginary extensions of streets and roads. In densely populated urban centers, census blocks generally correspond to city blocks. Census blocks are usually not constructed for rural areas.

Block groups are logical collections of census blocks. They contain an average of about 650 people and are sometimes used for the reporting of demographic data to

# Map 15

# CENSUS GEOGRAPHY




Source: US Bureau of Census, 1990.
Produced by: North Carolina Rural Health Research Program, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill.

compare, for example, the incidence of communicable disease with the average household income for the census block group. There were approximately 225,000 block groups in the US in 1990. Block groups are usually only applicable to urban areas since they are comprised of blocks.

Census tracts are geographic entities within a county (or statistical equivalent of a county) defined by a committee of local data users. When first established, census tracts should have relatively homogeneous demographic characteristics. Generally, census tracts have a population size between 2,500 and 8,000 people, and average about 4,000 people; there are approximately 61,000 census tracts in the United States. The committee of local data users can delineate census tracts for special land uses, such as military installations and Native American reservations. Block groups and census blocks in urban areas do not cross the boundaries of census tracts and each urban census tract is comprised of a unique set of block groups (and hence census blocks). In rural counties the subcounty division is often made up only of census tracts and these subcounty areas are applicable to research and analysis at the subcounty level if the tracts are "homogenous" and represent some logical aggregation of communities. This is not always the case, as the tracts are constructed to fit the needs of local data users and the Census Bureau and may not relate to health care utilization or the location of health care resources in a community.

The census also identifies and aggregates data into Minor Civil Divisions (MCD) or Census County Divisions (CCD) which represent some 35,000 townships or boroughs within county boundaries. These units do not necessarily have to retain a "logical" geography and may have evolved from a rational division of a county to a remnant of prior settlement patterns. Likewise, the census also recognizes place boundaries for the 25,000 named places in the US. These may or may not correspond to city or incorporated government boundaries but are generally tied to those jurisdictions.

These subcounty areas can now be identified and mapped easily given the availability of the TIGER (Topologically Integrated Geographic Encoding and Referencing -TIGER/Line) boundary files from the Census Bureau. TIGER files contain all of the census boundaries and a wealth of other information including street and rural route address locations. TIGER boundary files can be used with appropriate census data and whatever other data that can be linked to some location or geographic reference point such as latitude or longitude. Geographic Information Systems (GIS) can then analyze the data by assigning information about individuals within a boundary to the summary data for that boundary or assigning summary data that characterizes the geographic unit to a case or individual. For example, in the analysis

of people who are diagnosed with advanced stage cancer to determine if income is related to the ability of people to access preventive services, the data which describe the cancer patients may include only their address but have no information concerning their income. However, by assigning the individual cases the general characteristics of the block group in which the person lives, certain assumptions can be drawn from an analysis of the stage of diagnosis and the income as assigned through this system. Such an analysis would apply only to small areas which are generally homogenous, something which is applicable to block groups in urban areas but not necessarily to rural areas where only census tracts may occur.

In general, the translation of data to sub-county areas requires substantial time and computing power and often does not yield the desired results because seldom are health care data linked to sub-county census geography. Address matching and aggregating to higher level census areas is feasible but not necessarily useful in rural places. For most rural communities, it has been found that less than half of the addresses gathered from survey data or patient origin files can be matched to TIGER line files using TIGER 1994 versions.

### B. ZIP Codes and Postal Geography*

ZIP Codes have been suggested as a preferred basis for definitions of rural (De La Torre, Fickenscher and Luft, 1991; Nunley, Heng and Bern-Klug, 1995) and for their application in the identification of service areas for health care delivery facilities and professionals (Lowe, 1994; Phibbs and Robinson, 1993; Goody, 1993). But before using ZIP Codes in developing policies or conducting and research an analysis, their strengths and limitations need to be thoroughly understood.

The Z-I-P in ZIP Codes stands for the Zone Improvement Program; ZIP Codes are designed to improve mail delivery. The ZIP Codes and area of responsibility are assigned to handle the mail as efficiently as possible and (mostly) without regard to geographic boundaries. In a technical sense, ZIP Codes are not area based, but a collection of delivery points. However, each ZIP Code usually can be assembled into an area by providing boundaries around the delivery points. This is done by the US Postal Service and modified by boundary file vendors on a regular basis. A ZIP Code can also be assigned to a unique delivery point such as a university, government

---

* Substantial portions of this section were drawn from the Census Bureau publication, "Geographic Coding of Administrative Records—Current Research in ZIP/Sector-to-County Coding Process" by Douglas K. Sater of the Population Division of the US Bureau of the Census (Technical Working Paper No. 7, June 1994); and Geographic Coding of Administrative Records—Current Research in ZIP/Sector-to-County Coding Process. Washington, DC: US Department of Commerce, Bureau of the Census (Technical Working Paper No. 7, 1993) also by Douglas Sater.

building, business, or a group of post office boxes; there are many "point-ZIPS" in any commercially available file.

Most individual ZIP Codes deliver wholly within an area in a single state, but a few do deliver across state lines. At the county level, some ZIP Codes cross county boundaries, but most deliver wholly within the county; there are important exceptions to this rule and ZIP Codes that are split by state or county, however, pose problems for coding or analysis of data by ZIP Code.

In certain rural parts of the country, there are also postal delivery processes that pose special problems. In Alaska, for example, there are post offices that are an intermediate drop off point where they hold mail in pouches for later delivery to a remote area such as a logging camp, fishery, or other remote place. These are now being changed to post office boxes, with a three character-alpha code as part of the box number. Also, there are areas that have no house-by-house delivery and individuals have to pick up their mail from the post office. Such individuals may also have a choice of post offices. This last issue is important for analysis of rural populations by ZIP code. The ZIP boundary that is defined for a sparsely populated rural area may include several "point-ZIPs" which are post offices and to which are assigned most of the population. The population using that "point-ZIP" may not be enclosed by the surrounding ZIP code boundary and combining the area with the "point-ZIPs" may not completely and accurate include all of the population of interest.

To use data from a hospital discharge system which uses patient ZIP codes as the geographic identifier it is necessary to cross-match those ZIP codes with their corresponding counties. An analysis by the Census Bureau found that it is possible to code to the county level using 5-digit ZIP Code (only) with about 96 percent accuracy overall. However, quality of coding will vary dramatically by county. For many of the large counties, the coding will be good, but for most of the small counties, the coding will be very poor. Some counties will not be coded at all. Additionally, independent cities, such as Baltimore City, MD or Manassas Park City, VA and the surrounding counties will have substantial problems in the coding. For many large cities (excluding the independent cities), most of the ZIP Codes are wholly contained within the city. Geographic coding to large cities using 5-digit ZIP code (only) may be feasible. For small places and the more sparsely populated areas, the ZIP codes tend to cover several subcounty areas. Geographic coding to such subcounty areas using 5-digit ZIP Codes would not be very good at all.

1. *ZIP + 4 Code*

A few years ago, the US Postal Service assigned an additional 4 digits to the existing 5-digit ZIP Code to make mail handling and delivery more efficient. The +4

code is actually two codes in one—the first two digits refer to the sector and the second two digits to segments within the sector. The ZIP+4 assignment process follows guidelines established by the post office and there is flexibility of implementation by the individual postmasters. The detailed description that follows illustrates the logic used by the Postal Service in assigning both ZIP+4 and ZIP Codes. It shows how this assignment system is very different from what would be the result if the boundary drawing were being done to identify a medical service area.

The US Postal Service (USPS) sees ZIP+4 codes in city-style address areas as essentially geographic in nature. A city-style address typically is an address structured in number-street name form, such as "4320 Oak Road." The first two digits of the +4 add-on, which is referred to as the "sector" component, typically represents a block group (but is not coincident with Census Bureau-defined block groups). The last two digits of the +4 add-on, which is referred to as the "segment" component, typically represents a block "side"—the north side of a street, a company, a unit within a company, a building, or a floor within a building. To establish ZIP+4 Codes, the USPS plots a 5-digit ZIP Code boundary on a street map and uses main thoroughfares to cut the 5-digit ZIP Code area into preliminary sectors. The USPS then divides the area up according to the number of places to which mail will be delivered.

In areas that have rural-style addresses, the USPS assigns +4 add-ons according to a letter carrier's line of travel. ZIP+4 Codes in these areas do *not* refer to geographic areas. This difference is very important to recognize when using ZIP Codes for rural places for analysis. The rural delivery routes may cross county lines and other jurisdictions. In areas that have rural-style addresses, a street segment receives a +4 add-on only if it is part of a letter carrier's route. If a rural route crosses a county boundary, the sector number changes, typically to a number in the nineties, and the USPS numbers the segments in sequence beginning with "01". If the rural route crosses back into the original county, the +4 numbering resumes where the original +4 numbering left off. For example, if "9718" was the last +4 number assigned before the rural route crossed into another county, then "9719" is the first +4 assigned when the rural route crosses back into the original county. When a group of rural mail boxes receive mail from different letter carriers, their sector numbers are different and there may be no pattern to the +4 add-ons. For example, the +4 add-ons for a group of rural mail boxes may be "9601", "9622", "9705", and "9601" again, because the mail boxes are not only on different rural routes, but on routes coming out of different 5-digit ZIP Codes. If a structure receives mail via a rural route, its mail box does not need to be anywhere near the structure.

The USPS has created a ZIP+4-to-county cross reference file which could serve as

the basis for the county coding process. The file is a quarterly product and is updated to reflect changes occurring since the prior release. That is, new ZIP Codes are added, discontinued ZIP Codes are deleted, changes to ZIP Codes or +4 codes incorporated. The ZIP+4 to county cross reference file contains a record for each unique ZIP+4 Code, or about 24 million records. Two exceptions to this are as follows: (a) if a business (or government agency) has more than one +4 code assigned to it, the file will have only one record with the data on the record showing the range of +4 codes assigned; (b) the same may be true for post office boxes.

The ZIP+4-to-county cross reference file is manually prepared at the local post office level, under general guidelines provided from "headquarters" USPS. The local post office creates work sheets with the data which are keyed and the file is compiled by the regional or national information centers. Thus, it is reasonable to expect errors in the posting and in the data keying of the county codes. Also, the local post offices are relatively autonomous. They usually try to adhere to the guidelines provided by "headquarters"; but, one should expect variations to occur. Further, there will be no documentation of such variation. Map 16 illustrates the problem of trying to identify ZIP code areas using a county overlay. There are many instances where urban ZIPs are included in rural counties and vice-versa. In short, any ZIP+4-to-county cross reference needs to be thoroughly edited.

### C. Geographic Units and Research and Analysis

There is no set standard nor widely accepted criteria for choosing the appropriate geographic area for the study of health services. Many studies are guided by the data which are available and little prior effort goes into looking at how geography will affect an analysis. A review by Connor, Kralewski and Hillson (1994) of geographic access to health care in rural areas, provides a glimpse of the range of areas used in research. They reviewed 87 studies that were concerned with geography and the use of services and classified each as to the primary unit of analysis, dividing the units into areas and individuals. The area units were broken down into

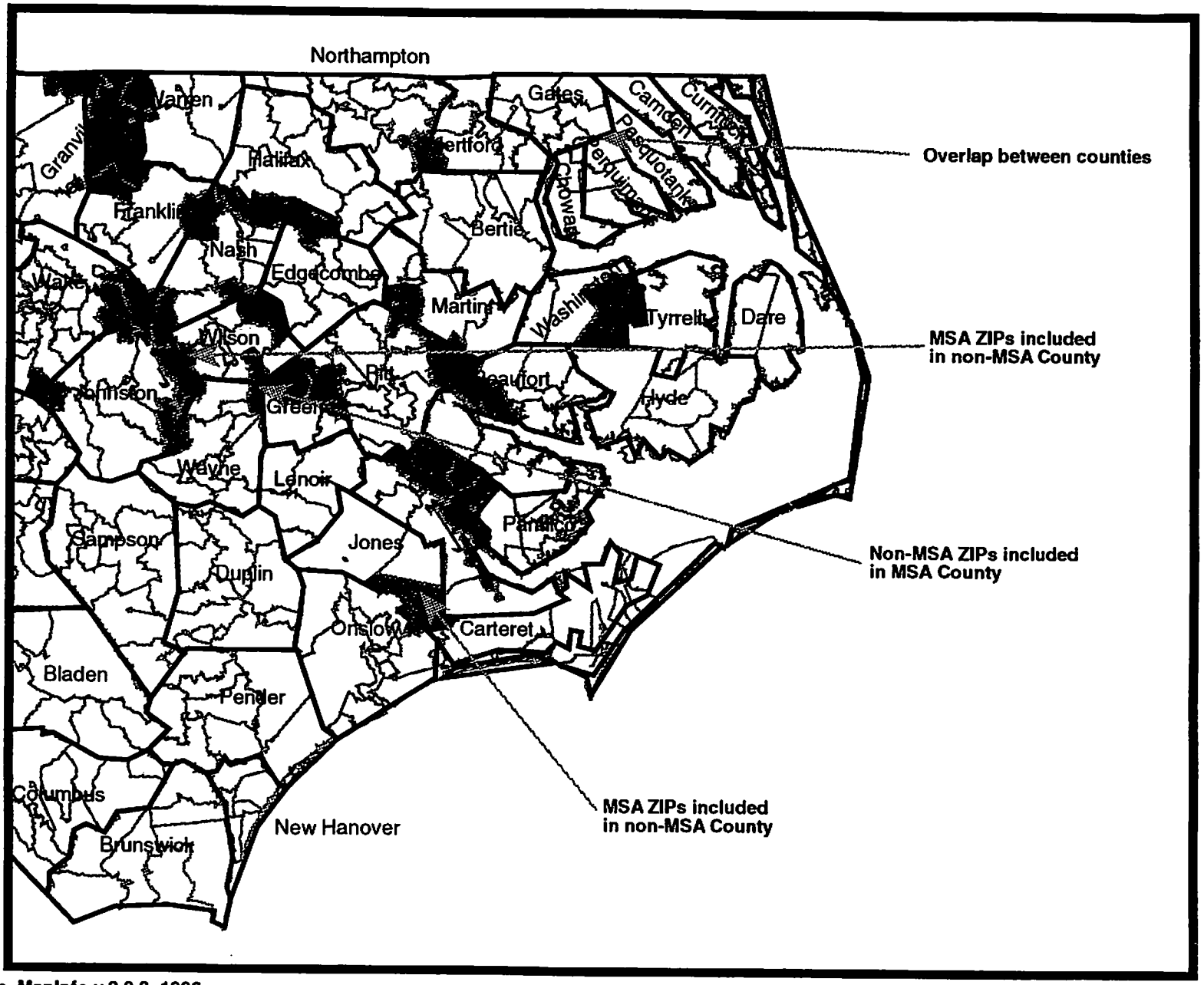
a. Town/community/ZIP
b. County
c. Market-share-defined
d. Nation
e. Other area

The individual measures were further divided into consumer and provider classifications. The studies they reviewed used the county most often as the primary unit of analysis, 29 were based on county data or comparisons. The next most often used category was the Town/community/ZIP, 15 times, followed by market share

Map 16

# DISCREPANCIES BETWEEN ZIP CODE AREAS AND COUNTY BOUNDARIES

## Eastern North Carolina as an Example




Source: Claritas, Inc. MapInfo v.3.0.3, 1996
Produced by: North Carolina Rural Health Research Program, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill.

aggregations, twice. There were, however, 23 studies which used some "other" type of aggregation, these were usually multi-county or multi-zip areas.

*The Journal of Rural Health* is published by the National Rural Health Association and which includes peer-reviewed scientific articles which focus on issues related to rural health care delivery. The *Journal* has no specific definition of rural for which it advocates and the *Journal's* contributors define rural in their articles according to their specific needs. Table 9 summarizes how rural is defined in articles published in the *Journal* between 1993-1995.

**Table 9. Definitions of Rural Used in the Journal of Rural Health**

| | Definition Used | Subject or Focus of Study |
|---|---|---|
| 1. | Self assessment | Nurse practice location |
| 2. | Metro-nonmetropolitan counties | Survey of residents for insurance coverage |
| 3. | Percent population classed rural, places <2,500 | Accident occurrence |
| 4. | Community size <5K, 5-35K, >35K | Physician location preferences |
| 5. | 10 county metropolitan area plus one metropolitan county versus other counties in Midwestern state | Physician location decisions |
| 6. | Counties classed by Beale Code (RUCC) | Native American use of services |
| 7. | 19 largest metro, other metro, nonmetropolitan | Surveys respondents, insurance coverage |
| 8. | Rural facilities in nonmetropolitan counties in 6 states | Hospitals, nursing homes, home health agencies |
| 9. | Towns, pop. less than 5,000 | Treatment for depression |
| 10. | "Rural practitioners" | Teaching rehabilitation |
| 11. | Federal EACH/PCH definition of rural | Hospital networks |
| 12. | Rural areas of Florida defined by the State | Health care networks |
| 13. | MSA-NonMSA counties | Locations of residency graduates |
| 14. | Metropolitan versus "clusters of nonmetropolitan counties" | Tuberculosis incidence, prevalence |
| 15. | NonMSA location | Outshopping for hospital care |
| 16. | Farm workers | Hygiene |
| 17. | Urban/small city/rural, adaptation of respondent data | Statistical analysis of location contrasts |
| 18. | Urban=area with >50K population or in metropolitan adjacent county and more than 2,500 people in town; others are rural | Workforce participation for farming and nonfarming families |
| 19. | "Rural area" in vignette, analysis by practitioner location in towns <1,000, 1,000-2,499, 2,500-9,999, and >10,000 | Perception of physician retention |
| 20. | Rural=Population of community less than 50K | Perceptions of practice location |
| 21. | MSA-NonMSA counties | Hospital strategic plans |
| 22. | MSA-NonMSA counties | Childbearing women in rural areas |
| 23. | Location more than 15 miles from city of 25,000 | Primary care center performance |
| 24. | Various | Physician supply |
| 25. | Rural counties, towns 2,500-5,000, 5-10K, >10K | Physician practice location |
| 26. | 13-county region | Health professions database |

The most often used definitions are based on the OMB county Metropolitan Area classification system but the year of applicability is seldom specified in the articles. The lack of consistency in the reported research and analysis should concern the research community to some degree in that it will be very difficult to compare studies where the units of analysis are either not well specified, or are not comparable. However, the research world reflects the uncertainty of the policy world, where definitions of rurality are as inconsistent.

**A Conclusion For Policy**

When considering the question of "what is rural?" in a policy or research context, it may be wiser to retreat from a fixed and firm definition of rural since the subject is a complex social construct where social definitions are constantly being proposed and debated. It may be better to think in terms of classification systems or typologies in order to avoid the more philosophical conflicts that may arise. This type of policy definition approach to rurality is necessary for the analyst or policy maker who has to choose a system that is fair and applicable. Even if the choice is made to try to understand the differences in nuance among rural and between rural and urban places, there are too many combinations of density, total population, adjacency, economic characteristics, or social structure, to allow for a truly simplified system of classification that will resist controversy.

# BIBLIOGRAPHY


Austin CM, Honey R, and Eagle TC. (1987). *Human Geography.* St. Paul, MN: West Publishing Company.

Baldwin DC, and Rowley B. (1990). Alternative models for the delivery of rural health care: A case study of a western frontier state. *Journal of Rural Health* 6(3):256-272.

Bealer RC, Willits FD and Kuvlesky WP. (1965). The meaning of rurality in American society: Some implications and alternative definitions. *Rural Sociology* 30:255-266.

Beale CL. and Johnson KM. (1995). Nonmetropolitan population continues post-1990 rebound. *Rural Conditions and Trends* 6(2).

Bosak J and Perlman B. (1982). A review of the definition of rural. *Journal of Rural Community Psychology,* 3(1):3-34.

Briggs, Jr., VM. (1981). Unemployment and underemployment. In: *Nonmetropolitan America in Transition.* Hawley AH and Mazie SM, eds. Chapel Hill, NC: The University of North Carolina Press.

Bureau of the Census. (1993). No more frontier? *Census and You* 28(7):9.

Bureau of the Census. (1996). *Census and You.* 31(7):7.

Bureau of Health Professions. Area Resource File (1992). Rockville, MD: Health Resources and Services Administration.

Business Week. (1995). Vol. 9 October 95 p. 105.

Butler MA and Beale CA. (1994). "Rural-urban continuum codes for metropolitan and nonmetropolitan counties, 1993." Agriculture and Rural Economy Division, Economic Research Service, United States Department of Agriculture. AGES 9425.

Carney K, Burns N and Slinkmen C. (1991). Index of demand: An economic index of rurality. *Texas Journal of Rural Health.* 3rd Q.

Cleland CL. (1995). "A measure of rurality." Department of Agricultural Economics and Rural Sociology, University of Tennessee-Knoxville. Paper presented at the Applied Geography Conference, Arlington, VA, November 8, 1995.

COGME. (1996). COGME Eighth Report: Patient care supply and requirements: testing COGME recommendations. Washington, DC: Health Resources and Services Administration, US DHHS.

Connor RA, Kralewski JE and Hillson SD. (1994). Measuring geographic access to health care in rural areas. *Medical Care Review* 51(3):337-377.

Cook PJ and Mizer KL. (1994). "The revised ERS county typology." Economic Research Service, USDA. *Rural Development Research Report* Number 89. December 1994

Cordes S. (1985). "Biopsychosocial imperatives from the rural perspective." *Social Science and Medicine,* 21, 1373-1379.

Cromartie JB and Swanson LL. (1995). A sub-county delineation of the rural urban continuum. Paper presented at the Applied Geography Conference, Arlington, VA, November 8, 1995.

Deavers KL and Brown DL. (1980). The rural turnaround: Research and national public policy. In: Brown DL and Wardwell JM, Eds. *New Directions in Urban-Rural Migration: The Population Turnaround in Rural America.* New York: Academic Press.

De La Torre A, Fickenscher K and Luft H. (1991). The zip (postal) code difference: Methods to improve identification of rural subgroups. *Agricultural Economics: The Journal of the International Association of Agricultural Economics.* 5(3):253-262.

Eberts P and Khawaja M. (1988). Changing socioeconomic conditions in rural localities in the 1980s: Experiences in New York state. Ithaca, NY: Cornell University. Bulletin No. 152. In series: Cornell Rural Sociology Bulletin Series.

Economic Research Service. (1995). US Department of Agriculture. Understanding rural America. Agriculture Information Bulletin No. 710. Washington, DC. February 1995, p. 2,5.

Edmondson B and Fontanez W. (1995). Where are the Boonies? *American Demographics.* 17(2):60, February.

Elison G. (1986). Frontier areas: Problems for delivery of health care services, *Rural Health Care* 8(5):1-3.

Falk WW and Pinhey TK. (1978). Making sense of the concept rural and doing rural sociology: An interpretive perspective. *Rural Sociology,* 44:547-558.

Federal Register. (1995). Volume 60, No. 21 at page 6139 (February 1, 1995).

Frenzen P. (1992). Health insurance coverage of rural family members. Washington, DC: US Department of Agriculture, Economic Research Service. (mimeo)

Frenzen P. (1993) Rural residents have different patterns of health insurance coverage. *Rural Conditions and Trends.* Spring 1993.

Fuguitt GV. (1975). Residential preferences and population distribution. *Demography* 12:491-504.

Ghelfi LM and Parker TS. (1995). A new county-level measure of urban influence. Staff Paper, Rural Economy Division, Economic Research Service, US Department of Agriculture.

Gilford DM, Nelson GL and Ingram L. (1981). *Rural America in Passage: Statistics for Policy.* Washington, DC: National Academy Press.

Goldsmith HF, Puskin DS, and Stiles DJ. (1992). "Improving the operational definition of 'rural areas' for federal programs." Paper presented at the 1992 Annual Meeting of the Southern Demographic Association, Charleston, SC, October 1992.

Goody B. (1993). Defining rural hospital markets. *Health Services Research* 28(2):183-200.

HRSA. (1992). Study of models to meet rural health care needs through mobilization of health care professions education and services resources. Rockville, MD: Office of Special Projects, Health Resources and Services Administration.

Hartlaub PP and Gordon RL. (1993). Rural practice: Preference, perception and reality. *Archives of Family Medicine.* 2(11):1198-201.

Hewitt M. (1992) Defining "rural" areas. Impact on health care policy and research. In: Gesler W and Ricketts TC, eds. *Health in Rural North America.* New Brunswick, NJ: Rutgers University Press.

Hewitt M. (1989). Defining rural areas: Impact on health care policy and research. (Staff paper, Office of Technology Assessment, Y3 T22/2: 2R88). Washington, DC: US Government Printing Office.

Ilvento TW, Fendley K and Christenson JA. (1988). "Political definitions of rurality and their impact on federal grant distribution: the case for the Farmer's Home Administration." *Journal of the Community Development Society.* 19(1):1-20.

Institute of Medicine. (1996). The nation's workforce: Options for balancing supply and requirements. Washington, DC: National Academy Press.

Johnson F. (1995). California Office of State Health Planning. Personal communication, December 6, 1995.

Johnston RJ. 1983. *Philosophy and Human Geography.* London: Edward Arnold.

Lee HJ. (1991). Definitions of rural: A review of the literature. In A. Bushy (Ed.), *Rural Nursing,* Volume 1 pp.7-20. Newbury Park, CA: Sage.

Lowe J. (1994). Hospital closure and access to hospital services. In: Ricketts TC, Savitz LA, Gesler WM and Osborne DN eds. *Geographic Methods for Health Services Research.* Lanham, MD: University Press of America.

Miller MK, Farmer F and Clarke L. (1994). Rural populations and their health. In: Beaulieu JE and Berry DE, eds. Rural Health Services: A Management Perspective. Ann Arbor MI: AUPHA/Health Administration Press, pp. 3-26.

Miller MK and Luloff AE. (1981). Who is rural? A typological approach to the examination of rurality. *Rural Sociology* 46:608-25.

Moses EB. (1990). The Registered nurse population. Findings from the national sample survey of registered nurses, March 1988. Rockville, MD: US Bureau of Health Professions.

New York State Legislative Commission on Rural Resources. (1990). Training physicians for rural health careers in New York State. Albany, New York: New York State Legislature.

Nunley R, Heng JC, and Bern-Klug M. (1995) Identifying "Rural" areas using ZIP Codes and different measures of population density. Paper presented at the Applied Geography Conference. Crystal City, VA, November 8, 1995.

O'Hare WP. (1988). The rise of poverty in rural America. Population Trends and Public Policy Series, No. 15. Washington, DC: Population Reference Bureau.

Pew Health Professions Commission. (1995). Critical challenges: Revitalizing the health professions for the twenty-first century. San Francisco: UCSF Center for the Health Professions.

Phibbs CS and Robinson JC. (1993). A variable-radius measure of local hospital market structure. *Health Services Research* 28(3):313-324.

Pickard J. (1988). A new county classification system. *Appalachia*, 21(3): 19-24, Summer.

Popper FJ. (1986). The strange case of the contemporary American frontier. *Yale Review* 76(1):101-121.

Ricketts TC. (1994). Health care professionals in rural America. In: Beaulieu JE and Berry DE (Eds.) *Rural Health Services: A Management Perspective.* Ann Arbor, MI: AUPHA Press/Health Administration Press.

Ricketts TC, Savitz LA, Gesler WM and Osborne DN eds. (1994). *Geographic Methods for Health Services Research.* Lanham, MD: University Press of America.

Rowland D and Lyons B. (1989). Triple jeopardy: Rural, poor, and uninsured. *Health Services Research.* 23(6):975-1004.

Sater DK. (1994). Geographic coding of administrative records—Current research in ZIP/Sector-to-county coding process. Washington, DC: US Department of Commerce, Bureau of the Census. Technical Working Paper No. 7. (1993). Geographic coding of administrative records—Past experience and current research. Washington, DC: US Department of Commerce, Bureau of the Census. Technical Working Paper No. 2.

Schneider D and Greenberg MR. (1992). Death rates in rural America 1939-1981: Convergence and poverty, in Wilbert M. Gesler and Thomas C. Ricketts, eds. *Health in Rural North America: The Geography of Health Care Services and Delivery.* New Brunswick, New Jersey: Rutgers University Press.

Simpson KN, DesHarnais S, Jacobs A and Menapace A. (1994). Methods for defining medical service areas. In: Ricketts TC, Savitz LA, Gesler WM and Osborne DN eds. *Geographic Methods for Health Services Research.* Lanham, MD: University Press of America.

New York State Legislative Commission on Rural Resources. (1990). Training physicians for rural health careers in New York State. Albany, New York: New York State Legislature.

Nunley R, Heng JC, and Bern-Klug M. (1995) Identifying "Rural" areas using ZIP Codes and different measures of population density. Paper presented at the Applied Geography Conference. Crystal City, VA, November 8, 1995.

O'Hare WP. (1988). The rise of poverty in rural America. Population Trends and Public Policy Series, No. 15. Washington, DC: Population Reference Bureau.

Pew Health Professions Commission. (1995). Critical challenges: Revitalizing the health professions for the twenty-first century. San Francisco: UCSF Center for the Health Professions.

Phibbs CS and Robinson JC. (1993). A variable-radius measure of local hospital market structure. *Health Services Research* 28(3):313-324.

Pickard J. (1988). A new county classification system. *Appalachia*, 21(3): 19-24, Summer.

Popper FJ. (1986). The strange case of the contemporary American frontier. *Yale Review* 76(1):101-121.

Ricketts TC. (1994). Health care professionals in rural America. In: Beaulieu JE and Berry DE (Eds.) *Rural Health Services: A Management Perspective*. Ann Arbor, MI: AUPHA Press/Health Administration Press.

Ricketts TC, Savitz LA, Gesler WM and Osborne DN eds. (1994). *Geographic Methods for Health Services Research*. Lanham, MD: University Press of America.

Rowland D and Lyons B. (1989). Triple jeopardy: Rural, poor, and uninsured. *Health Services Research*. 23(6):975-1004.

Sater DK. (1994). Geographic coding of administrative records—Current research in ZIP/Sector-to-county coding process. Washington, DC: US Department of Commerce, Bureau of the Census. Technical Working Paper No. 7. (1993). Geographic coding of administrative records—Past experience and current research. Washington, DC: US Department of Commerce, Bureau of the Census. Technical Working Paper No. 2.

Schneider D and Greenberg MR. (1992). Death rates in rural America 1939-1981: Convergence and poverty, in Wilbert M. Gesler and Thomas C. Ricketts, eds. *Health in Rural North America: The Geography of Health Care Services and Delivery*. New Brunswick, New Jersey: Rutgers University Press.

Simpson KN, DesHarnais S, Jacobs A and Menapace A. (1994). Methods for defining medical service areas. In: Ricketts TC, Savitz LA, Gesler WM and Osborne DN eds. *Geographic Methods for Health Services Research*. Lanham, MD: University Press of America.

Smeloff EA, Burnett WH, Kelzer PJ. (1981). A Geographic framework for coordination of needs assessment for primary medical care in California. *Public Health Reports* 96(4):310-14.

Taylor DT, Ricketts TC, Kolimaga JT and Howard HA. (1994). The measurement of underservice and provider shortage in the United States: A policy analysis. No. 34, Working Paper Series, North Carolina Rural Health Research Program. December 1994.

Weinert C and Long K. (1990). "Rural families and health care: Refining the knowledge base." *Journal of Marriage and Family Review*, 15, 57-75.

Weinert C and Boik RJ. (1995). MSU rurality index: Development and evaluation. *Research in Nursing and Health* 18:453-464.

Whittaker WH. (1982). The many faces of Ephraim: In search of a functional typology of rural areas. (ERIC index reference ED 242 459)

Wibberly GP. (1972). Conflicts in the countryside. *Town and Country Planning* 40:259-64, 1972.

Willits FK and Bealer RC (1967). An evaluation of a composite definition of "rurality." *Rural Sociology*. 32(2):165-77.