DEFINING UNDERSERVICE AND PHYSICIAN SHORTAGE AREAS IN HISTORICAL AND FUTURE CONTEXTS

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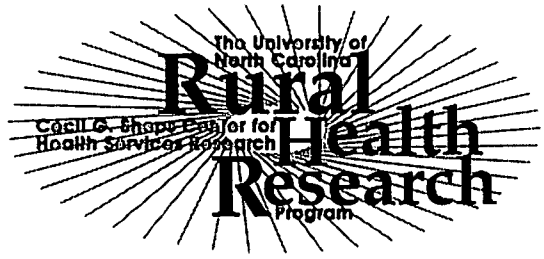

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Executive Summary

This paper reviews the background and operation over time of the Health Professional Shortage Area (HPSA) methodology and the Index of Medical Underservice (IMU) which is used as part of the Medically Underserved Area (MUA) methodology. This review provides the context for a discussion of the relative merits and drawbacks of continued use of the HPSA methodology for identification of underserved populations, and discussion of relevant issues to be considered in attempts to develop an improved methodology to identify underserved populations in the future.

Defining individuals or populations as underserved with respect to primary health care has been a central part of American health care policy since the mid-1970's. Presently, the United States government uses the health professional shortage area (HPSA) methodology and the medically underserved area (MUA) methodology primarily to identify locations which are qualified to receive assistance under the National Health Service Corps (NHSC) program and the community health center (CHC) program, respectively. These methodologies have been identified as suffering from theoretical shortcomings, but no viable alternatives have been offered in their place, suggesting the need to consider new methodologies. While this paper focuses on the functioning of the HPSA methodology as well as the changes over time in the number of areas identified as HPSAs, many of the issues raised are relevant to the MUA methodology as well.

As of September 30, 1993, there were 2,448 primary care HPSA designations with 42,787,156 people living within them; 1,064 dental HPSAs with 20,910,147 persons living within them; and 772 mental health HPSAs with 53,741,746 persons living within them. There are 223 rural whole-county HPSAs and 23 urban whole-county HPSAs which have been chronically designated as HPSAs since 1978, in

addition to 172 rural part-county and 164 urban part-county HPSAs which have been chronically designated for the same period of time.

There appears to be consensus among some policy makers and researchers that the present methodologies are inadequate in identifying underserved populations. This underscores the timeliness of looking at the present methodologies with a view towards developing a new methodology that will enhance policy maker's ability to identify underserved populations which are eligible for programmatic assistance. The paper concludes with a discussion of future uses of, and difficulties in developing, new methodologies to identify underserved populations.

I. Introduction

As underserved populations and their lack of access to primary care have become an area of increased focus in the latest consideration of changes in the U.S. health care system, the two basic methodologies used to identify areas that are underserved and in need of extra health care resources have garnered more attention. The Health Professional Shortage Area (HPSA) and the Index of Medical Underservice (IMU) associated with the Medically Underserved Area (MUA) methodology are the two primary methods used to identify areas and populations which are in need of extra assistance. The purpose of this paper is to provide insight into understanding the historical context of these methodologies, showing how they fit into post-Medicare/Medicaid federal health policy, and to sketch some of the most important issues that must be accounted for in considering changes in the manner in which underserved populations, or those suffering from a provider shortage, are identified.

Concern over underservice and provider shortage in the United States is at least 60 years old. Since the Committee on the Cost of Medical Care (1933) reported that there were fundamental problems with the U.S. health care system, what to do (if anything) to respond to these problems (as well as subsequent ones) has been a central public policy issue at the federal, state and local level. The CCMC's report heralded a subtle but key change in the manner in which health care issues were debated in Congress, state legislatures, academia, and around the kitchen table. This report found fundamental problems in the manner in which health care was financed, organized, and thus used in the United States. No longer was health insurance seen as a matter of putting in place a scheme to stave off economic destitution in the case of illness, but as a means of increasing the ability of masses to use health care on a consistent basis, and not simply in the event of a dread disease.

Out of the CCMC report came advocates of the position that almost all people needed more health care services than they regularly received. Thus, the notion of underservice as it is generally used today was born: an individual or group who does not have access to an adequate level of health care services. Health care came to be seen as a good thing in and of itself, not simply as a means of preventing economic disaster. Many people were found not to get enough of this good thing, and the debate over what role the government should play in achieving this normative goal (increasing use of care) began. It continues today.

While the CCMC's vision of American health care being organized into prepaid group practices, and of a broad-based financing mechanism in the social insurance vein did not take hold in the U.S., the message that more health care was needed by most persons resonated with politicians and consumers. Persons of all ideological ilks embraced programs such as the Hill-Burton legislation (1946) to increase the supply of community hospital beds and governmental efforts to increase the supply of physicians. Through the 1940s and 1950s, the view remained that there was generally a need to increase the use of health care by all segments of society. Harry Truman, during his campaign to enact a system of National Health Insurance in 1948, was known to lament the fact that only 4 percent of the nation's GNP was spent on health care; he intended to take it higher (Starr, 1982). The only disagreement was over how to do it, whether to enact a system of compulsory national health insurance, or to depend upon the businesses of the nation to provide health insurance as a tax-free benefit. The latter won out.

But, in the 1960s, the political will to make a major leap in the financing of health care services for the elderly and the very poor came together and Medicare and Medicaid were passed. Some thought that this signaled the beginning of the end, and that National Health Insurance (NHI) could not be far behind. In fact, their implementation may have slowed any progress toward such a comprehensive and

sweeping change in the health care system. The middle class assumed that it would be employed and receive health insurance from employers during their working years, and Medicare during their retirement. It was viewed as Social Security, something earned during years of working. Medicaid was there for the poor in society, and the problems appeared to many to be solved (Starr, 1982). Even though these two programs were passed that had the effect of enabling millions to receive a level of care that they could not otherwise afford, some health policy makers still saw major problems with segments of the population who continued to fall through the cracks.

After the passage of the Medicare and Medicaid programs in the mid-1960s, U.S. health and social policy began to focus on programmatic responses to inequities within the U.S. health care system, and not so much on general efforts to increase the use of health care by large segments of the population. These efforts recognized that many persons still remained uninsured, and that some persons who were insured had special health care needs which were largely unaddressed and could be expected to persist even if all persons were covered by health insurance. No longer was the notion that there was a general need to increase access to health care resonant. The new goal was to identify the exceptions, those not being well served by the system of organizing and financing health care in the United States. In order to aid policy makers in their attempts to address these problems, a way of identifying such underserved populations or geographic areas was necessary. The Health Professional Shortage Area (HPSA) methodology and the Index of Medical Underservice (IMU), which were developed to identify underserved populations in the early to mid-1970s, are still in use today.

The development of these methodologies resulted, in part, from the American health care system's development of an "intervention by exception" approach to improving access to health care services after the enactment of the

Medicare and Medicaid program. Instead of developing a more cohesive national strategy of financing or delivering health care, the patchwork system that was developing as many businesses provided health insurance to their employees, with the poor and elderly insured through a governmental "safety net," was encouraged to remain. Efforts to improve access to care and to address the needs of persons and groups within this loose-knit system who were identified as having health care problems that were not being addressed were seen as calling for specific responses to these problems, not a major overhaul of the health care system.

Community Health Centers (CHC) were developed to provide comprehensive health services and outreach to rural and inner-city communities; the National Health Service Corps (NHSC) was launched to provide physicians in rural and inner-city areas which could not obtain them otherwise; rural health clinics operating in certain areas defined as being medically underserved were eligible for special reimbursement rates from the federal government for services rendered; and various states developed programs which forgave medical school loans in return for physicians practicing for a specified length of time in their state's underserved areas. Each of these programs relied on one of the two methodologies (HPSA and MUA) to identify eligible recipients of this assistance. While these programs (and others) differ in many ways, implicitly they were developed on the basis of two assumptions. First, that certain areas or groups of persons within the United States were underserved or comprised an area with inadequate health care resources and thus were not able to avail themselves of a level of health care services broadly seen as "normal, basic, or adequate"; and second, that this situation placed those persons at risk of poorer health outcomes. Being underserved or living in a shortage area (however defined) was seen as a negative determinant of health.

II. DEFINITIONS OF UNDERSERVICE

Defining underservice is more difficult than might be imagined. This task has remained extremely problematic and troublesome, in spite of the fact that we have undertaken major commitments of resources via federal health policy based upon a notion that some people, areas, and populations still did not have adequate health care services. While most persons probably have an intuitive notion concerning what the term underservice means, identifying a consensual definition that can be adopted for discussion of the concept is virtually impossible. In a sense, the methodologies that are used to identify Medically Underserved Areas or Health Professional Shortage Areas have come to define the terms. But, there was little clear consideration of a definition of underservice in the development of the HPSA methodology, and an explicit failure to define the term in the development of the IMU. This section briefly reviews the implicit definition of underservice that is associated with these two methodologies. There are alternative ways to define underservice, but they will not be the focus of this work since they are not being used in the formulation of health policy at the present time.

This paper will focus on the Health Professional Shortage Area (HPSA) and the Index of Medical Underservice (IMU) to discuss issues relevant to the measurement of underservice. The methodologies used to identify areas that are underserved have been developed in response to a need to designate particular areas as being underserved in order to make them eligible to receive special financial or other types of support. The HPSA methodology and the IMU which is used in designating areas as being medically underserved are the two most common means of identifying underserved areas. The HPSA methodology does not explicitly define underservice, but focuses instead on provider shortage, a concept that is often used synonymously with underservice. The implicit definition of underservice that comes from this methodology is a lack of primary care physicians sufficient to

ensure that the population–to–primary care physician ratio is less than 3500:1. This implies that not having enough primary care physicians in an area means that the persons living in that area will be hindered from obtaining the primary care that they need.

The definition of underservice assumed in the framework of the IMU is not as clear as might be expected from the name of the methodology. During the process of developing the IMU, the researchers that were working on this did not explicitly define underservice (Wysong, 1975). However, the definition of underservice implied by the IMU is more comprehensive than the one that can be inferred from the HPSA methodology. The population–to–primary care physician ratio remains central to the designation, but the population of a given area is not the only determinant of underservice or health need as it is under HPSA.[1] Instead, the IMU adds to the population–to–primary care physician ratio a measure of poverty in the area (percent of persons below the poverty level), the age structure of the area (proportion of persons 65 years of age and older), and a crude measure of health status or outcome (the infant mortality rate).

Table II.1

Implicit Definitions of Underservice, HPSA and IMU

HPSA:	A rational service area is seen as underserved if there are not enough physicians in the area such that the population to primary care ratio is greater than 3500:1, or 3000:1 if there is evidence of extreme need for health services. In this definition, need is determined solely by population, and two communities with equal populations are assumed to have equal need for physician services.
IMU:	A county (or sub-county unit) is seen as underserved if the supply of primary care physicians in the area is inappropriate to meet the health

[1]Implicitly, population is the only determinant of health need because each of two areas with the same population is assumed to have the same need for primary care physicians that the other area has, regardless of any other characteristics of the areas.

needs of the population as measured by the population–to–primary care physician ratio, the infant mortality rate, the proportion of persons below poverty, the proportion of persons above 65 years of age. Different combinations of the variables indicated can define an underserved area.

These two methodologies are the primary means by which underservice and underserved populations are identified in the United States, as well as being the determinants of how these areas qualify for programmatic assistance to respond to their underservice. These methodologies may or may not provide an adequate definition of underservice depending upon one's perspective, but they are what is presently being used to identify areas that can receive programmatic assistance. The programs and funds that are distributed as a result of these definitions are discussed later in this paper.

III. Health Professional Shortage Area Methodology (HPSA)

Legislative History. The Health Manpower Shortage Area (HMSA) methodology was created by the Health Professions Educational Assistance Act of 1976, as set forth by Section 332 of the Act.[2] The purpose of the HPSA designation was to qualify these areas to be eligible to apply for National Health Service Corps physicians to practice in the area so designated. The Act enacted procedures to designate areas, population groups, medical facilities, and other public facilities as health manpower shortage areas. This did not guarantee areas or other units of designation the placement of a National Health Service Corps physician in their locale, but was a necessary step in being able to apply to receive such a physician.

Designation of an area as a HPSA meant that the population–to–primary care physician ratio was greater than 3500:1, implying that there are not enough primary

[2]Health Manpower Shortage Areas (HMSA) were changed to Health Professional Shortage Areas (HPSA) in 1990. The only thing that changed about the methodology was the name. Health Professional Shortage Area (HPSA) is used throughout this paper.

care physicians in a geographic area that constitutes a "rational service area," which does not have to necessarily coincide with set political boundaries[3] (Berk et al., 1983; Lee, 1979; Lee, 1991). In addition, evidence that areas surrounding a proposed rational service area do have high need is required for designation of a HPSA that has a population–to–primary care physician ratio between 3000:1 and 3499:1. Indicators that can be used to show evidence of high need are the birth rate in the area, the infant mortality rate, and a certain proportion of households in the area living below the poverty level.[4] In later years, these same indicators of need have been used to prioritize HPSAs according to their relative degree of need in order to give preference in designation to high need areas.

In this context, underservice means that a shortage of primary care physicians in a particular geographic area is thought to make it difficult for persons in that area to receive adequate care. However, past research has suggested that the HPSA methodology does not adequately distinguish areas suffering from reduced access to primary health care services, suggesting that using population–to–primary care physician ratios as a measure of underservice may be inadequate (Berk et al., 1983; Kehrer and Wooldridge, 1983; Kleinman and Makuc, 1977; Lee, 1979; Lee, 1991; U.S. DHHS, 1990). This research has found that those populations living in areas designated as HPSAs show little difference from those who do not live in HPSAs based on measures of access to care such as number of visits to a physician in a year; percentage of persons with no visits; self-reported health status; and distance traveled to receive care (Berk et al., 1983). In other words, the HPSA methodology does not adequately identify populations that appear to be experiencing systematic barriers in their access to physician-delivered care. The lack of a broadly accepted

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[3]See Appendix A for an in–depth discussion of HPSA eligibility requirements, including definition of a "rational service area."

[4]As set forth in the original rules and regulations of the HPSA program (published January 10, 1978 in the Federal Register) the cutoff for indicators of high need include: more than 100 births per 1,000 women aged 15–44, or more than 40 births per 1,000 women aged 13–17.

definition of underservice hinders attempts to operationalize and measure the concept.

Process of HPSA Designation

The designation process for having particular areas, facilities, or populations declared as a HPSA that is actually in place differs somewhat from the process that was adopted initially as outlined in the Interim-Final Regulations for the Health Manpower Shortage Area (HMSA) released in the January 10, 1978 *Federal Register*. Originally, the Secretary of the Department of Health, Education, and Welfare developed and circulated a list of possible HMSAs to be reviewed by Governor's offices, health systems agencies, medical societies, and any other state or local organizations wishing to comment on the list (*Federal Register*, 1978). In addition, other areas could be suggested for designation as a HMSA for inclusion in the Secretary's original list, and they would be considered by the Shortage Area Designation Section, Manpower Analysis Branch, Bureau of Health Manpower.

The designation process of HPSAs is initiated at the local level and this has implications for any analysis of HPSAs. The federal government does not go through a process of identifying all the counties in the U.S. which could qualify as whole or part-county HPSAs in a top-down process. Instead, county- or local-level governments or interest groups are required to seek designation as a HPSA for the qualification process to be initiated. Therefore, it would be inaccurate to assume that the counties or populations comprising a designated HPSA includes all persons living in an area that has a population–to–physician ratio that would qualify it as a HPSA. Other counties (or portions of counties), which are not designated may have a more acute shortage of primary care physicians than do some of the counties which are designated. But, without having a state government or other organization officially petitioning for the county or portion of a county to be

designated as a HPSA, the designation process would never begin. Thus, the most severely underserved areas (in terms of primary care physicians) may be those most likely to *not* be designated as a HPSA because of the resources necessary to seek designation as a HPSA.

The National Health Service Corps Revitalization Act, passed in 1990, mandated that HPSAs of greatest shortage be identified each year and that the entities within those areas approved to have NHSC physicians be highlighted during the placement process. This system of prioritization was first used in the 1992 placement cycle of NHSC physicians which began on July 1, 1991. Utilization of these criteria has the effect of ensuring that NHSC physicians are placed in the HPSAs of greatest need based on this supplemental methodology. The "exclusive factors" (variables) used to prioritize HPSAs according to degree of shortage are: population–to–physician ratio, poverty rate, infant mortality rate, low birthweight babies, and indicators of access to primary health care, taking into account distance to sites of such care (*Federal Register*, 1991). Appendix B shows the *Federal Register* notice of the adoption of this methodology to prioritize HPSAs and the variables used in the methodology.

Programs Using HPSA as a Designation Tool

The HPSA designation was originally developed in order to identify areas eligible to receive National Health Service Corps (NHSC) physician placements. The NHSC was launched to provide physicians in rural and inner-city areas where they could not be obtained otherwise. Both the NHSC loan repayment and scholarship programs use the HPSA methodology to designate eligible areas. Rural health clinics operating within HPSAs can bill Medicaid and Medicare directly for services provided by Physicians Assistants and Nurse Practitioners. Physicians practicing in these areas (all physicians, not simply NHSC physicians) are eligible for

a 10 percent bonus on all Medicare-billable charges, and new physicians opening practices in HPSAs are exempt from Medicare limitations on customary charges to be adopted for the purpose of determining Medicare reimbursement (Division of Shortage Designation, 1993). Some state programs, such as loan forgiveness programs or direct payment of medical school tuition, "piggy-back" on the HPSA designation process.

Identification of the HPSA Cutoff Rule

In 1974, the cutoff point for designating a rational service area as a HPSA was set at a population–to–primary care physician ratio of 3500:1 (with exceptions available down to 3000:1 for high need communities). The 3500:1 ratio represented approximately 1.5 times the mean population–to–primary care physician ratio of all the counties in the United States (there was not a separate analysis carried out for rural and urban counties). The mean ratio was 2360:1 for all counties and 1.5 times this equaled 3540:1. The ratio that was chosen (3500:1) also identified about one-fourth of the counties in the country as falling above this cutoff (having a larger population–to–primary care physician ratio, meaning there were fewer physicians). Thus, 3500:1 corresponded closely with the 75th percentile of all counties in the United States, arrayed according to their population–to–primary care physician ratio. This standard has remained unchanged since its inception in 1974, and is still the single criterion through which counties and other "rational service areas" are identified as HPSAs or not.

The county-level population–to–primary care physician ratio using 1990 population and 1992 physician data was analyzed to determine what the population–to–primary care physician ratio of the median of the lowest quartile of counties is almost 20 years since 3500:1 became the standard by which HPSA's were designated. Table III.1 shows the change in the 75th percentile of the population–

to–primary care physician ratio of all counties in the United States for the years 1974, 1979, 1985, 1988, 1989, 1990, and 1992.

Table III.1
75th Percentile of Population–to–Primary Care Physician Ratio for All Counties in Selected Years

	Percentile Ratio				
	12.5th	**25th**	**50th**	**75th**	**87.5th**
1974				3580:1	
1979	1713:1	2031:1	2700:1	3820:1	5125:1
1985	1636:1	1938:1	2585:1	3575:1	4750:1
1988	1500:1	1808:1	2400:1	3427:1	4500:1
1989	1475:1	1810:1	2375:1	3400:1	4767:1
1990	1447:1	1770:1	2340:1	3400:1	4650:1
1992	1336:1	1622:1	2220:1	3414:1	4850:1

This table shows that the population–to–primary care physician ratio has not remained static in the years for which we have data.[5] From 1974, there was an increase in the ratio represented by the 75th percentile county[6], but since then a general trend of decrease in the ratio has occurred. The bottom quartile refers to the one-fourth of counties in the nation that have a population–to–primary care physician ratio larger than the number corresponding to that position in a given year. For example, in 1992 the bottom quartile ratio was 3414:1, meaning that there were 3,414 persons per each primary care physician in that county corresponding to this percentile. One-fourth of the counties in the nation (approximately 770 of 3080

[5]The definition of primary care physician has been held constant for each of the years in the comparison so the years could be comparable. We had to use the definition of primary care physician that was adopted in 1974 since data reporting formats do not allow for the use of definitions later adopted because earlier data were not disaggregated in the manner necessary. Primary care physicians include general practitioners, family physicians, pediatricians, all internal medicine physicians, and OB/GYNs. Later definitions make distinctions between general internal medicine physicians and other internal medicine specialties, but these data are not available for earlier years.

[6]The lowest quartile represents the "worst" quartile of counties in this case. Technically, it is the upper quartile since in this instance a larger ratio represents a situation that is worse, with "worse" meaning a larger population per physician.

counties) had larger ratios than 3414:1 in 1992, meaning they had relatively fewer primary care physicians given the population of the county.

These results must be considered in light of the general trend of an increase in the total number of primary care physicians per 100,000 persons in all but the smallest communities across the United States from 1975-1988.[7] In spite of these changes in overall physician supply, the population–to–primary care physician ratio of the 75th percentile county remains fairly similar to the 3500:1 set as the cutoff point for identifying a primary care physician shortage area. But, it appears that the increasing numbers of primary care physicians practicing over the past 20 years have not been moving proportionally into all counties in the U.S. The 12.5th percentile, the county that has a better population–to–primary care physician ratio than 87.5 percent of the counties in the nation, has seen a decrease in its population–to–primary care physician ratio from 1713:1 in 1979 to 1336:1 in 1992, an improvement of 22 percent. In contrast, the 87.5th percentile county has seen its population–to–primary care physician ratio improve from 5125:1 in 1979 to 4850:1 in 1992, an improvement of only 5.3 percent. The median county has seen an improvement in its population–to–primary care physician ratio of 17.7 percent over the same time period. Thus, it is clear that population–to–primary care physician ratios have been improving (getting smaller) over the past 15+ years throughout the nation, but the rate of improvement has been most rapid in the counties that already had the best situation vis-a-vis population–to–primary care physician ratios. This shows that the distribution of the increasing number of primary care physicians in the nation has not served to close the relative gap between the counties in the country with the most physicians per population, and those with fewer physicians per population. In fact, the number of counties in the nation with no primary care physicians

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[7]HRSA. Study of Models to Meet Rural Health Care Needs Through Mobilization of Health Professions Education and Services Resources. HRSA Contract No. HRSA-240-89-0037, 1992.

practicing within them has increased (albeit not much) from 185 in 1979 to 204 in 1992. Table III.2 shows the number of counties in the nation with no primary care physicians for selected years from 1979 to 1992.

Table III.2
Number of Counties with No Physicians,
Selected Years from 1979 to 1992

	Counties
1979	185 (6.0%)
1985	174 (5.6%)
1988	180 (5.8%)
1989	193 (6.3%)
1990	180 (5.8%)
1992	204 (6.6%)

Note: Total counties = 3080

Even though the number of counties with no primary care physician was higher in 1992 than in any other year for which data are available, it is difficult to discern a trend from these numbers since they are similar in comparison to the total number of counties in the nation. The proportion of the total counties in the nation with no primary care physicians varied from 5.6 percent in 1985 to 6.6 percent in 1992.

Number of HPSAs Designated, September 1993

There are three types of HPSA designations: geographic areas, population groups (such as migrant farm workers, homeless), and facilities such as prisons. An area, population, or facility can be classified as a HPSA with respect to primary

medical care, dental care or mental health care. Table III.3 below shows the number of HPSA designations and the population living in the designated areas; Table III.4 shows the number of practitioners needed to remove the HPSA designation, and the estimated underserved population living in the HPSAs as calculated by the Division of Shortage Designation.

Table III.3
Health Professional Shortage Areas by Type of Designation, September 30, 1993

	Num. Designations	Population Living in Designated HPSAs
PRIMARY MEDICAL		
HPSA TOTALS	2,448	42,787,156
Geographic areas	1,992	36,354,111
Population groups	332	6,192,692
Facilities	124	240,353
DENTAL HPSA TOTALS	1,064	20,910,147
Geographic areas	887	18,142,486
Population groups	153	2,628,029
Facilities	24	139,632
MENTAL HEALTH		
HPSA TOTALS	772	53,741,746
Geographic areas	608	53,254,052
Population groups	8	285,442
Facilities	156	202,252

Table adapted from: Division of Shortage Designation, Bureau of Primary Health Care, HRSA. September 30, 1993

Table III.4
Number of Practitioners Needed to Remove HPSA Designations and Estimated Underserved Population in HPSAs, September 30, 1993

	Number of Practitioners Needed to Remove Designations	Estimated Underserved Population
PRIMARY MEDICAL		
HPSA TOTALS	4,559	23,877,228
Geographic areas	3,593	N/A
Population groups	882	N/A
Facilities	84	N/A
DENTAL HPSA TOTALS	2,082	11,665,881
Geographic areas	584	N/A
Population groups	436	N/A
Facilities	62	N/A
MENTAL HEALTH		
HPSA TOTALS	1,688	43,282,298
Geographic areas	530	N/A
Population groups	7	N/A
Facilities	530	N/A

Table adapted from: Division of Shortage Designation, Bureau of Primary Health Care, HRSA. September 30, 1993

Criticism of HPSA Methodology

Berk, Bernstein and Taylor, (1983) focused on the Health Manpower Shortage Area (HMSA) methodology, and sought to determine the actual availability and utilization of care among persons living in (then called) HMSAs. These authors used the 1977 National Medical Care Expenditure Survey (NMCES) in much the same way Kleinman and Wilson (1977) used the NHIS. They classified the 40,000 respondents to the survey according to their residence in a HMSA or not. Since HMSAs can be parts of counties, or aggregations of counties, this was more difficult than assigning NHIS respondents to their county. Therefore, the authors assigned, by hand, the HMSA status of the ZIP code in which each respondent to the survey lived. They went on to compare respondents living in a HMSA to those respondents not living in a HMSA on the likelihood of having a physician visit in the past year, number of physician visits in the past year, travel time to usual source of medical care, and waiting time in a physician office for an appointment, and also conducted a series of regression analyses using these measures as the dependent variable. The authors found some differences in use of care and access to care between respondents to the survey who lived in a HMSA compared to those who did not live in a HMSA, but these differences were not significant when the data were analyzed using multivariate methods. The multivariate models showed that racial, income and health insurance coverage differences among respondents were stronger predictors of the dependent variables than was residence in a HMSA, with the exception of travel time to care. Based on these findings the authors concluded "that the assumptions concerning access to care in manpower shortage areas should be reexamined. Our investigation suggests that residents of HMSAs do not appear to be using fewer physician services as a result of the low physician/population ratios in the areas in which they live" (Berk, Bernstein & Taylor, 1983). They suggest

that new criteria are needed to identify areas eligible for receipt of programmatic assistance designed to improve access to care.

IV. Index of Medical Underservice

Legislative History. The origin of the Index of Medical Underservice (IMU) was the Health Maintenance Organization (HMO) Act of 1973. The purpose of this Act was to encourage the development of HMOs throughout the United States in an effort to improve both access to health care and the efficiency of the system. Proposed HMOs for which at least 30 percent of the people in their service areas were in areas identified as medically underserved were eligible to receive special funds to encourage the provision of care via HMOs to poor populations. The HMO Act of 1973 stipulated that a methodology for identifying medically underserved areas be developed and the IMU was the methodology that resulted from this process. The IMU has remained in use even after federal attempts to encourage HMO development had subsided, and has been used by various federal programs as a means of designating areas eligible for programmatic assistance such as the Community Health Center (CHC) program.

Process of Designation as a Medically Underserved Area

The designation of medically underserved areas (MUAs) was first completed by the Secretary of the Department of Health, Education, and Welfare in 1975 using the IMU, as prescribed by the HMO Act of 1973. The list of MUAs was updated at various points in the future, again using the IMU. There is also a process of designating a medically underserved population (MUP) within a particular geographical service area that may or may not meet the criteria set forth to classify an area as a MUA, but the focus of this report will be on the MUA designation process. The designation of an area as a MUA is based on the application of the

Index of Medical Underservice (IMU) to a particular geographic service area. In theory, this service area could vary in size and in its adherence to political boundaries such as county lines, but in practice, geographic service areas tend to often be counties because of data availability considerations. In order to classify an area as a MUA, a particular service to be designated must be identified in terms of:

1) whole county(ies); or
2) groups of contiguous counties, minor civil divisions (MCD), census county divisions (CCD), or census tracts whose population centers are within 30 minutes travel time of each other and which represent communities with similar socioeconomic and demographic characteristics.[8]

As well, other information corresponding to the proposed service area is needed in order to determine whether the area in question is indeed qualified to be designated as a MUA. The data needed are as follows:

1. the resident civilian, non–institutionalized population of the service area (aggregated from the unit of analysis appropriate given the boundaries of the proposed service area).[9]
2. the percent of the service area's population with incomes below the poverty level.[10]
3. the percent of the service area's population that is over 65 years of age.
4. the infant mortality rate (latest 5 year average) for the service area in question.[11]

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[8]The measures of economic and demographic characteristics to be used to determine whether a proposed service area constituted a "community" are not given in the rules of the operation of the MUA designation.

[9]If a service area is a sub–county unit, then this information would be aggregated from minor civil divisions, census county divisions, or census tracts.

[10]While not entirely clear, we assume that this criteria refers to the percent of persons below poverty, as opposed to the percent of families below poverty.

[11]If the service area does not coincide with county boundaries, then calculation of the infant mortality rate for the service area in question will be difficult. The rules of the methodology allow for the use of

5. the current number of full-time equivalent (FTE) primary care physicians service the service area, and their locations of practice.[12] This information is used along with the population of the service area to calculate the ratio of FTE primary care physicians per 1,000 population for the service area.
6. Designation requests are also supposed to have a map of the service area requesting designation, with health care resources available in the service area identified. When seeking a designation for a service area other than a single, whole county, a case must be made why the service area requested has been chosen. Information regarding travel patterns, work patterns, use of health resources, linguistic, cultural, or other population reasons that a non-county service area is appropriate should be provided to the Division of Shortage Designation.[13]

Once the service area has been delineated, calculation of the Index of Medical Underservice requires 4 variables: 1) primary care population–to–physician ratio; 2) infant mortality rate; 3) percentage of the population living below the federal poverty level; and 4) percentage of the population greater than 65 years of age

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the infant mortality rate for the unit of aggregation that is closest to the proposed service area, and for which data exists. The latest 5 year average available is used for the infant mortality rate because of the instability of infant mortality rates in areas with a small number of live births per year. In this circumstance, small changes (increases or decreases) in infant deaths will cause the infant mortality rate to jump up and down from year to year. The 5 year average reduces the volatility of the infant mortality rate. In fact, the methodology states that sub-county infant mortality rates should be used in the calculation of the Index of Medical Underservice (IMU) only if there area at least 4000 births in the service area over the 5 year period of time in question. When only county-level data are available and the proposed service area contains parts of two counties, then the infant mortality rates in the respective counties should be weighted according to the proportion of the population in the service area made up by the respective counties to determine an estimate of the service area infant mortality rate. This, in effect, assumes that the infant mortality rate is uniform throughout each of the counties in question.

[12]Which type of physicians are to be counted as primary care physicians is not clear in the methodology. The HPSA designation counts general practitioners, family medicine, ob/gyns, general internal medicine, and pediatricians as primary care physicians.

[13]Because of data availability, and more explanation required for sub-county service areas, whole counties are more often identified as service areas in the seeking of MUA designations.

(Division of Shortage Designation, 1994; Health Services Research Group, 1975; Wysong, 1975). The IMU is then calculated for the service area using weighting factors provided by the Division of Shortage Designation, Bureau of Primary Health Care, Health Resources and Services Administration (HRSA). These weights translate the raw values for the measures of the variables which make up the IMU into scores which are summed to obtain the value of the IMU for a given service area.

In the original designation process, rural and urban counties were treated differently. In rural counties, (defined as those classified as non–metropolitan) county level data were used for the infant mortality rate and population–to–primary care physician ratio. Minor civil division (MCD) and Census County Division (CCD) were used for the proportion of the population below poverty and the proportion who were age 65 or older along with the same county level data on infant mortality and population–to–primary care physician ratio to determine the IMU score for non–metropolitan counties (Department of Health, Education, & Welfare, 1976). In metropolitan counties, the same two county level variables were used along with census tract level data on poverty and the elderly to develop an IMU score, and thus a designation of an area as medically underserved.

The IMU ranges from 0 to 100, with 0 representing a service area that is "completely" underserved, and 100 an area that is best served, or least underserved. All service areas with an IMU score of 62.0 or less are designated as a MUA. This cutoff level was adopted when the original calculation of the IMU showed the median IMU value for all counties in the United States to be 62.0; hence, the cutoff adopted identified half of the counties in the nation as medically underserved and the other half as not underserved. This cutoff remains in effect today.

This may appear to be a more comprehensive view of underservice, since it adds to the idea of physician shortage the health status or level of need of a

population, as well as the population's ability to seek care to address those health care needs (poor and old persons are assumed to have higher need and more barriers to the receipt of needed care). However, the MUA methodology typically focuses on service areas as counties, because of data difficulties, while the HPSA methodology more readily allows for identification of sub–county units or areas encompassing more than one county as HPSAs.

There is a procedure for making a request for a service area that does not have an IMU value of 62.0 or less to be designated as a MUA. As part of the provisions of Public Law 99–280, enacted in 1986, an area or population group can be declared a MUA or MUP even if they do not have an IMU score of 62.0 or less. In order to be designated as a MUA or MUP on the basis of this exception clause, an applicant must make the case that the service area in question has "unusual local conditions which are a barrier to access to or the availability of personal health services" (Division of Shortage Designation, 1994). The methodology sheet put out by the Division of Shortage Designation states that service areas with IMU scores of 70.0 or above will have to have particularly convincing evidence that the area is experiencing unusual circumstances. When a request is made to the Division of Shortage Designation (DSD), whether a normal request or an exception request, the DSD first determines if all the necessary information has been included in the application. If not, then the application is returned for additional information to be added. After the application is completed, there is a 30 day comment period, with copies of the application sent to the State's Governor's office, the State Primary Care Association, local health department or health planning agency, and the State cooperative agreement office (such as an Office of Rural Health). The decision to designate or deny the application is made in writing to the applicant organization. The time of the entire process is supposed to take between 60 and 90 days.

Programs Using the IMU for Designation

As noted, originally the IMU was developed in order to identify medically underserved areas so that HMOs with at least 30 percent of their patients coming from such areas could receive priority funding for HMO development grants. Any health facility that primarily served medically underserved areas was also eligible for special funds under Section 1611(d) of Title XVI of the Public Health Service Act. For a locale to receive funds to build and maintain a Community Health Center (CHC), or for certain clinics to be classified as rural health clinics, it also must be identified as being a medically underserved area (MUA).

During Fiscal Year 1975, there were feasibility, planning, and initial development grants available for HMOs. By the end of Fiscal Year 1975, only five HMOs nationally were federally qualified[14], although there were 178 "look-alike" organizations operating in 33 states, the District of Columbia, and Guam (Department of Health, Education, & Welfare, 1975). By June 30, 1975 there were approximately 50 organizations believed to be interested in being designated as federally-qualified HMOs. One of the five originally qualified HMOs (they met all criteria as set forth in the Act) was located in Greenville, South Carolina and had two facilities located in underserved areas, to provide care to the underserved community in this area (U.S. DHEW, 1975). The number of HMOs receiving grants increased over the next few years, but this program has not continued to the present. So, the program for which the MUA methodology were specifically developed does not exist any longer, but the IMU is still used for other purposes.

The CHC grant program still relies upon the MUA methodology as the means for determining eligibility for receipt of grants for planning, development, and

[14]Any legal entity or organization was eligible to apply for grants and/or loans under the HMO Act of 1973. In order to receive any federal funds, a prospective HMO had to agree to comply with the regulations as stipulated in the Act. Briefly, this meant comprehensive care had to be available 24 hours a day, 7 days a week; the governing board of the HMO had to be comprised of at least one-third consumers; and the HMO had to develop grievance procedures to deal with concerns of patients.

operation of CHCs can only be awarded to CHCs that serve populations designated as medically underserved by the Secretary of Health and Human Services. As well, organizations or systems of organizations that meet the qualification of CHCs under Section 330 of the Public Health Service Act, but which do not receiving funding from that act are designated as Federally Qualified Health Centers (FQHC) as long as they serve medically underserved areas and/or medically underserved populations. This designation of a FQHC qualifies them for cost-based reimbursement of Medicaid eligible patients. Finally, health clinics which serve rural areas and/or populations designated as medically underserved via the MUA methodology are eligible for certification Rural Health Clinics by the Health Care Financing Administration which enables them to receive several reimbursement advantages, including direct billing of Medicare and Medicaid of services provided by mid-level practitioners such as Nurse Practitioners (NP), and Certified Nurse Midwives (CNM).

Criticisms of the MUA Designation

Wysong (1975) outlined the major theoretical difficulties with the Index of Medical Underservice. While he commented on the "almost unprecedented" degree to which this research represents health services researchers playing a direct role in health policy making, he concluded "that there are serious problems associated with the meaning of the concepts 'medical underservice' and 'health services scarcity' (as the concept was originally formulated at the University of Wisconsin) and in the interpretation of the values obtained when the index is applied" (Wysong, 1975). Wysong identified the lack of a definition of medical underservice as the biggest problem with the methodology. He also noted that a distinction between underservice, availability and accessibility was not made and that many persons remain unclear about their relationship. He argued that without

a clear definition of the concept to drive the research which developed the IMU, it is not clear what the IMU measures, which in turn renders the IMU a less-than-ideal health policy tool. He concludes that further work is needed to clearly identify what is meant by medical underservice, and that this meaning should be operationalized to identify areas which are underserved.

Kleinman and Wilson (1977) compared respondents to the 1973 and 1974 National Health Interview Survey (NHIS) who lived in rural counties classified as MUAs to rural counties not classified as MUAs (what they call ASAs, adequately served areas) and each of these groups was compared with all respondents living in metropolitan counties, to determine if the groups were different in terms of health status, access, and utilization of health care. They found no differences in number of physician visits per year among those rural residents living in MUAs compared to those living in ASAs, slight differences in the percentage with at least one visit in the past year (71.0 in MUA vs. 73.4 in ASA), slightly lower utilization of preventive services by those living in MUAs, and higher rates of non-surgical hospitalization for those in MUAs compared to those in ASAs. Even among the measures for which they were able to detect a difference, the practical significance of the difference remains in doubt. They conclude that, "in terms of reported problems with access to medical care, the differences between MUAs and ASAs were not large" (Kleinman & Wilson, 1977). Generally, the respondents to the 1974 NHIS living in rural counties appeared to be similar, regardless of whether they lived in a MUA or not. Kleinman and Wilson conclude that these findings imply that the concept of medical underservice needs to be closely examined, defined, and then operationalized if a better methodology to identify underserved populations is to be developed. They say that, ideally, appropriate standards of care should be agreed upon and that deviations from this standard should be defined as underservice. They suggest that in the interim, before these standards are defined and a way to

measure them developed, NHIS data could be used to construct and test indices of underservice using discriminant analysis that would weight different factors according to their importance in determining underservice. They suggest that this index could then be used to identify the proportion of the residents in a county that are underserved. They conclude that the major improvement of this method over the IMU is that the criteria used to determine if an area is underserved would be known, since it is impossible to know what the experts who developed the IMU had in mind.

Kviz and Flaskerud (1984) attempted to determine the ability of the IMU to differentiate among the underservice or degree of need for health services of individuals living in MUAs compared to those who did not. They focused their study on counties in which at least 50% of the population was rural (based on percent of population residing in places with a population less than 2,500) in DHHS Region V (Illinois, Indiana, Michigan, Minnesota, Ohio and Wisconsin). They then stratified the counties according to IMU scores as follows: less than 50, 50-62, 63-67, 68-72, and 73 and more. The cutoffs were determined in order to make the strata approximately equal in terms of number of counties in each. In each state, one county was randomly selected from each stratum with selection probability proportionate to the number of housing units in the county. The median value of the IMU for included counties was 66.3, which was fairly close to the national median of 62.0 identified in 1974. A systematic random sample of households was taken from each county selected.

To this sample, a questionnaire was administered that was designed to measure the need for health services, and to, as the authors put it, "examine the degree to which consumers' relative assessments agree with the experts' consensus assessments as predicted by the IMU" (Kviz & Flaskerud, 1984). The questionnaire sought to measure access and availability to care, utilization of care, health status,

and satisfaction with care. Analysis of variance was carried out on the county score for the IMU for each respondent and six items: whether they had a usual source of care, whether they traveled out-of-county for care, number of physician visits, the symptoms they experienced, their self-assessed health status, and their satisfaction with care. The results show that the IMU explained less than 10% of the variance for each of the six criterion measures listed above, and less than 3% for the likelihood of a person having a usual source of care, number of physician visits, and number of symptoms experienced (measure of need). They found that when the counties were collapsed into dichotomous MUA/not-MUA format (as they are in practice) that the predictive power of the IMU to identify underserved areas became even weaker. The authors concluded that with regard to both the MUA methodology as used, and the IMU applied in a more exact manner, they were "not found to be an effective discriminator among levels of need for health services as reported by the survey respondents" (Kviz & Flaskerud, 1984).

It seems clear, based on the evidence of past research and evaluation concerning both the HPSA and MUA methodologies, that each of them is deficient in its ability to demarcate between populations that are underserved and those that are adequately served, and that a new methodology which does a better job at this would be an improvement. But, a change in the methodologies should not be undertaken lightly. Whatever their theoretical and operational shortcomings, the HPSA and MUA methodologies have played an important role in distributing finite health care resources to those populations and areas identified as being underserved over the past 20 years. Changing the manner in which decisions are made regarding the use of federal health policy resources targeted at underserved populations or persons living in shortage areas could have severe consequences, potentially altering the flow of millions of federal dollars. Depending on how different the results of a new methodology proved to be, some areas which now receive funding

might not in the future, and some which do not presently may become identified as eligible. Since the use of these two methodologies is well entrenched in federal health policy making and because those now identified as eligible for programs by the present methodologies will benefit from the status quo, changes in the methodology will likely be difficult, and the process of doing so very political.

V. Areas for Future Consideration

The United States Congress, and the nation in general, is presently engaged in a debate regarding changes in the financing and delivery of health care in America. The goals of cost containment, choice of health care providers, and universal health insurance coverage appear to be the focus of much of the debate.[15] While the results of this latest American attempt to overhaul our nation's health care system remain in doubt, the need to be able to identify underserved populations and those persons living in an area suffering from a shortage of necessary health care resources will remain important regardless of what proposal ultimately is passed (if indeed one is passed). Even in a health care system in which each American were covered by relatively similar health insurance, underserved and vulnerable populations will continue to exist and resources above and beyond the basic level of health insurance would likely be necessary to increase access to care and maximize the health care status and well-being of these citizens. This means that improvements in the various methodologies for identification of underserved persons remain important for federal health care policy making, regardless of the outcome of the debate over health care reform. Better ways of identifying such populations with greater specificity are crucial given that the costs of the overall health care system continue to rise, which in turn applies increasing pressure on programmatic responses aimed

[15]This paper has been prepared making the minimum number of assumptions regarding the ultimate outcome of the health care reform debate. No particular bill or approach has been assumed when preparing this work.

at improving access to care for underserved and vulnerable populations; quite simply, there are finite dollars available for this type of assistance. This mean that being able to clearly differentiate among underserved and adequately served populations, and to prioritize among the underserved, is increasingly important. Some programs may find themselves operating with smaller numbers of dollars and larger numbers of persons eligible or in need of care based on the traditional views of eligibility for this type of assistance.

There are several areas which will probably be key factors to be taken into account as new and improved methodologies to identify and measure underservice are considered. This concluding section does not provide a definitive discussion of the merits, drawbacks and issues surrounding the manner in which these issues may become important in attempts to measure underservice in the future, but simply outlines some issues which will likely warrant further consideration.

1. Essential Community Providers. In the past, designations of underserved areas or areas which are experiencing a shortage of health care providers have focused primarily on the lack of primary care physicians who were practicing in a particular area. In the future, identifying populations without access to 'essential community providers' is likely to become more important than simply the number of physicians in an area, as the focus of health policy making begins to focus on the notion of a *system* of care. Defining just who or what is an 'essential community provider' remains in the eye of the beholder. Generally, as the term is used today, essential community providers are organizations or groups of professionals and facilities which can offer a broad spectrum of primary health care services seen as basic, or "essential." Regardless of whether the term 'essential community provider' remains in parlance in the framing of any health care reform efforts, a new perspective is needed that focuses on the health care system as a larger unit, and not

simply on the number of individual physicians practicing in a particular area in relation to the number of persons living there, representing a fundamental change from both the HPSA and MUA methodologies which rely solely and heavily, respectively, on the population–to–primary care physician ratio in identifying underserved areas.

2. Definitional Difficulties. Much of the difficulty in writing or thinking about the designation of populations as underserved stems from the fact that the key terms in the debate are poorly defined. Being underserved by the health care system is assumed to be a negative thing, but what constitutes being underserved is unclear. Even if reaching a consensus about what access is proves difficult, researchers and policy makers should be explicit in defining the term when they use it.

3. Identification of Service Area. Regardless of the content of the methodology used to identify areas with provider shortage or underservice in general, a service area must be chosen to be used by a methodology. The identification of the proper service area or population which is to be tied to particular facilities, providers or range of services for the purpose of identifying rates of utilization or outcome is very difficult (Ricketts et al., 1994; Goody, 1993). The county has traditionally been used as the unit of analysis often because the vast majority of data are collected, aggregated and reported at the county level, and because of the county's role as a functioning political entity. But, there are obvious problems with this approach. However, the use of the county remains attractive given its ease and understandability even though other ways of identifying a service area do exist. More basic research on the proper definition and identification of the notion of service area must be completed to allow health services research to make the full contribution possible to the health policy making process. This is especially true if

the focus in this area is going to shift to concern with a broader population and its access to care provided by a more complex and integrated health care delivery system.

4. Data Limitations. A limiting factor of much of the research focused upon identifying underserved populations, and the ability to operationalize any new methodologies, is the availability of data. In particular, finding data at the level of aggregation desired for identification of the underserved area is very hard, as alluded to in the above section on service area definition. At present, decisions regarding the definition of a concept or term that is key in research are not always made in an objective or scientific manner, but are driven by the availability of data. Theoretically, researchers and even policy makers do not consider this process ideal, but it remains a reality since the best answer possible must be generated using the data that are available. Research needs to be conducted comparing the answer that is obtained with the use of different definitions of underservice/shortage, and which uses different types of data to identify the sensitivity of the identification of a population as underserved to the method and data source used to conduct the analysis.

Other data problems include the difficulty of detecting variations in health outcome with respect to variations in the degree of underservice of a population. The sentinel event method (use of ambulatory care-sensitive conditions) is one way of trying to link the two concepts, but deciding what populations are served by a particular hospital where one of these admissions occurs is difficult (Arnold and Zuvekas, 1989). As well, assuming that a particular bad outcome is "caused" by

aggregate level health care resources is particularly prone to be a victim of 'ecological fallacy.'[16]

5. Prioritizing Underserved Areas. Being able to prioritize underserved areas according to their degree of underservice is necessary in order to best allocate moneys to the places most in need of assistance. The HPSA methodology presently has a prioritization system that is used in the placement of National Health Service Corps physicians as a result of the NHSC revitalization in 1990. The poverty rate, infant mortality rate, rate of low birthweight births, and unspecified indicators of access to primary care are used to identify the areas suffering from the "greatest shortage." Intuitively, it seems obvious to prioritize among underserved areas in order to allocate funds to those most in need. However, it is possible that by prioritizing and sending NHSC physicians to the worst areas that the program sets physicians up for failure in the most underserved places, increasing a perception that the NHSC does not place physicians in places where they will continue to practice after their service commitment is finished. This, however, is another issue. While issues such as which variables and factors to use to prioritize underserved areas must be addressed, more important policy decisions regarding the purpose of prioritization of underserved areas need to be thought through. The issue of who does the prioritizing is also key. Should it be done at the federal level, or at the state level in collaboration with local governments and organizations? These issues must be dealt with explicitly if an effective prioritizing scheme is to be developed.

[16]Ecological fallacy is where an individual is assigned, or assumed to possess, a particular characteristic because the aggregate area in which an individual lives is characterized by that characteristic. This means that classifying an area as underserved does not mean that all persons living in that area are underserved, and vice-versa.

6. Political Realities. In many ways, political realities surrounding the designation of areas as underserved should be first, not last, in a list of issues to consider. Given that the HPSA and MUA methodologies are used to disburse federal funds to localities, the process of designation and of changing the designation methodology is inherently political. Individuals, organizations and communities which benefit from the present regulations and flows of money will likely resist any change in the status quo; they have a vested interest in keeping the programs functioning as they are currently. Future methodologies will likely preserve the funding and designation of some localities as underserved, de-designate others, and designate some which do not presently qualify for money or other assistance. The view of any new methodology that persons or groups adopt likely depends on which group they find themselves in, and how they will be affected by any changes. Responses to both the present and future methodologies will vary. On the one hand, some persons may feel that not enough areas are now classified as underserved. On the other hand, some may feel that the present methodologies designate too many locales as underserved, and that a new methodology must be more specific in identifying the areas which should receive support, thereby reducing the total number identified.

The process of changing the methodologies for designating underserved areas will likely prove intensely political, and this fact could overwhelm even the best reasoning and analysis which argue in favor of using some new methodology. Just coming up with the right answer (if some such animal exists) is not enough to change the manner in which underserved populations are designated.

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